



2026–27

Bulletin

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About This Bulletin

The graduate and professional *Bulletins* are the catalogs of programs, degree requirements, courses that may be offered and course descriptions, pertinent university policies, and faculty of the following schools of Washington University in St. Louis: Architecture & Urban Design; Art; Arts & Sciences; Business; Engineering; Law; Medicine; Public Health; and Social Work & Social Policy.

The *WashU Continuing & Professional Studies Bulletin* is the catalog for WashU Continuing & Professional Studies (CAPS), the professional and continuing education division at Washington University in St. Louis. The catalog includes programs, degree requirements, course descriptions, and pertinent university policies for students earning a degree or taking courses through CAPS.

The 2026-27 *Bulletin* is entirely online but may be downloaded in PDF format for printing. Individual pages as well as information from individual tabs may be downloaded in PDF format using the PDF icon in the top right corner of each page. To download the full PDF, please choose from the following:

- Architecture & Urban Design Bulletin (PDF) (*to come*)
- Art Bulletin (PDF) (*to come*)
- Arts & Sciences Bulletin (PDF) (*to come*)
- Business Bulletin (PDF) (*to come*)
- Engineering Bulletin (PDF) (*to come*)
- Law Bulletin (PDF) (*to come*)
- Medicine Bulletin (PDF) (*to come*)
- Public Health Bulletin (PDF) (*to come*)
- Social Work & Social Policy Bulletin (PDF) (*to come*)
- School of Continuing & Professional Studies Bulletin (undergraduate & graduate) (PDF) (*to come*)

The degree requirements and policies listed in the 2026-27 *Bulletin* apply to students entering Washington University during the 2026-27 academic year. For more information, please visit the Catalog Editions (p. 12) page.

Every effort is made to ensure that the information, applicable key policies, and other materials presented in the *Bulletin* are accurate and correct as of the date of publication (July 1, 2026). To view a list of changes that have taken place after that date, visit the Program & Policy Updates page. Please note that the *Bulletin* highlights key university policies applicable to its students. Not all applicable university and departmental policies are included here.

Washington University reserves the right to make changes at any time without prior notice to the *Bulletin* and to university policies. Therefore, the electronic version of the *Bulletin* as published online is considered the official, governing document, and it may change from time to time without notice.

The next edition of the *Bulletin* will be published on July 1, 2027. Midyear changes to current courses (titles, descriptions, and credit units) are not reflected in this *Bulletin*. For more information about determining the appropriate edition of the *Bulletin* to consult, please visit the Catalog Editions page (p. 12) in the About This Bulletin section.

For the most current information about registration, visit the Plan for Next Semester Overview page of the Workday@WashU website. To view current semester course listings, consult the Class Schedule Search on the Office of the University Registrar website.

Degree progress is monitored in Workday based on program requirements as published in the *Bulletin* in the year of the student's matriculation. Students are responsible for reviewing their academic progress for accuracy and remaining credential requirements. Questions about degree requirements and course applicability should be directed to advisors.

Please email the Bulletin editor (bulletin@wustl.edu), Jennifer Etling Gann, with any questions concerning the *Bulletin*.

Bulletin Policies

Policies related to this catalog include the following:

Changes to the Bulletin

Every effort is made to ensure that the information, policies and other materials presented in the *Bulletin* are accurate and correct as of the date of publication. For more information about the content review process for the *Bulletin*, please visit the Catalog Editions page (p. 12).

The *Bulletin* for the upcoming academic year is published annually on July 1, and certain post-publication changes may be made until October 1. To view a list of changes that have taken place after the July 1 publication date, please visit the Program & Policy Updates page.

Washington University reserves the right to make changes at any time without prior notice. Therefore, the electronic version of the *Bulletin* and the policies set forth therein may change from time to time without notice. The governing document at any given time is the then-current version of the *Bulletin*, as published online, and then-currently applicable policies and information are those contained in that *Bulletin*.

Discontinued Programs

Students enrolled in programs that discontinue admitting new students during their tenure are expected to meet degree requirements published in the *Bulletin* and in place during their year of matriculation. If a program's requirements change, a student may request to change to a subsequent version effective during their enrollment, which is subject to approval by their school. Students who leave the university may not be allowed to return to a discontinued program depending on the time frame the university has established that the program will teach out remaining students.

Students are held to other policies in effect and as published for the current academic year.

For more information, please visit the Prior Bulletins page (p. 12).

Year of Matriculation

Students are expected to meet degree requirements published in the *Bulletin* and in place during their year of matriculation. If a program's requirements change, a student may request to change to a subsequent version effective during their enrollment, which is subject to approval by their school.

For more information, please visit the Catalog Editions page (p. 12).

Course Numbering

Washington University adopted a new course labeling structure in Fall 2025. The first part is the subject code indicating the area of study: for example, ANTHRO for Anthropology or MEMS for Mechanical Engineering and Materials Science. The second part is a four-digit course number. Course numbers demonstrate a progression of difficulty and/or depth in coursework.

- 1000 to 1999 indicates an introductory undergraduate course, usually without prerequisites.
- 2000 to 2999 indicates an introductory or intermediate undergraduate course, sometimes with prerequisites.
- 3000 to 3999 indicates an upper-level undergraduate course, often with a prerequisite of a prior course or class standing (e.g., junior standing).
- 4000 to 4999 indicates an undergraduate course or seminar with advanced content, in which a graduate student may be eligible to register.
- 5000 to 9999 indicates a graduate course, in which advanced undergraduates may request to register.

The presence of a course in this *Bulletin* signifies that it is part of the curriculum currently offered and may be scheduled for registration.

Curriculum Designators

The subject codes shown below are used in Washington University's course records and are listed here alphabetically.

A

Code	Name
AAS	Asian American Studies
ACCT	Accounting
AFAS	African & African American Studies
AHBR	Applied Health Behavior Research
AMCS	American Culture Studies
ANESTH	Anesthesiology
ANTHRO	Anthropology
APL	Applied Linguistics
ARAB	Arabic
ARC	Archaeology
ARCH	Architecture
ART	Art
ARTARCH	Art History & Archaeology
ASGS	Arts & Sciences Graduate Studies

B

Code	Name
BBS	Biology & Biomedical Sciences
BDSAI	Biomedical Data Science and AI
BEYOND	Beyond Boundaries
BIOCHEM	Biochemistry & Molecular Biophysics
BIOL	Biology & Biomedical Sciences
BME	Biomedical Engineering
BMI	Biomedical Informatics
BSDC	Brown School Doctoral

C

Code	Name
CAPS-AFAS	CAPS - African & African American Studies
CAPS-AMCS	CAPS - American Culture Studies
CAPS-ANTHRO	CAPS - Anthropology
CAPS-ARAB	CAPS - Arabic
CAPS-ART	CAPS - Art
CAPS-ARTARCH	CAPS - Art History & Archaeology
CAPS-BIO	CAPS - Biology
CAPS-BUS	CAPS - Business
CAPS-CHEM	CAPS - Chemistry
CAPS-CHINESE	CAPS - Chinese
CAPS-CIM	CAPS - Computers & Information Management



CAPS-CLASSICS	CAPS - Classics
CAPS-COMM	CAPS - Communications
CAPS-COMPLIT	CAPS - Comparative Literature
CAPS-CRM	CAPS - Clinical Research Management
CAPS-CS	CAPS - Computer Science
CAPS-DANCE	CAPS - Dance & Somatic Movement Studies
CAPS-DATASTUDIES	CAPS - Data Studies
CAPS-DRAMA	CAPS - Drama
CAPS-EASIA	CAPS - East Asian Studies
CAPS-ECOMP	CAPS - English Composition
CAPS-ECON	CAPS - Economics
CAPS-EDUC	CAPS - Education
CAPS-ELIT	CAPS - English & American Literature
CAPS-ELP	CAPS - English Language Programs
CAPS-EPSC	CAPS - Earth & Planetary Sciences
CAPS-FILM	CAPS - Film & Media Studies
CAPS-FR	CAPS - French
CAPS-GERMAN	CAPS - Germanic Languages & Literatures
CAPS-GIS	CAPS - Geographic Information Systems
CAPS-GS	CAPS - General Studies
CAPS-HCARE	CAPS - Health Care
CAPS-HEBR	CAPS - Hebrew
CAPS-HINDI	CAPS - Hindi
CAPS-HIST	CAPS - History
CAPS-HRM	CAPS - Human Resources Management
CAPS-IA	CAPS - International Affairs
CAPS-IRISH	CAPS - Irish Studies
CAPS-IS	CAPS - International Studies
CAPS-ISLA	CAPS - Integrated Studies in Liberal Arts
CAPS-ITAL	CAPS - Italian
CAPS-JAPAN	CAPS - Japanese
CAPS-JME	CAPS - Jewish, Islamic, & Middle East Studies
CAPS-JRN	CAPS - Journalism
CAPS-KOREAN	CAPS - Korean
CAPS-LAS	CAPS - Latin American Studies
CAPS-LING	CAPS - Linguistics
CAPS-MATH	CAPS - Mathematics & Statistics
CAPS-MUS	CAPS - Music
CAPS-NPM	CAPS - Nonprofit Management
CAPS-PHIL	CAPS - Philosophy
CAPS-PHYS	CAPS - Physics
CAPS-POLSCI	CAPS - Political Science
CAPS-PORT	CAPS - Portuguese

CAPS-PSYCH	CAPS - Psychological & Brain Science (Psychology)
CAPS-RELST	CAPS - Religious Studies
CAPS-RUSS	CAPS - Russian
CAPS-SCAN	CAPS - Scandinavian
CAPS-SCI	CAPS - Science
CAPS-SOC	CAPS - Sociology
CAPS-SPAN	CAPS - Spanish
CAPS-SPCH	CAPS - Speech
CAPS-SUST	CAPS - Sustainability
CAPS-WGSS	CAPS - Women, Gender, & Sexuality Studies
CFH	Center for the Humanities
CHEM	Chemistry
CHINA	Chinese
CHST	Children's Studies
CLASSICS	Classics
CLNV	Clinical Investigation
CNST	Construction Management
COMPLITHT	Comparative Literature & Thought
CSE	Computer Science & Engineering
CWP	College Writing Program
CYBER	Cybersecurity Management

D

Code	Name
DANCE	Dance
DAT	Data Analytics
DCDS	Division of Computational & Data Sciences
DESIGN	Design
DRAMA	Drama

E

Code	Name
EALC	East Asian Languages & Cultures
ECON	Economics
EDUC	Education
EECE	Energy, Environmental, & Chemical Engineering
EEPS	Earth, Environmental, & Planetary Sciences
EGS	Engineering Graduate Studies
ELIT	English Literature
EMED	Emergency Medicine
EMGT	Engineering Management
ENGR	General Engineering
ENST	Environmental Studies
ESE	Electrical & Systems Engineering
ETEM	Engineering Management



F

Code	Name
FASHION	Fashion Design
FILM	Film & Media Studies
FIN	Finance
FRENCH	French

G

Code	Name
GENETICS	Genetics
GENST	General Studies
GERMAN	Germanic Languages & Literatures
GLOBAL	Global Studies
GNCOUN	Genetic Counseling
GREEK	Greek

H

Code	Name
HBRW	Hebrew
HCO	Health Care Operations
HINDI	Hindi
HISTORY	History

I

Code	Name
IMSE	Institute of Materials Science & Engineering
INFO	Information Management
INTERD	Interdisciplinary Studies
INTL	International Studies
IPMS	Movement Science
ITAL	Italian

J

Code	Name
JAPAN	Japanese
JCE	Joint Civil Engineering
JCHE	Joint Chemical Engineering
JCS	Joint Intro to Computing
JEC	Joint Engineering Communications
JEE	Joint Electrical Engineer
JEMT	Joint Engineering Math
JIMES	Jewish, Islamic, & Middle East Studies
JME	Joint Mechanical Engineering

K

Code	Name
KOREA	Korean

L

Code	Name
LANDARCH	Landscape Architecture
LATAM	Latin American Studies
LATIN	Latin
LAW	Law
LAWO	Law Online
LING	Linguistics
LWST	Legal Studies

M

Code	Name
MAIR	Military Aerospace Science
MARM	Military Science
MATH	Mathematics & Statistics
MBIO	Molecular Biology
MBIOPHARM	Molecular Biology & Pharmacology
MEC	Managerial Economics
MEDH	Medical Humanities
MEDICINE	Internal Medicine
MEDINTER	Medicine Interdisciplinary
MEDPHASE1	Medicine Phase 1
MEDPHASE2	Medicine Phase 2
MEDPHASE3	Medicine Phase 3
MEDPHYS	Medical Physics
MEDRSRCH	Medicine Research
MEMS	Mechanical Engineering & Materials Science
MGS	Medicine Graduate Studies
MGT	Management
MKT	Marketing
MSB	Biostatistics & Genetic Epidemiology
MUSIC	Music

N

Code	Name
NEUROL	Neurology
NEUROSCI	Neuroscience
NEUROSUR	Neurological Surgery
NRSSCI	Nursing Science



O

Code	Name
OB	Organizational Behavior
OBGYN	Obstetrics & Gynecology
OPHTH	Ophthalmology & Visual Sciences
ORTHO	Orthopedic Surgery
OSP	Overseas Programs
OT	Occupational Therapy
OTO	Otolaryngology

P

Code	Name
PACS	Audiology & Communication Sciences
PATH	Pathology
PBPMSTUDY	Biological & Physical Sciences for PBPM
PE	Physical Education
PEDS	Pediatrics
PHCC	Public Health Concentration Courses
PHDC	Public Health Doctoral
PHEL	Public Health Electives
PHFN	Public Health Foundation
PHIL	Philosophy
PHPC	Public Health Practicum
PHRS	Public Health Research
PHS	Population Health Sciences
PHSL	Public Health Skill Lab
PHTPS	Public Health Transdisciplinary Problem Solving
PHYSICS	Physics
PHYTHER	Physical Therapy Program - Grad
PNP	Philosophy-Neuroscience-Psychology
POLSCI	Political Science
PORTUG	Portuguese
PRJM	Project Management
PSY	Psychiatry
PSYCH	Psychological & Brain Sciences
PUBHLTHSOC	Public Health & Society

R

Code	Name
RADIOL	Radiology
RADONC	Radiation Oncology
RELPOL	Religion & Politics
REPRSCI	Reproductive Science
RESEARCH	Research
REST	Religious Studies
RUSS	Russian

S

Code	Name
SCOT	Supply Chain, Operations, & Technology
SDS	Statistics & Data Science
SLU	Saint Louis University
SOC	Sociology
SPAN	Spanish
SPCN	Social Policy Concentration
SPFN	Social Policy Foundation
SPGN	Social Policy General
SPHR	Speech & Hearing
SURGERY	Surgery
SWCP	Social Work Concentration Practicum
SWDT	Social Work Doctoral
SWEL	Social Work Electives
SWEV	Social Work Evaluation
SWFN	Social Work Foundation
SWHS	Social Work History & Professional Theme
SWLM	Social Work Leadership & Management
SWPM	Social Work Practice Methods
SWSL	Social Work Skill Lab
SWSP	Social Policy
SWTH	Social Work Theory

T

Code	Name
TIPM	Industrial Management

U

Code	Name
UMSL	University of Missouri-St. Louis
URBDES	Urban Design
URST	Urban Studies

W

Code	Name
WGSS	Women, Gender, & Sexuality Studies
WRITING	Writing

Catalog Editions

The courses and policies listed in this *Bulletin* are subject to change at any time through normal approval channels within Washington University. New courses, changes to existing coursework, and new policies are initiated by the appropriate institutional departments, committees, or administrators. Academic policy revisions are generally implemented in the next academic year following notification thereof. Washington University publishes a new edition of the *Bulletin* each July, and its contents apply to the subsequent fall, spring, and summer terms. Occasionally a policy or requirement must be changed and implemented during the same academic year (e.g., in the case of relevant external requirements, such as state regulations). All changes must be approved by college or school personnel who oversee academic curriculum and policies.

Washington University students are expected to meet degree requirements published in the *Bulletin* and in place during their year of matriculation. Undergraduates who initially enroll in a summer term to pursue a special program follow requirements for the subsequent fall term. Students will need to check their school's processes to potentially change applicable catalog years or alter their degree requirements.

Students should review specific Washington University and individual school policies related to transfer credit, changing programs, leaves of absence, and military service.

Prior Bulletins

To find program details, course descriptions, and relevant policies, choose the year of enrollment below to find the available *Bulletins*. If the required year is not shown or the school's *Bulletin* is not available, please email the Office of the University Registrar (registrar@wustl.edu) with specifics of what information is needed.

2025-2026

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Business Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Public Health Bulletin (HTML) (PDF)

- Social Work & Social Policy Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- School of Continuing & Professional Studies Bulletin (HTML: Undergraduate, Graduate) (PDF)

2024-2025

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Business Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Social Work & Public Health Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- School of Continuing & Professional Studies Bulletin (HTML: Undergraduate, Graduate) (PDF)

2023-2024

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Business Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Social Work & Public Health Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- School of Continuing & Professional Studies Bulletin (HTML: Undergraduate, Graduate) (PDF)

2022-2023

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Business Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Social Work & Public Health Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- University College Bulletin (HTML: Undergraduate, Graduate) (PDF)

2021-2022

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Business Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Social Work & Public Health Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- University College Bulletin (HTML: Undergraduate, Graduate) (PDF)

2020-2021

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Business Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Social Work & Public Health Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- University College Bulletin (HTML: Undergraduate, Graduate) (PDF)

2019-2020

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Business Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Social Work & Public Health Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- University College Bulletin (HTML: Undergraduate, Graduate) (PDF)

2018-2019

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)

- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Social Work & Public Health Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- University College Bulletin (HTML: Undergraduate, Graduate) (PDF)

2017-2018

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Law Bulletin (HTML) (PDF)
- Medicine Bulletin (HTML) (PDF)
- Social Work & Public Health Bulletin (HTML) (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- University College Bulletin (HTML: Undergraduate, Graduate) (PDF)

2016-2017

- Graduate Architecture & Urban Design Bulletin (HTML) (PDF)
- Graduate Art Bulletin (HTML) (PDF)
- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Graduate Engineering Bulletin (HTML) (PDF)
- Medicine Bulletin (PDF)
- Undergraduate Bulletin (HTML) (PDF)
- University College Bulletin (HTML: Undergraduate, Graduate) (PDF)

2015-2016

- Graduate Arts & Sciences Bulletin (HTML) (PDF)
- Medicine Bulletin (PDF)
- Undergraduate Bulletin (HTML) (PDF)

2014-2016

- University College Bulletin (undergraduate & graduate) (PDF)

2014-2015

- Medicine Bulletin (PDF)
- Undergraduate Bulletin (HTML) (PDF)

2013-2014

- Medicine Bulletin (PDF)
- Undergraduate Bulletin (HTML) (PDF)

2012-2015

- Graduate Arts & Sciences Bulletin (PDF)

2012-2014

- University College Bulletin (undergraduate & graduate) (PDF)

2012-2013

- Medicine Bulletin (PDF)
- Undergraduate Bulletin (HTML) (PDF)

2011-2012

- Medicine Bulletin (PDF)
- Undergraduate Bulletin (HTML) (PDF)

2010-2011

- Medicine Bulletin (PDF)
- Undergraduate Bulletin (PDF)

2009-2012

- Graduate Arts & Sciences Bulletin (PDF)

2009-2010

- Medicine Bulletin (PDF)

2008-2010

- Undergraduate Bulletin (PDF)

2008-2009

- Medicine Bulletin (PDF)

2006-2009

- Graduate Arts & Sciences Bulletin (PDF)
and accompanying 2008 Update (PDF)

2006-2008

- Undergraduate Bulletin (PDF)

About Washington University in St. Louis

Who We Are Today

Washington University in St. Louis — a medium-sized, independent university — is dedicated to challenging its faculty and students alike to seek new knowledge and greater understanding of an ever-changing, multicultural world. The university is counted among the world's leaders in teaching and research, and it draws students from all 50 states, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands. Students and faculty come from more than 100 countries around the world.

The university offers more than 250 programs and 5,500 courses leading to associate, bachelor's, master's, and doctoral degrees in a broad spectrum of traditional and interdisciplinary fields, with additional opportunities for minor concentrations and individualized programs. For more information about the university, please visit the About WashU page of our website.

Enrollment by School

For enrollment information, please visit the University Facts page of our website.

Our Mission Statement

The mission of Washington University in St. Louis is to act in service of truth through the formation of leaders, the discovery of knowledge, and the treatment of patients for the betterment of our region, our nation, and our world.

At WashU, we generate, disseminate, and apply knowledge. We foster freedom of inquiry and expression of ideas in our research, teaching, and learning.

We aim to create an environment that encourages and supports wide-ranging exploration at the frontier of discovery by embracing diverse perspectives from individuals of all identities and backgrounds. We promote higher education and rigorous research as a fundamental component of an open, vibrant society. We strive to enhance the lives and livelihoods not only of our students, patients, and employees but also of the people of the greater St. Louis community and beyond. We do so by addressing scientific, social, economic, medical, and other challenges in the local, national, and international realms.

Our goals are:

- to foster excellence and creativity in our teaching, research, scholarship, patient care, and service
- to welcome students, faculty, and staff from all backgrounds to create an inclusive, equitable community that is nurturing and intellectually rigorous

- to cultivate in students habits of lifelong learning and critical and ethical thinking, thereby enabling them to be productive members and leaders of a global society
- to contribute positively to our home community of St. Louis, and to effect meaningful, constructive change in our world

To this end we intend:

- to hold ourselves to the highest standards of excellence
- to educate aspiring leaders of great ability from diverse backgrounds
- to encourage faculty and students to be innovative, bold, independent, critical thinkers
- to build an inclusive, equitable, respectful, ethically-principled environment for living, teaching, learning, and working for the present and future generations
- to focus on meaningful and measurable outcomes for all of our endeavors

Mission statement endorsed by the Faculty Senate Council in April 2021 and approved by the Board of Trustees on October 1, 2021.

Trustees & Administration

Board of Trustees

Washington University's Board of Trustees is the chief governing body of Washington University in St. Louis. Current members of the board include the following:

Andrew Bursky
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Vice Chair

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Please visit the Board of Trustees website for more information.

University Administration

In 1871, Washington University co-founder and then-Chancellor William Greenleaf Eliot sought a gift from Hudson E. Bridge, a charter member of the university's Board of Directors, to endow the chancellorship. Soon after this endowment was received, the position was renamed the "Hudson E. Bridge Chancellorship."

The officers of the university administration are currently led by Chancellor Andrew D. Martin. University leadership is detailed on the Washington University website.

Andrew D. Martin

Chancellor

Mark D. West

Provost

Academic Calendar

The academic calendar of Washington University in St. Louis is designed to provide an optimal amount of classroom instruction and examination within a manageable time frame, facilitating our educational mission to promote learning among both students and faculty. The dates listed here are the outline of the standard semester calendar, applicable to traditional undergraduate and many graduate programs. Certain schools or programs may have varying calendars due to the nature of particular fields of study. Please refer to the Academic Calendar page of the Office of the University Registrar's website for more information.

Fall Semester 2026

Date	Day	Description
August 24	Monday	First day of classes
September 7	Monday	Labor Day holiday (no classes)
October 3-6	Saturday-Tuesday	Fall Break (no classes)
November 25- November 29	Wednesday-Sunday	Thanksgiving Break (no classes)
December 7	Monday	Last day of classes
December 8-9	Tuesday-Wednesday	Reading days
December 10-16	Thursday-Wednesday	Final exams

Spring Semester 2027

Date	Day	Description
January 18	Monday	Martin Luther King, Jr. holiday (no classes)
January 19	Tuesday	First day of classes
March 14-21	Sunday-Sunday	Spring Break (no classes)
May 3	Monday	Last day of classes
May 4-5	Tuesday-Wednesday	Reading days
May 6-12	Thursday-Wednesday	Final exams

Commencement

Date	Day	Description
May 21	Friday	Class of 2027 Commencement

Summer Semester 2027

Date	Day	Description
May 24	Monday	First Summer Session begins
May 31	Monday	Memorial Day holiday (no classes)
July 5	Monday	Independence Day holiday observed (no classes)
August 19	Thursday	Last Summer Session ends

Religious Holiday Class Absence Policy

As home to students, faculty, and staff of all the world's major religions and as a non-sectarian institution, Washington University in St. Louis values the rich diversity of spiritual expression and practice found on campus. It is therefore the policy of the university that students who miss class, assignments, or exams to observe a religious holiday should be accommodated as follows:

1. Absences should be counted as excused in any course in which attendance is a measure of academic performance;
2. Reasonable extensions of time should be given, without academic penalty, for missed assignments; and
3. Exams should be reasonably rescheduled without academic penalty.

To ensure that accommodations may be made, students who plan to miss class for a religious holiday must inform their instructors in writing *before the end of the third week of class* or as soon as possible if the holiday occurs during the first three weeks of the semester. Instructors should inform students on their syllabus and/or at the start of the class how they would like students to notify them of any accommodation needs related to religious observance.

Absence for religious reasons does not lessen students' responsibility for coursework or material covered during their absence. It is incumbent on the student who misses a class to catch up on any material discussed and assignments given during that class period. If a student believes that they have not received a reasonable accommodation despite engaging with their instructor on the topic, they should follow the course grievance process outlined by their school.

The Office for Religious, Spiritual & Ethical Life provides a list of Religious & Spiritual Holidays that fall within the academic year. This list is not a designation of religious holidays recognized by the university, and it is not meant to be comprehensive; it is simply a guide to help students and instructors plan their courses and assignments.

For Faculty

Every effort should be made to avoid scheduling exams on religious holidays, particularly those with work restrictions as noted on the holiday calendar.

Faculty should be supported in establishing a teaching schedule that allows them to avoid conflict with their observance of religious holidays. Where this is not possible, faculty should make up any missed class(es) in the method most appropriate to student learning in their course (e.g., rescheduling for an alternate time, providing asynchronous material, engaging a guest lecturer). Appropriate advance notice should be provided to students.

Any instructor with concerns regarding either a given holiday or the academic implications of a particular student's religious observance of holidays may seek guidance from the chair of their department, the dean of their school, or the Director for Religious, Spiritual & Ethical Life.

Campus Resources

Student Support Services

The Learning Center

The Learning Center, located on the lower level of the Mallinckrodt Center and housed within the Center for Teaching and Learning, is the hub of academic support at Washington University in St. Louis. The Learning Center's programs are designed to support students in their course work by helping them develop the lifelong skill of "learning how to learn" and by stimulating their independent thinking. All services are free (with the exception of MCAT prep), and each year more than 1,800 students participate in one or more of our programs.

The Learning Center offers support for foundational courses through Peer-Led Team Learning and our drop-in mentoring programs (Residential Peer Mentoring and Drop-In Academic Mentoring). Individual peer-led coaching is available for academic skills such as time management, study strategies, note-taking, accessing resources, and managing test anxiety. Other services offered include small group mentoring for eligible students and an MCAT preparation program.

For more information, visit the Learning Center website or call 314-935-2066.

Disability Resources

Disability Resources supports students with disabilities by fostering and facilitating an equal access environment for the Washington University community of learners. Disability Resources partners with faculty and staff to facilitate academic and housing accommodations for students with disabilities on the Danforth Campus. Students enrolled in the School of Medicine should contact their program's director. Please visit the Disability Resources website or call 314-935-5970 for more information.

TRIO: Student Support Services

TRIO is a federally funded program that provides customized services for undergraduate students who are low income, who are the first in their family to go to college, and/or who have a documented disability. Services include academic coaching, academic peer mentoring, cultural and leadership programs, summer internship assistance and post-graduation advising. First-year and transfer students are

considered for selection during the summer before they enter their first semester. Eligible students are encouraged to apply when they are notified, because space in this program is limited. For more information, visit the TRIO Program website.

Medical Student Support Services

For information about Medical Student Support Services, please visit the School of Medicine website.

Office for International Students and Scholars

The Office for International Students and Scholars (OISS) is dedicated to fostering an inclusive environment that celebrates our international students' and scholars' diverse experiences, cultures, and aspirations. OISS plays a pivotal role in cultivating a vibrant, intercultural atmosphere on our campus, extending support to international students, scholars, faculty, and staff through immigration sponsorship. OISS commits to ensuring a seamless integration process for those who are admitted, appointed, or employed by Washington University. Grounded in the belief that education can shape global perspectives, the OISS mission is to empower the Washington University international community with the knowledge and resources needed to navigate U.S. immigration compliance while guiding them with care and compassion at every step.

OISS has locations on both the Danforth Campus and the Medical Campus. For information about OISS locations, office hours, staff, and services, visit the Office for International Students and Scholars website, email oiss@wustl.edu, or call 314-935-5910.

Office of Military and Veteran Services

This office serves as the university's focal point for military and veteran matters, including transitioning military-connected students into higher education, providing and connecting students with programs and services, and partnering across campus and in the community. Services include advising current and prospective students on how to navigate the university and maximize Department of Defense and Veterans Affairs (VA) educational benefits, transition support, Veteran Ally training for faculty and staff, veteran-unique programming, and connecting students to campus and community resources. Military-connected students include veterans, military service members, spouses, dependent children, caregivers, survivors and Reserve Officer Training Corp cadets. There are two university policies that apply to students who still serve in the Armed Forces and students who use VA educational benefits:

- The Policy on Military Absences, Refunds and Readmissions applies to students serving in the U.S. Armed Forces and their family members when military service forces them to be absent or withdraw from a course of study.

- The Policy on Protections for VA Educational Benefit Users applies to students using VA education benefits when payments to the institution and the individual are delayed through no fault of the student.

The Office of Military and Veteran Services is located in Umrath Hall on the Danforth Campus. Please visit the Military and Veteran Services website or send an email to veterans@wustl.edu for more information.

Relationship and Sexual Violence Prevention (RSVP) Center

The RSVP Center offers free and confidential services including 24/7 crisis intervention, counseling services, resources, support and prevention education for all students on the Danforth Campus. The RSVP Center operates from a public health model and uses trauma-informed practices to address the prevalent issues of relationship and sexual violence. By providing support for affected students, it is our goal to foster post-traumatic growth and resilience and to help ensure academic retention and success. Our prevention efforts call for community engagement to engender an intolerance of violence and an active stance toward challenging cultural injustices that perpetuate such issues. Learn more at the RSVP Center website.

WashU Cares

WashU Cares assists the university with handling situations involving the safety and well-being of Danforth Campus students. WashU Cares is committed to fostering student success and campus safety through a proactive, collaborative and systematic approach to the identification of, intervention with and support of students of concern while empowering all university community members to create a culture of caring. If there is a concern about the physical or mental well-being of a student, please visit the WashU Cares website to file a report.

The Writing Center & Speaking Studio

The Writing Center & Speaking Studio — a free service — offers writing and public speaking support to all Washington University undergraduate and graduate students. Tutors will read and discuss any kind of work in progress, including student papers, senior theses, application materials, dissertations and oral presentations. The Writing Center staff is trained to work with students at any stage of the writing process, including brainstorming, developing and clarifying an argument, organizing evidence, and improving style. Rather than editing or proofreading, tutors will emphasize the process of revision and teach students how to edit their own work.

The Writing Center is located in Mallinckrodt Center on the lower level. Appointments are preferred and can be made online, but walk-ins will be accepted if tutors are available. Dedicated Undergraduate Walk-in Hours are held in the second half of each semester (after fall break and spring break) on Tuesday and Wednesday afternoons. Questions? Email writing@wustl.edu.

Student Health and Well-Being Services, Danforth Campus

The Student Health Center – Danforth Campus provides medical, psychiatric, and health promotion services for undergraduate and graduate students on the Danforth Campus. Please visit the Student Health Center – Danforth Campus website for more information about Health Center services and staff members.

Hours:

Monday, Tuesday, Thursday, and Friday: 8 a.m. - 5 p.m.

Wednesday: 10 a.m. - 5 p.m.

Saturday, Sunday, and university holidays: Closed

For after-hours care, students should access TimelyCare.

Medical Services

Medical Services staff members provide care for the evaluation and treatment of an illness or injury, preventive health care and health education, immunizations, nutrition counseling, sports medicine, travel medicine, and sexual health services. Student Psychiatry Services staff provide ongoing medication management for students to address their mental health concerns. Student Health Center providers are participating members of the Washington University in St. Louis Physician's Network. Any condition requiring specialized medical services will be referred to an appropriate specialist. The Health Center accepts health insurance plans that have met waiver criteria for the Student Health Insurance Plan and will be able to bill the plan according to plan benefits. The Student Health Insurance Plan requires a referral for medical care any time care is not provided at Student Health (except in an emergency). Call 314-935-6666 or visit the Student Health Center – Danforth Campus website to schedule an appointment.

Appointments are also available for the assessment and referral of students struggling with substance use.

The Student Health Center lab provides full laboratory services. Some tests can be performed in house. The remainder of all testing that is ordered by Student Health is completed by LabCorp. LabCorp serves as Student Health's reference lab, and it is a preferred provider on the student health insurance plan. This lab can perform any test ordered by Student Health Center providers or outside providers.

All incoming students must provide proof of immunization for measles, mumps, and rubella (i.e., two vaccinations after the age of one year old; a titer may be provided in lieu of the immunizations). Proof of receiving a meningococcal vaccine on or after the age of 16 is

required for all incoming undergraduate students. A TB test in the past six months is required for students entering the university who screen positive on the TB questionnaire found on the student portal. It is also recommended that before beginning their studies at WashU, all students will have received the tetanus diphtheria pertussis immunization, the hepatitis A vaccine series, the hepatitis B vaccine series, the HPV vaccine series, the meningitis B vaccine, and the varicella vaccine. Failure to complete the required forms will delay a student's registration and prevent their entrance into housing assignments. Please visit the Student Health Center website for complete information about immunization requirements and deadlines.

Health Promotion Services

Health Promotion Services staff and Peer Health Educators provide free programs and risk reduction information related to mental health, sexual health, alcohol/other drugs, and community care. For more information, visit the Zenker Wellness Suite in Summers Recreation Center, consult the Health and Wellbeing Digital Library, follow us on Instagram (@washu_healthpromotion), and/or email wellness@wustl.edu. In 2018, this department launched the WashU Recovery Community to provide an opportunity for students in recovery from substance use to connect with other students with similar experiences.

Center for Counseling and Psychological Services (CCPS)

Hours:

Monday, Tuesday, Thursday, and Friday: 8 a.m. - 5 p.m.

Wednesday: 10 a.m. - 5 p.m.

Saturday, Sunday, and university holidays: Closed

For after-hours mental health support, students should access the TimelyCare app and request a "Talk Now" visit.

Located in the Student Health Center-Danforth Campus, CCPS is staffed by licensed professional staff members who work with students to resolve personal and interpersonal difficulties. These may include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. Services include individual, group, and couples counseling; crisis counseling; and referral for off-campus counseling when students' needs can be better met outside of CCPS. All full-time students who pay the university health and wellness fee as part of their tuition are eligible for services. Visit the CCPS website or call 314-935-6695 to schedule an appointment during business hours. For additional information, visit the CCPS website or send an email to ccpscoordinator@wustl.edu.

Important Information About Health Insurance and Fees for Danforth Campus Students

All full-time, degree-seeking WashU students are automatically enrolled in the Student Health Insurance Plan upon completion of registration. Students may opt out of this coverage and receive a refund of the health insurance fee if they provide proof of existing comprehensive insurance coverage that meets all university requirements. Information concerning opting out of the student health insurance plan can be found online after June 1 of each year. All students must request to opt out by September 5 of *every year* in which they wish to be removed from the Student Health Insurance Plan. The Student Health Center provides billing services to many of the major insurance companies in the United States. Specific fees and copays apply to students using Medical Services and Student Psychiatric Services; these fees are billable to the students' insurance plans. More information is available on the Student Health Center – Danforth Campus website.

In addition, WashU has a health and wellness fee designed to improve the health and well-being of the campus community. It is assessed by the university, and it is entirely separate from health insurance. This fee helps support membership to the Summers Recreation Center, health education/prevention efforts, the Center for Counseling and Psychological Services, and TimelyCare.

Student Health Services, Medical Campus

For information about student health services on the Medical Campus, please visit the Student & Occupational Health Services page of the School of Medicine website.

Campus Security

The Washington University campus is among the most attractive in the nation, and it enjoys a safe and relaxed atmosphere. Personal safety and the security of personal property while on campus is a shared responsibility. Washington University has made safety and security a priority through our commitment to a full-time professional police department, the use of closed-circuit television, card access, extensive lighting initiatives based on Crime Prevention Through Environmental Design (CPTED) practices, shuttle services, emergency telephones, and ongoing educational safety awareness programs. The vast majority of crimes that occur on college campuses are crimes of opportunity, which can be prevented.

The best protection against crime is an informed and alert campus community. Washington University has developed several programs to help make everyone's experiences here safe and secure. An extensive network of emergency telephones — including more than 200 "blue light" telephones — is connected directly to the University Police

Department and can alert the police to a person's exact location. In addition to the regular shuttle service, an evening student walking/mobile escort service known as "Bear Patrol" and a mobile Campus Circulator shuttle are available on the Danforth Campus.

The Campus2Home shuttle will provide a safe ride home for those living in four designated areas off campus — Skinker-DeBaliviere, Loop South, north of the Loop, and just south of the campus — within these boundaries:

- North – Olive Blvd
- South – Clayton Road
- East – Union Blvd
- West – Hanley Road

Shuttles will run from 7:00 p.m. to 4:00 a.m. seven days a week during academic sessions. Rides should be requested via the TripShot app. Pickup locations to choose from are the Mallinckrodt Center, the Summers Welcome Center, and the Knight Center. The shuttle takes passengers directly to the front doors of their buildings. Shuttle drivers will then wait and watch to make sure passengers get into their buildings safely.

The University Police Department is a full-service organization staffed by certified police officers who patrol the campus 24 hours a day throughout the entire year. The department offers a variety of crime prevention programs, including a high-security bicycle lock program, computer security tags, personal safety classes, and security surveys. Community members are encouraged to download and install the WashU Safe personal safety app on their phones; this app allows users to call for help during emergencies, to use Friend Walk to track their walks on and off campus, and to access many additional safety features. For more information about these programs, visit the Washington University Police Department website.

WashU PD also has comfort dogs — Bear, Brookie, Misty, and Archie — on campus to support our students, faculty, and staff. In addition, there is a decompression/comfort room inside the police station at 6615 Shepley Drive on the South 40. This room offers a supportive, stress-free, and welcoming environment designed to promote wellness and connection with the officers and the comfort dogs. Students are welcome to walk in at any time, or they can schedule a visit by emailing wupddogs@wustl.edu to secure a dedicated time with the dogs.

In compliance with the Campus Crime Awareness and Security Act of 1990, Washington University publishes an annual report entitled *Safety & Security: Guide for Students, Faculty, and Staff — Annual Campus Security and Fire Safety Reports and Drug & Alcohol Abuse Prevention Program*. This report is available to all current and prospective students on the Danforth Campus and to university employees on the Danforth, North and West campuses. To request a hard copy, contact the Washington University Police Department, 6615 Shepley Drive, Clayton, MO 63105, 314-935-5555.

For information regarding protective services at the School of Medicine, please visit the Campus Safety page of the Washington University Operations & Facilities Management Department.

Student Complaints

WashU provides students with different processes to handle complaints depending on the nature of the complaint. The Student Feedback & Complaint Form provides information on the different avenues available, as well as a web-form for submitting complaints. Complaints submitted through the form are reviewed by the Office of the Vice Chancellor for Student Affairs and forwarded to the University office or department that would be responsible for addressing the complaint. Complaints may be made anonymously, but students have the option of providing contact information to receive a response regarding steps taken to resolve the complaint. The University's Whistleblower Protection Policy applies to students making good-faith complaints regarding violations of policy or unethical acts.

If a student has a complaint related to distance education, as a participant in the National Council for State Authorization Reciprocity Agreements (NC-SARA), WashU follows the SARA policy that provides for the resolution of complaints resulting from distance education courses, activities, and operations delivered by WashU to students who participate in such courses outside of the state of Missouri (including the District of Columbia, Puerto Rico, and the US Virgin Islands, but excepting California, which is not a member of NC-SARA). Under NC-SARA Policy Section 4.5 (Process for Resolving Complaints), students are asked to seek resolution of complaints first through WashU, as described above. If the complaint is not resolved, distance education students should contact the Missouri State Portal Entity:

Joshua Fischer, Program Specialist
Email: joshuafischer@dhewd.mo.gov
Phone: 573-751-2361
Missouri Department of Higher Education and Workforce
Development
PO Box 1469
Jefferson City, MO 65102-1469

Students who participate in distance education courses and who reside in California may contact the Bureau for Private Postsecondary Education.

University Policies

Washington University has various policies and procedures that govern our faculty, staff and students. Highlighted below are several key policies of the university. Web links to key policies and procedures are available on the Office of the University Registrar website and on the University Policies page. Please note that the policies identified on these websites and in this *Bulletin* do not represent an entire repository of university policies, as schools, offices, and departments may implement policies that are not listed. In addition, policies may be amended throughout the year.

Application to Graduate

Students are required to apply for program completion in Workday, by the deadline relevant to the semester in which they intend to graduate, in order to be eligible for degree conferral. Additional information is available from the Office of the University Registrar.

Compliance with Section 103 of the Veterans Benefits and Transition Act of 2018

It is WashU's policy to not impose penalties on individuals using Veteran Education Benefits, including the assessment of late fees, the denial of access to classes, libraries or other institutional facilities, or the requirement to borrow additional funds to cover the student's inability to meet his or her financial obligations to the institution due to the delayed disbursement of a payment by the VA. This applies to individuals who submit their Certificate of Eligibility for entitlement to educational assistance to their VA School Certifying Official (SCO).

1. Students should submit a Certificate of Eligibility not later than the first day of a course for which the student wishes to use the entitlement for educational assistance. The SCO will advise the student to provide additional Documentation and information necessary for the proper certification of enrollment.
2. If a student does not receive their Certificate of Eligibility from the VA by the start of the academic term, the student should notify their SCO of their intent to use Veteran Education Benefits and should submit additional Documentation and forms as requested.
3. In cases where a student is unable to meet a financial obligation to the university because the amount of a disbursement from the VA is less than anticipated, the university will require additional payment from the student and will provide the student with a timeline for payment before assessing late fees. Students should contact their SCO for assistance.
4. Students may request certification for previous academic terms if they were eligible for benefits at the time for which they want to be certified. In cases where Veteran Education Benefits are used to certify previous academic terms, students are responsible for any late fees incurred prior to the date of the certification request. This excludes Yellow Ribbon benefits, which are not retroactive for previous fiscal years.

Courses and Credit

Academic Calendar

Washington University in St. Louis primarily follows a standard semester-based academic calendar: a fall and spring semester, each spanning 16 calendar weeks, including sessions of half-semester lengths and intersessions beginning before the term start date, and

a summer term of 13 weeks, including sessions of half-term length, an intercession beginning before the term start date, and 3-, 5- and 8-week lengths. The Doctor of Medicine program follows a yearlong calendar supporting modular curriculum delivery.

Credit Measure

Credit hours for undergraduate and graduate programs are awarded as “units” based on the University Statement on Credit, which is in alignment with the Federal definition found in 34 CFR 600.2.

Email Communication

Email is the mechanism for official communication with students at Washington University. Students are expected to read email communications from the university in a timely fashion.

All students will be individually assigned a University email address, which will be maintained in the University email directory. Official University communications will be sent to the student's University email address in order to ensure such communications reach the intended recipient.

With the exception of School of Medicine students, a student may have email forwarded from their assigned University email address to another email address of the student's choice. School of Medicine students are prohibited from forwarding their University-assigned email address to an email address external to the University other than @bjc.org and @va.gov email domains. Students who choose to have email forwarded to another email address do so at their own risk. The University is not responsible for email forwarded to any other email address. A student's failure to read official University communications sent to the student's University email address does not absolve the student of responsibility for awareness of and compliance with the content of the official communication. Faculty and administrators should use a student's University email address when communicating via email with the student. This policy will ensure that all students will be able to comply with course and other requirements communicated to them by email from course instructors and administrators.

Graduate Student Academic Integrity

Authority of Schools Over Graduate and Graduate Professional Students

1. Each school at the university may establish an academic integrity officer and/or a panel to hear and decide cases of alleged academic or professional misconduct by its graduate or graduate professional students. Schools that so choose are required to create procedures to govern the process of investigating and adjudicating the complaints filed.

- a. The school dean, or a designee, determines the composition of such a panel and the scope of the panel's authority, which will not exceed the parameters set out immediately below.
 - b. The panel has authority to impose or recommend appropriate sanctions to the school dean, including suspension or expulsion, if academic or professional misconduct is determined.
 - c. Appeals of decisions made by an academic and professional integrity panel of a school may be made to the school dean, whose decision is final. This includes decisions of a school's academic and professional integrity panel, where the panel is vested with such authority, and the panel's decision is to impose the sanctions of suspension or expulsion. Schools are permitted, but not required, to establish an intermediate level of appeal that must be completed before a final appeal to the dean.
 - d. Except for cases falling within the immediately preceding sub-bullet, any appeal from a decision of a dean of a school to suspend or expel a student will be made in accordance with the provisions of Section VI of the Code.
2. If a school does not establish an academic integrity officer or panel or if an established officer or panel fails to function, complaints of academic or professional misconduct against graduate or graduate professional students may be heard by Academic Integrity in the Office of the Provost, the Academic Integrity Board, or the Student Conduct Board.

Source: Washington University Student Conduct Code IV.A.6

International Travel

WashU is concerned with the health, safety, and security of all members of our community while they are traveling outside of the United States of America.

The WashU International Travel Policy has been adopted to ensure a consistent set of travel standards to be followed by all units of the university. The policy applies to all international travel that is sponsored by, that is funded in any part by, or that involves registered academic experiences at Washington University in St. Louis.

The full text of the International Travel Policy is available on the WashU Global website.

Involuntary Leave

Policy Statement

The primary goals of this Involuntary Leave Policy (“policy”) are to protect the well-being and safety of Washington University students and the university community and to preserve the integrity of the university's academic, residential and administrative functions.

An involuntary leave under this policy will not be invoked unless the student's behavior is of such a serious nature that the continued presence of the student at the university is judged to threaten the safety, well-being or health of that student and/or others in the WashU community, or the ability of that student or others to engage in customary functions and activities at the university.

Examples of circumstances where this policy may be invoked include: suicidal threats; self-starvation or purging behavior; substance abuse or addiction; threats of harm to self or others; or disturbing, disruptive or destructive behavior.

This policy is not intended to replace disciplinary actions taken in response to violations of other university policies, including the university Student Conduct Code (SCC). A student who commits a violation of any university policy before taking voluntary leave or being placed on involuntary leave may be required to defend such charges before being considered for re-admission. Temporary suspension may also be issued in accordance with the SCC and this policy.

Policy Procedures

The vice chancellor for student affairs, the dean of any school or the designees of any of the aforementioned (referred to herein as "administrator") may be alerted to a student's concerning behavior from a variety of sources on campus including the student's advisor, a college dean, residential life staff, student affairs staff, health care providers or other faculty members. If the administrator deems it appropriate, the following procedures may be initiated.

1. **Notification:** Whenever possible, the administrator will notify the student that involuntary leave is under consideration and attempt to meet with the student to discuss his or her behavior. The administrator will provide the student with a copy of this policy. During the meeting, the administrator may choose to encourage the student to take a voluntary leave of absence, thereby eliminating the need to complete the procedures for involuntary leave. If the administrator believes that the student's well-being may be in imminent danger, he or she may proceed with a case conference without notifying and/or meeting with the student.
2. **Assembly of Case Conference Committee:** If the student is unable or chooses not to meet with the administrator, or if the student chooses not to take a voluntary leave of absence and the administrator still believes that involuntary leave may be appropriate, the administrator will convene a Case Conference Committee ("committee") of appropriate individuals or their designates to conduct a case conference regarding the need for an involuntary leave of absence. The committee may include the following:
 - The dean of the student's college or school
 - The assistant/associate vice chancellors for student affairs
 - Student conduct administrator
 - Director of the Student Health Center, Danforth Campus
 - Director of Counseling and Psychological Services
 - Assistant director of sorority and fraternity life
 - Executive director of Campus Life

- Chief of police
- Residential Life staff
- Director of the Office of International Students & Scholars
- Office of the General Counsel
- The student's advisor(s) or academic dean
- Professors, instructors, or staff who have observed the student's behavior of concern

3. **Committee Consideration:** The administrator should convene a Case Conference as soon as possible. During this conference, the committee should address whether and to what extent the student engages in, or is judged to be likely to engage in, behavior described in this policy. Where deemed necessary by the committee to facilitate a more informed recommendation, the committee may consult with other university administrators, faculty or staff familiar with the student. The committee may seek additional information from the student or enlist the assistance of other university faculty or staff members familiar with the student to consult with the student on behalf of the committee. If contacted, the student may refuse to provide information, but such refusal shall not limit the right of the committee to make a recommendation under this policy, nor limit the right of the university to mandate an involuntary leave.
4. **Committee Recommendation:** Following the Case Conference and the review of relevant information, the committee will make a written recommendation to the administrator. In lieu of recommending involuntary leave, the committee may make recommendations as to other conditions and/or requirements under which the student may remain at the university.
5. **Decision:** After review of the committee's recommendation, the administrator will decide whether to mandate an involuntary leave of absence, to mandate other requirements if the student remains at the university, or to permit the student to remain at the university with no additional requirements. The administrator will give the student written notice of this decision. This notice will provide (1) a brief summary of the reasons for decision, (2) the duration of the leave or a description of the requirements for the student to remain on campus, and (3) the steps that the student must take to request readmission if involuntary leave is invoked. The administrator may notify a parent or guardian, in accordance with the Family Educational Rights & Privacy Act ("FERPA"). Pursuant to FERPA, the administrator may also notify a spouse or partner upon obtaining the student's consent. Where an involuntary leave is mandated, the student must leave campus within the time frame established in the notice. In that event, the student's parent(s), guardian(s) or other persons may be asked to make arrangements for the safe removal of the student from the university community.

Option of Voluntary Leave

At any time prior to the administrator's decision, the student may choose to take voluntary leave. The university expects students to notify family members when they voluntarily withdraw from the university. However, when permitted by FERPA, the university retains the discretion to notify parents, guardians, spouses or partners if the student chooses to leave.

Records and Tuition

Leave may affect academic grades, credits and access to university housing or other facilities. Tuition, financial aid, and housing costs will be refunded in accordance with university policy. Regardless of whether leave is voluntary or involuntary, the student's status at the university will be updated in student systems to reflect a leave of absence, which includes a notation on the transcript indicating: "Leave of Absence" and the start date. When involuntary leave is not mandated, but a student is required to fulfill certain requirements to remain on campus, the student's in-progress status is unchanged and no notation will be made on the transcript.

Safety and Security

In cases involving serious and imminent threat to the safety, well being or health of the student or other members of the campus community, or to the ability of others in the university community to conduct their customary university functions and activities, the administrator may take immediate action to remove the student from the university community. In such event, the administrator may immediately notify the student's parent, guardian, spouse, partner, or other relevant individuals in accordance with FERPA. The parent, guardian or other person may be asked to make arrangements for the safe removal of the student from the university community pending a decision on involuntary leave.

Request for Re-Enrollment

When a student is placed on involuntary leave or accepts voluntary leave, a letter from the administrator to the student will outline the conditions for re-enrollment. Conditions for re-enrollment are at the discretion of the administrator. If the leave was for health or medical reasons, the administrator will work with the director of health services or his/her designate to formulate appropriate conditions of return, which may include requirements and/or guidance regarding treatment. A copy of this letter will be forwarded to the academic dean of the student's college or school and, where health-related, to the director of the Student Health Center.

When a student's voluntary or involuntary leave is not health-related, the procedures to request re-enrollment will be outlined in the administrator's letter.

The following process will guide re-enrollment for all students taking involuntary or voluntary leave of absence for a health-related reason:

1. The student must contact in writing both the academic dean and the director of the Student Health Center to request re-enrollment between June 1 and July 1 for the upcoming fall semester or November 1 and December 1 for the spring semester.
2. The student's health status must be reviewed by the director of the Student Health Center or his/her designate. As part of the review, the student may be asked to present written evidence that the student has been evaluated and completed follow-up measures recommended by the student's treating health care professional. This evidence may include a recitation of the health care professional's credentials, a description of their contact with the student, the evaluation method, the diagnosis, the recommended follow-up measures and the student's efforts to complete them. The student's efforts to complete those follow-up measures will be evaluated to determine whether the student used the time away from the university to address the issues that led to the separation and to acquire skills to facilitate a successful return to the university.
3. A recommendation regarding medical eligibility for re-enrollment will be made by the director of the Student Health Center or his/her designate and forwarded to the student's academic dean and the administrator. The academic dean, in consultation with the administrator, will determine academic eligibility for re-enrollment and will communicate in writing the final decision and any conditions to the student.

Appeal of Administrator Decisions

A student may submit, within 24 hours of receiving the written decision from the administrator, a written appeal to the provost who will review the written record only. A decision to affirm or reverse the administrator's decision will be rendered within 48 hours. The decision of the administrator will be affirmed if supported by substantial information appearing in the record of the case. The decision of the provost is final.

Confidentiality

The university will strive to protect, to the greatest extent possible, the confidentiality of students involved in matters of voluntary or involuntary leave. Because the university has an obligation to preserve the security of its community, the university cannot guarantee complete confidentiality where it would conflict with the university's obligation to investigate meaningfully matters which may threaten a student's health or safety or the safety and security of the university community. When some disclosure of the university's information or sources is necessary, that disclosure will be limited to the extent possible. Medical records of a student will be protected in accordance with the WashU Student Health Center Notice of Privacy Practices. The university will, to the extent permitted by law, keep confidential all records of committee reviews. The records maintained by the Case Conference Committee will be available only to the administrator.

and other university officials in accordance with FERPA. All records will be destroyed after a period of ten (10) years from the date of final decision on involuntary leave or the student's decision to take voluntary leave.

Nondiscrimination Statement

Washington University encourages and gives full consideration to all applicants for admission, financial aid, and employment. The university does not discriminate in access to, treatment during, or employment in its programs and activities on the basis of race, color, national origin (including shared ancestry or ethnic characteristics), citizenship (where prohibited by federal law), age, religion, sex, sexual orientation, gender identity or expression, veteran status, disability, or genetic information.

Policy on Discrimination and Harassment

Washington University is committed to having a positive learning and working environment for its students, faculty, and staff. University policy prohibits discrimination on the basis of race, color, age, religion, sex, sexual orientation, gender identity or expression, national origin (including shared ancestry or ethnic characteristics), citizenship (where prohibited by federal law), veteran status, disability, or genetic information. Harassment based on any of these classifications is a form of discrimination; it violates university policy and will not be tolerated. In some circumstances, such discriminatory harassment may also violate federal, state, or local law. A copy of the Discrimination and Harassment Policy is available on the Human Resources website.

Conduct Prohibited by Title VI

Title VI of the Civil Rights Act of 1964 prohibits discrimination based on race, color, or national origin in programs that receive federal financial assistance. Discrimination on the basis of race, color, or national origin includes discrimination or harassment based on a person's actual or perceived 1) shared ancestry or ethnic characteristics; or 2) citizenship or residency in a country with a dominant religion or distinct religious identity (such as individuals who are Hindu, Jewish, Muslim, Buddhist, or Sikh). Such conduct is prohibited by the Discrimination and Harassment Policy.

Sexual Harassment

Sexual harassment is a form of discrimination that violates university policy and will not be tolerated. It is also illegal under state and federal law. Title IX of the Education Amendments of 1972 prohibits discrimination based on sex (including sexual harassment and sexual violence) in the university's educational programs and activities. Title IX also prohibits retaliation for asserting claims of sex discrimination. The university has designated the Title IX Coordinator identified below to coordinate its compliance with and response to inquiries concerning Title IX.

For more information or to report a violation under the Policy on Discrimination and Harassment, please contact the following individuals:

Discrimination and Harassment Response Coordinators

Apryle Gladney, Vice Chancellor and Chief Human Resources Officer
Phone: 314-935-1252
apryle.gladney@wustl.edu

Gillian Lawson, Director of Investigations, Office of Institutional Equity
Phone: 314-935-1139
oie-investigations@wustl.edu; gillian.boscan@wustl.edu

Office: The Link in the Loop
Address: 621 N. Skinker Blvd., Suite 300, St. Louis, MO 63130
WashU University Reporting Hotline

Title IX Coordinator

Jessica Kennedy, Director & Title IX Coordinator, Office of the Provost
Phone: 314-935-3118
jwkennedy@wustl.edu

Office: Umrath Hall, Room 001
Address: One Brookings Drive, MSC 1175-0153-0B, St. Louis, MO 63130

Inquiries or complaints regarding civil rights may also be submitted to the United States Department of Education's Office of Civil Rights at 400 Maryland Avenue, SW, Washington, DC 20202-1100; by visiting the U.S. Department of Education website; or by calling 800-421-3481.

Student Academic Records and Transcripts

Under the Family Educational Rights and Privacy Act of 1974 (FERPA) — Title 20 of the United States Code, Section 1232g, as amended — current and former students of the university have certain rights with regard to their educational records. Washington University's FERPA policy is available via the Office of the University Registrar's website.

All current and former students may request official Washington University transcripts of their academic records from the Office of the University Registrar. Current students may print unofficial transcripts for their personal use from Workday. Instructions and additional information are available on the Office of the University Registrar's website.

Washington University does not release nor certify copies of transcripts or other academic documents received from other schools or institutions. This includes test score reports and transcripts submitted to Washington University for purposes of admission or evaluation of transfer credit.

Academic records may not be altered after degree conferral, at which time records are considered closed or sealed.

Student Conduct

The Washington University in St. Louis Student Conduct Code (“the Code”) sets forth community standards and expectations for university students. These community standards and expectations are intended to foster an environment conducive to working, learning, and inquiry. Each student is held to the expectations outlined in the Code.

Freedom of thought and expression as well as respect for different points of view are essential to the university’s academic mission. Nothing in the Code should be construed to limit the lawful, free, and open exchange of ideas and viewpoints, even if that exchange proves to be offensive, distasteful, or disturbing to some. However, such speech must conform to university policies.

The Code also describes general procedures that may be used to ensure that these standards and expectations are upheld by all students. The university is committed to ensuring that students adhere to university policies, take responsibility for their actions, and recognize how their choices may affect others.

Complaints against students that include allegations of sex-based discrimination — including sexual harassment, sexual assault, dating violence, domestic violence and stalking — in violation of the Student Conduct Code are governed by the procedures found on the Gender Equity and Title IX Compliance Office website. These procedures are also available in hard copy from the Title IX Coordinator or the director of the Office of Student Conduct and Community Standards.

Students may be accountable to both governmental authorities and to the university for acts that constitute violations of law and the Student Conduct Code.

For a complete copy of the Student Conduct Code, visit the Student Affairs website.

For more information, visit the Student Conduct and Community Standards website.

Student Financial Responsibility

Communication

Washington University in St. Louis uses University-assigned email accounts and University-supported systems for communication with students and authorized users. Washington University will also contact students via personal email addresses, cellular phone numbers, or wireless devices from time to time regarding the Student Account or other general information. Students are responsible for reading University communications in a timely manner.

Promise to Pay

When students register for any course at or receive any service from Washington University in St. Louis, they accept full responsibility to pay all tuition, fees, and other associated charges assessed as a result of registration and/or receipt of services such as housing, dining, and other University-provided items that exceed financial support provided by the University, the University payment plan, and/or third parties by the scheduled due dates shown on the WebSTAC student account. Failure to attend class or receive a bill does not absolve students of financial responsibility as described above.

Failure to Pay

University policies regarding Student Accounts (including payment options, late fees, holds, and refunds) are published on the University’s Financial Services website. If a student fails to pay the Student Account balance by the scheduled due dates, the University will place a financial hold preventing the student from registering for future courses and could assess a late fee on the past due portion until the past due amount is paid in full. Failure to pay will result in a Delinquent Student Receivable Account. Delinquent Student Accounts will be referred to University’s Collection Services department. Collection Services may report the Delinquent Student Account to one or more national credit bureaus, refer the Delinquent Student Account to a third-party collection agency, and pursue all legal and equitable remedies to collect the monies owed to the University.

Student Health

Drug and Alcohol Policy

Washington University is committed to maintaining a safe and healthy environment for members of the university community by promoting a drug-free environment as well as one free of the abuse of alcohol. Violations of the Washington University Drug and Alcohol Policy will be handled according to existing policies and procedures concerning the conduct of faculty, staff, and students. This policy is adopted in accordance with the Drug-Free Workplace Act and the Drug-Free Schools and Communities Act.

Tobacco-Free Policy

Washington University is committed to providing a healthy, comfortable and productive work and learning environment for all students, faculty, and staff. Research shows that tobacco use in general, including smoking and breathing secondhand smoke, constitutes a significant health hazard. The university strictly prohibits all smoking and other uses of tobacco products within all university buildings and on university property, at all times. A copy of our complete Tobacco-Free and Smoke-Free Policy is available on the Washington University Human Resources website.

Medical Information

Entering students in Danforth Campus programs must provide medical information to the Student Health Center – Danforth Campus. This will include the completion of a health history and a record of all current immunizations.

If students fail to comply with these requirements prior to registration, they must obtain the required vaccinations and tests at the Student Health Center – Danforth Campus or in the community. Students will be assessed the costs of the vaccinations and/or tests. Students will be unable to complete registration for classes until all health requirements have been satisfied.

Noncompliant students may be barred from classes and from all university facilities, including housing units, if in the judgment of the university their continued presence would pose a health risk to themselves or to the university community.

Medical and immunization information is to be given via the student health portal on the Student Health Center – Danforth Campus website. All students who have completed the registration process should access the student health portal on the website. Students should fill out the form and follow the instructions for transmitting it to the Student Health Center – Danforth Campus. Student information is treated securely and confidentially.

Entering students in Medical Campus programs must follow the requirements as outlined on the WashU Medicine Student Health Services website.

Student Status: Expulsion and Dismissal

The terms *expulsion* and *dismissal* are used to indicate distinct types of involuntary separation of a student from the university or from their program of study.

- *Expulsion* refers to a permanent removal from the university. A student who is expelled is not eligible to return to a prior program of study nor to enter a new program of study.
- *Dismissal* refers to a permanent separation from a specific program of study or school. A student may apply to begin a different program of study and may or may not be admitted according to the standards and practices of that program or school.

Time Away and Reinstatement

Degree-seeking students may be eligible to request a leave of absence for health or other personal reasons (e.g., family, military service, professional obligations, religious mission). The mechanism and process are described on the Office of the University Registrar's website. Such leaves may exceed no more than two years from the effective date of the leave; individual programs' policies may limit

students to shorter leaves. Students must verify their school and program policies and any other relevant requirements related to immigration or financial aid/support policies. Students who have not requested and received approval for reinstatement after two years will have their records withdrawn.

Required enrollment reporting to the federal government will reflect a leave of absence for 180 days after it is enacted; any longer duration of institutional leave is recorded in their systems as a withdrawal.

Students on approved leave of absence will retain access to their Washington University email addresses, and to Workday to review their records. Access to other University privileges such as recreation facilities and libraries as well as participation in activities are paused during a leave of absence.

Students are expected to request reinstatement to in-progress status to resume studies via the process outlined on the Office of the University Registrar's website. Depending on the nature of their leave, additional steps or documentation may be required and must be provided to appropriately consider the request. Students whose records have been withdrawn as a result of two years of inactivity may be allowed, depending on program-specific policies regarding the maximum time allowed to complete the program of study, to request to re-enter their programs. In these cases, additional items may be required of the student depending on the circumstances, the length of time away, and whether their program of study has undergone curricular revisions since their enrollment.

Undergraduate Student Academic Integrity

Effective learning, teaching, and research all depend upon the ability of members of the academic community to trust one another and to trust the integrity of work that is submitted for academic credit or conducted in the wider arena of scholarly research.

Such an atmosphere of mutual trust fosters the free exchange of ideas and enables all members of the community to achieve their highest potential.

In all academic work, the ideas and contributions of others must be appropriately acknowledged, and the work of a student that is presented as original must be, in fact, original. Faculty, students, and administrative staff all share the responsibility of ensuring the honesty and fairness of the intellectual environment at Washington University in St. Louis.

Scope and Purpose

This statement on academic integrity applies to all undergraduate students at Washington University. Graduate students may be governed by policies in each graduate school or division. To the extent a graduate school or program has not adopted its own academic integrity policy, the provisions of this policy will apply. All students are expected to adhere to the highest standards of behavior.

The purpose of the statement is twofold:

1. To clarify the university's expectations with regard to undergraduate students' academic behavior; and
2. To provide specific examples of academic misconduct (the examples are only illustrative, *not* exhaustive).

This policy and statement were endorsed by the Faculty Senate Council. Any changes to the policy are to be reviewed by the Faculty Senate Council, as described in the Faculty Senate Council bylaws.

Violations of This Policy Include but Are Not Limited to the Following:

1. Plagiarism

Plagiarism consists of taking someone else's ideas, words or other types of work product, and presenting them as one's own. To avoid plagiarism, students are expected to be attentive to proper methods of documentation and acknowledgement. To avoid even the suspicion of plagiarism, a student must always:

- Enclose every quotation in quotation marks and acknowledge its source.
- Cite the source of every summary, paraphrase, abstraction or adaptation of material originally prepared by another person and any factual data that is not considered common knowledge. Include the name of author, title of work, publication information and page reference.
- Acknowledge material obtained from lectures, interviews or other oral communication by citing the source (name of the speaker, the occasion, the place and the date).
- Cite material from the internet or material generated by an artificial intelligence as if it were from a traditionally published source. Follow the citation style or requirements of the instructor for whom the work is produced.

2. Cheating on an Examination

A student must not receive or provide any unauthorized assistance on an examination. During an examination, a student may use only materials authorized by the faculty.

3. Copying or Collaborating on Assignments Without Permission

When a student submits work with their name on it, this is a written statement that credit for the work belongs to that student alone. If the work was a product of collaboration, each student is expected to clearly acknowledge in writing all persons or artificial intelligences who contributed to its completion.

Unless the instructor explicitly states otherwise, it is dishonest to collaborate with others when completing any assignment or test, performing laboratory experiments, writing and/or documenting computer programs, writing papers or reports, and completing problem sets.

If the instructor allows group work in some circumstances but not others, it is the student's responsibility to understand the degree of acceptable collaboration for each assignment and to ask for clarification if necessary.

To avoid cheating or unauthorized collaboration, a student should never:

- Use, copy, or paraphrase the results of another person's work or material generated by an artificial intelligence and represent that work as their own, regardless of the circumstances.
- Refer to, study from, or copy archival files (e.g., old tests, homework, solutions manuals, or backfiles) that were not approved by the instructor.
- Copy another's work or to permit another student to copy their work.
- Submit work as a collaborative effort if they did not contribute a fair share of the effort.

4. Fabrication or Falsification of Data or Records

It is dishonest to fabricate or falsify data in laboratory experiments, research papers, reports or in any other circumstances; to fabricate source material in a bibliography or "works cited" list; or to provide false information on a résumé or other document in connection with academic efforts. It is also dishonest to take data developed by someone else and present them as one's own.

Examples of falsification include:

- Altering information on any exam, problem set, or class assignment being submitted for a re-grade.
- Altering, omitting, or inventing laboratory data to submit as one's own findings. This includes copying laboratory data from another student to present as one's own; modifying data in a write-up; and providing data to another student to submit as their own.

5. Other Forms of Deceit, Dishonesty, or Inappropriate Conduct

Under no circumstances is it acceptable for a student to:

- Submit the same work, or essentially the same work, for more than one course without explicitly obtaining permission from all instructors. A student must disclose when a paper or project builds on work completed earlier in their academic career.
- Request an academic benefit based on false information or deception. This includes requesting an extension of time, a better grade or a recommendation from an instructor.
- Make any changes (including adding material or erasing material) on any test paper, problem set or class assignment being submitted for a re-grade.
- Willfully damage the efforts or work of other students.
- Steal, deface, or damage academic facilities or materials.
- Collaborate with other students planning or engaging in any form of academic misconduct.

- Submit any academic work under someone else's name other than their own. This includes but is not limited to sitting for another person's exam; both parties will be held responsible.
- Violate any rules or conditions of test-taking or other course assessment (e.g., bringing materials or devices into an exam room when disallowed).
- Engage in any other form of academic misconduct not covered here.

This list is not intended to be exhaustive. To seek clarification, students should ask the professor or teaching assistant for guidance.

Reporting Misconduct

Faculty Responsibility

Faculty and instructors are strongly encouraged to report incidents of student academic misconduct to the academic integrity coordinators in the Office of the Provost in a timely manner (normally within five business days of discovery) so that the incident may be handled fairly and consistently across schools and departments. Teaching assistants and assistants in instruction are expected to report instances of student misconduct to their supervising instructors. Faculty members are expected to respond to student concerns about academic integrity violations in their courses.

Student Responsibility

If a student observes others violating this policy, they are strongly encouraged to report the misconduct to the instructor, to seek advice from the academic integrity coordinator in the Office of the Provost, or to address the student(s) directly.

Exam Proctor Responsibility

Exam proctors are expected to report incidents of suspected student misconduct to the course instructor and/or the Disability Resources staff, if applicable.

Procedure

Jurisdiction

This policy covers all undergraduate students, regardless of their college of enrollment, as well as graduate and professional students whose schools and programs do not have a separate policy and procedure. Cases will be heard by a panel drawn from an Academic Integrity Board made up of faculty and students representing the undergraduate schools and participating graduate programs.

Student Rights and Responsibilities in a Hearing

A student accused of an academic integrity violation, whether by a professor, teaching/graduate assistant, academic integrity coordinator or student is entitled to:

- A presumption of non-responsibility unless and until a panel determines that, based upon the evidence, it is more likely than not that the student engaged in a violation of academic integrity under this policy.
- Request a mediation/facilitation session prior to a hearing.
- Review the written evidence in support of the charge.
- Ask relevant questions.
- Offer an explanation as to what occurred.
- Present relevant material that would cast doubt on the correctness of the charge.
- Determination of the validity of the charge by an unbiased and objective panel and generally without reference to any past record of misconduct.

When responding to a charge of an academic integrity violation, a student may:

- Deny the charges and request a hearing in front of an Academic Integrity Board panel.
- Admit the charges and request a hearing to determine recommended sanction(s).
- Admit the charges and accept the imposition of sanctions by the academic integrity coordinator without a committee hearing.
- Request a leave of absence from the university. The academic integrity matter must be resolved prior to re-enrollment. A notation will be placed on the student's transcript indicating there is an unresolved academic integrity matter pending.
- Request to withdraw permanently from the university with a transcript notation that there is an unresolved academic integrity matter pending.

A student has the following responsibilities in resolving the charge of academic misconduct:

- Admit or deny the charge. This will determine the course of action to be pursued.
- Provide truthful information regarding the charges. It is a student code violation to provide false information to the university or anyone acting on its behalf.

Sanctions

If Found *Not* in Violation of the Academic Integrity Policy

If the charges of academic misconduct are not proven, no record of the allegation will appear on the student's transcript.

If Found in Violation of the Academic Integrity Policy

If, after a hearing, a student is found responsible for violation of the academic integrity policy or if a student has admitted to the charges prior to a hearing, the academic integrity coordinator may impose sanctions, including but not limited to the following:

- Issue a formal written reprimand.
- Impose educational sanctions, such as completing a workshop on plagiarism or academic ethics.
- Recommend to the instructor that the student fail the assignment. (A grade is ultimately the prerogative of the instructor.)
- Recommend to the instructor that the student fail the course.
- Recommend to the instructor that the student receive a course grade penalty less severe than failure of the course.
- Place the student on disciplinary probation for a specified period of time or until defined conditions are met. The probation will be noted on the student's transcript and internal record while it is in force.
- Impose suspension or expulsion.

Additional educational sanctions may be imposed. This list is not intended to be exhaustive.

A hearing panel may also elect to refer their recommended sanctions to the SCB Chairperson for determination if, for example, the recommendation departs from their standard recommendations.

Withdrawing from the course will not prevent the academic integrity coordinator or hearing panel from adjudicating the case, imposing sanctions, or recommending grade penalties, including a failing grade in the course.

A copy of the sanction letter will be placed in the student's academic file and may be reported in accordance with the Policy on Reporting of Student Conduct Violations.

Appeals

If a student believes the panel did not conduct a fair hearing or if a student believes the sanction imposed is excessive (i.e., suspension or expulsion), they may seek an appeal within 14 days of the original decision. For cases in which the decision resulted in suspension or expulsion, the appellate officer will be the Vice Provost of Educational Initiatives or the Vice Provost for Graduate Education. For all other cases, the appellate officer will be the Chair of the Student Conduct Board. Appeals are governed by Section VI of the university Student Conduct Code.

Administrative Record-Keeping Responsibilities

It is the responsibility of the academic integrity coordinators to keep accurate, confidential records concerning academic integrity violations. When a student has been found responsible for an academic integrity violation, a letter summarizing the allegation, the outcome, and the sanction will be placed in the student's official conduct file and may be reported out in accordance with the Policy on Reporting of Student Conduct Violations.

In addition, a report of the outcome of every formal accusation of student academic misconduct will be shared with the director of university student conduct programs, who shall maintain a record of each incident.

Multiple Offenses

When a student is formally accused of academic misconduct and a hearing is to be held, the academic integrity coordinator shall query the Office of Student Conduct and Community Standards (OSCCS) about the student(s) accused of misconduct. OSCCS shall provide any information in the OSCCS records concerning prior code violations of that student to the integrity coordinator. Such information will be used in determining sanctions if the student is found responsible for an academic integrity violation in the present case. Evidence of past misconduct generally may not be used to resolve the issue of whether a student has committed a violation in a subsequent case unless the hearing chair deems it relevant.

Reports to Faculty and Student Body

Periodic (at least annual) reports will be made to the students and faculty of their school concerning accusations of academic misconduct and the outcomes, without disclosing specific information that would allow identification of the student(s) involved.

*Endorsed by the Faculty Senate Council on March 16, 2010
Effective July 1, 2010
Updated December 4, 2014*

*Endorsed by the Faculty Senate Council on October 18, 2023
Updated April 18, 2024*

University Affiliations

The accrediting organizations and memberships of the different areas of Washington University are listed below.

Additional information about professional and specialized accreditation can be found on the Office of the Provost website.

Washington University in St. Louis

Accreditation

- Higher Learning Commission

Memberships

- American Academy of Arts & Sciences
- American Association of Colleges & Universities
- American Council of Learned Societies
- American Council on Education
- Association of American Universities
- Hispanic Association of Colleges and Universities
- Independent Colleges and Universities of Missouri
- National Association of Independent Colleges and Universities
- National Council for State Authorization Reciprocity Agreements
- Universities Research Association

College of Arts & Sciences

Memberships

- American Academy of Physician Associates
- American Camp Association
- Association for Pre-College Program Directors
- Association of University Summer Sessions
- Diversity Abroad
- Forum on Education Abroad
- Higher Education Protection Network
- International Center for Academic Integrity
- International Educational Exchange
- Midwest Association of Pre-Law Advisors
- National Academic Advising Association
- National Association of Advisors for the Health Professions
- National Association of Fellowships Advisors
- North American Association of Summer Sessions
- Professional and Organizational Development Network

Office of Graduate Studies, Arts & Sciences

Accreditation — Office of Graduate Studies

- American Psychological Association Commission on Accreditation
- Psychological Clinical Science Accreditation System

Memberships

- American Academy of Physician Associates
- Association of Graduate Schools
(Founding member)
- Council of Graduate Schools
(Founding member)
- Midwest Association of Pre-Law Advisors
- Pod Network
- Student Affairs Administrators in Higher Education
- The Council of Independent Colleges

Sam Fox School of Design & Visual Arts

Accreditation — College of Art

- National Association of Schools of Art & Design
(Founding member)

Accreditation — College of Architecture

- Master of Architecture: National Architectural Accrediting Board
- Master of Landscape Architecture: Landscape Architectural Accreditation Board

Membership — College of Architecture

- Association of Collegiate Schools of Architecture

Accreditation — Mildred Lane Kemper Art Museum

- American Alliance of Museums

Membership — Mildred Lane Kemper Art Museum

- Association of Academic Museums and Galleries
- Association of Art Museum Directors
- College Art Association

Olin Business School

Accreditation

- Association to Advance Collegiate Schools of Business International
(Charter member since 1921)

McKelvey School of Engineering

Accreditation

- In the McKelvey School of Engineering, many of the undergraduate degree programs are accredited by the Engineering Accreditation Commission of ABET.

Membership

- American Society for Engineering Education

School of Law

Accreditation

- American Bar Association

Memberships

- American Association of Law Libraries
- American Society of Comparative Law
- American Society of International Law
- Association of Academic Support Educators
- Association of American Law Schools
- Central States Law Schools Association
- Clinical Legal Education Association
- Equal Justice Works
- Mid-America Association of Law Libraries
- Mid-America Law Library Consortium

- National Association for Law Placement
- National Association of Law Student Affairs Professionals
- Southeastern Association of Law Schools

School of Medicine

Accreditation

- American Speech-Language-Hearing Association, Council on Academic Accreditation in Audiology and Speech-Language Pathology (ASHA CAA)
- Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC)
- Liaison Committee on Medical Education
- Council on Education of the Deaf (CED)
- Missouri Department of Elementary and Secondary Education (DESE)
- American Occupational Therapy Association, Accreditation Council for Occupational Therapy Education (ACOTE)
- American Physical Therapy Association, Commission on Accreditation in Physical Therapy Education (CAPTE)
- Accreditation Council for Genetic Counseling (ACGC)
- Accreditation Council for Continuing Medical Education (ACCME)
- Accreditation Council for Pharmacy Education (ACPE)
- American Nurses Credentialing Center (ANCC)
- Association of Regulatory Boards of Optometry's Council on Optometric Practitioner Education (ARBO/COPE)
- Joint Accreditation for Interprofessional Continuing Education
- Accreditation Council for Graduate Medical Education (ACGME)

Membership

- Association of American Medical Colleges

School of Public Health

Accreditation

- Council on Education for Public Health

Affiliation

- Association of Schools and Programs of Public Health

Brown School

Accreditation

- Council on Social Work Education



School of Continuing & Professional Studies

Memberships

- American Association of Collegiate Registrars and Admissions Officers
- Council for Adult and Experiential Learning
- International Center for Academic Integrity
- National Academic Advising Association
- National Association of Student Personnel Administrators
- University Professional and Continuing Education Association

Note: Business-related programs in the School of Continuing & Professional Studies are not accredited by the Association to Advance Collegiate Schools of Business International.

University Libraries

Membership

- Association of Research Libraries

Graduate Policies

Please expand the sections below for more information about WashU's graduate policies and guidelines.

Academic Load Status for Financial Aid, Immigration, and Enrollment Verification

Graduate (Fall, Spring)

Status	Enrolled Units of Credit
Full time	9+ units
Half time	4.5-8.99 units
Less than half time	Fewer than 4.5 units

Graduate (Summer)

Status	Enrolled Units of Credit
Full time	6+ units
Half time	3-5.99 units
Less than half time	Fewer than 3 units

Certain courses may, due to appropriate curriculum and monitoring circumstances, be encoded to carry a load value higher than the actual academic credit awarded. Examples include certain engineering co-op experiences, doctoral research study and select clinical or practicum courses.

Registration in Courses

Registration dates are published in advance on the Office of the University Registrar's website. Late registration after the term begins is permitted only until the "add/drop" deadline relevant to a student's program. Students will not earn credit for courses in which they are not duly registered. Students may not register in courses that have conflicting meeting times.

Students may drop a course by the published deadline found on the Office of the University Registrar's website; dropped courses do not appear on the permanent academic record, and no grade is recorded. Students may withdraw from a course after the drop deadline and until the published withdrawal deadline. A withdrawal will result in a W notation associated with the course on the permanent record, including the transcript. Students who wish to drop or withdraw from a course are expected to follow steps to do so by the appropriate deadline. Failure to drop a course or withdraw by the published deadline may result in a failure of the course, and the transcript will reflect the failing grade.

Transfer Credit

Transfer credit is recorded on a student's permanent record. Courses transferred from other institutions of higher education do not have grades or grade points awarded and therefore do not apply toward a student's GPA.

Institutionally, Washington University participates in the Inter-University Exchange Program. Courses taken at Saint Louis University and the University of Missouri–St. Louis, according to the parameters documented, are approved to transfer to Washington University. The School of Law has a specific agreement in place with Saint Louis University for JD students only and under certain circumstances. Other transfer credit policies vary by school and program. Details may be found in the relevant academic sections of this *Bulletin*.

Tuition and Cost of Attendance

The cost of a Washington University education varies by school and, in some cases, by program. Tuition rates and fees are available through the Office of Financial Planning and Budget and are typically listed in greater detail (including fees and financial support options and procedures) on school websites.

Withdrawals and Refunds

If a student withdraws from Washington University after classes have begun, they must promptly file a request to withdraw in order to have appropriate registration and refund policies apply. These timelines vary by school and, in some cases, by program. Students should refer to the appropriate sections of this *Bulletin* for details.

University PhD Policies & Requirements

Academic PhD Programs

The following university-wide policies and practices apply to all PhD students regardless of school affiliation. They are specific to PhD program administration and PhD student experience. Schools/divisions may set stricter standards for students within their ambit, but they may not set standards that fall below university-wide policies. This page *does not* include those policies and practices that apply to the student community as a whole (e.g., the University Student Conduct Code).

Academic and Professional Integrity for PhD Students

The Academic and Professional Integrity Policy for PhD Students (PDF) continues to apply to all PhD students on the Danforth and Medical campuses, including dual-degree students when one of the degree programs is a PhD program.

Involuntary Leave of Absence

The Involuntary Leave of Absence Policy that applies to undergraduates was adopted to apply to all PhD students in 2014.

PhD Student Support Policies and Resources

New Child Leave

Full-time PhD students may request a New Child Leave to assume care for a new child. They should maintain their full-time student status. Students on New Child Leave are not expected to participate in mentored teaching or research experience for up to 60 consecutive calendar days (8 weeks) and will receive their current stipend support during this 60-day period. Students may request additional time off via a leave of absence without receiving a stipend (for up to a full semester) if approved by the student's department/program.

New Child Leave does not affect the student's full-time status and will not appear on the student's official transcript. New Child Leave must be taken within the first year after the child's date of birth or adoption. Students should contact their department/program to request a New Child Leave. Students who receive support from external agencies should consult the policies and guidelines of the sponsor as well as their Vice Dean or designee before requesting a New Child Leave.

Child Daycare Subsidy

The Child Daycare Subsidy is sponsored by WashU, and its purpose is to help PhD students with children under their care (who meet the requisite eligibility criteria) to meet the costs of child daycare while they pursue their studies.

The amount of the Child Daycare Subsidy awarded to eligible applicants is based on their financial need, the number of children they have enrolled in child daycare facilities, their child daycare expenses, and available funding. Eligible PhD students can expect the following:

- For one child, the maximum award is \$3,550 per Fall/Spring semester.
- For two children, the maximum award is \$4,550 per Fall/Spring semester.
- For three or more children, the maximum award is \$5,550 per Fall/Spring semester.

The subsidy amount cannot exceed the cost of the daycare facility.

The application is available on the Office of the Provost website.

Financial Policies

PhD Student Minimum Financial Award

The education of PhD students represents a significant commitment on the part of both WashU and the students admitted/enrolled. WashU typically funds most full-time PhD students for a minimum of five years (with the exception of post-professional PhD programs in the School of Medicine). Funding typically consists of full tuition scholarship and financial support to defray living expenses. Financial support may also be referred to as stipends or fellowships. Such financial support may be sourced internally from university-wide fellowships such as the Olin Chancellor's Fellowship (OCF), the McDonnell International Scholars Academy (p. 496), or school/program/department funds or from external sources (e.g., external research contracts and grants, external fellowships such as NSF GRFP).

The minimum PhD financial support rate for the 2026-27 academic year is \$37,853 annually, dispersed on a monthly basis while the student is enrolled full time. The rate applies to all PhD programs with the exception of post-professional specialty programs in the School of Medicine. Departments, schools, cross-school interdisciplinary programs, and other fellowship programs may choose to offer a rate higher than the established minimum, but they must do so for all students in their cohort. The eligibility criteria for PhD students receiving such financial support are outlined in the PhD Student Funding section below.

Students admitted to a part-time PhD program or on a part-time basis are not eligible for this minimum financial award.

PhD Student Funding

Financial support at or above the university-wide PhD minimum stipend rate allows PhD students to focus on their programmatic requirements, enabling them to make expeditious progress toward degree completion. This section predominantly pertains to PhD students, but it may apply to other graduate and professional students receiving financial support from the university.

Eligibility and Status

Students receiving university financial support must do the following:

- Enroll and maintain full-time student status in a graduate or professional program during the academic year;
- Make satisfactory academic progress in accordance with their degree program requirements; and
- Report to their degree program and university fellowship program (if applicable) any additional financial award(s) they receive or employment they engage in as outlined in this policy.

Because graduate students sometimes receive funding from multiple sources, it is the responsibility of the student, the student's department/degree program, and the Principal Investigator (if applicable) to understand and abide by the terms and conditions of each funding source.

Funding From Multiple Sources

Eligible students are encouraged to seek additional fellowships from external agencies. In addition to the funding amount, which can be more generous than that of a university financial award, these external fellowships are prestigious; they provide valuable training, experiences, and resources, and they enhance future career opportunities. In addition, securing external funding to support training and research is often an important component of the professional development of graduate students.

PhD students receiving university financial support who also receive an external fellowship or stipendiary award *may not* combine or "stack" the external award with the university financial support.* Students receiving an external fellowship or stipendiary award have two options.

Option 1: Supplementation of an External Fellowship or Stipendiary Award

If the sum of all external fellowship or stipendiary awards is less than the university financial support, the university funds may supplement the total amount of external funding to bring the student up to their guaranteed university fellowship or to the minimum university financial support for PhD students.

Students who receive external fellowship or stipendiary awards providing annual stipends that total more than the university financial support will retain the full external award(s) and will receive no additional university financial support for the duration of the external award.

- *Example One:* A student has a university award of \$38,000. The student receives a \$34,000 external award; the university will supplement the external award by \$4,000 to bring the student up to their university award of \$38,000.
- *Example Two:* A student has a university award of \$38,000. The student receives an external foundation award of \$42,000. Since the external award is greater, no university funds will be distributed while the student is supported by the external award.

Option 2: Deferral of University Fellowship or Stipendiary Award

Students receiving an external fellowship or stipendiary award during years one through five of study may, with program approval, defer up to one year of the university fellowship or stipendiary award made at the time of admission, if permissible based upon the award criteria from the external funding agency.

The university fellowship program and/or the student's home department or program can assist students when considering the benefits of each option. For cases in which a student has access to multiple sources of funding, external funds must be used before university funds are applied. University, school, and degree program funds will be the last source of funds to be applied to a student's financial support.

Schools and departments/programs may choose to offer an additional financial incentive to students who are awarded competitive external funding. Any such incentives must be uniformly awarded to all qualifying students within a degree program. Incentive awards given by school or degree programs to students who win external awards do not count toward the total university financial support; these incentive awards are in addition to the fellowship or stipendiary award.

All financial support will be applied in accordance with the terms and conditions of each funding source. In consultation with the student, departments/programs should ensure financial support is dispersed in the correct amount and in accordance with applicable policy.

* Limited exceptions may occur for instances in which the external award is explicitly contingent on the continuation of the university stipendiary award. In such instances, the decision on stacking is at the discretion of the school dean or their designee for support provided by the school or by a cross-school interdisciplinary program and at the discretion of the fellowship administrator for university-wide fellowships (e.g., OCF, MISA).

PhD Student Employment

Full-Time Employment

University financial support that is provided at or above the university-wide PhD minimum stipend rate is intended to enable students to focus exclusively (i.e., full time) on their studies. Students who receive university financial support at or above the university-wide minimum PhD stipend rate are not permitted to hold full-time employment.

Students who perform full-time employment during the summer term will have their university fellowship or stipendiary award stopped for the duration of their full-time employment. Students are also subject to any school or program-based policies regarding employment, which may be more restrictive. Students should consult their school and degree program for approval.

Part-Time Employment

To ensure that students receiving university financial support can focus on their programmatic requirements and make expeditious progress toward degree completion, part-time employment should not exceed an average of 10 hours per week. This allowance may be restricted by schools/departments/programs to a smaller number of hours per week to conform with a student's funding source policies and with federal time and effort reporting guidelines (as applicable).

If a student and that student's advisor(s) believe that additional part-time employment will enhance the student's outcomes and is unlikely to hinder timely progress toward degree completion, the student may request approval for an exception through their school's graduate program office. Any such exceptions will be documented and kept on file in the school. For students supported on federal grants, it is the school's responsibility to ensure adherence to any constraints derived from time and effort reporting.

To reiterate, students are also subject to any school or department/program-based policies regarding employment, which may be more restrictive. Students should consult their school and degree program for approval prior to undertaking any part-time employment.

Implications for International Students

International students attending WashU on a visa must consult with the Office for International Students and Scholars (OISS) before accepting any external or internal employment, either full-time or part-time.

Tax Implications

Please visit WashU's Financial Services website for more information about the taxability of stipend payments. Students are encouraged to consult a personal tax advisor to ensure that they are adhering to federal and state laws and Internal Revenue Service (IRS) regulations.

PhD General Requirements and Policies

To earn a PhD at WashU, a student must complete all courses required by their department/program; maintain satisfactory academic progress; pass certain examinations; fulfill residence and mentored experience requirements; write, defend, and submit a dissertation; and file an Intent to Graduate in Workday Student. **Note:** Individual schools and departments/programs may have more restrictive policies than the university-wide policies stated herein.

Residence Requirement

Each full-time PhD student must spend at least one academic year enrolled full-time at Washington University in St. Louis. Any exceptions must be approved by the dean of the student's respective school and the Vice Provost for Graduate Education.

Students admitted to a part-time PhD program must be enrolled in at least 3 units for each Fall/Spring semester until the unit requirements for their program are satisfied

Time Limit for PhD Enrollment Eligibility

Full-time PhD students are eligible for enrollment at Washington University in St. Louis for a maximum of 14 Fall/Spring semesters (seven years). Enrollment includes traditional course registration and 0-unit courses that carry a full-time enrollment status. Semesters of approved leaves of absence do not count toward this time limit.

Students admitted to a part-time PhD program are eligible for enrollment at Washington University in St. Louis for 18 Fall/Spring semesters (nine years). Semesters of approved leaves of absence do not count toward this time limit.

Full-time PhD students and those admitted to part-time PhD programs may petition for an enrollment eligibility extension for a maximum of one academic year. Petitions must be directed to the student's dean or their designee. Supplemental petitions will not be permitted. In unusual circumstances, the dean or their designee may appeal to the Vice Provost for Graduate Education on behalf of a particular student.

Qualifying Examinations

Progress toward the PhD is contingent upon the student passing examinations that are variously called *preliminary*, *qualifying*, *general*, *comprehensive*, or *major field exams*. The qualifying examination process varies considerably according to the department/program, and the structure and schedule of the qualifying exam are set by the department/program in accordance with best practices within their field. The department/program is responsible for documenting the process properly and ensuring the process is clearly outlined to their students. Each PhD program is responsible for notifying the school registrar or the appropriate record custodian of the student's outcome, whether successful or unsuccessful.

Mentored Experience Requirement

As part of the university-wide degree requirements, PhD students and some master's students (i.e., MFA in Writing and MFA in Dance) at WashU must complete a department-/program-defined Mentored Experience Requirement (MER). The MER is an accomplishment that is noted on the student's academic record when complete. Each department/program established a Mentored Experience Implementation Plan (MEIP) in which required MER units and pathways for completion are defined and specified. The MEIP typically consists of Mentored Teaching Experiences (mentored activities designed to achieve competencies in teaching at basic and advanced levels) and/or Mentored Professional Experiences (mentored activities focused on the development of skills relevant to individual, intended career and professional outcomes). Students enroll in Mentored Teaching Experience courses and/or Mentored Professional Experience courses to signify progression toward completing the MER.

Dissertation

As evidence of the mastery of a specific field of knowledge and of the capacity for original scholarly work, each candidate must complete a dissertation. Each PhD candidate will form a Research Advisory Committee (RAC) approved by their department/program and by their school's graduate program oversight body. The RAC will approve the subject and approach of the dissertation, which will be evidenced by the student's completion of the Title, Scope and Procedure requirement.

The RAC should consist of at least three full-time Washington University in St. Louis faculty members who are authorized to supervise PhD students and who have appropriate expertise in the proposed field of study. One of these faculty members must be the student's primary research advisor/mentor. Additional members, including external members with active research programs at outside institutions, may serve on the RAC subject to approval by the school's graduate program oversight body.

- For cross-school/interdisciplinary PhD programs, the approvals referenced above should be obtained from the graduate program oversight body of the school of the primary research advisor/mentor.
- For a PhD program offered in partnership with an external academic institution, one full-time faculty member of the partner institution who is authorized to supervise PhD students and who has appropriate expertise in the proposed field of study may serve on the RAC as part of the three-member minimum requirement.

A Title, Scope and Procedure form for the dissertation must be signed by the RAC members and by the program chair. Full-time students must submit the Title, Scope and Procedure form to the school registrar or the appropriate record custodian at least six months before the degree is expected to be conferred or before the beginning of the fifth year of full-time enrollment, whichever is earlier. Students enrolled in a part-time PhD program must submit the Title, Scope

and Procedure form to the school registrar or the appropriate record custodian at least six months before the degree is expected to be conferred or before the beginning of the sixth year of enrollment, whichever is earlier.

A Doctoral Dissertation Guide and a template that provides instructions regarding the format of the dissertation are available through the website of the Office of the Provost; both of these should be read carefully at every stage of dissertation preparation.

Each student is required to make the full text of the dissertation available to the committee members for their review at least one week before the dissertation defense. Most degree programs require two or more weeks for the review period; students should check their department/program's policies.

Dissertation Defense

Approval of the written dissertation by the Research Advisory Committee (RAC) is strongly recommended before the student can orally defend the dissertation. The doctoral dissertation committee that examines the student during the defense consists of at least five members. Normally, the members of the RAC also serve on the Doctoral Dissertation Committee. The dissertation committee is then additionally augmented to ensure that the following criteria are met:

1. Three of the five members (or a similar proportion of a larger committee) must be full-time Washington University in St. Louis faculty members or, for programs offered by Washington University in St. Louis-affiliated partners, full-time members of a Washington University in St. Louis-affiliated partner institution who are authorized to supervise PhD students and who have appropriate expertise in the proposed field of study. One of these three members must be the PhD student's primary thesis advisor, and one may be a member of the emeritus faculty.
2. All other committee members must be active in research/scholarship and have appropriate expertise in the proposed field of study whether at Washington University in St. Louis, at another university, in government, or in industry.
3. At least one of the five members must bring expertise outside of the student's field of study to the committee, as judged by the relevant school's graduate program oversight body.

The approval processes outlined under RAC in the Doctoral Council bylaws also apply to the doctoral dissertation committee, including approval of each dissertation committee by the host school's graduate program oversight body/bodies.

The student is responsible for making the full text of the dissertation accessible to their committee members for their review in advance of the defense according to program rules. Washington University in St. Louis community members and guests of the student who are interested in the subject of the dissertation are normally welcome to attend all or part of the defense but may ask questions only at the discretion of the committee chair. Although there is some variation among degree programs, the defense ordinarily focuses on the dissertation itself and its relation to the student's field of expertise.

Attendance by a minimum of four members of the Doctoral Dissertation Committee, including the committee chair and an outside member, is required for the defense to take place. This provision is designed to permit the student's defense to proceed in case of a situation that unexpectedly prevents one of the five members from attending. Students should not plan in advance to only have four members in attendance; if one of those four cannot attend, the defense must be rescheduled. The absence of all outside members or of the committee chair would necessitate rescheduling the defense.

Students, with the support of their Doctoral Dissertation Committee chair, may opt to hold their dissertation defense in-person or by utilizing a virtual or hybrid format.

Dissenting Vote(s) at a Dissertation

Faculty members of the Doctoral Dissertation Committee normally will examine the PhD candidate and vote on whether to approve the dissertation. In the vast majority of cases, these votes are unanimously for approval. In the rare case that there are faculty concerns that cannot be resolved through subsequent revisions and which therefore result in dissenting (negative) vote(s), the committee chair will refer the case to the Vice Provost for Graduate Education for resolution.

In the case of a single dissenting vote, the committee chair and the dissenting voter will be asked to explain the reasons for the dissent in a letter to the Vice Provost for Graduate Education. After consulting with these and other members of the committee, the Vice Provost for Graduate Education may then decide to accept the majority opinion and approve the dissertation, or they may seek the opinion of an additional reader. After considering this additional evidence, the Vice Provost for Graduate Education may approve or decline to approve the dissertation.

In the case of two or more dissenting votes, the committee chair and the dissenting voters will again be asked to explain the reasons for the dissent. The Vice Provost for Graduate Education may then decide to decline to approve the dissertation. Alternatively, they may ask the department or graduate program to name a Resolution Committee, consisting of three tenured or tenure-track professors at Washington University in St. Louis or elsewhere who did not serve on the original committee, to reexamine the dissertation and the candidate. A unanimous positive recommendation from this committee will be required in order for the Vice Provost for Graduate Education to approve the dissertation. Failure of a department or graduate program to identify three faculty members to serve on this Resolution Committee will be tantamount to a rejection of the dissertation.

Dissertation Submission

After the successful defense of their dissertation, the student must submit an electronic copy of the dissertation online to the university by the established deadline for their graduation term. Dissertations must be submitted no later than three months after the oral defense of the dissertation. Petitions for an extension to the three-month limit may be submitted to the Director of Graduate Studies for consideration and approval. The submission website requires students

to choose from among publishing and copyrighting services offered by ProQuest ETD Administrator, but the university permits students to make whichever choices they prefer. Washington University in St. Louis doctoral students may initially request to embargo the public release of their dissertation for a specified period of six months, one year, or two years. Renewals beyond the initial embargo may be granted by the Vice Provost for Graduate Education. Students are asked to submit the Survey of Earned Doctorates separately. The degree program is responsible for delivering the final approval form, signed by the committee members at the defense and then by the department/program chair or director, to the school registrar or the appropriate record custodian. Students who complete all degree requirements and defend their dissertations successfully have not completed their PhD requirements; they finish earning their degree only when their dissertation submission has been accepted by their school of record.

Degree Candidacy Extension

Degree Candidacy Extension (DCE) refers to a non-enrolled status available, under exceptional circumstances, to full-time PhD students who have completed all PhD degree requirements with the exception of the dissertation.

Extended degree candidates are not registered for any courses, have no enrollment status, and are ineligible for financial awards or support, benefits, and resources available to enrolled Washington University in St. Louis students. Once a student enters DCE, they may not register or enroll with Washington University in St. Louis as a student in their intended degree program in a future term.

DCE status may be assigned to full-time students in a variety of situations, including but not limited to the following:

- PhD students who do not complete their dissertation after exhausting the time allowable for PhD enrollment status due to circumstances beyond their control (see Time Limit for PhD Enrollment Eligibility earlier on this page);
- PhD students who secure full-time employment prior to the completion of their dissertation and who have established a timeline for the completion of the dissertation requirement; and
- PhD students who have exhausted their university financial support period as defined by their school or program prior to the completion of their dissertation and who have established a time line for the completion of the dissertation requirement.

DCE status may be inappropriate for international students dependent on a U.S. visa, and such students may not be eligible for this status. International students should always consult with an OISS advisor prior to making an enrollment status change. In addition, students admitted as part-time PhD students are not eligible for DCE status.

DCE status is not the rule. Rather, it is assigned as an exception. Students must obtain the recommendation of their department/program leadership and petition the Vice Dean for Graduate Education (or equivalent) within their school to request to enter DCE status. If the petition is successful, the DCE status is conferred for the period of one year, after which an additional petition should be made and approved. Students seeking to remain in DCE status are obligated to provide a written report on their dissertation's progress annually to

their department to secure their approval for subsequent petitions. Individual departments may require additional checkpoints to ensure progression. Students may remain a PhD candidate in this status for a maximum of three calendar years.

If three calendar years pass from the first semester in which a student was placed on DCE and the student has not successfully completed all degree requirements, then that student has officially forfeited their eligibility to earn the PhD degree. Under these circumstances, the student may petition the Vice Provost of Graduate Education with the support of their department chair and school vice dean to be allowed to complete the degree outside of the three-year extension period. The petition will include a timeline for completion. The Vice Provost of Graduate Education reserves the right to deny any such request.

PhD Mentored Experiences

The Mentored Experience Requirement (MER)

As part of the university-wide degree requirements, PhD students and students in certain master's programs (i.e., MFA in Writing and MFA in Dance) at Washington University in St. Louis must complete a program-defined Mentored Experience Requirement (MER). The MER is an accomplishment that is noted on the student's academic record when complete. Each program established a Mentored Experience Implementation Plan (MEIP) in which required MER units and pathways for completion are defined and specified. The MEIP typically consists of Mentored Teaching Experiences (mentored activities designed to achieve competencies in teaching at basic and advanced levels) and/or Mentored Professional Experiences (mentored activities focused on the development of skills relevant to individual, intended career, and professional outcomes). Students enroll in Mentored Teaching Experience (MTE) courses and/or Mentored Professional Experience (MPE) courses to signify progression toward completing their MER.

Mentored Experience Implementation Plan (MEIP)

An MEIP is a program-defined plan for students to complete their MER and engage in mentored teaching activities and/or mentored professional activities. MEIPs include the philosophy related to the role of teaching or professional experiences within the discipline, the program's plan for preparatory engagement, the normal sequence of opportunities for a student, and the number of MER units required. Each of these terms are defined within this section.

MEIPs were updated by programs during the 2024-25 academic year, and new plans are available under each program's "Mentored Experience Implementation Plan" tab in the *Bulletin*. Plans were effective as of Fall 2025 and applied to all students who had not yet completed their MER. Any revised plans in this Bulletin would be effective for students entering their program in Fall 2026.

Preparatory Engagement

Preparatory Engagement activities represent an introduction to the foundational skills associated with teaching or communication. Preparatory Engagement represents an important foundational component to training in pedagogy. As such, all MEIPs contain required pedagogical preparation before students are permitted to engage in assisting or teaching in a classroom.

Mentored Teaching Experiences (MTEs)

An MTE represents a collaborative engagement between a student and a faculty mentor wherein the student reflects on and interprets disciplinary knowledge; identifies multiple ways to represent disciplinary content; adapts content to students' abilities and prior knowledge; and develops methods to assess and improve the teaching and learning process in a discipline. A student engaged in an MTE will have an assigned faculty mentor supporting the student's development into an educator able to communicate and/or evaluate disciplinary knowledge.

Two categories of MTE exist at WashU: Assistantships in Instruction (AI) and Mentored Independent Teaching (MIT). Each MTE engagement is weighted by MER units to recognize the different levels of effort involved.

Assistant in Instruction (AI)

An AI experience is one in which the student is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. During the AI, the student receives mentorship from the faculty member in best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students receive regular informal feedback or evaluation from the mentor throughout the semester, as well as a final evaluation from the mentor and course evaluations from students enrolled in the course as part of the normal course evaluation process.

The student is formally listed as instructional support via Workday in the course listings. In general, AI assignments connect to undergraduate courses or to lower-level graduate courses that the student has taken previously.

MER units for AI experiences are determined by the program based on the level of activity needed for each assignment:

- 5 MER units are equivalent to an average of 5 hours per week of engagement; students enroll in their program's course numbered 8005 during the semester of engagement.
- 10 MER units are equivalent to an average of 10 hours per week of engagement; students enroll in their program's course numbered 8010 during the semester of engagement.
- 15 MER units are equivalent to an average of 15 hours per week of engagement; students enroll in their program's course numbered 8015 during the semester of engagement.

Mentored Independent Teaching (MIT)

An MIT is a semester-long experience for students who engage as the primary instructor or co-instructor of a course *under the mentorship of a faculty member* as part of their MER. Throughout the semester, students receive regular feedback from a faculty mentor based on classroom observation conducted a few times per semester or other acceptable review mechanisms. The student should ask for guidance and support from the faculty mentor while navigating the responsibilities of independent teaching. Faculty mentors are also required to complete the final evaluation for the student.

An MIT experience may not be a requirement or option under every program's MEIP. Each MIT engagement will equate to 20 MER units. The 20 MER unit assignment accounts for the considerable level of preparation and consultation each PhD student needs to engage in as part of this introductory experience toward acquiring the skills required for independent teaching. Students enroll for the semester of engagement under their program's course numbered 8020.

Mentored Professional Experiences (MPEs)

MPEs are unpaid experiences that allow students to develop skills and experiences relevant to their intended career outcomes. These experiences could include, for example, opportunities in industry, communication and outreach, government or policy, consulting, or higher education administration. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences.

An MPE experience may not be a requirement or option under every program's MEIP. Each MPE engagement will equate to 20 MER units. The 20 MER unit assignment accounts for the considerable level of preparation and time needed for this engagement. An MPE should involve at least 150 hours (and not more than 180 hours) per engagement. Students enroll for the semester of engagement under their program's course 8120.

Optional MER Activities

Some programs allow for students to participate in additional, optional MTE or MPE engagements. If allowed, the program's MEIP will list the requirements for a Teaching Intensive Pathway (TIP) or a Professional Intensive Pathway (PIP).

Teaching Intensive Pathway (TIP)

The TIP is an optional pathway for those students whose career interests lie in academia or another field that would benefit from extended MTEs. This immersive experience allows students to further explore the breadth and depth of teaching best practices and pedagogy related to their respective field.

Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the TIP will not receive compensation.

Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or want to benefit from MPEs. An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Similar to normal MPE experiences, students who participate in the PIP do not receive compensation associated with their MPE.

Post-MER Completion Teaching Activities

To be eligible to participate in an additional teaching activity at WashU, students must complete their MER as defined by their program's MEIP prior to undertaking optional elective instructional activity. Any independent teaching for pay that occurs after the completion of the MER must meet the spirit of the part-time employment policy or otherwise students must request an exception.

Instructional Support

At the completion of the student's MER as defined in the MEIP, students may elect to pursue additional instructional opportunities at WashU as a non-MTE AI or a similarly situated role. These additional opportunities are subject to the approval of their primary advisor and their department/program as well as the existence of such a position. These students will be paid an hourly rate.

Instructor or Co-Instructor of Record

At the completion of a student's MER requirements as defined in the MEIP, the student may elect to pursue instructor opportunities at WashU as an independent instructor. These opportunities are subject to the approval of the student's primary advisor and their department/program as well as the existence of such a position. Students who have completed their MERs must demonstrate the requisite experience and training in pedagogy to engage in teaching at the fully independent level. These students are eligible for compensation in accordance with the adjunct professor collective bargaining agreement.

Current MEIPs

Arts & Sciences

- Anthropology, PhD, Archeology Concentration
- Anthropology, PhD, Biological Anthropology Concentration
- Anthropology, PhD, Sociocultural Anthropology Concentration
- Art History & Archaeology, PhD
- Chemistry, PhD
- Classics, PhD
- Comparative Literature, PhD
- Dance, MFA
- Earth, Environmental, and Planetary Sciences, PhD
- East Asian Languages and Cultures, PhD
- Ecology and Evolutionary Biology, PhD
- Economics, PhD
- Education, PhD
- English and American Literature, PhD
- English and Comparative Literature, PhD
- French and Francophone Studies and Comparative Literature, PhD
- French and Francophone Studies, PhD
- German and Comparative Literature, PhD
- Germanic Languages and Literatures, PhD
- Hispanic Studies and Comparative Literature, PhD
- Hispanic Studies, PhD
- History, PhD
- Mathematics, PhD
- Music, PhD, Music Theory Concentration
- Music, PhD, Musicology Concentration
- Philosophy, PhD
- Philosophy-Neuroscience-Psychology, PhD
- Physics, PhD
- Political Science, PhD
- Psychological & Brain Sciences, PhD
- Sociology, PhD
- Statistics and Data Sciences, PhD
- Writing, MFA

Business

- PhD Program

Engineering

- Biomedical Engineering PhD
- Biomedical Engineering PhD-MD
- Computational & Data Sciences, PhD
- Computer Engineering, PhD

- Computer Science, PhD
- Electrical Engineering, PhD
- Energy, Environmental, & Chemical Engineering, PhD
- Imaging Science, PhD
- Materials Science & Engineering, Interdisciplinary PhD
- Mechanical Engineering, PhD
- Systems Science & Mathematics, PhD

Medicine

- Division of Biology & Biomedical Sciences Programs (p. 51)
 - Biochemistry, Biophysics & Structural Biology, PhD (p. 117)
 - Biomedical Informatics & Data Science, PhD (p. 120)
 - Cancer Biology, PhD (p. 123)
 - Computational & Systems Biology, PhD (p. 126)
 - Developmental, Regenerative, & Stem Cell Biology, PhD (p. 129)
 - Immunology, PhD (p. 132)
 - Molecular Cell Biology, PhD (p. 135)
 - Molecular Genetics & Genomics, PhD (p. 138)
 - Molecular Microbiology & Microbial Pathogenesis, PhD (p. 141)
 - Neurosciences, PhD (p. 144)
 - Plant & Microbial Biosciences, PhD (p. 147)
- Medical Physics, PhD (p. 197)
- Movement Science, PhD (p. 205)
- Nursing Science, PhD (p. 200)
- Rehabilitation and Participation Science, PhD (p. 202)
- Speech and Hearing Sciences, PhD (p. 114)

Public Health

- Public Health Sciences, PhD

Brown School

- Social Work, PhD

Additional information including forms, resources, and FAQs are available on the Mentored Experiences page of the Office of the Provost website.

Washington University School of Medicine in St. Louis

Washington University School of Medicine is a world leader in medical education, research and patient care. Its graduate programs in medical education (p. 76), occupational therapy, physical therapy and audiology are considered to be among the nation's best. Faculty lead a robust research enterprise, supported by \$583.4 million from the National Institutes of Health during the fiscal year ending June 30, 2023. The school's physicians provide care in partnership with the nationally ranked Barnes-Jewish Hospital and St. Louis Children's Hospital.

Official Course Catalog

The *Bulletin* of Washington University School of Medicine presents the academic policies, services, and course and degree program offerings of the school. It also includes academic calendars, leadership, and directories for faculty, students and staff.

Contact Information

Washington University School of Medicine
660 S. Euclid Ave.
St. Louis, MO 63110

Website: <https://medicine.wustl.edu/education>

Mission & Vision

Our Vision

Washington University School of Medicine will lead in advancing human health through the promotion of wellness and the delivery of outstanding health care, innovative research, and the education of tomorrow's leaders in biomedicine within a culture that supports diversity, inclusion, critical thinking and creativity.

Our Mission

In leading the advancement of human health, Washington University School of Medicine will do the following:

- Cultivate excellence and collegiality within an equitable and inclusive community
- Attract, develop, advance and support a diverse and talented current and future workforce
- Innovate through discoveries and inventions in basic, clinical, translational and population sciences

- Build and support an environment that fosters exceptionally creative research, health care, education and the well-being of our workforce
- Use our academic excellence and scientific rigor to continually advance and enhance health care in a way that ensures access, compassion, high value, equity, and evidence-based care for all people in our community, including those who are underserved and uninsured
- Observe the highest standards of ethics, integrity and humanity across all missions
- Apply advances in research, education and health care to the betterment of the human condition locally and globally

Diversity Statement

Washington University School of Medicine's culture of collaboration and inclusion is the foundation for success in everything it does. The School of Medicine recognizes that — by bringing together people from varying backgrounds, experiences, and areas of expertise — it can develop richer solutions to complex scientific questions, train culturally sensitive clinicians, and provide health care in a way that best serves our diverse patient population. To support these values, the School of Medicine is deeply committed to building a diverse and inclusive community in which everyone is welcomed and valued. As the School of Medicine engages more fully with the community around it and appeals more broadly to student talent, it has adopted a clearer priority on diversifying its own ranks. Washington University encourages and gives full consideration to all applicants for admission, financial aid, and employment regardless of race, color, ethnicity, age, religion, sex, sexual orientation, ability, gender identity or expression, national origin, veteran status, socioeconomic status, or genetic information. We implement policies and practices that support the inclusion of all such potential students, trainees, and employees, and we are committed to being an institution that is accessible to everyone who learns, conducts research, works, and seeks care on our campus. We provide reasonable accommodations to those seeking that assistance.

The School of Medicine Vision and Mission were approved by the Executive Faculty on Sept. 8, 2021.

The diversity statement was revised and endorsed by the School of Medicine Academic Affairs Committee on December 10, 2020. It was approved by the Executive Faculty on January 6, 2021.

Areas of Study

- Audiology and Communication Sciences (p. 45)
- Biology and Biomedical Sciences (p. 51)
- Clinical Investigation (p. 64)
- Genetic Counseling (p. 69)
- Informatics, Data Science, and Biostatistics (p. 71)
- Medical Education (MD, GME, CME) (p. 76)
- Medical Physics (p. 76)
- Nursing Science (p. 79)

- Occupational Therapy (p. 83)
- Physical Therapy (p. 95)
- Population Health Sciences (p. 104)
- Public Health (p. 107)
- Reproductive Sciences (p. 108)

Audiology and Communication Sciences

The Program in Audiology and Communication Sciences (PACS) offers exceptional graduate education programs in clinical audiology (AuD), deaf education (MSDE), and speech and hearing sciences (PhD) as well as an undergraduate minor in speech and hearing (p. 116).

PACS provides students with a uniquely supportive and approachable atmosphere where they are encouraged and respected by one another and by faculty as they develop their passion, knowledge, and experience. With hearing research programs, a school for children who are deaf or hard of hearing, and audiology clinics located on campus, our students gain a breadth and depth of firsthand experience with opportunities to further their educations and careers. As one of the oldest and most respected centers for education, clinical care, and research in hearing disorders, balance, and language, our history is rich in groundbreaking discoveries, and our highly ranked graduate programs are taught by some of the leading minds in these fields.

By preparing passionate and experienced graduates, we strive to improve outcomes for people with hearing disorders.

Additional Information

Additional information, including application and admission information, program descriptions, and tuition and fees, can be found on the PACS website or through direct correspondence with PACS.

WashU Medicine
Audiology and Communication Sciences
MSC 8042-26-2000
660 S. Euclid Ave.
St. Louis, MO 63110

Phone: 314-747-0104
Email: pacs@wustl.edu
Website: <https://pacs.wustl.edu>

Degrees & Offerings

- Doctor of Audiology (p. 113)
- PhD in Speech and Hearing Sciences (p. 113)
- Master of Arts in Speech and Hearing Sciences (p. 115)
- Master of Science in Deaf Education (p. 115)
- Minor in Speech and Hearing Sciences (p. 116)

Research

The integration of research into the curriculum is a distinctive feature of the PACS graduate programs. All students receive research training through course work and the completion of an independent research project. Additional opportunities to pursue individual research interests are also available, including via Grand Rounds, colloquia, brown bag seminars, journal clubs and similar opportunities. In addition, elective summer research opportunities, which include a stipend, are also available for interested and qualified AuD students.

The affiliated Department of Otolaryngology's Harold W. Siebens Hearing Research Center provides focused research in two primary areas. The *Fay & Carl Simons Center for the Biology of Hearing and Deafness* is made up of a group of investigators within the department who study the cellular and molecular mechanisms of auditory signal transduction, sensory cell death, and regeneration and development. Ongoing and new studies within this group are adding to our understanding of the molecular and cellular processes of the development of neural connections, hearing loss and the potential for future treatments. In the *Center for Childhood Deafness and Adult Aural Rehabilitation*, researchers are achieving a better understanding of how communication disorders can be measured, treated and overcome.

Additional areas of research focus within the department include the study of normal vestibular function and vestibular disorders, hearing aids, cochlear implants, age-related and noise-induced hearing loss, and the education of children who are deaf or hard of hearing.

Faculty

Program Directors

Kate McClannahan
Director of Undergraduate Studies
Assistant Professor of Otolaryngology

Amanda Ortmann
Director of Audiology Studies
Assistant Professor of Otolaryngology

Casey Reimer
Director of Deaf Education Studies
Assistant Professor of Otolaryngology

Faculty and Staff List

For a full list of faculty and staff, please visit the PACS website.

Courses

PACS 3000 Acoustics and Speech Perception

Topics include principles of acoustics, with applications to speech and hearing. Basic physics of sound -- including simple harmonic motion, wave propagation in air, resonance, sound measurement and spectral analyses, filtering, and digital sound processing -- are discussed. Principles will be applied to the production and physical properties of speech. An overview of the acoustic characteristics of individual speech sounds and of suprasegmental speech patterns will be provided. Perceptions of speech and non-speech sounds are discussed.

Credit 3 units.

Typical periods offered: Spring

PACS 3010 Introduction to Audiology

This course covers the role of the audiologist in the diagnosis and treatment of hearing loss; the administration and interpretation of audiologic test results; and amplification systems and assistive devices. It explores practical experience with the clinical issues professionals will face when working with individuals who are deaf or hard of hearing. This course is recommended for future practitioners in speech-language pathology/audiology/deaf education who will be serving individuals with hearing loss across the lifespan.

Credit 3 units.

Typical periods offered: Fall

PACS 3993 Observation in Audiology

Provides students with an introduction to clinical methods and observation experiences in audiology. Important note: Students must complete screening requirements to be eligible to observe in clinical spaces. Visit <https://hr.wustl.edu/non-appointee-visitor-observer/> for information.

Credit 3 units.

Typical periods offered: Fall

PACS 3994 Observation and Methods in Speech-Language Pathology

This course surveys a broad range of speech and language disorders in terms of associated characteristics, assessment techniques, and treatment considerations. Important note: Students must complete screening requirements to be eligible to observe in clinical spaces. Visit <https://hr.wustl.edu/non-appointee-visitor-observer/> for information.

Credit 3 units.

Typical periods offered: Fall

PACS 4000 Anatomy and Physiology of Speech and Hearing

General introduction to anatomy (structure) and physiology (function) of the auditory, vestibular, and speech production systems, including organ systems of audition, articulation, and phonation (nervous, respiratory, and musculoskeletal systems). Covers normal and disordered structure and function.

Credit 3 units.

Typical periods offered: Fall

PACS 4050 Sign Language I

Basics of American Sign Language are introduced, including vocabulary, grammatical structure, fingerspelling, and cultural information about the Deaf community. This is a highly interactive and participatory course.

Credit 2 units. EN: H

Typical periods offered: Fall Intersession, Spring Intersession

PACS 4051 Sign Language II

Continues development of American Sign Language with additional vocabulary, emphasis on expressive and receptive abilities, conversational skills, and knowledge of Deaf culture. This is a highly interactive and participatory course.

Credit 2 units. EN: H

Typical periods offered: Spring Intersession

PACS 4052 Sign Language III

Continues development of American Sign Language with additional vocabulary, emphasis on expressive and receptive abilities, conversational skills. Expands knowledge of deaf culture/history specific to D/deaf Education and American Sign Language. This is a highly interactive and participatory course.

Credit 2 units.

Typical periods offered: Fall Intersession

PACS 4060 Typical Language Development

Study of typical language development, including the phonologic, morphologic, semantic, syntactic and metalinguistic aspects. Interactions between linguistic and other areas of child development will be discussed. Contrasts will be explored between typical and atypical child development to shed light on language learning processes.

Credit 3 units.

Typical periods offered: Fall

PACS 4080 Speech and Language Disorders

This course surveys a broad range of speech and language disorders in terms of associated characteristics, assessment techniques and treatment considerations.

Credit 3 units.

Typical periods offered: Spring

PACS 5000 Anatomy and Physiology of Speech and Hearing

Comprehensive introduction to anatomy (structure) and physiology (function) of the auditory, vestibular, and speech production systems, including organ systems of audition, articulation, and phonation (nervous, respiratory, and musculoskeletal systems). Covers normal and disordered structure and function. All undergraduate students should register for Section 01.

Credit 3 units.

Typical periods offered: Fall

PACS 5702 Research Seminar

A seminar of variable topics related to research in speech and hearing sciences. Each semester/section has its own specific area of focus, which may include an investigation of active areas of research, an overview of outcomes-based research and evidence-based practice for students' research projects, or thorough analysis and discussion of a specific area of active research. See section description for information on specific topics by section.

Credit 1 unit.

Typical periods offered: Fall, Spring



PACS 5705 Introduction to Research

This course provides foundational concepts related to research methodologies, critical analysis skills, and the scientific principles necessary to evaluate and interpret research literature within the field of hearing science, enabling students to apply evidence-based practices in their future clinical careers.

Credit 0.5 units.

Typical periods offered: Fall

PACS 5710 Journal Club

Presentation and discussion of current issues and recent research in the fields related to hearing and deafness.

Credit 6 units.

Typical periods offered: Fall, Spring

PACS 6010 Behavior Management

Introduction to various behavior management systems effective in both individual and group environments. Behavior interventions, classroom management strategies, environmental controls, psychodynamic techniques, and biophysical interventions are discussed, observed, and practiced. Focus is on working with children who are deaf or hard of hearing.

Credit 2 units.

Typical periods offered: Fall

PACS 6020 Evaluation Techniques for Children Who Are Deaf or Hard of Hearing

A basic introduction to psychometrics with emphasis on the selection, interpretation, and evaluation of assessments. Specific techniques for evaluating intellectual, educational, and linguistic abilities and achievement in children who are deaf or hard of hearing, from infancy through adolescence, are discussed and demonstrated.

Credit 3 units.

Typical periods offered: Fall

PACS 6040 Early Literacy Development of Children Who Are Deaf or Hard of Hearing

Development of early print-recognition, reading, and writing of children who are typically hearing and children who are deaf or hard of hearing. Focus is on the years leading up to kindergarten. An overarching theme is the interaction between early language and early literacy development. Evidence-based strategies for differentiated instruction will also be discussed.

Credit 3 units.

Typical periods offered: Fall

PACS 6050 Amplification Systems and Aural Rehabilitation for Children

This course will provide students with a broad understanding of amplification systems and principles and methods of aural rehabilitation as they apply to children who are deaf or hard of hearing. Amplification systems to be covered will include digital hearing aids, cochlear implants and a full range of assistive devices. Aural rehabilitation topics will emphasize patient management and will include communication strategies, conversation styles and speech recognition assessment. Students will be provided with videos, live demonstrations and in-class activities. Direct contact with children and technological devices will also be used to support lectures and discussions.

Credit 2 units.

Typical periods offered: Spring

PACS 6060 Language Instruction for Children Who Are Deaf or Hard of Hearing

Principles and methods of developing competence in spoken English in children who are deaf or hard of hearing, birth to grade 12. Includes presentation of differentiated instructional techniques for teaching a diverse population of children who are deaf or hard of hearing English vocabulary, syntax, and pragmatics, as well as techniques for auditory training. Evaluations and data-driven lesson planning/IEP/IFSP development will be discussed, as well as the role of families as engaged, educational partners in spoken language development.

Credit 3 units.

Typical periods offered: Fall

PACS 6070 Foundations of Literacy Theory and Instruction

Principles and methods of developing reading and writing competence in children who are typically hearing, with an emphasis on the stages of development and appropriate teaching sequences. Based on this foundation, strategies and methods will be presented for making appropriate differentiated learning adaptations and interventions for reading instruction with students who are deaf or hard of hearing who have language and reading deficits. Additional topics include the use of children's literature in instruction, the intersection of language and reading development, content literacy, and general language arts instruction.

Credit 4 units.

Typical periods offered: Spring

PACS 6071 Literacy Lab: A Focus On Typical and Atypical Learners

Emphasizes observation and some practice planning and teaching reading and writing with students who are typical and atypical learners, including children who are deaf or hard of hearing and who struggle to develop appropriate literacy skills. Observations will focus on areas such as how teachers use differentiated learning strategies for diverse learners, the use of children's literature in instruction, the intersection of language and reading development, instruction in content literacy, and general language arts instruction.

Credit 2 units.

Typical periods offered: Spring

PACS 6080 Counseling Parents of Children Who Are Deaf or Hard of Hearing

Examines the psychological needs of families who have children who are deaf or hard of hearing. The aim of the course is to help teachers of children who are deaf or hard of hearing interact more effectively with parents and caregivers, using a collaborative model that views families as engaged partners in the educational process. Students will develop a repertoire of interviewing and counseling skills, as well as learn about a wealth of resources to share with families.

Credit 3 units.

Typical periods offered: Spring

PACS 6090 Speech for Children Who Are Deaf or Hard of Hearing

Development, improvement and maintenance of speech skills for children who are deaf or hard of hearing through multisensory approaches. Articulation, voice and rhythm patterns are considered. Lectures, demonstrations and practice.

Credit 3 units.

Typical periods offered: Spring

PACS 6100 Psychosocial and Educational Foundations of Deafness

Examines psychological, social, educational, legal, historical, and cultural influences related to individuals who are deaf or hard of hearing. Additional topics include IEPs and interprofessional collaboration related to post-high school transitions.

Credit 2 units.

Typical periods offered: Spring

PACS 6110 Mathematics And Content-Area Instruction for Children Who Are Deaf or Hard of Hearing I

Principles and methods of teaching mathematics to students who are typically hearing and those who are deaf or hard of hearing. Strategies for other content-area instruction (science, social studies), use of instructional technology, and strategies for improving content literacy will also be discussed, with an emphasis on techniques for working with children who are deaf or hard of hearing. Students will practice developing and implementing lesson plans that are aligned to state and national standards.

Credit 3 units.

Typical periods offered: Spring

PACS 6111 Mathematics And Content-Area Instruction for Children Who Are Deaf or Hard of Hearing II

Principles and methods of teaching mathematics to students who are typically hearing and those who are deaf or hard of hearing. Strategies for other content-area instruction (science, social studies), use of instructional technology, and strategies for improving content literacy will also be discussed, with an emphasis on techniques for working with children who are deaf or hard of hearing. Students will practice developing and implementing lesson plans that are aligned to state and national standards.

Credit 3 units.

Typical periods offered: Fall

PACS 6120 Fundamentals of Early Intervention and Child Development

Course provides information about general and exceptional child development, focusing on ages birth through five years. Course also discusses historical and philosophical tenets of early intervention practice, focusing on a collaborative coaching model, which views families as engaged partners in the child's education. Other topics include addressing needs of families from a variety of cultural and economic backgrounds, linking families to resources, and Federal laws that govern special education services for children with disabilities including transitions in service provisions for children at the age of 3 years.

Credit 2 units.

Typical periods offered: Spring

PACS 6122 Early Intervention: Serving Children Who Are Deaf or Hard of Hearing, Birth to Age 5

This course provides an overview of early childhood development of children who are deaf or hard of hearing, birth to age 5, with particular focus on early speech and language development, intervention strategies, assessment techniques, instructional strategies, and aural rehabilitation. Course discusses the philosophical tenets of early intervention practice, which views families as engaged partners in the child's education, and respects cultural and linguistic diversity. Students will learn about IFSP and IEP development, as well as a variety of resources that can be provided to families.

Credit 3 units.

Typical periods offered: Fall

PACS 6130 Pre-Service Teacher Preparation

This course is designed to help students in the deaf education teacher training program create a teaching portfolio that reflects their own teaching development. Students will demonstrate their ability to reflect on and critique their own teaching practice especially in relation to course planning, instructional strategies, differentiated learning, data-based decision-making, tiered systems for supporting instruction, and classroom management. Professional issues, including developing a résumé and conducting interviews, will also be discussed.

Credit 1 unit.

Typical periods offered: Fall

PACS 6900 Independent Study

Students engage in independent work on the Independent Study, which demonstrates advanced critical thinking and writing skills.

Credit 6 units.

Typical periods offered: Fall, Spring, Summer

PACS 7010 Clinical Audiology

An introduction to the field of clinical audiology. Covers the role of the audiologist in the diagnosis and treatment of hearing disorders; the administration and interpretation of audiologic test results; and amplification systems and assistive devices, such as DM/FM technology. Additional topics may include relevant calibration and instrumentation requirements, audiology as a career, aural rehabilitation, and legal and ethical issues in the field.

Credit 3 units.

PACS 7411 Practicum in Deaf Education

Supervised practicum in education of children who are deaf or hard of hearing. Students will be placed in field experiences (early, mid-level, and culminating levels) in a variety of educational settings with a variety of age ranges, using interventions in areas such as language, speech, auditory training, reading, math, and other content areas.

Credit 1-12 units.

Typical periods offered: Fall

PACS 7412 Practicum in Deaf Education

Supervised practicum in education of children who are deaf or hard of hearing. Students will be placed in field experiences (early, mid-level, and culminating levels) in a variety of educational settings with a variety of age ranges, using interventions in areas such as language, speech, auditory training, reading, math, and other content areas.

Credit 1-12 units.

Typical periods offered: Spring

PACS 8000 Anatomy and Physiology of Speech and Hearing

Comprehensive introduction to anatomy (structure) and physiology (function) of the auditory, vestibular, and speech production systems, including organ systems of audition, articulation, and phonation (nervous, respiratory, and musculoskeletal systems). Covers normal and disordered structure and function.

Credit 3 units.

Typical periods offered: Fall

PACS 8010 Clinical Audiology I

An introduction to the field of clinical audiology. Covers the role of the audiologist in the diagnosis and treatment of hearing disorders; the administration and interpretation of audiologic test results; and amplification systems and assistive devices, such as DM/FM technology. Additional topics may include relevant calibration and instrumentation requirements, audiology as a career, aural rehabilitation, and legal and ethical issues in the field.



Credit 3 units.

Typical periods offered: Fall

PACS 8011 Clinical Audiology II

Covers hearing evaluation and diagnosis in clinical audiology from infancy through adulthood. Topics include auditory processing disorders, functional hearing loss, and other advanced measures.

Credit 3 units.

Typical periods offered: Spring

PACS 8020 Introduction to Electroacoustics

Introduction to the physics of sound. Topics include production, transmission, and reception of sound and factors affecting human communication. Includes discussion, lectures, problems, and lab.

Credit 3 units.

Typical periods offered: Fall

PACS 8030 Rehabilitative Audiology

Principles and methods of aural rehabilitation with an emphasis on patient management. Topics include communication strategies and conversation styles, speech recognition assessment and hearing aid service provisions for adults, older persons, children, and family members.

Credit 3 units.

Typical periods offered: Fall, Spring

PACS 8040 Pediatric Audiology

Fundamentals of audiologic assessment for infants and children. Behavioral and electrophysiologic procedures, and assessment of auditory processing abilities, are presented.

Credit 3 units.

Typical periods offered: Fall

PACS 8050 Business Practices

Issues relating to establishing a private practice including clinical management, small business and accounting practices, models of private practice, referrals and reimbursement, and managed care.

Credit 2 units.

Typical periods offered: Fall, Summer

PACS 8052 Leadership Skills and Precepting

Provides an overview of effective leadership skills for future audiologists, as well as knowledge and skills needed to effectively serve as a preceptor in a clinical setting.

Credit 1 unit.

Typical periods offered: Fall

PACS 8060 Electrophysiologic Techniques I

Introduces basic concepts in administration and interpretation of physiologic and electrophysiologic measures, with focus on early latency auditory evoked potentials (AEP). Content covers basic instrumentation, parameters and variables affecting the otoacoustic emissions (OAE) and AEP measurements of auditory brainstem response (ABR), auditory steady state response (ASSR), and electrocochleography (ECochG). Course includes a strong experiential component with hands-on activities related to the performing these measures, identifying waveforms and interpreting results.

Credit 3 units.

Typical periods offered: Fall

PACS 8061 Electrophysiologic Techniques II

Advanced concepts related to the administration and interpretation of physiologic and electrophysiologic measures. Content includes in-depth study of ABR and its correlates with Auditory Steady State Response (ASSR), and the clinical application of these for the audiologist. Additional topics include middle (MLR) and late (LLR) evoked response, P300 auditory responses, and mismatched negativity (MMN). This course will include a thorough study of intraoperative monitoring including neurophysiology and anatomy review, cranial nerve monitoring, spinal cord monitoring, and facial nerve monitoring.

Credit 1 unit.

Typical periods offered: Summer

PACS 8070 Pharmacology

Includes basic information related to medications utilized for treating common hearing/balance disorders. Hearing and balance side effects of medications are discussed, as are ototoxic and preventative mechanisms related to pharmacology.

Credit 1 unit.

Typical periods offered: Summer

PACS 8080 Auditory Neuroscience

Development of an in-depth understanding of issues related to auditory neurophysiology from the auditory nerve to the cortex.

Credit 2 units.

Typical periods offered: Spring

PACS 8090 Genetics in Hearing Loss

Study of the genetic causes of hearing loss and balance disorders, and syndromes affecting the auditory and vestibular systems.

Credit 1 unit.

Typical periods offered: Fall, Summer

PACS 8100 Vestibular Disorders

Comprehensive course covering the assessment, diagnosis, and treatment of vestibular disorders.

Credit 3 units.

Typical periods offered: Spring

PACS 8110 Auditory Perception

Study of how the listener perceives parameters of and differences in acoustical stimuli. Perception of the speech stimulus is also studied in detail, both for listeners who are typically-developing and those who are deaf or hard of hearing.

Credit 3 units.

Typical periods offered: Spring

PACS 8120 Hearing Conservation

This course will cover topics related to hearing conservation, including effects of noise on hearing, environmental noise, classroom acoustics, federal regulations, interactions of noise and other agents, and ototoxicity. Additional topics may vary year-to-year.

Credit 1-2 units.

Typical periods offered: Spring, Summer

PACS 8130 Counseling for Audiology

Examines the relationship between clinician and patient in audiology. Topics include counseling theory and practices, and principles and methods of effective interviewing and counseling across the lifespan.

Credit 2 units.

Typical periods offered: Summer



PACS 8140 Hearing Devices in Audiology I

Philosophical issues related to the selection and evaluation of hearing devices, including hearing aids and alternative devices. Means of adjusting hearing devices and measuring their function and benefit are covered.

Credit 4 units.

Typical periods offered: Fall

PACS 8141 Hearing Devices in Audiology II (Cochlear Implants)

Covers the selection and fitting of implantable hearing devices including candidacy, psychophysical testing, electrophysiologic testing, programming of the devices, and auditory training. Includes lectures and discussion.

Credit 3 units.

Typical periods offered: Fall

PACS 8142 Hearing Devices in Audiology III (Pediatrics)

This course will cover essential topics related to pediatric amplification. Topics include device candidacy, selection of devices and relevant features, device fitting methods and protocols, verification of fitting, device orientation, hearing assistive technology (HAT), and considerations for special populations. All devices available for the pediatric population will be covered: hearing aids, bone anchored hearing aids, and cochlear implants. Lectures, in-class demonstrations, and lab activities will be used to illustrate procedures and protocols for device fitting.

Credit 2 units.

Typical periods offered: Fall, Spring

PACS 8150 Hearing Disorders

This course covers the nature and causes of hearing disorders, including outer and middle ear, cochlear, retrocochlear and central nervous system.

Credit 2 units.

Typical periods offered: Spring

PACS 8300 Audiology Staffing

Discussion and presentations of clinical cases and issues related to practice in clinical audiology.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PACS 8310 Clinical Skills

Clinical competency checkpoint; topics will vary (see program curriculum for topic by year/semester).

Credit 0.5 units.

Typical periods offered: Fall, Spring

PACS 8411 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 1 unit.

Typical periods offered: Fall

PACS 8412 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 1 unit.

Typical periods offered: Spring

PACS 8413 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 1-4 units.

Typical periods offered: Summer

PACS 8421 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 1-3 units.

Typical periods offered: Fall

PACS 8422 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 1-12 units.

Typical periods offered: Spring Intersession

PACS 8423 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 4 units.

Typical periods offered: Summer

PACS 8431 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 1-12 units.

Typical periods offered: Fall

PACS 8432 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 2 units.

Typical periods offered: Spring

PACS 8433 Fieldwork in Audiology

Supervised fieldwork in audiology.

Credit 6 units.

Typical periods offered: Summer

PACS 8441 Fieldwork in Audiology

Fieldwork in audiology.

Credit 9 units.

Typical periods offered: Fall

PACS 8442 Fieldwork in Audiology

Fieldwork in audiology.

Credit 9 units.

Typical periods offered: Spring

PACS 8499 Pre-Clinical Externship

Clinical externship in audiology application process.

Credit 1 unit.

Typical periods offered: Fall

PACS 8500 Geriatric Audiology

Study of general aging and age-related hearing loss. Will provide foundational knowledge in the fundamental concepts of aging common to most species, normal and pathological processes in auditory physiology across the lifespan, assessment and treatment of hearing loss in older adults, and non-auditory factors that affect clinical intervention and treatment strategies for older patients (e.g., cognition, mental health, physical limitations).

Credit 2 units.

Typical periods offered: Spring



PACS 8600 Hearing and Communication Seminar

Provides an overview of hearing, auditory neuroscience, language, and deaf education.

Credit 3 units.

Typical periods offered: Fall, Spring

PACS 8700 Statistics and Research Methods

Examines experimental and field research methods as they apply to audiology and communication sciences. Covers such methods as surveys, survey interviews, content analysis, and experimental design.

Credit 3 units.

Typical periods offered: Spring

PACS 8710 Introduction to Scientific Literature

This course introduces students to the study of hearing science through search and examination of scientific literature, including the critical review, discussion, and application of scientific literature as it relates to clinical practice in the field.

Credit 0.5 units.

Typical periods offered: Spring

PACS 8800 Capstone Project Seminar

This weekly, joint meeting is intended to provide extra and preliminary support for initiation of the Capstone Project. Areas will include but are not limited to: journal article critique, scientific writing, overview of research design and methodologies, statistical review, support for graph and table construction, and others.

Credit 1 unit.

Typical periods offered: Fall, Spring

PACS 8900 Capstone Project

Independent work on the Capstone Project.

Credit 1-6 units.

Typical periods offered: Fall, Spring

PACS 9000 Full-Time Graduate Study/Research

Full-time graduate study and/or research; students enrolled in this course have full-time status.

Credit 0 units.

Typical periods offered: Fall, Spring

PACS 9001 Full-Time Graduate Study in Absentia

Full-time graduate study in absentia; students enrolled in this course have full-time status.

Credit 0 units.

Typical periods offered: Fall, Spring

PACS 9002 Full-Time Graduate Study Extension

Full-time graduate study extension; students enrolled in this course have full-time status.

Credit 0 units.

Typical periods offered: Fall, Spring

PACS 9100 Special Topics

Special topics in speech and hearing sciences, audiology and/or education of the deaf or hard of hearing. Contact the department for more information.

Credit 4 units.

Typical periods offered: Fall, Spring

PACS 9600 Research Design and Methods

A review of statistical concepts learned and discussion of their application in research projects. Will include selection of statistical tests in different projects with different types of data and data distributions, as well as the interpretation of the results of the statistical analysis in lieu of clinical importance and generalizability of results. Course will also include a critical review of statistical methods used in published articles chosen for discussion.

Credit 2 units.

Typical periods offered: Fall

PACS 9800 Research in Speech and Hearing

Independent research (pre-dissertation).

Credit 12 units.

Typical periods offered: Fall, Spring, Summer

PACS 9900 Dissertation Research

Dissertation research.

Credit 12 units.

Typical periods offered: Fall, Spring

Biology & Biomedical Sciences

The Roy and Diana Vagelos Division of Biology & Biomedical Sciences at Washington University offers exceptional doctoral education at one of the nation's preeminent biomedical research centers. The Division includes 11 doctoral programs:

- Biochemistry, Biophysics, & Structural Biology
- Biomedical Informatics & Data Science
- Cancer Biology
- Computational & Systems Biology
- Developmental, Regenerative, & Stem Cell Biology
- Immunology
- Molecular Cell Biology
- Molecular Genetics & Genomics
- Molecular Microbiology & Microbial Pathogenesis
- Neurosciences
- Plant & Microbial Biosciences

A collaborative, interdisciplinary approach to research and education is a hallmark of Washington University and the Division. As a university-wide consortium, the Division transcends departmental lines and removes traditional boundaries of scientific fields. Faculty and graduate students regularly cross disciplines, devising novel questions and approaches that might otherwise go unexplored. The Division consists of over 700 PhD and MD/PhD students, with more than 700 faculty members from 39 departments.

Washington University in St. Louis provides unique opportunities for translating basic science into practical application. In addition, the Division's associations with internationally prominent local institutions provide exciting opportunities. Students in the biomedical sciences enrich their work with the clinical perspective of our outstanding medical school; students also benefit from our close affiliation with the internationally renowned Missouri Botanical Garden, as well as the Saint Louis Zoo, the Tyson Research Center, the National Great Rivers Research & Education Center, and the Donald Danforth Plant Science Center.

To help prepare graduates for careers in academia, government, industry or another field of their choice, educational opportunities are offered for skill development and career exploration. The Division offers a career-planning curriculum where students can pursue noncredit elective credentials to build transferable professional skills in four areas that apply to a wide variety of scientific careers: leadership, entrepreneurship, science communication, and teaching. Through the Next Generation of Science Scholars, students are provided networking and community-building events, professional development seminars, and scientific community outreach opportunities. Professionals from a variety of fields (e.g., biotech startups, patent law) provide presentations and Q&A sessions to students throughout the year. In addition, the DBBS holds partnerships with groups such as the Center for Teaching and Learning, the Center for Career Engagement, and student organizations such as ProSPER, InPrint, the BALSA Group, and the Young Scientist Program. Students have multiple opportunities to develop experiences relevant to their future career goals.

DBBS students can reference the DBBS Student Handbook for student guidelines across all Division programs.

Additional Information

Further information, including full program descriptions, may be obtained in the following ways:

Mailing address:

Division of Biology & Biomedical Science
Washington University in St. Louis
660 S. Euclid Ave., CB 8226
St. Louis, MO 63110

Physical location:

Bernard Becker Medical Library, Fourth Floor
660 S. Euclid Ave.
St. Louis, MO 63110

Email: dbbsphdadmissions@wustl.edu

Website: <http://dbbs.wustl.edu>

Faculty

Associate Dean for Graduate Education

Steven Mennerick

John P. Feighner Professor of Neuropsychopharmacology, Professor of Psychiatry, Associate Dean for Biology and Biomedical Sciences, Professor of Neuroscience
PhD, Washington University in St. Louis

Associate Directors

Eric Herzog

Professor of Biology, Professor of Neuroscience, Viktor Hamburger Distinguished Professor
PhD, Syracuse University

Heather True

Professor of Cell Biology and Physiology, David English Smith Professorship in Medicine
PhD, University of Illinois-Urbana-Champaign

Faculty Program Directors: Biochemistry, Biophysics, & Structural Biology

Thomas Brett

Associate Professor of Medicine, Associate Professor of Biochemistry and Molecular Biophysics, Associate Professor of Cell Biology and Physiology
PhD, University of Nebraska – Lincoln

Eric Galburt

Associate Professor of Biochemistry and Molecular Biophysics
PhD, University of Washington

Faculty Program Directors: Biomedical Informatics & Data Science

Philip Payne

Professor of Medicine, Director, Institute for Informatics, Professor,
Professor of Computer Science and Engineering, Associate Dean for
Health Information and Data Science for the School of Medicine,
Chief Scientist for the School of Medicine, Janet and Bernard Becker
Professor of Medicine
PhD, Columbia University

Po-Yin Yen

Associate Professor of Medicine, Division of General Medicine &
Geriatrics, Associate Professor, Goldfarb School of Nursing, Barnes
Jewish College
PhD, Columbia University

Faculty Program Directors: Cancer Biology

Grant Challen

Professor, Division of Oncology, Department of Medicine
PhD, University of Queensland, Brisbane, Australia

Jason Weber

Professor, Departments of Medicine, Cell Biology & Physiology, and
Biology
PhD, Saint Louis University

Faculty Program Directors: Computational & Systems Biology

Gautam Dantas

Professor of Pathology and Immunology, Co-Division Chief - Division
of Laboratory and Genomic Medicine, Professor of Biomedical
Engineering, Professor of Molecular Microbiology, Professor of
Pediatrics, Conan Professorship in Laboratory and Genomic Medicine
PhD, University of Washington – Seattle

Nancy Saccone

Associate Professor of Genetics
PhD, Brown University

Faculty Program Directors: Developmental, Regenerative, & Stem Cell Biology

Mayssa Mokalled

Associate Professor of Developmental Biology
PhD, UT Southwestern Medical Center at Dallas

Andrew Yoo

Phil and Sima Needleman Distinguished Professor of Developmental
Biology
PhD, Columbia University

Faculty Program Director: Immunology

Eynav Klechevsky

Associate Professor of Pathology and Immunology
PhD, Israel Institute of Technology, Haifa, Israel and The Baylor
Institute for Immunology Research

Faculty Program Directors: Molecular Cell Biology

Ben Major

Alan A. and Edith L. Wolff Professorship in Cell Biology and Physiology,
Professor of Cell Biology and Physiology, Professor of Otolaryngology
PhD, University of Utah

Maria Remedi

Professor of Medicine and Cell Biology & Physiology
PhD, National University of Cordoba, Argentina

Faculty Program Directors: Molecular Genetics & Genomics

John Edwards

Associate Professor of Medicine
PhD, Columbia University

Jim Skeath

Professor of Genetics, Assistant Dean Academic Pathway Programs
PhD, University of Wisconsin – Madison

Faculty Program Directors: Molecular Microbiology & Microbial Pathogenesis

Megan Baldrige

Associate Professor of Medicine, Associate Professor of Molecular Microbiology
MD/PhD, Baylor College of Medicine

Andrew Kau

Associate Professor, Division of Allergy and Immunology, Associate Division Chief - Research
MD/PhD, Washington University in St. Louis

Faculty Program Directors: Neurosciences

Martha Bagnall

Associate Professor of Neuroscience
PhD, University of California – San Diego

Alexxai Kravitz

Associate Professor of Psychiatry, Interim Division Director for Basic Neuroscience, Associate Professor of Neuroscience, Associate Professor of Anesthesiology
PhD, University of Pennsylvania

Faculty Program Directors: Plant & Microbial Biosciences

Barbara Kunkel

Professor of Biology, Associate Chair of Undergraduate Education
PhD, Harvard University

Xuehua Zhong

Professor of Biology, Dean's Distinguished Professorial Scholar
PhD, The Ohio State University

DBBS mentors and educators are key to our training mission. Those who serve as primary mentors are DBBS Program Members, and others who participate in the educational mission are General Members.

Visit the DBBS website to learn about DBBS Faculty Membership or to search DBBS Faculty by last name, program, or expertise.

Degree Requirements

- Biochemistry, Biophysics, & Structural Biology, PhD (p. 117)
- Biomedical Informatics & Data Science, PhD (p. 120)
- Cancer Biology, PhD (p. 123)
- Computational & Systems Biology, PhD (p. 126)
- Developmental, Regenerative, & Stem Cell Biology, PhD (p. 129)
- Immunology, PhD (p. 132)
- Molecular Cell Biology, PhD (p. 135)
- Molecular Genetics & Genomics, PhD (p. 138)
- Molecular Microbiology & Microbial Pathogenesis, PhD (p. 141)
- Neurosciences, PhD (p. 144)
- Plant & Microbial Biosciences, PhD (p. 147)

Courses

For questions about course listings, please email dbbscurriculum@wustl.edu.

BBS 5011 Ethics & Research Science

This course prepares DBBS graduate students to analyze and address ethical and professional issues across the range of their professional roles and responsibilities. The primary goals are for students to recognize complex situational dynamics and ethical issues and to develop professional and ethical problem-solving skills. The course examines ethical challenges related to research design and data collection, management, ownership, security, sharing, analysis, interpretation, and reporting while providing practical guidance on these issues. The course also examines the fundamentals of the broader research environment, including principles of ethics in genetics and human and animal subjects research, regulatory issues in biological and biomedical research, publication and authorship, and collaboration in science.

Credit 1 unit.

Typical periods offered: Spring Half B, Spring Half A, Spring, Spring Intersession, Summer

BBS 5014 Biotech Industry Innovators

Late one Friday afternoon in April 1976, the late venture capitalist Robert Swanson met with biochemist Herb Boyer, PhD, at his UCSF lab. Swanson had requested 10 minutes of Boyer's time; when the meeting ended, three hours later, the foundations had been laid for the formation of Genentech, the first biotechnology company, and the beginnings of the biotechnology industry. This course, The Basics of Bio-Entrepreneurship, investigates issues and choices that inventor/scientists encounter when considering the applications and commercialization of early stage scientific discoveries. This course is intended for anyone interested in working in the medical device, life-, bio-, or pharma-sciences industries as a founder, scientist, entrepreneur, manager, consultant, or investor. It focuses on the decision processes and issues that researchers and their business partners face when considering how a discovery might best be moved from academia to successful commercialization.

Credit 3 units.

Typical periods offered: Fall, Spring



BBS 5053 Immunobiology I

Immunobiology I is taught by the faculty members of the Immunology Program. This course covers in depth modern immunology and are based on Janeway's Immunobiology 10th Edition textbook. The topics include: basic concepts in immunology, innate immunity: the first lines of defense, the induce responses of innate immunity, antigen recognition by B-cell and T-cell receptors, the generation of lymphocyte antigen receptors, antigen presentation to T lymphocytes and signaling through immune system receptors.

Credit 4 units.

Typical periods offered: Fall

BBS 5054 Immunobiology II

Immunobiology II is taught by the faculty members of the Immunology Program. This course covers in depth modern immunology and are based on Janeway's Immunobiology 10th Edition textbook. The topics include: the development and survival of lymphocytes, T cell-mediated immunity, the humoral immune response, dynamics of adaptive immunity, the mucosal immune system, failures of host defense mechanisms, allergy and allergic diseases, autoimmunity and transplantation, and manipulation of the immune response.

Credit 4 units.

Typical periods offered: Spring

BBS 5068 Fundamentals of Molecular Cell Biology

This is a core course for incoming graduate students in Cell and Molecular Biology programs to learn about research and experimental strategies used to dissect molecular mechanisms that underlie cell structure and function, including techniques of protein biochemistry. Enrolling students should have backgrounds in cell biology and biochemistry. The format is two lectures and one small group discussion section per week. Discussion section focuses on original research articles.

Credit 4 units.

Typical periods offered: Fall

BBS 5075 Introduction to Coding and Statistical Thinking for Genetics and Genomics

This course is designed for first-year DBBS students who have had little to no prior experience in programming or statistics. The course will cover common statistical practices and concepts in the life sciences, such as error bars, summary statistics, probability and distributions, and hypothesis testing. The class will also teach students basic programming skills for statistical computation, enabling them to retrieve and analyze small and large data sets from online databases and other sources.

Credit 2 units.

Typical periods offered: Fall

BBS 5084 Single Molecule Biophysics Journal Club

Molecular motors in the cell harness chemical energy to generate mechanical work in a host of processes including cell motility, DNA replication and repair, cell division, transcriptional regulation, and intracellular transport. The purpose of this course is to discuss recent advances in the field of molecular motors. Special emphasis will be placed on understanding and critically evaluating single molecule studies. The course will consist of both journal club presentations and small group discussions.

Credit 1 unit.

Typical periods offered: Spring

BBS 5098 Graduate Research Fundamentals

This course introduces first-year Ph.D. students to the foundational skills, knowledge, and habits of mind required of successful independent biological scientists: 1) Social dynamics in the scientific research enterprise 2) Epistemology and ethics of bio research methods 3) Development and communication of research questions and results 4) Interdisciplinary scientific thinking. Class sessions and homework introduce these topics; major assignments prompt student to connect them with the broader scope of graduate training in lab rotations, course work, and interdisciplinary scientific seminars. The interactive, student-driven class structure facilitates autodidactic development while integrating small group activities and peer mentoring from advanced DBBS students.

Credit 0.5 units.

Typical periods offered: Fall

BBS 5123 Experimental Hematopoiesis Journal Club

Journal club in which papers that describe significant advances in the field of experimental hematopoiesis are discussed. Students are expected to present one paper per semester and attend the weekly (1 hour) session.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5137 TriMED: Membrane Excitability and Disease

TriMED consists of seminars, work-in-progress talks and journal club presentations. It meets Monday lunchtime (1-2pm, with lunch provided) from Jan - end April and from Sept - end November (1 credit each semester). Any student signed up for credit has to attend regularly and make one half hour presentation (either of their own research, or of a paper). The attendees are a mix of students, post-docs and faculty, but the goal is for trainee experience. The course is designed to fulfil interest in membrane proteins or signaling, ion channels, electrophysiology, neurobiology or excitability more broadly.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5138 Journal Club for the Molecular Mechanism of Aging

Why do we age? What causes aging? How is our life span determined? This journal club will address such fundamental, but challenging questions of aging and longevity. Recent studies on aging and longevity are now unveiling regulatory mechanisms of the complex biological phenomenon. We'll cover the latest progress in this exciting field and stimulate discussions on a variety of topics including aging-related diseases. One hour of paper presentation or research talk and discussion per every two weeks. Registered students are expected to have at least one presentation for 1 unit credit.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5146 Principles and Applications of Biological Imaging

Principles and Applications of Biological Imaging will introduce the interdisciplinary nature of the imaging sciences and conduct a comprehensive survey of the array of interrelated topics that define biological imaging. The course will cover the basics of the optical, magnetic resonance, CT, SPECT and PET imaging modalities, and microscopy, while focusing on applications of imaging to different disease states, such as oncology, neurology, cardiology and pulmonary diseases.

Credit 3 units.

Typical periods offered: Fall

BBS 5147 Contrast Agents for Biological Imaging

Contrast Agents in Biological Imaging will build the chemistry foundations for the design and use of contrast agents in imaging applications such as nuclear medicine, magnetic resonance imaging (MRI) and optical imaging. The course will include lectures on the design of radiopharmaceuticals for gamma scintigraphy and positron emission tomography, MRI contrast agents and agents for optical imaging, including bioluminescence and fluorescence microscopy. One year of general chemistry, one semester of organic chemistry required. Credit 3 units.

Typical periods offered: Spring

BBS 5148 Metabolism Journal Club

The purpose of the Metabolism Journal Club is to introduce the graduate students to advanced topics spanning the biochemistry, cell biology and genetics of cellular and whole body metabolism. Under the guidance of the course directors, students will select recent topical articles for discussion in the weekly journal club. Students will be expected to provide a succinct introduction to the topic and lead discussion of the data presented in the journal article. Students will be evaluated on the basis of their presentation and their participation in the seminar throughout the semester.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5152 Rad Journal Club (Regeneration, Aging, and Development)

Focuses on developing a dialog around current topics in developmental and regenerative biology at the molecular, cellular and systems levels.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5191 Pathobiology of Human Disease States

Three human disease states will be discussed in detail. Topics will include background clinical and epidemiological information, followed by a detailed examination of the molecular and cellular events that underlie the disease state. Examples of pertinent topics include Alzheimer's disease, AIDS, leukemia, cystic fibrosis, sickle cell anemia, diabetes, etc.

Credit 2 units.

Typical periods offered: Fall

BBS 5192 Cancer Biology Journal Club

This journal club covers current papers in molecular oncology, cancer genetics and contemporary molecular biology. Presentations will be given by students, post-docs and faculty, then discussed.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5196 Special Emphasis Pathway in Cancer Biology

This course is designed to present pre- and postdoctoral trainees with an organized educational format to explore major contemporary topics in cancer biology. The elective will provide an integrated view of cancer research including basic science, translational science, and clinical investigation. Approximately 60 minutes will be devoted to a didactic presentation by a faculty member with interaction by the participants. The remaining 30 minutes will be used to discuss a pivotal research paper from this field, preselected by the faculty member. Outside reading (30-60 min/week) will be required.

Credit 2 units.

Typical periods offered: Spring

BBS 5201 Membrane Protein Biophysics Journal Club

Cells are encapsulated by lipid bilayers providing a physical barrier for the passage of charged molecules and ions in and out of the cell. The proteins that reside within this layer of oil are called membrane proteins, and they act as the molecular gatekeepers, controlling the passage of ions, nutrients, waste products and signaling elements, across cell membranes. This journal club focuses on examining key literature in the field that investigates how membrane proteins fold, adopt certain structures, and how they function inside of the strange environment of the lipid membrane. The papers will be selected from biophysical studies that combine new and notable research with key historical work, for a broad perspective of the science being conducted in this complex and emerging field. Special emphasis will be placed on emerging topics, such as regulation of protein function by lipid composition, membrane protein synthesis and folding, cutting-edge developments in membrane biophysics. The course will consist of both journal club presentations, as well as small group discussions in the form of chalk-talks.

Credit 1 unit.

Typical periods offered: Spring

BBS 5217 Special Topics in Microbial Pathogenesis

Primarily for graduate and MSTP students, this course involves oral presentation and discussion of current research articles on pathogenic microorganisms (bacteria, viruses, parasites, and fungi). Discussion will include design of specific aims for research proposals. Emphasis will be on literature that addresses the cellular and molecular basis of host-pathogen interactions. Students are expected to prepare all articles covered and to participate actively in each discussion. Class meets twice per week for 1.5 hours each.

Credit 2 units.

Typical periods offered: Spring

BBS 5224 Molecular, Cell and Organ Systems

This course will introduce Ph.D. and MSTP students to fundamental problems in cell and molecular biology at the systems level. The course is divided into 5 themes: 1) microbial systems; 2) organ development and repair; 3) cardiovascular system and disease; 4) tumor & host systems; and 5) metabolic systems and disease. Topics within each theme highlight current research concepts, questions, approaches and findings at the molecular, cellular and physiological levels. Students will write an original research grant proposal on a topic of their choosing in one of the 5 themes. Students will critique proposals anonymously in an NIH-like study section.

Credit 3 units.

Typical periods offered: Spring

BBS 5235 Genetics Journal Club

This journal club will be focused on the Genetics department seminar series. Students will present one or a few recent papers by the seminar speaker scheduled for that week. Students will provide a brief written evaluation (on a form that will be provided) of their peers' presentations, and the faculty advisors will meet with each student after the presentation to provide feedback.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5255 Experimental Skeletal Biology Journal Club

The journal club, which meets weekly, focuses on cellular and molecular biology of the skeleton. Emphasis is placed on gaining insights into normal skeletal homeostasis as well as systemic disorders of bone. Papers presented for review are selected from the most competitive journals. Participants are encouraged to think outside of the box and discuss novel molecular discoveries that may impact bone cell function.



Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5272 Advanced Topics in Immunology

This course uses a journal club format to discuss contemporary issues in the cell and molecular biology of the immune system. Discussions focus on the use of current approaches to analyze the cellular and molecular basis of immunity. Topics include mechanisms of antigenic specificity, diversity, cell communication, differentiation, activation, and effector activity.

Credit 2 units.

Typical periods offered: Fall

BBS 5282 Chromatin Structure and Gene Expression

This special topics course will use *Epigenetics* ed. by Allis, Jenuwein, Reinberg, and Caparros (2007, Cold Spring Harbor Laboratory Press) as the organizing text. Each week a faculty member will provide a background lecture on an important topic or model system, and a student will present and lead discussion of a paper from the current scientific literature related to the previous week's background lecture. Topics to be considered will include background on chromatin structure, histone modifications and histone variants; epigenetic regulation in yeast, other fungi, ciliates, flies, mammals and plants; dosage compensation in different systems; DNA methylation and imprinting in mammals; stem cells, nuclear transplantation and reprogramming; and the epigenetics of cancer and other human diseases (some variation in topics in different years). Students enrolled in the course will be required to present one paper and to come prepared to each session, with a question for discussion.

Credit 2 units.

Typical periods offered: Spring

BBS 5284 Current Research in Chromatin, Epigenetics and Nuclear Organization

This journal club considers papers from the current literature on chromatin structure and function, with an emphasis on regulation of transcription, epigenetics and genomics. Presentations are given by students, postdocs and faculty, with discussion by all. Students enrolled for credit are expected to attend regularly, and to present a minimum of one paper during the term, with consultation and critique from the faculty.

Credit 1 unit.

Typical periods offered: Spring

BBS 5285 Current Topics in Human and Mammalian Genetics

This course aims to provide both biologists and those with mathematical backgrounds with a basis in mammalian genetics. The course will include the following modules: Nucleic acid biochemistry; Gene and chromosome organization; Introduction to Human Genetics; Mutations and DNA repair; Cancer Genetics; Genomic methodologies; Biochemical genetics; Murine Genetics; Epigenetics; Neurodegenerative diseases; Mitochondrial disorders; Pharmacogenetics; Introduction to human population genetics; Applications of modern human genetics; Introduction to web-based informatics tools for molecular genetics. One of the required courses in the Quantitative Human Statistical Genetics graduate program.

Credit 3 units.

Typical periods offered: Fall

BBS 5288 Special Topics in Molecular Genetics

A special topics course with lectures and discussion on the molecular basis of cancer including cell cycle regulation, tumor suppressor genes, tumor invasion, angiogenesis, immune evasion, resistance to apoptosis, signaling, imaging, gene expression, chromosomal translocations, and viral oncology.

Credit 2 units.

Typical periods offered: Spring

BBS 5303 Protein NMR Journal Club

This journal club covers the recent literature on protein NMR with a focus on using NMR to study protein function, NMR dynamics, and novel methods that expand the range of systems accessible to solution NMR studies. Students, postdocs and faculty discuss a recent paper and present background information on the relevant technical aspects of NMR. Students receive 1 credit for participation and presenting one paper.

Credit 1 unit.

Typical periods offered: Fall

BBS 5311 Dynamics in Mesoscopic Molecular Systems

This course will provide a background in the theory of the dynamics of mesoscopic systems and introduction to methods for measuring the dynamics of these systems. It will include measurement methods, some of which are in common use and others that have only recently been introduced. This course would be useful for biophysics students and others that are interested in molecular processes and mechanisms in small systems such as cells.

Credit 3 units.

Typical periods offered: Spring

BBS 5312 Macromolecular Interactions

This course will cover equilibria, kinetics and mechanisms of macromolecular interactions from a quantitative perspective. Thermodynamics, multiple binding equilibria (binding polynomials), linkage phenomena, cooperativity, allostery, macromolecular assembly, analysis of binding isotherms, enzyme catalysis and mechanism, steady-state and pre-steady-state kinetics, kinetic simulation, and isotope effects.

Credit 3 units.

Typical periods offered: Spring

BBS 5318 DNA Repair

This course is an advanced graduate course that explores all aspects of DNA damage and the cellular responses to DNA damage. It is designed for graduate students who have a working knowledge of chemistry, molecular biology and cellular biology, and for interested postdocs and researchers. Specific topics that will be covered are: The chemical basis of DNA damage, specific DNA repair mechanisms, cell cycle responses to damage, translesion DNA replication and mutagenesis, and human diseases related to defects in DNA damage response. The course consists of a lecture module, open to all, and a discussion module for registered students. In addition, several invited speakers in the field of DNA repair will give seminars and meet with registered students for discussion. Students will present and discuss research papers. Grades will be given based on student presentation and participation. Prerequisite: Permission of instructor.

Credit 2 units.

Typical periods offered: Spring

BBS 5319 Molecular Foundations of Medicine

This course will cover fundamental aspects of biochemistry and cell biology from a medical perspective. The course begins with a treatment of protein structure and the function of proteins in the cytoskeleton and cell motility. The principles of enzyme kinetics and regulation are then discussed and basic pathways for the synthesis and metabolism of carbohydrates and lipids are introduced. This leads in to a discussion of membrane structure and the function cellular organelles in biological processes including energy production, protein degradation and protein trafficking.

Credit 3 units.

Typical periods offered: Fall

BBS 5327 Optical Spectroscopy: Theory and Applications

Spectroscopic methods to be covered include fluorescence, both ensemble and single molecule, and absorption (circular dichroism); fluorescence correlation spectroscopy will also be discussed. The quantum chemistry /physics behind these methods will be reviewed.

Credit 2 units.

Typical periods offered: Fall

BBS 5328 Structural Biology Journal Club

Multi-laboratory research colloquia for DBBS graduate students focused on structural biology and complementary biophysical techniques. Course credit requires student presentation for credit.

Credit 1 unit.

Typical periods offered: Spring

BBS 5336 Computational Biophysics Journal Club

This course covers a combination of classic and recent publications on computational methods for studying biomolecules. Students participating for credit will be required to present at least once.

Credit 1 unit.

Typical periods offered: Spring

BBS 5357 Chemistry and Physics of Biomolecules

This course covers three major types of biomolecular structures: proteins, nucleic acids, and membranes. Basic structural chemistry is presented as well as the biophysical techniques used to probe each type of structure. Selected topics covered include protein folding, protein design, X-ray crystallography, NMR spectroscopy, nucleic acid bending and supercoiling, nucleic acid:protein interactions, RNA folding, membrane organization, fluidity, permeability and transport, and membrane channels. The weekly discussion section will cover problem sets and present current research papers. This is one of the required courses for the biochemistry and for the molecular biophysics graduate programs. Prior course work in biochemistry and physical chemistry is recommended but not required.

Credit 3 units.

Typical periods offered: Fall

BBS 5358 Biochemical and Biophysical Investigations of Infectious Diseases Journal Club

Biochemical and biophysical approaches continue to advance as powerful approaches to the understanding of human disease processes. This journal club covers recent papers in which these approaches address aspects of infectious diseases or inflammation. Students who enroll for credit will be expected to participate in weekly presentations and to present one to two papers along with accompanying background information.

Credit 1 unit.

Typical periods offered: Spring

BBS 5392 Molecular Microbiology & Pathogenesis

Course is devoted to studying microorganisms, particularly those that cause disease, with an emphasis on the molecular interactions between pathogens and hosts. First third of the course focuses on virology, second third on bacteriology and the last third on eukaryotic pathogens.

Credit 4 units.

Typical periods offered: Fall, Spring

BBS 5393 Molecular Virology Journal Club

Journal club covering a broad range of topics in virology with an emphasis on pathogenesis or molecular biology of medically important viruses. A minimum of one student presentation with faculty critique.

Credit 0.5 units.

Typical periods offered: Fall, Spring

BBS 5397 Current Literature in Microbiology

Presentations by students on a broad range of topics of current interest in microbiology. The course will emphasize presentations and discussion skills. Credit requires attendance and participation at all sessions and one presentation.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5412 Tropical and Molecular Parasitology

Graduate level seminar course focusing on current scientific literature in molecular parasitology. The journal club will meet biweekly during the Fall and Spring semesters. Students will attend both semesters in order to receive one credit. The seminar series will run jointly with a research conference in Tropical and Molecular Parasitology. Outside speakers will be invited for the seminar series to emphasize important developments in tropical medicine and molecular parasitology. In advance of the invited speakers, topics will focus on their previous research publications.

Credit 0.5 units.

Typical periods offered: Fall

BBS 5417 Hematology Division Journal Club: Current Topics in Cellular, Molecular, and Stem Cell Biology

This journal club covers a broad range of topics of current interest, including the fields of biochemistry, molecular biology, cell biology, developmental biology, and immunology. Speakers usually give a brief background to introduce the topic and then focus on one-two papers from the current literature. Presentations are given by graduate students, post-doctorates, and faculty. Each attendee presents two-three times per year. Participants are expected to attend all the sessions. This journal club was founded in 1966.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5425 Immunology of Infectious Diseases Journal Club

The goal of this Journal Club (JC) is to provide 2nd year students in MMMP program a platform to discuss new and emerging concepts on mechanisms by which host immune responses mediate protection against infectious diseases. This exercise will also enable the student who attend the fundamental Immunology course to apply their knowledge to understand the basis for immunology of infectious diseases. The format will include faculty who will select cutting-edge papers and head the discussion during the JC session.

Credit 1 unit.

Typical periods offered: Fall, Spring



BBS 5426 ID Gateway: Translational and Public Health Aspects of Basic Infectious Disease Research

This course provides an opportunity for students, postdoctoral fellows, infectious disease fellows and faculty to explore issues at the interface between patient care, public health and basic research in the area of microbial pathogenesis.

Credit 2 units.

Typical periods offered: Spring

BBS 5445 DNA Metabolism Journal Club

Presentation of current research papers in DNA replication, DNA repair, and DNA recombination, with an emphasis on basic biochemical and biophysical approaches.

Credit 1 unit.

Typical periods offered: Spring

BBS 5456 Advanced Crystallography

The advanced course in Protein Crystallography will address all aspects of modern protein crystallography including fundamentals of crystallography, the derivation of the structure factor and electron density equation, symmetry and space groups, direct methods, isomorphous replacement, molecular replacement, data collection, and crystal growing theory and techniques. Prerequisite, Physical Chemistry & Bio 5325 Protein Structure and Function. Two class hours per week.

Credit 2 units.

Typical periods offered: Spring

BBS 5469 Biochemistry, Biophysics, and Structural Biology Seminar

Student presentation of Biochemistry, Biophysics or Structural Biology topic. Second Year Students present from literature; senior students give formal research seminar. Attendance required of all BBSB Graduate Students.

Credit 0.5 units.

Typical periods offered: Fall, Spring

BBS 5480 Nucleic Acids & Protein Biosynthesis

Fundamental aspects of the structure, biosynthesis, and function of nucleic acids and the biosynthesis of proteins. Emphasis on mechanisms involved in the biosynthetic processes and the regulation thereof. Lecture course supplemented with student discussions of research papers.

Credit 3 units.

Typical periods offered: Fall

BBS 5483 Human Genetic Analysis

Basic Genetic concepts: meiosis, inheritance, Hardy-Weinberg Equilibrium, Linkage, segregation analysis; Linkage analysis: definition, crossing over, map functions, phase, LOD scores, penetrance, phenocopies, liability classes, multi-point analysis, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis, determination of power for mendelian and complex trait analysis; Linkage Disequilibrium analyses: allelic association (case control designs and family based studies), QQ and Manhattan plots, whole genome association analysis; population stratification; Quantitative Trait Analysis: measured genotypes and variance components. Hands-on computer lab experience doing parametric linkage analysis with the program LINKAGE, model free linkage analyses with Genehunter and Merlin, power computations with SLINK, quantitative trait analyses with SOLAR, LD computations with Haploview and WGAViewer, and family-based and case-control association analyses with PLINK and

SAS. The methods and exercises are coordinated with the lectures and students are expected to understand underlying assumptions and limitations and the basic calculations performed by these computer programs. Auditors will not have access to the computer lab sessions. Credit 3 units.

Typical periods offered: Fall

BBS 5484 Genetics and Development of C. Elegans Journal Club

Students will present a research paper (or present their current thesis research) and the appropriate background material.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5487 Genetics and Genomics of Disease

The course will cover the use of genomic and genetic information in the diagnosis and treatment of disease, with an emphasis on current practice and existing gaps to be filled to achieve precision medicine. Areas of discussion include: bioinformatics methods; assessment of pathogenicity; use and curation of disease variant databases; discovery of incidental findings; genomics applications in Mendelian disease, complex traits, cancer, pharmacogenomics, and infectious disease; design of clinical trials with genetic data; ethical and policy issues. Credit 2 units.

Typical periods offered: Fall, Spring

BBS 5488 Genomics

This course is designed for beginning graduate students who want to become familiar with the basic concepts and applications of genomics. The course covers a wide range of topics including how genomes are mapped and sequenced as well as the latest computational and experimental techniques for predicting genes, splice sites, and promoter elements. High throughput techniques for ascribing function to DNA, RNA, and protein sequences including microarrays, mass spectrometry, interspecies genome comparisons, and genome-wide knock-out collections will also be discussed. Finally, the use of genomic techniques and resources for studies of human disease will be discussed. A heavy emphasis will be put on students acquiring the basic skills needed to navigate databases that archive sequence data, expression data and other types of genome-wide data. Through problem sets, the students will learn to manipulate and analyze the large data sets that accompany genomic analyses by writing simple computer scripts. While students will become sophisticated users of computational tools and databases, programming and the theory behind it are not covered in this course.

Credit 4 units.

Typical periods offered: Spring

BBS 5489 Human Genetics Journal Club

In this biweekly journal club on Human Genetics we will present and discuss current cutting edge papers in human and mammalian molecular genetics. Students learn presentation skills, how to critique a paper and how to interact with a very active and critical audience. Any person interested in the current state of the art in Human Genetics may attend this course. It is a requirement that all students wishing to earn credit in this course must present a 1.5 hour journal club talk and must regularly attend and participate in the journal club throughout the year.

Credit 0.5 units.

Typical periods offered: Fall, Spring

BBS 5491 Advanced Genetics

Fundamental aspects of organismal genetics with emphasis on experimental studies that have contributed to the molecular analysis of complex biological problems. Examples are drawn primarily from yeast, nematodes, fruit flies, mouse, and humans. Students will conceive and write an original research proposal with a substantial genetics component; the learning goal is to build skills in developing hypotheses from the literature and designing experimental approaches to test those hypotheses.

Credit 3 units.

Typical periods offered: Spring

BBS 5496 Seminar in Computational Molecular Biology

Students present current research papers and the appropriate background material in the field of Computational Biology. Arts & Sciences students must take this course for credit; Engineering students must take this course Pass/No Pass.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5499 Cancer Informatics Journal Club

This journal club will explore current topics in cancer informatics. Current literature will be reviewed for advanced cancer genome analysis methods, statistics, algorithms, tools, databases, and other informatics resources.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5500 Medical Genetics

A significant portion of the first-year course in basic medical genetics devoted to human and clinical genetics, with emphasis on how genomic information will transform the practice of medicine. Topics covered include population genetics; molecular basis of mutations; human functional genomics; mouse models of human disease; pharmacogenomics; metabolic defects. Lectures, small group discussions, patient information session.

Credit 2 units.

Typical periods offered: Spring

BBS 5501 Biology of the Visual System

The purpose of the course is to provide a fascinating view of vertebrate eye development, anatomy, physiology and pathology. Topics to be covered include the molecules that control eye formation, ocular stem cells, the physiology of transparency, hereditary ocular diseases, phototransduction, the neurobiology of the retina and central visual pathways, age-related eye diseases, and many others. The course is open to all second year graduates students and above. Ophthalmology residents and postdocs with an interest in vision are strongly encouraged to attend.

Credit 3 units.

Typical periods offered: Fall

BBS 5505 Independent Study in Fundamentals of Molecular and Microbial Genetics

This literature-based course will introduce students to seminal and current studies in molecular and microbial genetics. Students will read and present a minimum of 12 landmark papers that helped shape our understanding of molecular and microbial genetics. Emphasis will be placed on students' ability to comprehend and explain these studies via chalk talks. All presentations will be given by students.

Credit 2 units.

Typical periods offered: Fall, Spring

BBS 5507 Genome Engineering Methods and Applications

This course will cover the basic principles of genome engineering with emphasis on Cas9/CRISPR technology. It will consist of discussion sessions in which students will present assigned manuscripts followed by a general discussion of the topic directed by the instructor. The course will cover the mechanisms of genome editing using host DNA repair systems, the function of Cas9, and how Cas9 can be harnessed to introduce defined mutations into almost any genome. The use of Cas9 to activate or repress genes, alter chromatin modifications, and the application of these Cas9 systems to conducting genome-scale screens in mammalian cells as well as its use in studying cell fate will be highlighted. Finally, we will study how Cas9 methodologies can be used to introduce disease-associated variants into pluripotent stem cells (e.g. iPSCs) that can be differentiated into disease-relevant cell for use in functional genomic studies.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5512 Diseases of Membrane Transport & Excitability

Classes will consider the molecular basis of the disease as well as animal models and current clinical studies. Addressing studies from the level of basic biophysical and molecular properties of the underlying ion channels/transporters, to the cellular defects, to organ and animal outcomes and therapies, which will encourage and force students to develop their ability to integrate understanding at multiple levels. Students will be introduced to emerging ideas in clinical diagnosis, management and treatment, when appropriate, clinical specialists will allow student participants to directly observe and participate in the clinical experiences.

Credit 2 units.

Typical periods offered: Spring

BBS 5513 ITVS Project Building

The overall goal is to have intense guidance to construct a grant/fellowship application. Students should expect to have a near completed F30/F31 application by the end of this course. Students will study previous F30/F31 applications and sit on a mock panel to review real world grants from their peers. They will use this experience to understand the reviewers perspective when writing fellowships and grants in the future. Students will draft all portions of a research proposal with feedback from their peers, the course instructor and faculty mentors.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5540 Neural Sciences

An integrated course dealing with the structure, function and development of the nervous system. The course will be offered in the Spring of the first year Medical School calendar.

Credit 5 units.

Typical periods offered: Spring

BBS 5543 Oral Presentation of Scientific Data

Practical course on how to prepare and present scientific data to an audience. Meets once a week for 90 minutes.

Credit 1 unit.

Typical periods offered: Spring

BBS 5571 Cellular Neurobiology

This course will present a fully integrated overview of nerve cell structure, function and development at the molecular and cellular level. Broad topics to be covered include gene structure and regulation in the nervous system, basic neurophysiology, presynaptic and postsynaptic mechanisms of chemical neurotransmission, sensory



transduction, neurogenesis and migration, axon guidance and synapse formation. Three 90 minute lectures plus one 75 minute paper discussion section per week. There will be four exams, as well as weekly quizzes.

Credit 6 units.

Typical periods offered: Fall

BBS 5572 Principles of Medicinal Chemistry

Overview of basic principles of medicinal chemistry covering drug targets and concepts of metabolism, efficacy and potency as relevant to drug design.

Credit 3 units.

Typical periods offered: Fall

BBS 5577 Synapses Journal Club

Synaptic function and malleability are fundamental to nervous system function and disease. This is an advanced seminar in the development, structure, and function of the synapse in health and disease. It is a natural extension of topics covered in Bio 5571. It may be primarily of interest to students in the Neurosciences Program, but also to students in MCB, Development, Biochemistry, Computational Biology, and Molecular Biophysics. Generally a topic for the semester helps focus the group; past topics have included Synapses and Disease, Neurotransmitter Transporters, Glutamate Receptors, Dendrites, GABA receptors. Participants (students, postdocs, and faculty) alternate responsibility for leading critical discussion of a current paper. Active participation offers the opportunity for students to hone their critical thinking and presentation skills. Students enrolling for credit will be expected to attend each week, to lead discussion once per semester and to provide written critiques (1-2 pages each) of two papers.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5617 Development Biology PhD Program Seminar

In response to student feedback for additional training in Developmental Biology obtained from surveys and group meetings, we propose a new seminar course in Developmental Biology. This once a week course will introduce student in the Developmental, Regenerative, and Stem Cell Biology PhD Program both to the classical embryological experiments that define key concepts in developmental biology, such as cellular fields, equivalence groups, cytoplasmic determinants, and the more modern experiments that uncovered the genetic and molecular basis of these processes. In general, the classes will be individual sessions on professional development, such as scientific presentation, how to navigate graduate school, etc.

Credit 1 unit.

Typical periods offered: Fall

BBS 5619 Advanced Cognitive, Computational, and Systems Neuroscience

This course will develop critical thinking and analysis skills with regard to topics in Cognitive, Computational and Systems Neuroscience. Course format will be a series of modules composed of intensive, faculty-led case studies on interdisciplinary topics at the intersection of psychology, computation and neuroscience. The goal will be to highlight the benefits of integrative, interdisciplinary approaches, by delving into a small set of topics from a variety of perspectives, rather than providing a survey-level introduction to a broader set of topic areas. Modules will involve a combination of lectures and student-led discussion groups, with students further expected to complete a multi-disciplinary integrative final review paper. Case-study topics will vary somewhat from year to year, but are likely to include some of the

following: temporal coding as a mechanism for information processing, coordinate transformations in sensory-motor integration, mechanisms of cognitive control, motor control strategies including application to neural prosthetics, and memory systems in health and disease.

Credit 3 units.

Typical periods offered: Fall

BBS 5622 Cognitive, Computational, and Systems Neuroscience Project Building

The goal of this course is to help students in the CCSN Pathway develop the critical thinking skills necessary to develop and implement high quality, interdisciplinary research projects. Throughout the course of the semester, each student will develop a research plan in their chosen area of interest. The plan will be developed in consultation with at least two faculty members (from at least two different subdisciplines within the pathway) as well as the other students and faculty participating in the course. The culmination of this course will be for each student to produce an NIH-style grant proposal on the research project of their choosing. For most students, this will serve either as their thesis proposal or a solid precursor to the thesis proposal. The course will be designed to help facilitate the development of such a research plan through didactic work, class presentations, class discussion, and constructive feedback on written work. The course will begin with a review of written examples of outstanding research proposals, primarily in the form of grant submissions similar to those that the students are expected to develop (i.e., NRSA style proposals, R03 proposals). Review of these proposals will serve as a stimulus to promote discussion about the critical elements of good research proposals and designs in different areas. Each student will be expected to give three presentations throughout the semester that will provide opportunities to receive constructive feedback on the development and implementation of research aims. The first presentation (towards the beginning of the semester) will involve presentation of the student's general topic of interest and preliminary formulation of research questions. Feedback will emphasize ways to focus and develop the research hypotheses into well-formulated questions and experiments. The second presentation will involve a more detailed presentation of specific research questions (along the lines of NIH-style Specific Aims) and an initial outline of research methods. The final presentation will involve a fuller presentation of research questions and proposed methods. Feedback, didactic work, and group discussion throughout the semester will include guidance on critical components of the development of a research plan, including how to perform literature searches, formulate testable hypotheses, write critical literature summaries, and design experiments and analyses. The course will meet once a week, with faculty members from different tracks within the Pathway present at each meeting. This will allow students to receive feedback from several perspectives.

Credit 3 units.

Typical periods offered: Fall, Spring

BBS 5646 First-Year Fundamentals

This course will provide a two-part introduction to neuroscience research fundamentals. Namely, it will introduce elementary statistical analysis for neuroscience research as well as grant writing to support neuroscience-related research. Enrollment is limited to first-year neuroscience students.

Credit 0.5 units.

Typical periods offered: Spring

BBS 5648 Coding and Statistical Thinking in the Neurosciences

Students are introduced to scientific programming in Python. Students will learn common programming constructs and how to visualize and analyze data. Coding will be integrated into a statistics curriculum introducing summary statistics, probability distributions, simulation and hypothesis testing, and power analysis for experimental design. Credit 3 units.

Typical periods offered: Fall, Spring

BBS 5651 Neural Systems

The course will consist of lectures and discussions of the sensory, motor and integrative systems of the brain and spinal cord, together with a weekly lab. The lectures will present aspects of most neural systems, and will be given by faculty members who have specific expertise on each topic. The discussions will include faculty led group discussions and papers presented and discussed by students. The labs will include human brain dissections, examination of histological slides, physiological recordings, behavioral methods, computational modeling, and functional neural imaging.

Credit 6 units.

Typical periods offered: Spring

BBS 5663 Neurobiology of Disease

This is an advanced graduate course on the pathology of nervous system disorders. This course is primarily intended to acquaint Neuroscience graduate students with a spectrum of neurological diseases, and to consider how advanced neuroscientific approaches may be applied to promoting recovery in the brain. Topics will be presented by Washington University faculty members and include: neurooncology, stroke, retinal disease, perinatal brain injury, neurodegenerative disorders, neuroinflammation, epilepsy, and psychiatric disorders. The class will meet for 2 hours each week. Each session will be led by a faculty guest with expertise in a specific neurological or psychiatric disease. In the first hour, the speaker will discuss clinical manifestations and pathophysiology. Where possible, the clinical presentation will be supplemented with a patient demonstration or videotape. After a 30 minute break for pizza and soda, the second hour will follow a journal club format. Two or three students will review current papers assigned by the speaker or course director. This course is offered in alternate years. Prerequisite: Introductory neuroscience course at the graduate or medical school level.

Credit 2 units.

Typical periods offered: Spring

BBS 5678 Clocksclub

Clocksclub focuses on recent advances in the study of biological timing including sleep and circadian rhythms. Participants discuss new publications and data on the molecules, cells and circuits underlying daily rhythms and their synchronization to the local environment. Students registered for this journal club will lead a discussion once during the semester.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5702 Current Approaches in Plant and Microbial Research

This course is designed to introduce graduate students and upper-division undergraduates to contemporary approaches and paradigms in plant and microbial biology. The course includes lectures, in-class discussions of primary literature and hands-on exploration of computational genomic and phylogenetic tools. Evaluations include short papers, quizzes, and oral presentations. Over the semester, each student works on conceptualizing and writing a short NIH-format research proposal. Particular emphasis is given to the articulation of

specific aims and the design of experiments to test these aims, using the approaches taught in class. Students provide feedback to their classmates on their oral presentations and on their specific aims in a review panel.

Credit 4 units.

Typical periods offered: Spring

BBS 5703 Experimental Design and Analysis in Biological Research

In-depth exploration of landmark and current papers in genetics, molecular and cell biology, with an emphasis on prokaryotes and eukaryotic microbes. Class discussions will center on such key discoveries as the chemical nature of genetic material, the genetic code, oxygen producing light-spectrum, cell-cell signaling, transcriptional regulation, the random nature of mutation, and cell cycle regulation. Emphasis will be placed on what makes a good question or hypothesis, expedient ways to address scientific problems, and creative thinking. The last third of the course will consist of student-run seminars on selected topics to increase proficiency in the synthesis of new material and public presentation skills.

Credit 2 units.

Typical periods offered: Fall

BBS 5723 Seminar in Plant and Microbial Bioscience

This course emphasizing presentation skill and critical analysis counts towards the PMB Graduate Program's journal club course requirement. Students will be responsible for dividing and presenting 30 current research publications selected by the course masters. In addition to assembling brief PowerPoint presentations providing background and significance for their assigned articles, students are expected to provide classmates with a 1 page primer and short list of relevant references

Credit 2 units.

Typical periods offered: Fall, Spring

BBS 5801 Biochemistry & Molecular Biophysics Seminar Journal Club

This will be a journal club-based seminar course mirroring the topics covered by Biochemistry and Molecular Biophysics (BMB) seminar speakers during the concurrent semester. Students will present a paper published by one of the BMB seminar speakers one-week ahead of that speaker's seminar. This will allow students and faculty to become more familiar with the research programs of BMB invited speakers, likely stimulating discussion within the Q&A period after the seminar, as well as during informal meet-the-speaker lunch sessions. Students will be evaluated on their journal club presentation, attendance and class participation.

Credit 1 unit.

Typical periods offered: Spring

BBS 5840 Climate Change Reading Group

The Climate Change Reading Group is made up of multi-disciplinary faculty and students from multiple institutions in St Louis: WUSTL, UMSL, SLU, Missouri Botanical Garden, Danforth Center, and more. Many of us in different labs, departments, and institutions around STL are actively investigating aspects and effects of climate change; this reading group provides a venue for interacting with others in the community. Subject matter within the context of Climate Change will be chosen each week by a different presenter. Students can join this reading group for 1 credit if they agree to read all papers, actively participate in discussions, find and present one high quality scientific paper on climate change in the field of their choice and moderate the discussion of this paper. The students will be evaluated on their participation, their understanding of the issues, and their presentation.

Credit 1 unit.

Typical periods offered: Spring



BBS 5850 Seminar in Floristic Taxonomy

This weekly seminar provides an introduction to/overview of Plants, each semester progressively covering orders and families in a sequence derived from the Angiosperm Phylogeny Website (<http://www.mobot.org/MOBOT/Research/APweb/welcome.html>); in Spring 2015, the seminar will cover several crown orders of the monocots, including grasses and relatives. Weekly presentations include a summary of all relevant information (molecular, chemical, anatomical, embryological, morphological, ecological, geographical, historical/paleontological, etc.) about the plant group under consideration, review of the classification/phylogeny of the group, examination of fresh and/or preserved specimens, and discussion of relationships, human uses, and other relevant aspects of the biology of that group. Credit will be contingent on one (or two) seminar presentation(s) per student, regular attendance and active participation in group discussions.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5866 Communicating Science: Writing for Multiple Audiences

This course introduces strategies for writing effectively and communicating scientific research to a variety of audiences. Students will learn to reduce jargon, explain scientific concepts in common language, write clearly and concisely, and use sentence structure to maximum efficiency. Written assignments emphasize the significance and innovation in scientific research that appeal to broad audiences, including: the general public, students, policy makers, grant reviewers, and journal editors. This course meets biweekly and consists of lectures and small group sessions. You must enroll in both the lecture session (section 1) and a small group (section A, B, C, or D).

Credit 1 unit.

Typical periods offered: Spring

BBS 5867 Career Planning for Biological Scientists

This course will guide you through nationally recognized and evidence-based career exploration curricula. It is intended for DBBS Ph.D. students and bioscience postdocs who want to jump-start career planning and professional skills needed for a broad range of scientific careers. Topics include self-assessment, career exploration, and goal-setting for long-term success. You will work on a team to research the scientific career path of your choice. Each team will study the specific required knowledge, skills, and attributes of their career interest or employment sector. As part of this research project, you will complete a simulated job exercise and network with alumni or local leaders in your chosen field, gaining valuable real-world insights and creating essential professional connections.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5900 Research

Enrolled students will meet in-person with faculty for a minimum of 1 hour per week. Pass/No Pass Only.

Credit 12 units.

Typical periods offered: Fall, Spring, Summer

BBS 5902 Introduction to the Scholarship of Teaching and Learning

In this course, advanced graduate students and postdocs in STEM will 1) learn the fundamentals of the Scholarship of Teaching and Learning (SoTL)-which is the practice of developing, reflecting on, and evaluating teaching methods to improve student learning, 2) Develop a working knowledge of SoTL, which draws on research in education, STEM education, and cognitive science, 3) Understand how SoTL can lead to the dissemination of new knowledge to a broad audience of educators through publication and presentations., and 4) Develop the

central elements of a SoTL project. These elements include articulating questions about classroom teaching that can be addressed in a SoTL research project; developing working hypotheses in response to the questions; designing an evaluative plan, including specific research methods, the type of data to be collected, and how the data will be analyzed in relation to the hypotheses; identifying and understanding necessary procedures to obtain IRB approval for the research.

Credit 1 unit.

Typical periods offered: Spring

BBS 5910 Nano Topics in Biology and Biomedical Sciences

This course will expose students to advanced topics, methods, and skills in biomedical sciences. The course will rapidly fill gaps in student knowledge in areas that are relevant to their research and or professional development. Each section of the course will be offered independently, sometimes in coordination with existing journal clubs and other seminars. Some sections will focus on technique; others will be theoretically or conceptually focused. Each section will be led by a faculty member drawn from DBBS in an area of their expertise. Objectives include deepening students knowledge and skill sets in critical thinking, experimental design, and technical prowess as related to the specific themes of each section.

Credit 0.5-1 units.

Typical periods offered: Fall, Spring

BBS 5911 Seminar in Biology & Biomedical Sciences

These seminars cover the recent literature in various areas not included in other courses, or in more depth than other courses. Credit to be arranged.

Credit 12 units.

Typical periods offered: Spring

BBS 5915 Teaching Practice in Biology & Biomedical Sciences

Students serve as teaching assistants for undergraduate and graduate level courses. Faculty-supervised activities include: lecture preparation and presentation; leading discussion and problem-solving sessions; laboratory instruction.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5922 Entering Mentoring

This course is a series of facilitated discussions aimed at developing and improving mentoring skills for those involved in supervising undergraduate research experiences. It is designed for postdocs and graduate students who are or will be 'bench mentors' for undergraduates doing Bio 500 and/or Summer Research. Participants will receive Entering Mentoring materials, including articles and worksheets to facilitate mentoring interactions with their mentee, plus several resource books relevant to mentoring. They will develop a mentoring philosophy statement, work on specific assignments designed to improve their relationship with their mentee and share their present and past experiences as mentors and mentees. Bench mentors will be eligible for a travel award to help defray expenses for attending a meeting with their mentee, if that student wins one of the HHMI SURF travel awards (4-5 awarded annually) or is otherwise being supported to present at a scientific meeting. Graduate students and postdocs do NOT need to be mentoring a student at the time of the course; it is open to all with an interest in mentoring now or in the future. Note: The sessions will be held either at the beginning of the day or the end of the day at the Danforth campus. Once registration closes, an email will be sent to those registered to poll for the best days & times.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5923 Foundations in Cancer Biology

This basic cancer biology class is designed to provide a didactic foundation into cancer biology principles. These will include tumor suppressors & oncogenes, DNA damage pathways, protein modifications, tumor progression, metastasis, tumor microenvironment and numerous other topics relevant to cancer biology.

Credit 3 units.

Typical periods offered: Fall

BBS 5928 Experimental Cancer Biology

This basic cancer biology class is meant to coincide with the Foundation course. Topics will be discussed in parallel with Foundation course topics but from the perspective of the laboratory experimentalist. Experimental details will provide the basis for understanding how to ask and answer important questions in the cancer biology laboratory.

Credit 3 units.

Typical periods offered: Fall

BBS 5940 Foundations in Cancer Biology and Experimental Cancer Biology

This advanced course will teach the clinical perspective of cancer biology using topics from oncology, radiation biology, radiology, pathology, immunology and surgery. Students will learn to write a grant proposal that includes a clinical trial element while also shadowing physicians in a real cancer clinical setting.

Credit 3 units.

Typical periods offered: Spring

BBS 5989 Advanced Topics in Neuroscience

This course will expose upper-level and postdoctoral students to advanced topics and methods in neuroscience. The course will rapidly fill gaps in student knowledge in areas that may be relevant to new directions in thesis work or interest areas. Each section of the course will be offered asynchronously, sometimes in coordination with existing journal clubs and other seminars. Each section will meet for two hours per week for three weeks. Sections may start with a didactic component or a review paper, but they will quickly delve into the discussion of primary papers curated by faculty and covering a focused topic. It is expected that papers will cover both historical and current contexts. Some sections will focus on technique; others will be conceptually focused. Each section will be led by a faculty member drawn from the Neuroscience program in an area of their expertise. Objectives include deepening critical thinking, statistical knowledge, experimental design, and technical prowess.

Credit 0.5-1 units.

Typical periods offered: Fall, Spring

BBS 5999 Independent Work

This course is designed for individual students wishing to explore indepth specialized areas of literature or technology with one or more faculty members. Credit will vary with the amount of work and discussion, but cannot be more than 3 credits.

Credit 3 units.

Typical periods offered: Fall, Spring

BBS 9000 Full-Time Graduate Research/Study

Full-Time Graduate Research/Study

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

BBS 9001 Full-Time Graduate Study in Absentia

Full-Time Graduate Study in Absentia

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

BBS 9002 Full-Time Graduate Study Extension

Full-Time Graduate Study Extension

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

Policies

The Vagelos Division of Biology & Biomedical Sciences has more than 700 students with access to over 700 faculty mentors with whom they may perform their dissertation work. This unparalleled flexibility results from the joint governance of DBBS by the Washington University School of Medicine and the School of Arts & Sciences — a 50-year-old model that fosters the most impactful science executed at the boundaries of fields, programs, disciplines, schools and departments. A hallmark of DBBS is our commitment to interdisciplinary collaboration. By transcending traditional academic boundaries, our programs consistently earn top-tier national and international rankings.

In this interdisciplinary environment, graduate students are governed by policies and guidelines established by the university, the School of Medicine, and DBBS. The policies identified here and elsewhere in this *Bulletin* are not to be considered a complete list. However, every attempt has been made to identify the location of those policies that affect most or all students in DBBS.

The University Policies (p. 21) page in this *Bulletin* outlines regulations for both graduate and undergraduate students. For further details, please consult the Office of the University Registrar website and the University Policies page of the WashU website. Graduate students are encouraged to review the specific policy categories relevant to their degree programs.

All DBBS students must follow the University PhD Policies & Requirements (p. 35) as set forth by the Provost's Office.

Degrees in DBBS are conferred by the School of Medicine; hence, students must follow the applicable policies (p. 413) as set forth by the school, including the relevant PhD Program Policies & Guidelines (p. 456).

DBBS students can reference the DBBS Student Handbook for student guidelines across all Division programs.

Clinical Investigation

The Clinical Research Training Center offers several academic programs for young investigators committed to pursuing academic careers in clinical research.



Degree and Certificate Programs

Master of Science in Clinical Investigation

The Master of Science in Clinical Investigation (MSCI) at WashU Medicine is an innovative, 33-credit program that provides scholars with the necessary skills and knowledge to excel in clinical research and the academic environment. Students enrolled in the 33 credit MS in Clinical Investigation do the following:

- Engage in high-quality didactic courses (refer to the MSCI course list) with mentored research and a weekly multidisciplinary seminar to meet the needs of clinicians seeking training in clinical research.
- Gain knowledge in the core competencies of clinical research and investigation, such as study design, research implementation, statistical approaches, responsible conduct of research, community engagement, scientific communication and literature critique, and leadership.
- Pursue one of four concentrations: Translational Medicine, Genetics/Genomics, Clinical Investigation, or Dissemination and Implementation, with each concentration providing focused training that is tailored specifically to a student's interest within clinical and translational research.
- Attend a weekly multidisciplinary seminar to learn about alternative research designs and methods through the discussion and presentation of peers' research and to obtain key feedback from senior faculty and peers with expertise in their fields.
- Attend monthly career development sessions to learn best practices in areas critical to success in clinical research, including grant writing, data management, intellectual property management, budgeting, ethics and other areas.
- Complete a thesis requirement consisting of a manuscript of original clinical research submitted for publication.
- Participate in a formal, structured mentorship program that offers an opportunity to work alongside faculty renowned for their innovative clinical research and teaching experience.

Graduate Certificate in Clinical Investigation

Students enrolled in the 16 credit Graduate Certificate Clinical Investigation do the following:

- Pursue one of four concentrations: Translational Medicine, Genetics/Genomics, Clinical Investigation, or Dissemination and Implementation, with each concentration providing focused training that is tailored specifically to a student's interest within clinical and translational research.

Non-Degree-Seeking Options

Eligible individuals not enrolled in a WashU degree program are able to enroll in up to 9 credits of coursework as non-degree-seeking scholars. Credits earned can later be applied to the Graduate Certificate in Clinical Investigation or the Master of Science in Clinical Investigation.

Location

Core courses are held on the School of Medicine campus after 4:00 p.m. to accommodate working professionals and full-time students participating in mentored research activities.

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Degrees & Offerings

- Master of Science in Clinical Investigation (p. 150)
- Graduate Certificate in Clinical Investigation (p. 152)

Research

While in the program, scholars conduct their own clinical research projects. These projects must receive Institutional Review Board approval, and they need to involve either patients, human tissue, human cell lines or clinical data. The resulting thesis manuscript cannot be a review article, case report or case series. Multidisciplinary mentors and leaders guide research projects and encourage career development activities. Research in progress is presented at multidisciplinary seminar sessions during which peer and mentor feedback is received. Program graduates have published more than

740 peer-reviewed manuscripts; secured more than 100 federal, state and privately sponsored grants; and presented at more than 1,000 conferences, symposia and meetings locally, nationally and internationally.

Faculty

Alison Antes, PhD

Associate Professor

Division: General Medicine & Geriatrics

Ana A. Baumann, PhD, MA

Associate Professor of Surgery

Division: Public Health Sciences

Patricia Cavazos-Rehg, PhD

Associate Professor

Department: Psychiatry

Karen L. Dodson, MBA

Manager, Professional Development

Department: Office of the Associate Dean of Faculty Affairs

Brian F. Gage, MD, MSc

Professor of Medicine

Department: Medicine

Division: General Medicine & Geriatrics

Elvin Geng, MD, MPH

Professor of Medicine

Department: Medicine

Division: Infectious Diseases

Obi Griffith, PhD

Professor of Medicine

Department: Medicine

Division: Oncology

Dorina Kallogjeri, MD, MPH

Associate Professor

Department: Otolaryngology

Jessica Mozersky, PhD

Assistant Professor in Medicine

Department: General Medicine & Geriatrics

Jay F. Piccirillo, MD, FACS

Professor of Otolaryngology

Department: Otolaryngology

Dominic Reeds, MD

Assistant Professor of Medicine

Department: Medicine

Division: Nutritional Science

Courses

CLNV 4060 Statistics for Step Up Scholars

Students will be introduced to basic biostatistical analysis using clinical examples, while receiving hands-on research experience. This course is only open to R25 STEP-UP Scholars

Credit 1 unit.

Typical periods offered: Fall, Summer

CLNV 4100 Fundamentals of Clinical and Translational Research

Under the direction of clinician-researchers, this course immerses young investigators in clinical research through didactic sessions, seminars and mentored research experiences. Students will be introduced to topics in designing outcomes and clinical research as well as basic biostatistical analysis using clinical examples, while getting hands-on research experience. Open only to students in the Advanced Summer Program for Investigation and Research Education (ASPIRE).

Credit 3 units.

Typical periods offered: Summer

CLNV 4101 Designing Outcomes & Clinical Research for R25 Scholars

Under the direction of clinician-researchers, this course immerses the young investigators in clinical and translational research through didactic sessions, seminars, and mentored research experiences. This course is designed to introduce students to medical research and further their existing interest in the field. The two-month course encompasses up to two separate components: Designing Outcomes and Clinical Research Workshop, a and mentored independent clinical research experience. Students will be introduced to topics in designing outcomes and clinical research methodology, as well as basic biostatistical analysis using clinical examples, while receiving hands-on research experience. This course is only open to students in the R25 program.

Credit 2 units.

Typical periods offered: Summer

CLNV 5000 Responsible Conduct of Research

This course provides practical knowledge and skills for the responsible conduct of research, spanning issues of authorship, peer review, data confidentiality, management, sharing, and ownership, human subjects protections, collaboration, mentor-mentee relationships, conflicts of interest, research misconduct, safe and supportive research environments. This course satisfies NIH, NSF, and other federal agency's requirements for instruction in the responsible conduct of research. The course encourages sensitivity to ethical issues in research, develops decision-making and communication skills for navigating challenges in research, and builds awareness of resources that support the responsible conduct of research.

Credit 1 unit.

Typical periods offered: Fall, Spring

CLNV 5050 Designing Clinical Research Workshop

Designing Clinical Research Workshop is a new eight-week course developed by Dr. Piccirillo, and is based on the Designing Clinical Research Course developed by Dr. Hulley and colleagues at the University of California - San Francisco School of Medicine. The course is taught in conjunction with the textbook, Designing Clinical Research, 2nd Edition (Hulley et al, Lippincott, Williams and Wilkins, 2001). The goal of the course is to teach the methods of clinical investigation to physicians and other health professionals. The main part of the course runs in seven sessions, with a lot of active homework and two hours a week in class. Topics include: The Anatomy and Physiology of Clinical Research; Conceiving the Research Questions; Choosing the Subjects: Specification, Sampling & Recruitment; Planning the Measurements: Precision and Accuracy; Getting Ready to Estimate Sample Size: Hypotheses & Underlying Principles; Estimating Sample Size and Power; Designing an Observational Study - cohort, cross-sectional, and case-control studies; Enhancing Causal Inference in Observational Studies; Designing an Experiment - clinical trials;



Designing Diagnostic and Prognostic Test Studies; Secondary Data Analysis; Designing Questionnaires and Data Collection Instruments; Implementing the Study; Data management; and Writing and Funding a Research Protocol. Open to CRTC Predoctoral Program scholars only. Credit 1 unit.

Typical periods offered: Summer

CLNV 5070 Ethical and Legal Issues in Clinical Research

This course prepares clinical researchers to critically evaluate ethical and regulatory issues in clinical research. The principal goal of this course is to prepare clinical researchers to identify ethical issues in clinical research and the situational factors that give rise to them, to identify ethics and compliance resources, and to foster ethical problem-solving skills. The course aims to deliver practical guidance for investigators through discussion of critical areas of clinical research ethics. An additional aim of the course is to enable participants to recognize the different ways in which research participants may be vulnerable and the ethical issues raised by including and excluding vulnerable participants. By the end of the course, participants will understand the regulatory framework that governs human subjects research and the distinction between compliance and ethics; be able to identify major ethical concerns in the conduct of clinical research, including situational factors that may give rise to ethical concerns; and be able to apply an ethical problem-solving model in clinical research. Please contact the MSCI Program for permission to enroll in this course.

Credit 2 units.

Typical periods offered: Fall

CLNV 5100 Designing Outcomes and Clinical Research

This course covers how to select a clinical research question, outline a research protocol, and execute a clinical study. Topics include: subject selection, observational and experimental study designs, sample size estimation, clinical measurement, bias and confounding, and data management. The course is designed for health care professionals who wish to conduct patient-oriented clinical research. Students incorporate research design concepts into their own research proposal. The course consists of lectures, weekly problem sets, weekly reading assignments, outlining a research protocol, and a final exam.

Credit 3 units.

Typical periods offered: Fall

CLNV 5110 Mentored Independent Research

Scholars earn Mentored Independent Research credits for conducting clinical research, completing a report and developing and presenting a poster describing their work. They are also expected to attend a half-day research symposium in the fall with other clinical investigators. Mentored Independent Research will be presented each semester to an advisory committee that includes the scholar's departmental mentors as well as Clinical Research Training Center program faculty. The research presented will be in the form of a research paper submitted for publication in a peer reviewed journal. Under some circumstances, a grant application submitted for review will be acceptable in place of the research paper. MTPCI Mentored Independent Research will provide scholars with the practical application of skills learned in the Clinical Research Training Program didactic coursework and seminars. Open to CRTC Postdoctoral Program scholars only.

Credit 1-8 units.

Typical periods offered: Fall, Spring, Summer

CLNV 5140 Clinical Investigation Seminar

Weekly seminar series are required for Postdoctoral Program and Career Development Program scholars for four semesters, one credit per semester. An important learning experience in research is the presentation and critical discussion of research ideas and projects at various points in their evolution. Seminars will alternate discussion of work in progress with critical reading of current clinical research in order to practice and enhance analysis and communication skills. Each scholar will formally present his or her own research in progress twice per year for feedback by peers and faculty from multiple disciplines. In addition to presenting their own work in oral and written form for peer and faculty evaluation, scholars will formally review the written proposals of their peers in a way that emulates the duties of a member of an NIH study section. This formal research evaluation exercise is a highly successful element of other clinical training instruction at Washington University. The Program Director and Co-Directors will lead a weekly seminar with participation of other core faculty. The weekly, small group, intensive discussions of research issues are one of the most valuable aspects of the program, allowing scholars to learn in an active and participatory fashion. Open to CRTC Postdoctoral Program scholars only.

Credit 1-2 units.

Typical periods offered: Fall, Spring

CLNV 5150 Introduction to Statistics for Clinical Research

This is an introductory course in statistics with a focus on the use of statistical analysis in clinical research. It is taught using SPSS, statistical analysis software commonly used in clinical research. The course teaches basic statistical methods with which clinical researchers will have the facility to execute their own analyses.

Credit 3 units.

Typical periods offered: Fall

CLNV 5151 Intermediate Statistics for the Health Sciences

This course builds upon Introduction to Statistics for the Health Sciences and will focus on SPSS, Cox proportional hazards, generalized linear models, multiple linear models, ANOVA, repeated measures, regression, applied modeling, 2X2, ROC curves, checking assumptions and regression diagnostics. Completion of this course will enable clinical investigators to work independently with their own data and run their own analyses. Content will include data sets with applied exercises, interpreting output, lab assignments and a midterm and final exam. R code will be provided for R users.

Credit 3 units.

Typical periods offered: Spring

CLNV 5160 Grantsmanship

Scholars will learn how to 1) develop research and career development grant proposals that incorporate well-formulated hypotheses, rationales, specific objectives and long-range research goals; 2) organize and present sound research and career development plans that accurately reflect the ideas and directions of the proposed research activities; and 3) avoid many common grant-writing mistakes. Scholars will also learn about the peer review process for grant evaluations and will participate in a mock NIH review exercise (study section) at the end of the semester. Though it is not required, scholars will get maximum benefits from the class if they are working on grant proposals.

Credit 2 units.

Typical periods offered: Fall

CLNV 5170 Scientific Writing and Publishing

The objective of this course is to teach the proper techniques of writing and publishing a biomedical manuscript. Writing a working title and structured abstract as well as hand drawing of figures and tables is covered. Publishing strategies are also discussed.

Credit 2 units.

Typical periods offered: Spring

CLNV 5220 Genomics in Medicine I

This course introduces principles of genomics in medicine as they apply to clinical research and provides a practical background in molecular biology and genetics. Students will be provided with an introduction to genomic research and applications of genomic technologies in the research environment and an understanding of the clinical application of genetic/genomic knowledge. Critical thinking and scientific/analytic competencies are emphasized through weekly lectures by renowned faculty. Reflection papers are required. Prior clinical research experience is helpful but not required.

Credit 1 unit.

Typical periods offered: Fall

CLNV 5221 Genomics in Medicine II

This course introduces principles of genomics in medicine as they apply to clinical research and provides a practical background in molecular biology and genetics. Students will be provided with an introduction to genomic research and applications of genomic technologies in the research environment and an understanding of the clinical application of genetic/genomic knowledge. Critical thinking and scientific/analytic competencies are emphasized through weekly lectures by renowned faculty. Reflection papers are required. Prior clinical research experience is helpful but not required.

Credit 1 unit.

Typical periods offered: Spring

CLNV 5230 Introduction to Dissemination and Implementation Science

Upon successfully completing this class, scholars will be able to: Describe the need for dissemination and implementation research, compare theories and frameworks in the field, select the appropriate designs, strategies, outcomes, and measures for implementation studies. Scholars will also: Understand the importance and language of D&I basic science, explore the theories and frameworks that are commonly used in D&I research and practice, describe the importance of context at multiple levels in D&I science, distinguish between implementation strategies and outcomes from those in efficacy and effectiveness research, describe various study designs, methods, and measures that support D&I science, understand D&I methods and challenges across various settings and populations, recognize opportunities to apply D&I science to intervention development and evaluation, and understand how D&I science can further your research/practice plans and career.

Credit 3 units.

Typical periods offered: Fall

CLNV 5240 Implementation Science: Measures, Metric and Methods

This course will address key methodological approaches in implementation science, focusing on methods with particular or distinctive relevance to implementation research. The course begins with an introduction to concepts of causality and tools for rendering causal relationships, and suggests that these tools are useful for scientific insights into context, adaptation, heterogeneity, external validity and other issues salient in implementation research. We will cover how to capture and represent strategies, the concept of implementation outcomes and how they can be measured. The course will cover methods relevant for approaches at the organizational,

practice, or regional level, based on cluster-level considerations about sampling, measurement and analysis. Subsequently, we will apply a causal lens to examine some prominent issues in measurement - including concepts such as sustainability, context and other concepts. Finally, the course will close a look at present methods of appraising research and rating evidence, such as GRADE and problematize these methods for implementation research, and suggest future directions.

Credit 3 units.

Typical periods offered: Spring

CLNV 5260 Bench Fundamentals for Translational Research

This course will introduce fellows-in-training and future physician scientists to the core principles of scientific investigation. This unique three-week intensive format will combine the theoretical knowledge with practical, hands-on application to provide students with an understanding of common and new and innovative research approaches used in current scientific endeavors. Course lectures will highlight the following areas: molecular medicine; biospecimens and tissue banking; gene expression; immunoassays and controls; immunolocalization techniques; flow cytometry and cell sorting; cell signaling; sequencing technologies; microarray and related technologies; proteomics and mass spectroscopy; animal models and bioinformatics. The lectures will be complemented by hands-on laboratory experiences in tissue culture, protein extraction and blot, cell signaling and ELISA, PCR and electrophoresis; and plasmid purification. The first two weeks of the course introduce course content via online lectures; the third week requires face-to-face lab work.

Credit 3 units.

Typical periods offered: Summer

CLNV 5420 Designing for Dissemination, Implementation & Sustainability: How to Maximize Impact and Equity

This course will introduce students to modern concepts in design thinking and how they affect dissemination, implementation, and sustainability of health interventions in clinical and public health translational research practice. This course will provide students with methods in all stages of the design thinking process: 1) empathize; 2) define; 3) ideate; 4) prototype; and 5) test. The goal of this approach is to ensure that the products of research (interventions, materials, and findings) are developed in ways that match well with the needs, resources, workflows, and contextual characteristics of the target audience and setting to maximize impact and equity.

Credit 3 units.

Typical periods offered: Fall

CLNV 5440 Independent Study

Active participation in research and/or scholarly activities with program faculty. A written plan of study agreed upon by faculty and student. Permission of faculty advisor required.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

CLNV 5882 Analysis of Clinical Data

Analysis of Clinical Data is a one-credit, online course consisting of different teaching modules. Course material is the same for short-term and intensive research core trainees. The goal of the course is to teach basic biostatistical analysis using clinical examples. Specifically, this course will cover: populations and samples; scales of measurement; variables; frequency distributions; central tendency; variability, probability, normal distribution, and sampling distribution; introduction to hypothesis testing and sample size; one-sample t-



test, independent samples t-test, paired t-test; one-way ANOVA; nonparametric statistical procedures; post-hoc testing; correlation and regression; logistic regression; calculation of survival curves/life tables, and Cox-regression. Open to CRTC Predoctoral Program scholars only. Credit 1 unit.

Typical periods offered: Summer

CLNV 5890 Advanced Methods for Clinical and Outcomes Research

This course focuses on the application of advanced epidemiologic principles and outcomes research as applied to clinical research. Students study the tools used in clinical research, in clinical issues, and in understanding the medical literature concerning these issues, which are crucial for making informed decisions in the care of patients. Critical thinking and scientific/analytic competencies are emphasized throughout the course.

Credit 3 units.

Typical periods offered: Spring

CLNV 7883 Master's Continuing Student Status

Full-time graduate research

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

Genetic Counseling

The Program in Genetic Counseling is an innovative, 21-month Master of Science program that prepares graduates to be Certified Genetic Counselors (CGCs®). We have *full accreditation status* through the Accreditation Council for Genetic Counseling (ACGC). Admission to programs accredited by the ACGC require registering for the Genetic Counseling Admissions Match.

Applicants to the Program in Genetic Counseling must have a bachelor's degree (or equivalent if from a foreign college or university). Most applicants will have majored in biology or a related field (e.g., biochemistry, genetics) or in psychology. Along with the required prerequisite undergraduate course work in genetics, biochemistry, statistics, and psychology, the Program in Genetic Counseling also highly recommends that applicants have obtained the following types of experiences prior to applying:

- Exposure to the field via shadowing and/or informational interviewing
- Advocacy and/or counseling experience

The mission of the Program in Genetic Counseling at Washington University is to educate future generations of genetic counselors to serve the growing need for diverse, culturally humble, innovative genetic counselors serving patients, working in industry, and conducting research. The objectives of the program are to provide a rigorous curriculum, broad and robust clinical experiences, and expert research guidance to graduate students who are well prepared to fill the ever-expanding professional roles in which genetic counselors may be employed.

All graduates of accredited genetic counseling graduate programs are prepared for entry-level genetic counseling positions, regardless of the area of specialization. Common areas of specialization for genetic counselors include oncology, prenatal, pediatrics, neurogenetics, and cardiology. Many genetic counselors do select a specialty area of practice that they focus on throughout their careers. Others change their area of practice many times. The field of genetic counseling provides a great deal of career flexibility.

As a result of its ACGC accreditation, the Program in Genetic Counseling curriculum meets the educational requirements to sit for the American Board of Genetic Counseling (ABGC) Certification Examination and to pursue licensure in all states and territories of the United States and Washington, DC, in which licensure is available.

Email: geneticcounseling@wustl.edu

Website: <http://geneticcounseling.wustl.edu>

Degrees & Offerings

- Master of Science in Genetic Counseling (p. 152)

Research

Program in Genetic Counseling faculty members are active collaborators and leaders of interdisciplinary research projects that inform the practice of genetic counseling. To benefit from this active research portfolio, our students will undertake research-related activities throughout the program. Students will be introduced to key genetic counseling research concepts and encouraged to note areas of research interest throughout the first semester. Formal training in genetic counseling research methods and responsible conduct will take place during the second semester course, Genetic Counseling Research Methods and Ethics. Assignments in this course will culminate in students having a proposal for an independent research project that will be completed prior to graduation.

Our program is committed to generating research results that enhance the genetic counseling evidence base and patient care. To support impactful research, students will have the opportunity to collaborate across cohorts on legacy research projects. Students are also strongly encouraged to submit their findings for peer-reviewed publication and presentation.

Faculty

Rachael Bradshaw, MS, CGC

Program Director

Tomi L. Toler, MS, CGC

Associate Director

Clinical Fieldwork Coordinator

Erin Linnenbringer, PhD, MS, CGC

Assistant Director

Research Coordinator

Marwan Shinawi, MD, FACMG

Medical Director

Meagan Corliss, MS, CGC

Course Director

Katherine King, MD

Course Director

Elizabeth Witthaus

Program Coordinator

Visit the Program in Genetic Counseling website for more information about our faculty and their appointments.

Courses

GNCCOUN 5000 Introduction to Genetic Counseling I

This seminar provides an overview of genetic counseling and health care, and it discusses how individual differences can affect health care choices and belief systems. Students will become familiar with the process of genetic counseling, and they will build an awareness of related health professions, the health care system, and important terminology. Attendance and active participation are expected and required. Course activities will include interactive lectures, class discussions, class member presentations, guest presentations, and outside reading. This course is open to students in the Program in Genetic Counseling. Admittance may be offered to other students by request.

Credit 4 units.

Typical periods offered: Fall

GNCCOUN 5001 Introduction to Genetic Counseling II

This course is a seminar focusing on preparing students for their clinical rotations and learning and practicing basic counseling skills. Attendance and active participation is expected and required. Course activities will include interactive lectures, class discussions, class member presentations, guest presentations, and outside reading. This course is open to students in the Master's in Program in Genetic Counseling. Admittance may be offered to other students by request.

Credit 4 units.

Typical periods offered: Spring

GNCCOUN 5010 Laboratory Genetic Counseling

This course is designed for genetic counseling students, and it focuses on a variety of areas related to genetic counseling in the laboratory. Students will become familiar with various laboratory testing methodologies, data interpretation, and report writing in addition to professional and regulatory scenarios encountered in the lab. Attendance and active participation are expected and required. The course will consist of lectures, class discussions, hands-on demonstrations and tutorials, laboratory tours, and written materials. Some travel will be required. This course is open to students in the Master's in Genetic Counseling Program. Admittance may be offered to other students by request.

Credit 3 units.

Typical periods offered: Fall

GNCCOUN 5020 Genetic Counseling Journal Club

This journal club is a monthly, two-hour discussion of a relevant topic in clinical genetics. Research articles are selected from the literature and presented by attendees (one article per attendee). Summaries of the articles include a critical appraisal of the study and

its methodology and results; the potential implications of the results for clinical practice (if any); the limitations of the conclusions that can be drawn from the study; and any biases or conflicts of interest that could have affected the study results. This course is open to students in the Master's Program in Genetic Counseling. Admittance may be offered to other students by request.

Credit 1 unit.

Typical periods offered: Fall, Spring

GNCCOUN 5040 Genetic Counseling Research Methods and Ethics

This course will provide the foundation for the development and execution of the research project required for successful completion of the Master's of Science in Genetic Counseling degree. Through a series of interactive lectures, class discussions, student presentations, guest presentations, and outside reading, students will learn about common genetic counseling-relevant research methods; areas of active genetic counseling research on both a local and national level; and ethical guidelines for the conduct of responsible human subjects research. By the end of the course, students will select a topic for their research project and submit a research proposal. Students will register for Research Project I, II, and III to complete their research projects with faculty mentorship and peer support. This course is open to graduate students at Washington University School of Medicine.

Credit 3 units.

Typical periods offered: Spring

GNCCOUN 5050 Research Project I

The primary objective of this course series is to ensure the timely completion of student research projects. This course series provides research project scaffolding, mentorship, and opportunities for peer feedback. Research Project I is an eight-week course taken remotely or in person during the summer between the first and second years.

Credit 1 unit.

Typical periods offered: Summer

GNCCOUN 5060 Clinical Fieldwork Rotations I

This course covers clinical fieldwork rotations. Participation as requested by supervisors is required. Clinical Fieldwork Rotations I is a 28-day clinical rotation over the summer between the first and second years. Students who complete this course successfully will be able to demonstrate management of a genetic counseling case from contracting to follow-up and successfully use psychosocial counseling skills with patients.

Credit 4 units.

Typical periods offered: Summer

GNCCOUN 5100 Clinical Genetics & Genomics I

This course is a seminar focusing on the fundamentals of clinical genetics and genomics. Attendance and active participation are expected and required. Course activities will include interactive lectures, class discussion, and class member presentations. This course is open to students in the Master's Program in Genetic Counseling. Admittance may be offered to other students by request.

Credit 3 units.

Typical periods offered: Fall

GNCCOUN 5110 Clinical Genetics & Genomics II

This course is a seminar focusing on the specialty areas in clinical genetics and genomics. Attendance and active participation are expected and required. Course activities will include interactive lectures, class discussion, and class member presentations. This course is open to students in the Master's Program in Genetic Counseling. Admittance may be offered to other students by request.

Credit 3 units.



Typical periods offered: Spring

GNCOUN 6010 Advanced Genetic Counseling I

This course is a seminar focusing on starting to build advanced genetic counseling skills. Students will become familiar with unique aspects of various genetic counseling specialties, with a focus on prenatal genetics. Students will also learn about counseling theories, psychosocial assessment, psychosocial counseling techniques, and professional development skills. Attendance and active participation are expected and required.

Credit 4 units.

Typical periods offered: Fall

GNCOUN 6020 Research Project II

The primary objective of this course series is to ensure the timely completion of student research projects. This course series provides research project scaffolding, mentorship, and opportunities for peer feedback. Research Project II is taken during the fall semester of the second year.

Credit 2 units.

Typical periods offered: Fall

GNCOUN 6030 Clinical Fieldwork Rotations II

This course covers clinical fieldwork rotations. Participation as requested by supervisors is required. Clinical Fieldwork Rotations II involves two 14-day clinical rotations during the fall semester of the second year. Students who complete this course successfully will be able to demonstrate management of a genetic counseling case from contracting to follow-up and successfully use psychosocial counseling skills with patients.

Credit 3 units.

Typical periods offered: Fall

GNCOUN 6040 Teratology

This course is a weekly seminar focusing on human teratogens. Students will become familiar with the mechanisms by which exposures affect human development, learn about known and potential teratogens, and understand the methods by which exposures are studied to understand their potential effects. Finally, students will learn how to incorporate data available in the medical literature and databases to provide information about teratogens to patients and providers. Attendance and active participation is expected and required. Course activities will include interactive lectures, class discussions, class member presentations, guest presentations, and outside reading. This course is open to students in the Master's Program in Genetic Counseling. Admittance may be offered to other students by request.

Credit 2 units.

Typical periods offered: Spring

GNCOUN 6050 Advanced Genetic Counseling II

This course is a seminar focusing on building and honing advanced genetic counseling skills. Students will learn about complex issues such as family dynamics, crisis intervention, and implicit biases and use this knowledge to increase their psychosocial assessment and counseling skills. This course will also help prepare students for graduation with a focus on ABGC Board Examination readiness and learning how to use self-care techniques to assist with stress management. Course activities will include interactive lectures, class discussions, class member presentations, guest presentations, and outside reading. This course is open to students in the Program in Genetic Counseling. Admittance may be offered to other students by request.

Credit 4 units.

Typical periods offered: Spring

GNCOUN 6060 Clinical Fieldwork Rotations III

This course covers clinical fieldwork rotations. Participation as requested by supervisors is required. This includes two 14-day clinical rotations during the spring semester of the second year. This course is open to students in the Master's Program in Genetic Counseling.

Credit 3 units.

Typical periods offered: Spring

GNCOUN 6070 Research Project III

The primary objective of the course series is to ensure the timely completion of student research projects. This course series provides research project scaffolding, mentorship, and opportunities for peer feedback. Research Project III is taken during the spring semester of the second year. This course is open to students in the Master's Program in Genetic Counseling.

Credit 2 units.

Typical periods offered: Spring

Informatics, Data Science, and Biostatistics

I²DB is no longer accepting applications for the following programs as it prepares for the new Biomedical Data Science and AI programs: Master of Science in Biomedical Informatics, Master of Science in Biostatistics, Certificate in Biomedical Informatics, and Certificate in Biostatistics and Data Science. Information found about these programs is for students who matriculated into these programs prior to Fall 2026.

The mission of the Institute for Informatics, Data Science and Biostatistics (I²DB) focuses on the informatics, data science, and biostatistics landscape at Washington University School of Medicine in order to transform research, education, and patient care by emphasizing precision medicine and efforts to improve the quality of health care and public health initiatives locally, nationally, and worldwide.

The education programs currently offered by I²DB include two master's degrees and one graduate certificate: the Master of Science in Biomedical Data Science and AI, the Master of Science in Biostatistics and Data Science, and the Graduate Certificate in Biomedical Data Science and AI. Interested students may pursue individual courses offered by the division as non-degree-seeking students.

Washington University School of Medicine is known for being at the forefront of medical research and primary care; the school engages students in research and practical training so that they can contribute to improving health outcomes. Our programs train students as critical thinkers and collaborators in biostatistics, genetics, and data science. We seek those with undergraduate degrees in the quantitative and biomedical sciences, including fields such as mathematics, statistics, computer science, informatics, and biomedical engineering.

Our programs are designed to teach students how to manage, analyze, and interpret health data using statistical and data science approaches. Internationally renowned faculty from multiple disciplines — including biostatistics, genetics, informatics, medicine, and public health — will train a new generation of quantitative scientists. The curriculum offers a unique training experience that combines core data science learning in statistical and computational methodologies with practical training in real-world data analysis of cutting-edge biomedical and genomics research.

Academic Calendar

The academic programs begin in the fall of each year. They follow the Washington University Graduate Programs in the School of Medicine academic calendar (p. 16) for fall and spring courses.

Location

The programs are located on the fifth floor of the Bernard Becker Medical Library (660 S. Euclid Ave., St. Louis, MO 63110), rooms 501 and 502.

Additional Information

Shelby Cripe, MA
Program Manager
Email: skcripe@wustl.edu

Zachary Abrams, PhD
Program Director
Email: abramsz@wustl.edu

Washington University School of Medicine
Institute for Informatics, Data Science and Biostatistics (I²DB)
660 S. Euclid Ave., MSC 8067-0013-05
St. Louis, MO 63110-1093

Degrees & Offerings

- Master of Science in Biomedical Data Science and AI (p. 153)
- Master of Science in Biomedical Informatics (p. 154)
- Master of Science in Biostatistics (p. 154)
- Master of Science in Biostatistics and Data Science (p. 155)
- Certificate in Biomedical Data Science and AI (p. 155)
- Certificate in Biomedical Informatics (p. 156)
- Certificate in Biostatistics and Data Science (p. 156)

Research

Master's students will complete 6 credit hours of an internship or work on an independent mentored research project to hone their research skills, including study design, data analysis, and interpretation.

Mentored Research/Thesis

All students enrolled in the Mentored Research course will complete a master's thesis, which may involve conducting and reporting on comprehensive data analysis or conducting research and reporting on a focused methodological problem; the latter may include a computer simulation approach to solve a problem, an in-depth review of available methods in a certain topical area, or the development of new methods. Each student will work closely with a mentor who has expertise in biostatistics or a related quantitative field. The grade for each student will be determined in consultation with the mentor.

Internship/Practicum

The primary goal of the Internship course is for all students enrolled in the Internship to acquire critical professional experience so that they will be well-prepared to enter the job market upon graduation. This provides an opportunity for students to test-drive the job market, develop contacts, build marketable skills, and figure out likes and dislikes in the chosen field. Students are expected to complete a minimum of 150 hours of work on their project per semester.

Faculty

Philip R.O. Payne, PhD, FACMI, FAMIA, FAIMBE, FIAHSI
Director, Institute for Informatics, Data Science and Biostatistics (I²DB)

Janet and Bernard Becker Professor
Vice Chancellor for Biomedical Informatics and Data Science, WashU Medicine
Chief Health AI Officer, BJC Health and WashU Medicine

Zachary Abrams, PhD
BDSAI Program Director
Instructor of Biostatistics

Po-Yin Yen, PhD, RN, FACMI, FAMIA, FAAN
Deputy Director for Education
Associate Professor of Medicine, Division of General Medicine & Geriatrics
Associate Professor, Goldfarb School of Nursing, Barnes Jewish College

Joanna Abraham, PhD, FACMI, FAMIA
Director, Center for Applied Health Informatics
Professor of Anesthesiology

Alison Antes Schuelke, PhD
Associate Professor of Medicine

Ling Chen, PhD
Associate Professor of Biostatistics

William Dunagan, MD, MS
Professor of Medicine in the Division of Infectious Diseases

Rosie Dutt, PhD

Instructional Consultant

Robert Fitzgerald, PhD

Associate Professor of Psychiatry

Charles Goss, PhD

Director, Center for Biostatistics and Data Science

Assistant Professor of Biostatistics

Charles Gu, PhD

Associate Professor of Biostatistics

Aditi Gupta, PhD

Assistant Professor of Biostatistics

Mackenzie Hofford, MD

Associate Chief Research Information Officer, School of Medicine

Assistant Professor of Medicine, Division of General Medicine & Geriatrics

Ronald Jackups Jr, MD, PhD

Professor of Pathology & Immunology

Daphne Lew, PhD, MPH

Assistant Professor of Biostatistics

Fuhai Li, PhD

Associate Professor of Pediatrics, School of Medicine

Sunny C. Lin, PhD, MS

Assistant Professor of Medicine, Division of General Medicine & Geriatrics

Lei Liu, PhD

Deputy Director for Faculty Affairs and Research

Professor of Biostatistics

J. Phillip Miller, PhD

Professor of Biostatistics

Alexander S. Plattner, MD, MBA

Assistant Professor of Pediatrics, Infectious Disease

Beth Prusaczyk, PhD, MSW

Assistant Professor of Medicine, Division of General Medicine & Geriatrics

Treva Rice, PhD

Professor of Biostatistics

Ken Schechtman, PhD

Professor of Biostatistics

RJ Waken, PhD

Instructor of Biostatistics

Adam Wilcox, PhD, FACMI

Professor of Medicine, Division of General Medicine & Geriatrics

Laura K Wiley, PhD, FACMI, FAMIA

Associate Professor of Neurology

Chengjie Xiong, PhD

Professor of Biostatistics

Linying Zhang, PhD

Assistant Professor of Biostatistics

Ruiwen Zhou, PhD

Assistant Professor of Biostatistics

Visit our website for more information about our faculty and their appointments.

Courses

BDSAI 5001 R for Biomedical Sciences

The course delves into the essential tools of Python programming within the context of biomedical informatics, biostatistics, and data science. This course emphasizes foundational programming skills in Python, crucial for data analysis in biomedical sciences. Participants will learn to set up and utilize the Jupyter environment for Python programming. The curriculum covers fundamental programming concepts, debugging techniques, and data manipulation using Pandas in Python. Practical sessions include working with diverse data formats such as CSV, JSON, and Excel, and handling data operations like data selection, filtering, grouping, and summarizing. By the end of the course, participants will be proficient in manipulating, analyzing, and managing, preparing you for more advanced studies or professional applications in biomedical informatics, biostatistics, and data analysis. Credit 1 unit.

Typical periods offered: Fall

BDSAI 5002 Python for Biomedical Sciences

The course delves into the essential tools of R programming within the context of biomedical informatics, biostatistics, and data science. This course emphasizes foundational programming skills in R, crucial for data analysis in biomedical sciences. Participants will learn to set up and utilize R Studio for R programming. The curriculum covers fundamental programming concepts, debugging techniques, and data manipulation using dplyr in R. Practical sessions include working with diverse data formats such as CSV, JSON, and Excel, and handling data operations like data selection, filtering, grouping, and summarizing. By the end of the course, participants will be proficient in manipulating, analyzing, and managing, preparing you for more advanced studies or professional applications in biomedical informatics, biostatistics, and data analysis.

Credit 1 unit.

Typical periods offered: Fall Intersession

BDSAI 5003 Introduction to Biomedical Data Science

Introduction to Biomedical Data Science will provide students with an introduction to tools, theories and methods related to data modeling, management and query, data cleaning and analysis, and visualization that serve as the foundations for advanced topics in Biomedical Informatics and Data Science. The course consists of didactic lectures and experiential learning opportunities including hands-on laboratory sessions and a culminating project. Prior participation in "R and Python for Biomedical Sciences" course or completing a "Python Proficiency Test" are required, no other assumptions are made about computer science or clinical background.

Credit 2 units.

Typical periods offered: Fall

BDSAI 5004 Introduction to Biomedical Informatics

This course offers an introduction to the definitions, theories, and methods that are foundational to Biomedical Informatics. Course content covers bioinformatics, clinical informatics, clinical research informatics, population health informatics, and imaging informatics. Students will be introduced to topics such as data standards, clinical decision support, natural language processing, and data visualization. By the end of the course, participants will have a broad understanding of biomedical informatics and its applications, preparing them for further study or professional opportunities in the field.

Credit 2 units.

Typical periods offered: Fall

BDSAI 5005 Fundamentals of Biostatistics

This course is designed for students who want to develop a working knowledge of basic methods in biostatistics. The course is focused on biostatistical and epidemiological concepts and on practical hints and hands-on approaches to data analysis rather than on details of the theoretical methods. We will cover basic concepts in hypothesis testing, will introduce students to several of the most widely used probability distributions, and will discuss classical statistical methods that include t-tests, chi-square tests, regression analysis, and analysis of variance. Both in-class examples and homework assignments will involve extensive use of R.

Credit 2 units.

Typical periods offered: Fall

BDSAI 5111 Data Visualization

This course introduces the fundamental principles and practical applications of data visualization in biomedical data science. Students will learn how to translate complex biomedical and clinical data into clear and interpretable visual representations, and apply visualization techniques to explore, analyze, and interpret biomedical and clinical datasets. The course covers foundational concepts, such as perception, color theory, and visual design, along with best practices in data communication. Students will gain hands-on experience with visualization tools to create static and interactive visualizations. The student will apply visualization techniques to real-world biomedical datasets, integrating visual analytics into workflows, and communicating data insights to diverse research and clinical audiences.

Credit 3 units.

Typical periods offered: Fall

BDSAI 5121 Electronic Health Records: Foundations

A course covering healthcare information technology (health IT), specifically focusing on electronic health records (EHRs). This course is designed to help students understand structures, functions, roles, and other factors that influence the use and impact of EHRs. It also addresses current issues and strategies related to health IT.

Credit 3 units.

Typical periods offered: Fall, Spring

BDSAI 5121 Electronic Health Records: Foundations

A course covering healthcare information technology (health IT), specifically focusing on electronic health records (EHRs). This course is designed to help students understand structures, functions, roles, and other factors that influence the use and impact of EHRs. It also addresses current issues and strategies related to health IT.

Credit 3 units.

Typical periods offered: Fall, Spring

BDSAI 5123 Advanced Multi-Omic Modeling and Systems Analysis

This advanced course addresses the computational and statistical challenges of integrating diverse high-throughput biological data—including genomics, transcriptomics, proteomics, metabolomics, and epigenomics. The curriculum covers data harmonization, preprocessing techniques, and advanced statistical methods such as matrix factorization, kernel-based techniques, and Bayesian inference, alongside application of network and systems biology approaches for predictive modeling, biomarker discovery, and clinical translation in personalized medicine. Through computational labs, literature reviews, and a semester-long project, MS and PhD students with strong backgrounds in statistics and programming (R or Python) will develop the ability to critically evaluate, design, and implement robust multi-omic data analysis pipelines, equipping them with essential skills for cutting-edge biological research and clinical discovery. This advanced, doctoral-level course provides a deep dive into the computational and statistical challenges inherent in integrating diverse high-throughput biological data (genomics, transcriptomics, proteomics, metabolomics, and epigenomics). The course begins by reviewing state-of-the-art data harmonization and preprocessing techniques necessary for combining datasets of varying dimensionality and noise profiles. Key themes include advanced statistical modeling for integration, such as matrix factorization methods, kernel-based techniques, and Bayesian inference, alongside the application of network and systems biology approaches to contextualize findings. Students will explore predictive modeling, biomarker discovery, and clinical translation within the framework of personalized medicine. The target audience is MS and PhD students in Biomedical Informatics, Computational Biology, and related quantitative disciplines who possess a strong foundation in statistics and programming (R or Python). Through computational labs, critical literature reviews, and a semester-long, project-based assessment, students will transition from theoretical knowledge to practical application. Upon completion, students will be able to critically evaluate, design, and implement robust multi-omic data analysis pipelines, equipping them with essential skills for cutting-edge biological research and clinical discovery.

Credit 3 units.

Typical periods offered: Fall

BDSAI 5131 Survival Analysis

This course introduces the fundamental theoretical and applied principles of survival analysis for modeling time-to-event data. Core topics include survival and hazard functions, censoring and truncation, Kaplan–Meier and Nelson–Aalen estimators, cohort life tables, and likelihood construction for censored and truncated data. The course covers estimation of hazard and survival functions, the Cox proportional hazards (PH) model with fixed and time-dependent covariates, and methods for model selection. Additional topics include regression diagnostics for survival models, stratified PH models, parametric regression models, and competing risks analysis. Computer lab sessions provide hands-on experience with real-world datasets to reinforce methodological concepts and data analysis skills.

Credit 3 units.

Typical periods offered: Fall

BDSAI 5213 Causal Artificial Intelligence for Healthcare

This course provides an introduction to causal artificial intelligence for healthcare, focusing on how causal reasoning and modern machine learning methods can be used to support reliable decision-making from real-world health data. Students will learn how to move beyond prediction toward answering clinically meaningful “what if” questions, such as estimating treatment effects, understanding sources of bias, and evaluating model robustness across populations and settings. Topics include randomized and observational study designs, causal diagrams, target trial emulation, counterfactual



reasoning, heterogeneous treatment effects, invariance and transportability, algorithmic fairness, and emerging approaches to causal representation learning. Throughout the course, methodological concepts are motivated by real clinical and public-health use cases. Credit 3 units.

Typical periods offered: Fall, Spring

BDSAI 5214 Entrepreneurship in Healthcare Informatics Using Data Science

This course introduces students to entrepreneurship within the context of healthcare informatics and data science. Students will explore how data-driven technologies such as AI, machine learning, electronic health records, and digital health tools can be translated into viable healthcare solutions. The course emphasizes identifying real-world healthcare problems, evaluating market opportunities, and navigating the legal, ethical, and regulatory landscape of healthcare innovation. Through case studies, hands-on activities, and a team-based project, students will develop and pitch a healthcare informatics startup concept grounded in clinical, technical, and business considerations.

Credit 3 units.

Typical periods offered: Fall, Spring

BDSAI 5215 Implementation of Health Information Technology into Real-World Settings

This course will serve as an introduction to implementation science and its use in implementing and evaluating health information technology into real-world settings. Students will learn the foundations of implementation science including how to design, conduct, and evaluate an implementation project. Key conceptual topics to be covered include implementation readiness, strategies, and outcomes, and key methodological topics to be covered include qualitative focus groups and interviews, engaging and managing advisory or stakeholder boards, and administering surveys to assess implementation outcomes.

Credit 3 units.

Typical periods offered: Fall, Spring

BDSAI 5216 Modern Data and AI Architectures for Biomedical Applications

Modern Data and AI Architectures for Biomedical Applications explores the design, implementation, and evaluation of scalable data and artificial intelligence architectures used in contemporary biomedical research and healthcare systems. The course covers end-to-end pipelines—from data acquisition and integration to model deployment—focusing on structured and unstructured biomedical data such as clinical records, omics data, and medical imaging. Emphasis is placed on modern architectural paradigms, including cloud-native systems, distributed computing, data lakes, and MLOps, alongside considerations of data governance, privacy, security, and regulatory compliance in biomedical contexts.

Credit 3 units.

Typical periods offered: Fall, Spring

BDSAI 5301 Seminar Series for Biomedical Sciences

This seminar series introduces students to research and emerging trends in biomedical informatics, data science, and biostatistics. Through presentations from invited speakers, students will learn about ongoing research initiatives and gain insight into career paths and types of interdisciplinary collaborations. Students will gain exposure to different scientific communication styles and develop critical evaluation skills through post-seminar discussions.

Credit 1 unit.

Typical periods offered: Fall

BDSAI 5302 Journal Club for Biomedical Sciences

Guided journal club discussions will build skills in critically appraising research articles, enabling students to evaluate methodological rigor, interpret findings, and consider their impact on science and practice. Students will gain experience in both leading discussions and providing constructive peer feedback on scientific presentations. The course is designed to broaden students' perspectives, strengthen their analytical skills, and support their professional development.

Credit 1 unit.

Typical periods offered: Spring

BDSAI 5901 Biomedical Data Science and AI Practicum

Students in the Internship course will acquire critical professional experience so that they will be well prepared to enter the scientific workforce upon graduation. This course provides a guided, mentored opportunity for students to build marketable skills, experience hands on applied work on open ended problems outside of the classroom, bolster professional and scientific communication skills, and gain greater understanding of their professional interests in aspects of biostatistics or biomedical informatics. Students will have an opportunity to work with experienced mentors (PIs) on a range of projects that may include data management, data analysis, study design, protocol development, and potentially, publication of scientific manuscripts. As part of the Internship requirements will give a presentation of the Internship experience. The grade (pass/fail) for each student will be determined in consultation with the mentor.

Credit 3 units.

Typical periods offered: Fall, Spring

BDSAI 5902 Biomedical Data Science and AI Mentored Research

Students will demonstrate how to synthesize and apply the full spectrum of biomedical informatics or biostatistics theories and methods included in the program curriculum. The mentored research project requires students to formulate research questions that focus on the development or extension of a theoretical framework or a novel method with relevance to the field of informatics or biostatistics, resulting in a report that outlines the student's topic selection and the design, conduct, and results of the student's research. Each trainee will also be expected to present their project and its outcomes or findings in a public seminar, where questions will be posed by both the audience and a committee of faculty members. The specific selection of the internship or mentored research project track as part of a trainee's degree program is to be discussed with and approved by the individual's faculty and academic adviser. The course instructor will determine the grade (pass/fail) in consultation with the mentors.

Credit 3 units.

Typical periods offered: Fall, Spring

BDSAI 7883 Master's Continuing Student Status

Full-time graduate research

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

Medical Education

Degrees & Offerings

MD and Joint MD Degrees

- Doctor of Medicine (MD) (p. 156)
- Doctor of Medicine Five-Year Program (p. 193)
- Doctor of Medicine and Master of Science in Clinical Investigation (p. 193)
- Doctor of Medicine and Master of Population Health Sciences (p. 193)
- Doctor of Medicine and Master of Public Health (p. 194)
- Doctor of Medicine and Master of Business Administration (p. 194)
- Doctor of Medicine and Doctor of Philosophy (p. 195)

Postgraduate Medicine

- Graduate Medical Education (p. 195)
- Continuing Medical Education (p. 196)

Medical Physics

The Department of Radiation Oncology at the School of Medicine currently offers three programs for graduate and postgraduate physics students who are interested in exploring pathways to prepare for residency programs as well as for careers in the field of medical physics: the Master of Science in Medical Physics (MSMP), the Doctor of Philosophy (PhD) in Medical Physics, and the Post-PhD Graduate Certificate in Medical Physics.

Contacts for Programs

Program Director

Michael Altman, PhD

Associate Program Directors

Arash Darafsheh, PhD

Ziad Saleh, PhD

Program Coordinator

Julie Follman, MBA

Degrees & Offerings

- Master of Science in Medical Physics (p. 196)
- Doctor of Philosophy (PhD) in Medical Physics (p. 197)
- Post-PhD Graduate Certificate in Medical Physics (p. 199)

Research

Master of Science in Medical Physics

Established in 2020, the MSMP program offers two different pathways to allow students to choose either a thesis option or a clinical option. Students who choose the thesis pathway are required to complete 6 credits of thesis research, with the option for additional research opportunities over the summer semester as part of the 30-credit requirement. Students who choose the clinical pathway are required to complete a 1-credit clinical rotation and a 3-credit clinical project, with the option for additional clinical rotations over the summer. Each pathway takes two years to complete.

Doctor of Philosophy (PhD) in Medical Physics

Started in 2022, the Doctor of Philosophy (PhD) in Medical Physics program is designed for full-time study with a minimum of 70 credit units required for degree completion. The program is comprised of 34 credit units of didactic course work, which are largely completed over the first two years of the program; this includes 22 credit units of medical physics “core” classes and 12 credit units of elective course work, as well as a minimum of 36 credit units of thesis research. The program commences in the fall semester, and didactic courses will run over traditional 16-week schedules during the fall and spring semesters. During the summer, students will be expected to work on their thesis research projects. Clinical shadowing opportunities will also be available for those who have interest.

Post-PhD Graduate Certificate in Medical Physics

The medical physics division in the Department of Radiation Oncology currently provides research and training opportunities to a large number of PhD researchers in different areas of science and engineering as applied to radiation oncology. The Department of Radiation Oncology established the Post-PhD Graduate Certificate in Medical Physics program in 2017, with the intent of providing a pathway for postdoctoral fellows to enter into clinical physics residencies.



Our post-PhD certificate program focuses on providing students with the medical physics background necessary for future success in medical physics while also offering students the opportunity to perform cutting-edge research in patient-focused areas. Didactics include 18 credits and can be completed over the course of one or two years.

Faculty

Program Director

Michael Altman, PhD

Professor of Radiation Oncology
BA, Physics, University of Chicago, 2002
PhD, Medical Physics, University of Chicago, 2010
Medical Physics Residency, Henry Ford Health System, 2012

Associate Program Directors

Arash Darafsheh, PhD

Associate Professor of Radiation Oncology
BSc, Electrical-Electronic Engineering: University of Tehran, Tehran, Iran, 2004
MSc, Radiation Medicine Engineering: Shahid Beheshti University, Tehran, Iran, 2007
MSc, Optical Science and Engineering: University of North Carolina - Charlotte, Charlotte, NC, 2011
PhD, Optical Science and Engineering: University of North Carolina - Charlotte, Charlotte, NC, 2013
Certificate in Medical Physics: University of Pennsylvania, Philadelphia, PA, 2015
Medical Physics Residency: University of Pennsylvania, Philadelphia, PA, 2017

Ziad Saleh, PhD

Assistant Professor of Radiation Oncology
BSc, Computer Engineering, Beirut Arab University, Beirut, Lebanon, 2001
MS, Electrical and Computer Engineering, University of Florida, Gainesville, FL, 2003
PhD, Space Sciences, Florida Institute of Technology, Melbourne, FL, 2010

Instructors

Lai Kuan Dionne, PhD

Assistant Professor of Cell Biology and Physiology
BS, Biomedicine, Universiti Sains Malaysia, 2004
PhD, Cell Biology, University of Colorado-Anschutz Medical Campus, 2010
Postdoctoral Fellow, Cancer Biology, University of Colorado-Anschutz Medical Campus, 2015
Postdoctoral Fellow, Nephrology, Washington University in St. Louis, 2018

Jose Garcia-Ramirez, MSc

Assistant Professor of Radiation Oncology
BS, Physics, University of Puerto Rico, 1995
MS, Medical Radiation Physics, Finch University of Health Sciences (Rosalind Franklin University), 1997

Ian Hagemann, MD, PhD

Professor of Pathology and Immunology
AB, Chemistry, Princeton University, 2000
MD, Washington University in St. Louis, 2008
PhD, Washington University in St. Louis, 2008
Resident and Chief Resident, Anatomic Pathology, Hospital of the University of Pennsylvania, 2011
Surgical Pathology Fellowship, Washington University in St. Louis, 2012
Molecular Genetic Pathology Fellowship, Washington University in St. Louis, 2013

Dean Hobbs, PhD

Instructor of Radiation Oncology Radiation Oncology
BS, Physics, Eckerd College, 2015
MS, Physics, University of South Florida, 2018
PhD, Applied Physics, University of South Florida, 2020
Certificate Program, Medical Physics, University of Chicago, 2021
Residency, Medical Physics, Mayo Clinic Arizona, 2023

TaeHo Kim, PhD

Professor of Radiation Oncology
PhD, Physics, Washington University in St. Louis, 2007
Postdoctoral Fellow, Radiology, University of Utah, 2008
Postdoctoral Fellow, Radiation Oncology, Stanford University, 2010
Physics Residency, Radiation Oncology, University of Virginia, 2015

Ashley Morhardt, PhD

Assistant Professor of Anatomy
BA, Biology, Illinois College, 2006
MS, Biology, Western Illinois University, 2009
PhD, Ecology and Evolutionary Biology, Ohio University, 2016

Joseph O'Sullivan, PhD

Samuel C. Sachs Professor of Electrical Engineering
BS, Electrical Engineering, University of Notre Dame, 1982
MS, Electrical Engineering, University of Notre Dame, 1984
PhD, Electrical Engineering, University of Notre Dame, 1986

Naim Ozturk, PhD

Chief Physicist, Cox Health Springfield
BS, Physics, Bogazici University (Turkey), 1984
MS, Physics, University of Toledo, 1989
PhD, Physics, University of Toledo, 1993
MS, Medical Physics, East Carolina University, 2003

Buck Rogers, PhD

Professor of Radiation Oncology (primary appointment)
Adjunct Professor of Chemistry (courtesy affiliation)
Professor of Radiology
BS, Chemistry, Loyola University Chicago, 1989
MA, Chemistry, Washington University in St. Louis, 1991
PhD, Inorganic Chemistry, Washington University in St. Louis, 1995

Zhongwei Zhang, MD, PhD

Assistant Professor of Radiology

MD, Taishan Medical University, 2000

PhD, Clinical Medicine, Sun Yat-sen University, 2009

Courses

MEDPHYS 5000 Clinical Imaging Fundamentals

This course will discuss the main imaging modalities used in the clinic. This includes x-ray, magnetic resonance, ultrasound, and nuclear imaging. Applications with an emphasis on diagnostic imaging and image-guided radiotherapy will be covered. The focus of this course is on the underlying physical principles, technical implementations, image reconstruction algorithms, and quality assurance. In addition to the didactic component, there will be hands-on laboratory sessions on CT, cone-beam CT, planar x-ray imaging, mammography, MRI, ultrasound, and nuclear medicine.

Credit 2 units.

Typical periods offered: Fall

MEDPHYS 5001 Structure and Function of the Human Body for Medical Physics

This comprehensive course is designed to describe the structure and function of the human body through an integrated survey of anatomy, physiology, and histopathology. This information will provide a framework for understanding clinical aspects of medical physics. The anatomy sections of this course will include its regions, viscera (organs), tissues, and spatial orientation, as well as a three-dimensional appreciation of the human body through imaging-based anatomy every organ system or region in the body covered. The physiology sections of the course will provide students with a profound understanding of human physiology from cellular to systemic levels, with the ability to articulate and comprehend the core principles of physiological concepts within major human systems. Students will also be introduced to human histology, including the principal tissue types (epithelia, connective tissue, blood vessels, muscle, neural tissue) and their organization into organs as well as basic pathologic concepts, including major non-neoplastic and neoplastic disease processes. The course content will be delivered through a combination of in-person lectures and, for a majority of the physiology content, self-paced, asynchronous, interactive modules available through Canvas. Team-based active learning sessions will provide an opportunity for students to consolidate and apply the knowledge gained from both lectures and learning modules.

Credit 3 units.

Typical periods offered: Fall

MEDPHYS 5010 Radiological Physics and Dosimetry

This class is designed to construct a theoretical foundation for ionizing radiation dose calculations and measurements in a medical context and prepare graduate students for proper scientific presentations of in the field of x-ray imaging and radiation therapy. This course will cover the fundamental concepts of radiation physics, how ionizing radiation interact with matter, and how the energy that is deposited in the matter can be measured in theory and practice. Specifically, a student completing this course will be able to do the following: 1. Understand and apply key concepts specific to energy deposition for both ionizing photon interactions and transport in matter and for energetic charged particle interactions and transport in matter. Radiation sources include radioactivity, x-ray tubes, and linear accelerators. 2. Understand the theoretical details of ion-chamber based dosimetry and of cavity-theories based clinical dose measurement protocols. 3. Perform

and present real world style research projects as a group, and present these projects in a typical professional scientific format and style. 4. Achieve an appreciation of the history and potential future developments in ionizing radiation detection and dosimetry.

Credit 3 units.

Typical periods offered: Fall

MEDPHYS 5020 Independent Study

The independent study course is designed to provide graduate students with an opportunity to gain insight into an aspect of the field of medical physics. The goal of the course is to provide introductory experience on a focused project with one or more faculty mentor(s). Graduate students will be matched with a project/mentor based on a number of factors, including student interest in the area of study and availability.

Credit 1 unit.

Typical periods offered: Fall, Spring, Summer

MEDPHYS 5030 Clinical Project

Students will complete a clinically-focused, hands-on project under the supervision of a faculty mentor. Students will learn background as to the impetus of this project, will develop a plan or procedure for completing the project, and will take a major role in performing and completing the developed tasks. The goal of this is to simulate and gain an understanding of the workflow needed to achieve advancements in the clinic and/or patient care, as well as for students to gain a deeper understanding about a clinically focused topic. An oral presentation and written report describing the completed project work is required.

Credit 3 units.

Typical periods offered: Fall

MEDPHYS 5031 PhD Thesis Research

Doctor of Philosophy in Medical Physics students will work on their thesis research under the guidance of their thesis advisor(s). Students will work on various elements of their thesis including research, writing, and other relevant tasks. Student progress will be assessed regularly throughout their doctoral thesis, including the achievement of required tasks and milestones.

Credit 1-9 units.

Typical periods offered: Fall, Spring

MEDPHYS 5032 PhD Research Rotation

The PhD Research Rotation course is designed to provide students with an experience working with one or more potential thesis mentors on a focused research opportunity. Students will gain insight into an aspect of the field of medical physics and a program of academic research, as well as cultivating a relationship with a potential thesis mentor. PhD students will be matched with a project/mentor based on a number of factors, including student interest in the area of study and availability.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

MEDPHYS 5040 MS Thesis Research

Students will complete a research project under the supervision of a faculty mentor. Thesis students will develop a thesis proposal, conduct mentored research, and disseminate this research in the form of an oral defense and written thesis. The goal of this project is to gain an in-depth understanding about an area of development or research in the medical physics field, as well as to gain an understanding about how to structure, perform, and present academic work. Students may also learn about academic publication composition and submission. An oral presentation and written report describing the completed project work are required.



Credit 3-6 units.

Typical periods offered: Fall, Spring, Summer

MEDPHYS 5050 Ethics, Professionalism and Current Topics

This course prepares students to critically evaluate ethical, regulatory and professional issues and for leadership in clinical practice and research. The principal goal of this course is to prepare students to recognize ethics and compliance resources in clinical research and the situational factors that give rise to them, to identify ethics and compliance resources, and to foster ethical problem-solving skills. In addition, the course introduces professionalism, core elements, common traits of the medical physics profession, confidentiality, conflict of interest, interpersonal interactions, negotiations and leadership skills. Characteristics of successful leadership are also identified. Interaction with patients, colleagues, vendors, and clinic staff will also be emphasized.

Credit 1 unit.

Typical periods offered: Fall

MEDPHYS 5060 Radiobiology

This class is designed to establish a foundation for ionizing radiation interaction with biological tissues. It will cover the fundamental concepts of cell biology, how ionizing radiation interacts with cells, radiation damage and carcinogenesis, radiation therapy fractionation and related concepts. The effects of ionizing radiations on living cells and organisms, including physical, chemical, and physiological basis of radiation cytotoxicity, mutagenicity, and carcinogenesis are also covered.

Credit 2 units.

Typical periods offered: Spring

MEDPHYS 5070 Radiation Oncology Physics

This course is designed to build on the concept of radiation dosimetry techniques and bring them into the clinical realm. The students will learn clinical applications of radiation dose measurements as used in radiation therapy for the treatment of cancer. Ionizing radiation producing devices such as external beam, brachytherapy, protons and charged particles, imaging modalities, simulation, radiation delivery, treatment verification imaging, quality assurance, motion management and image-guided techniques will be the major focus.

Credit 3 units.

Typical periods offered: Spring

MEDPHYS 5080 Radiation Protection and Safety

This class is designed to further the concepts of radiation interactions and dosimetry to radiation protection and safety and biological consequences of radiation exposure in humans. Protection and safety of the radiation worker and patient, as well as detection equipment and shielding analysis will be main focus. This course will briefly cover regulations, and radiological protection in various clinical environments.

Credit 2 units.

Typical periods offered: Fall

MEDPHYS 5090 Clinical Rotations

The student will rotate through various areas within the Radiation Therapy Clinic and develop an understanding of the applications of physics in the use of radiation for the treatment of cancers. This will include simulation, quality assurance of various imaging and radiation sources, dose calculation, intensity modulation treatments, radiosurgery, stereotactic body radiotherapy, brachytherapy, radiopharmaceutical therapy, and more.

Credit 1 unit.

Typical periods offered: Fall

MEDPHYS 5100 Advanced Clinical Medical Physics Laboratory

The objective of this course is to reinforce and enhance the understanding concepts developed in didactic medical physics courses through practica, laboratory work, and/or special lectures. Students will gain a deeper understanding of the physics and methods involved in clinical imaging and/or radiation therapy treatment processes. The various practica will cover an array of topic areas including absolute dosimetry, relative dose measurements, patient QA, imaging QA, radiation beam modeling, treatment planning, proton therapy, brachytherapy, stereotactic radiotherapy, and adaptive radiation therapy.

Credit 2 units.

Typical periods offered: Fall

MEDPHYS 7883 Master's Continuing Student Status

Full-Time Graduate Research

Credit 0 units.

Typical periods offered: Fall, Spring

MEDPHYS 8884 Doctoral Continuing Student Status

Full-Time Graduate Research

Credit 0 units.

Typical periods offered: Fall, Spring

Nursing Science

The Department of Nursing Science is a collaboration with Barnes-Jewish College Goldfarb School of Nursing. The Department of Nursing Science emphasizes the reciprocity among research, clinical practice, and teaching based on the belief that clinical practice advises research, research advises clinical practice, and both research and clinical practice advise teaching. The department's commitment to the preparation of the next generation of nurse scientists is reflected in the strong research emphasis of the PhD program in the science of nursing.

The goal of the PhD program is to educate nurse scientists who want to become independent nurse researchers. Students bring a unique combination of nursing knowledge and clinical experiences to doctoral study, and these serve as the basis for the development of programs of study that are both compatible with the core doctoral curriculum and individualized to allow for the gaining of in-depth knowledge in a specialized area of study. The PhD in Nursing Science provides a solid foundation for graduates to pursue rigorous programs of nursing research that are clinically significant and contribute to the advancement of nursing science.

Contact:	Masako Mayahara
Phone:	314-362-3316
Email:	masakom@wustl.edu
Website:	https://www.barnesjewishcollege.edu/doctoral-degree/phd-nursing-science/

Degrees & Offerings

- PhD in Nursing Science (p. 199)

Research

Sarah Farabi, PhD, RN, is an Assistant Professor at Barnes-Jewish College Goldfarb School of Nursing. Dr. Farabi has expertise in measuring sleep and metabolic function and experience in behavioral lifestyle interventions, with training in community-based research and implementation science. Her research focuses on understanding the mechanisms through which poor sleep health contributes to the risk of metabolic disease (particularly diabetes) and developing equitable interventions to improve sleep health and reduce diabetes risk in pregnant and postpartum populations.

Research interests: sleep, diabetes, cardiometabolic disease, pregnancy, nurse-led interventions, implementation science

Heidi Holtz, PhD, RN, is an Assistant Professor at Barnes-Jewish College Goldfarb School of Nursing. Dr. Holtz served as a research fellow at the Johns Hopkins Berman Institute of Bioethics, collaborating with leading experts in the fields of moral resilience and moral distress within healthcare. Her research employs both empirical and qualitative methods to foster healthy work environments, support nurses' well-being, and enhance patient outcomes by developing interventions for nurses in critical care settings. Dr. Holtz's research goals are to empower nurses by building resilience and fostering safe practice environments, addressing the critical need to recognize and alleviate the everyday trauma and stress they face.

Research interests: well-being of nurses, burnout in nursing, burnout among healthcare professionals, system-level intervention to support healthy work environments for nurses

JoAnn Jabbari, PhD, RN, is an Assistant Professor at Barnes-Jewish College Goldfarb School of Nursing. Her research program focuses on examining the dynamic relationships between loneliness and health outcomes among vulnerable populations. She has a particular interest in understanding how military experiences influence the unique healthcare and psychosocial needs of the veteran population. Her clinical experience as a nurse within the VA healthcare system, in combination with her mentorship as a Jonas Nursing Veterans Healthcare Scholar (2021-2023), have significantly influenced and guided her research. She is committed to advancing interventions that enhance the health and quality of life for veterans and other vulnerable populations, with a particular focus on psychosocial support.

Research interests: loneliness, Veterans health, social connection, psychosocial support

Masako Mayahara, PhD, RN, FAAN, FPCN, CHPN, is a Professor at Goldfarb School of Nursing and an Associate Professor of Medicine in the Division of Palliative Medicine at Washington University School of Medicine. Dr. Mayahara is widely recognized as an expert in pain management, particularly within hospice and palliative care settings. Her research program focuses on improving pain management for hospice patients through the implementation of innovative

technologies and delivery models. She is a past president of the Hospice and Palliative Nurses Association and the Hospice and Palliative Nurses Foundation, and she currently serves on the Board of Directors of the Midwest Nursing Research Society.

Research interests: pain management, palliative care, hospice, family caregiving, digital health

Tamara Otey, PhD, RN, is an Associate Professor at Goldfarb School of Nursing, with a dual appointment as a research scientist at Missouri Baptist Medical Center. Dr. Otey's research is focused on global health and vulnerable populations. She has conducted research in Nigeria and across the midwestern United States. Dr. Otey serves as an advisor or mentor for PhD and DNP students and nurses and interprofessional clinicians with research and evidence-based practice projects.

Research interests: global health; vulnerable populations; breast cancer screening; oncology medication trials; care management of patients with congestive heart failure

Dominic Reeds, MD, is the Associate Dean for Research at Goldfarb School of Nursing and the Associate Director of Washington University's Nutrition and Obesity Research Center and Center for Diabetes Translation Research. He is a Professor in Nutritional Science and Obesity Division at Washington University School of Medicine, and he is Director of the Barnes-Jewish Hospital Nutrition Support Service. Dr. Reeds is Director of Washington University's KL2 program and Co-Director of the Master of Science in Clinical Investigation. His research focuses on the pathogenesis of HIV-associated diabetes and obesity.

Research interests: clinical nutrition; diabetes and metabolism; prevention, pathogenesis, and management of cardiometabolic risk factors, including obesity, hypertension, and HIV; and nurse-led implementation science programs for the management of hypertension and diabetes; global health

Po-Yin Yen, PhD, RN, is an Associate Professor at Goldfarb School of Nursing and an Associate Professor of Medicine in the Division of General Medical Sciences at Washington University School of Medicine Institute of Informatics, Data Science, and Biostatistics. Dr. Yen conducts applied clinical informatics research to promote a user-friendly health information technology environment for clinicians and patients. Dr. Yen's expertise in predictive modeling and machine learning bridges research to nursing practice.

Research interests: clinical informatics; usability and technology acceptance; human-computer interaction; user-centered design; mixed methods; literature mining; data visualization; workflow analysis and time and motion study

Faculty

Program Director

Masako Mayahara

Professor, Goldfarb School of Nursing
Associate Professor, Division of Palliative Medicine, Washington
University School of Medicine
PhD, University of Illinois–Chicago

Associate Dean for Research

Dominic Reeds

Associate Dean for Research, Goldfarb School of Nursing
Associate Director, Washington University's Nutrition and Obesity
Research Center and Center for Diabetes Translation Research
Professor, Geriatrics and Nutritional Science Division, Washington
University School of Medicine
Director, Barnes-Jewish Hospital Nutrition Support Service
MD, Texas Tech University Health Sciences Center

Faculty

Sarah Farabi

Assistant Professor
PhD, University of Illinois–Chicago

Heidi Holtz

Assistant Professor
PhD, Indiana University–Purdue University Indianapolis

JoAnn Jabbari

Assistant Professor
PhD, Washington University–Goldfarb School of Nursing

Tamara Otey

Associate Professor
PhD, Indiana University

Po-Yin Yen

Associate Professor, Goldfarb School of Nursing
Associate Professor, Washington University School of Medicine,
Institute for Informatics, Data Science & Biostatistics
PhD, Columbia University

Courses

NRSSCI 5010 Philosophy and Theoretical Underpinnings of Nursing Science

This course explores the evolution, assumptions, and principal themes that underpin philosophies of nursing science and their influence on knowledge development for nursing practice and nursing theory. The interrelationships among theoretical perspectives, theoretical thinking, scientific inquiry, and knowledge development in nursing will be discussed. The relationship of scientific integrity and bioethics to the scientific method will be discussed.

Credit 3 units.

Typical periods offered: Fall, Summer

NRSSCI 5015 Literary Critique and Synthesis

The focus of this course is on synthesizing evidence from the published research literature to determine the state of knowledge about a selected research topic and to guide a research plan. The course emphasizes the processes of critiquing, analysis, and synthesis of existing research in order to draw useful conclusions or make decisions about the topic, problem, or research plan.

Credit 3 units.

Typical periods offered: Fall, Spring

NRSSCI 5020 Dissemination and Implementation Science

This course focuses on dissemination and implementation research. Strategies underlying the creation, transmission, and reception of information will be explored. The goal of this course is to bridge the gap among clinical research, everyday practice, and public health by building a knowledge base to improve population health.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5025 Grant Writing and Scientific Review

This course focuses on developing and evaluating fundable research applications. Grant-writing and scientific review processes are emphasized, including identifying various types of funding mechanisms, developing successful grant applications, and reviewing research proposals. Strategies for developing high impact scientific protocols and a feasible research budget will be discussed. Opportunities to conduct peer reviews of grant applications will be provided.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5030 Interdisciplinary Science and the Innovative Nurse Scientist

This course provides an educational opportunity to understand diverse disciplines with their specific perspective in conducting research. The emphasis is placed on understanding key scientific concepts and methodologies. The goal is to connect and integrate different schools of thought and demonstrate how the disciplines of science come together in innovative ways to identify and solve scientific challenges. Preparation, training, support, challenges, and roles of the nurse scientist are also explored. Related topics include how to advance a career as a nurse scientist with a focus on building a research trajectory, obtaining funding and becoming an innovative researcher who is able to identify trends in emerging science. Discussions will focus on integrating biologic and behavioral factors to achieve translational bench-to-bedside nursing science.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5035 Mentored Research Experience I

This course is the first in a five serial mentored research course series designed to provide one-to-one mentoring for students to have hands-on research experiences and gain skills necessary to conduct interdisciplinary research. Students will be paired with a nursing mentor and a non-nursing mentor. In courses I and II, students will learn about a chosen research project led by the non-nursing mentor and work with his/her research team. In courses III and IV, under the supervision of both nursing and non-nursing mentors, students will identify a scientific challenge that is significant to nursing. Students will then develop a research plan integrating methods from a non-nursing discipline to address the challenges. In course V, students will work closely with the nursing and non-nursing mentors in developing their dissertation research proposal.

Credit 1 unit.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5040 Mentored Research Experience II

This course is the second in a five serial mentored research course series designed to provide one-to-one mentoring for students to have hands-on research experiences and gain skills necessary to conduct interdisciplinary research. Students will be paired with a nursing mentor and a non-nursing mentor. In courses I and II, students will learn about a chosen research project led by the non-nursing mentor and work with his/her research team. In courses III and IV, under the supervision of both nursing and non-nursing mentors, students will identify a scientific challenge that is significant to nursing. Students will then develop a research plan integrating methods from a non-nursing discipline to address the challenges. In course V, students will work closely with the nursing and non-nursing mentors in developing their dissertation research proposal.

Credit 1 unit.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5045 Mentored Research Experience III

This course is the third in a five serial mentored research course series designed to provide one-to-one mentoring for students to have hands-on research experiences and gain skills necessary to conduct interdisciplinary research. Students will be paired with a nursing mentor and a non-nursing mentor. In courses I and II, students will learn about a chosen research project led by the non-nursing mentor and work with his/her research team. In courses III and IV, under the supervision of both nursing and non-nursing mentors, students will identify a scientific challenge that is significant to nursing. Students will then develop a research plan integrating methods from a non-nursing discipline to address the challenges. In course V, students will work closely with the nursing and non-nursing mentors in developing their dissertation research proposal.

Credit 1 unit.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5050 Mentored Research Experience IV

This course is the fourth in a five serial mentored research course series designed to provide one-to-one mentoring for students to have hands-on research experiences and gain skills necessary to conduct interdisciplinary research. Students will be paired with a nursing mentor and a non-nursing mentor. In courses I and II, students will learn about a chosen research project led by the non-nursing mentor and work with his/her research team. In courses III and IV, under the supervision of both nursing and non-nursing mentors, students will identify a scientific challenge that is significant to nursing. Students will then develop a research plan integrating methods from a non-nursing discipline to address the challenges. In course V, students will work closely with the nursing and non-nursing mentors in developing their dissertation research proposal.

Credit 1 unit.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5055 Mentored Research Experience V

This course is the final in a five serial mentored research course series designed to provide one-to-one mentoring for students to have hands-on research experiences and gain skills necessary to conduct interdisciplinary research. Students will be paired with a nursing mentor and a non-nursing mentor. In courses I and II, students will learn about a chosen research project led by the non-nursing mentor and work with his/her research team. In courses III and IV, under the supervision of both nursing and non-nursing mentors, students will identify a scientific challenge that is significant to nursing. Students will then develop a research plan integrating methods from a non-nursing discipline to address the challenges. In course V, students will work closely with the nursing and non-nursing mentors in developing their dissertation research proposal.

Credit 1 unit.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5060 Research I: Research Designs and Measurement for Scientific Inquiry: Quantitative Methods

The goal of this course is to deepen the understanding of scientific inquiry pertaining to quantitative methods in nursing research. This course emphasizes research questions/hypotheses, frameworks, designs, methodology, and analysis. Methods of dissemination of research findings in symptom science are examined.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5065 Research II: Research Design and Measurement for Scientific Inquiry: Qualitative Methods

This is an introductory course in qualitative research with particular focus on the health sciences. The course focuses on study of traditions and methods, scientific issues, techniques of data collection, analysis and interpretation. Emphasis is given to the contribution of qualitative research in expanding nursing knowledge

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5070 Research III: Research Designs and Measurement for Scientific Inquiry: Psychometrics

This course offers information on psychometric theories. The application of these theories in constructing and evaluating measurements in nursing research is presented. Relevant course content includes statistical techniques to evaluate measurements, such as reliability and validity tests. This course also provides an introduction to the issues that arise when writing/selecting questions for the psychosocial instruments. The focus is on examining the logic of measurement in standardized survey administration and selected techniques for testing scale items.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

NRSSCI 5100 Dissertation

Original investigation research experience designed by student to prepare for completing proposed research, public defense, and publication of dissertation as based on student's substantive areas of interest and program of research.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

NRSSCI 6000 Mentored Teaching Experience

Mentored teaching experience

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

NRSSCI 9000 Full-Time Graduate Research/Study

Full-Time Graduate Research

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

Occupational Therapy

The Program in Occupational Therapy offers several professional degrees as well as a dual degree with the George Warren Brown School of Social Work.

Students interested in entering the field of occupational therapy may do so with a master's or doctoral degree. It is possible to enroll in either program and then apply to transfer to the other program later, as both the master's and doctoral programs share the same curriculum for the first year of study. Students may also decide to apply to both programs if they like. Typically, the doctoral program attracts students who have further interest in research and leadership in the field.

The Program in Occupational Therapy prepares students for professional practice and, through its research, generates knowledge to address the issues facing individuals with disabilities, chronic diseases and developmental disabilities. Students are prepared as generalists, but they can also concentrate their studies for work in pediatrics, aging, rehabilitation, work and industry, or social participation. The curriculum focuses on the dynamic interaction of the biological with the psychological, environmental and occupational factors that enable persons to fulfill their roles and lead meaningful and productive lives. Students interact with leading physicians and scientists whose practices and science are contributing to better methods for the treatment of persons with disabilities. In addition, students are linked with community agencies and leaders providing services to individuals with disabling conditions.

Undergraduate students in pre-medical, psychology, biology or anthropology will find that the program offers a means of applying their knowledge in a professional field.

The Program in Occupational Therapy is accredited by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA), located at 7501 Wisconsin Avenue, Suite 510E, Bethesda, MD 20814. ACOTE's telephone number, care of AOTA, is 301-652-6611. For more information, visit the ACOTE Accreditation webpage.

Email: wuotinfo@wustl.edu

Website: <http://www.ot.wustl.edu>

Degrees & Offerings

- Master of Science in Occupational Therapy (p. 201)
- Clinical Doctorate of Occupational Therapy (p. 201)
- Post-Professional Doctorate of Occupational Therapy (p. 201)
- PhD in Rehabilitation and Participation Science (p. 202)

Research

Faculty in the Program in Occupational Therapy at Washington University are involved in research that is changing the way occupational therapy is practiced. In collaboration with colleagues in the School of Medicine, public health, social work and community agencies, these individuals are involved in projects that encompass many of the challenges facing society. By providing evidence through scientific research, they are validating the profession as an important partner in the health care team. By acting as innovators, they are developing new and better ways to provide care.

To find more information about research activities in the Program of Occupational Therapy, please visit the Research page of our website.

Faculty

Lisa Tabor Connor, PhD, MSOT, OTR/L

Associate Dean and Director of Occupational Therapy
Elias Michael Professor of Occupational Therapy
Professor of Neurology
Director, Division of Research

Lenin Grajo, PhD, EdM, OTR/L

Associate Professor of Occupational Therapy and Psychiatry
Director, Division of Professional Education
Associate Director, Program in Occupational Therapy
Associate Director, Diversity, Equity and Inclusion

Patricia Nellis, OTD, OTR/L

Associate Professor of Occupational Therapy and Neurology
Director, Division of Clinical Operations

Visit our website for more information about our faculty and their appointments.

A

Kaylee A Abeln, M.S.

Course Association
Bachelor of Science, Saint Louis University, 2016
Master of Science, Saint Louis University, 2017

Cami Antonacci

Course Association

Katherine Aylmer, O.T.D.

Course Association
Bachelor of Science, Ohio State University-Main Campus

Doctor of Occupational Therapy, Washington University in St Louis

B

Salma Hussain Bachelani, O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Pediatrics
Bachelor of Science, Missouri State University, 2013
Doctor of Occupational Therapy, Washington University in St Louis, 2016

Stacy Baker

Course Association

Peggy Barco, O.T.D.

Professor of Occupational Therapy (primary appointment)
Professor of Medicine
Doctor of Occupational Therapy, Washington University in St Louis, 1987

M. Carolyn Baum, M.A., Ph.D.

Professor Emeritus of Occupational Therapy
Bachelor of Science, University of Kansas, 1966
Master of Arts, Webster University, 1979
Doctor of Philosophy, Washington University in St Louis, 1993

Jennifer Bell, B.E.E.

No Rank
Bachelor of Electrical Engineering, Western Illinois University

Katherine Elizabeth Bogan, O.T.D.

Course Association
Bachelor of Arts, Baylor University, 2005
Doctor of Occupational Therapy, Washington University in St Louis, 2012

Jessie Lynne Bricker, M.S., O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Medicine
Academic Fieldwork Coordinator and Capstone Coordinator
Bachelor of Science, Illinois Wesleyan University, 2000
Master of Science, Washington University in St Louis, 2001
Doctor of Occupational Therapy, Eastern Kentucky University, 2018

Kimberly Denise Bryant

Course Association

C

Cia Carpenter, M.S.

Course Association
Associate of Applied Science, Saint Louis Community College, 1986
Bachelor of Science, Mount Mary College, 1989
Master of Science, Mount Mary College, 2016

Chih-Hung Chang, Ph.D.

Professor of Occupational Therapy (primary appointment)
Professor of Medicine
Professor of Orthopedic Surgery
Professor of Public Health
Bachelor of Science, National Chengchi University, 1987

Doctor of Philosophy, University of Chicago, 1995

Sarah C Cheatham Oberle, O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Pediatrics
Bachelor of Arts, Wake Forest University, 2008
Doctor of Occupational Therapy, Washington University in St Louis, 2013

Lisa Tabor Connor, M.A., M.S., Ph.D.

Professor of Occupational Therapy (primary appointment)
Elias Michael Executive Director of the Program in Occupational Therapy
Associate Dean for Occupational Therapy
Director of the Research Division
Professor of Neurology
Bachelor of Arts, Johns Hopkins University, 1986
Master of Arts, Washington University in St Louis, 1990
Doctor of Philosophy, Washington University in St Louis, 1992
Master of Science, Washington University in St Louis, 2013

Kayla Covert

Course Association

Maria Lopez Coxon, M.S., O.T.D.

Course Association
Bachelor of Science, University of Pittsburgh
Master of Science, Boston University
Doctor of Occupational Therapy, Boston University

D

Ann Marie Dale, Ph.D.

Professor of Occupational Therapy
Bachelor of Science, University of Missouri Columbia, 1983
Doctor of Philosophy, Saint Louis University, 2009

Mary Helen Danly, Master

Course Association
Master's degree, Saint Louis University, 2017

Jessica L Dashner, O.T.D.

Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Neurology
Bachelor of Science, McKendree University, 2000
Doctor of Occupational Therapy, Washington University in St Louis, 2002

Jennifer DeBourge, M.S.

Instructor in Occupational Therapy (primary appointment)
Bachelor of Science, McKendree University, 2006
Master of Science, Washington University in St Louis, 2007

Katherine DeNunzio

No Rank

E

Shannon M. Eckhoff

Course Association

Dorothy F Edwards, Ph.D.



Voluntary Research Professor of Occupational Therapy
Voluntary Research Professor of Neurology
Bachelor of Arts, Loyola University (Duplicate of Loyola University New Orleans), 1972
Doctor of Philosophy, Washington University in St Louis, 1980

F

Jianna D Fernandez

Course Association
Bachelor of Science, Millikin University, 2014

Michelle M Furman, M.S.

Course Association
Bachelor of Science, Saint Louis University, 2006
Master of Science, Saint Louis University, 2007

G

Lenin Grajo, M.Ed., Ph.D.

Associate Professor of Occupational Therapy (primary appointment)
Director of Professional Education
Associate Director of Diversity, Equity and Inclusion
Associate Director of Program in Occupational Therapy
Associate Professor of Psychiatry
Master of Education, Harvard University, 2010
Doctor of Philosophy, Texas Woman's University, 2015
Bachelor of Science, University of the Philippines Manila

Brianna K Grant

No Rank

H

Samy Omar A Hamdan, M.S.

Course Association
Bachelor of Science, Keuka College, 2019
Master of Science, Keuka College, 2020

Kelly McClelland Harris, M.A., Ph.D.

Assistant Professor of Occupational Therapy (primary appointment)
Lecturer in Education
Assistant Professor of Surgery (Public Health Sciences)
Bachelor of Arts, University of Kansas, 2000
Master of Arts, Northwestern University, 2001
Doctor of Philosophy, Washington University in St Louis, 2017

Heidi Hoskins

Course Association

Catherine R Hoyt, O.T.D., Ph.D.

Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Neurology
Assistant Professor of Pediatrics
Bachelor of Science, Juniata College, 2007
Doctor of Occupational Therapy, Washington University in St Louis, 2010
Doctor of Philosophy, Washington University in St Louis, 2019

K

Jessica Kersey, Ph.D.

Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Neurology
Doctor of Philosophy, University of Pittsburgh, 2021

Abigail King

Course Association
Bachelor of Arts, Murray State University, 2005

Kathleen Marie Kniemann, M.Ed., M.P.H., O.T.D.

Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Neurology
Bachelor of Science, Washington University in St Louis, 1974
Bachelor of Arts, Washington University in St Louis, 1975
Master of Public Health, Harvard University, 1980
Master of Public Health, Harvard University, 1981
Doctor of Occupational Therapy, Washington University in St Louis, 2008

L

SangJin Lee

Course Association

Kailin Lynn Lust, O.T.D.

No Rank
Bachelor of Science, University of Iowa, 2020
Doctor of Occupational Therapy, Washington University in St Louis, 2023

M

Amanda Mack, M.S., O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)
Director of Post-Professional Education
Assistant Professor of Medicine
Bachelor of Science, Boston University, 2011
Master of Science, Boston University, 2013
Doctor of Occupational Therapy, Boston University, 2019

Elizabeth Mattie Magee

Course Association
Bachelor of Arts, Azusa Pacific University, 2021

Wanda Jean Mahoney, M.A., M.S., Ph.D.

Professor of Occupational Therapy (primary appointment)
Professor of Medicine
Bachelor of Science, Saint Louis University, 1997
Master of Science, Washington University in St Louis, 1999
Doctor of Philosophy, Nova Southeastern University, 2008
Master of Arts, De Paul University, 2018

Mario Millsap, O.T.D., Master

Course Association
Bachelor of Science, Southern Illinois University Edwardsville
Doctor of Occupational Therapy, Washington University in St Louis
Master's degree, Washington University in St Louis

Marian A Minor, M.P.H., Ph.D.

Associate Professor of Occupational Therapy
Bachelor of Science, University of Kansas, 1965
Master of Public Health, University of Missouri Columbia, 1979
Doctor of Philosophy, University of Missouri Columbia, 1989

Kerri A Morgan, M.S., Ph.D.

Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Neurology
Director of Research Division
Bachelor of Arts, Texas Christian University, 1996
Master of Science, Washington University in St Louis, 1998
Doctor of Philosophy, Washington University in St Louis, 2015

Stacey Rene Myers, M.S.

Course Association
Bachelor of Science, University of Kansas, 2000
Master of Science, University North Carolina, 2002

N**Rebecca Nehrt-Flores, M.S.**

No Rank
Master of Science, Maryville University of Saint Louis, 2012

Patricia K Nellis, M.B.A., O.T.D.

Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Neurology
Director of Clinical Practice
Master of Business Administration, Columbia College Missouri, 2004
Doctor of Occupational Therapy, A T Still University of Health Sciences, 2017

P**Anna Corinne Perlmutter, M.S.**

No Rank
Bachelor of Arts, Emory University
Master of Science, Tufts University

Monica S Perlmutter, M.A., O.T.D.

Course Association
Master of Arts, Washington University in St Louis, 1989
Doctor of Occupational Therapy, Washington University in St Louis, 2012

Roberta G Pineda, M.H.S.

Voluntary Research Assistant Professor of Occupational Therapy
Master of Health Science, University of Florida, 1994

Erica D Pisciotto

Course Association

R**Megan Elizabeth Reagan**

Course Association

Melissa Mirkay Redington, M.H.A.

Course Association
Bachelor of Science, University of Missouri Columbia, 1993

Master of Health Administration, Washington University in St Louis, 1998

Jessica Romeo

Course Association
Associate of Arts, Saint Louis Community College, 2007
Bachelor of Arts, University of Missouri in St Louis, 2010

Scott Rushanan

Course Association

Duana C Russell, M.S., O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)
Director of the Center for Community Living
Assistant Professor of Medicine
Master of Science, Washington University in St Louis, 1997
Doctor of Occupational Therapy, Washington University in St Louis, 2016

Justin Ryckman, O.T.D.

Course Association
Doctor of Occupational Therapy, Washington University in St Louis, 2017

S**Patricia Schneider Gibson, M.S.**

Course Association
Master of Science, Washington University in St Louis, 1996

Claire Mary Schueler, M.S.

Course Association
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2012
Master of Science, Washington University in St Louis, 2014

Gregory Steven Seymour

Course Association
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2006

Nadine Signe, M.B.A., M.S.

Course Association
Master of Business Administration, Cornell University
Master of Science, Towson University

Nicole Renee Sigona, M.S.

Course Association
Master of Science, Washington University in St Louis, 2000
Bachelor of Science, Maryville University of Saint Louis, 2018

Emily K Somerville, M.A., O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Neurology
Bachelor of Arts, Covenant College, 2005
Master of Arts, Washington University in St Louis, 2007
Doctor of Occupational Therapy, Washington University in St Louis, 2017

Macyn Miller Stonner, O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)
Bachelor of Science, Furman University, 2013



Doctor of Occupational Therapy, Washington University in St Louis,
2016

Kathryn Stump, M.S.

Course Association

Master of Science, Washington University in St Louis

T

Steven D Taff, M.S., Ph.D.

Professor of Occupational Therapy (primary appointment)

Professor of Medicine

Assistant Dean for Faculty Promotions and Career Development

Bachelor of Science, Missouri State University (Formerly Southwest
Missouri State), 1989

Master of Science, Washington University in St Louis, 1997

Doctor of Philosophy, University of Missouri in St Louis, 2005

Kelsey Anne Cook Todd

Course Association

Garth D Tubbs

Assistant Professor Emeritus of Occupational Therapy

Bachelor of Science, School Not Found, 1953

Susan M Tucker, M.S., O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)

Assistant Professor of Neurology

Master of Science, Washington University in St Louis, 2002

Doctor of Occupational Therapy, Washington University in St Louis,
2014

Quinn Peal Tyminski, M.S., O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)

Assistant Professor of Psychiatry

Bachelor of Science, Adrian College, 2010

Master of Science, Washington University in St Louis, 2012

Doctor of Occupational Therapy, Washington University in St Louis,
2017

Ellen Twining Tyson, M.A.

Assistant Professor Emerita of Occupational Therapy

Bachelor of Arts, Syracuse University, 1949

Master of Arts, Syracuse University, 1950

V

Erin Foster Voegtli, O.T.D., Ph.D.

Associate Professor of Occupational Therapy (primary appointment)

Director of Graduate Studies

Associate Professor of Neurology

Associate Professor of Psychiatry

Bachelor of Science, Washington University in St Louis, 2003

Doctor of Occupational Therapy, Washington University in St Louis,
2005

Doctor of Philosophy, Washington University in St Louis, 2018

W

Ashley Wagner, O.T.D.

Course Association

Doctor of Occupational Therapy, Washington University in St Louis

Carla W Walker, O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)

Assistant Professor of Medicine

Doctor of Occupational Therapy, Washington University in St Louis,
2014

Kimberly Walker, O.T.D.

Course Association

Doctor of Occupational Therapy, Washington University in St Louis,
2006

Marit Watson, O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)

Assistant Professor of Medicine

Bachelor of Science, Colorado State University, 1999

Doctor of Occupational Therapy, Creighton University, 2019

Elizabeth Weese

No Rank

Stacy E West-Bruce, M.S.W., O.T.D.

Assistant Professor of Occupational Therapy (primary appointment)

Assistant Professor of Medicine

Bachelor of Science, Saint Louis University, 2000

Master of Social Work, Washington University in St Louis, 2004

Doctor of Occupational Therapy, Saint Louis University, 2018

Alexis White

Course Association

Kristin Will, O.T.D.

Course Association

Bachelor of Science, Colorado State University, 2010

Doctor of Occupational Therapy, Washington University in St Louis,
2014

Timothy J Wolf, O.T.D.

Voluntary Research Associate Professor of Occupational Therapy

Voluntary Research Associate Professor of Neurology

Doctor of Occupational Therapy, Washington University in St Louis,
2007

Courses

OT 6050 Analyzing, Adapting, and Teaching Occupations Across the Lifespan

This course will introduce the concepts of occupations, activities, and tasks in relation to the Domain of Practice of Occupational Therapy and as core to the OT Process. Students will learn to analyze the performance of occupations, activities, and tasks of persons across the lifespan and their transaction with their important occupational environments and contexts. Students will develop emerging skills in modifying and adapting components of occupations, activities, and tasks, and occupational environments to enable optimal performance and participation. Lastly, this course will introduce teaching and learning principles to develop students' skills in teaching occupations to clients individually and in groups, the building block in planning and implementing OT interventions.

Credit 3 units.

Typical periods offered: Fall

OT 6065 Therapeutic Communication, Group Dynamics, and Professional Development

This course provides foundational skills in effective verbal and nonverbal communication for all aspects of occupational therapy practice. Evidenced-based models of professional communication are presented with an emphasis on therapeutic modes of communication. Students develop competency in therapeutic use of self, stages of change, group dynamics, giving feedback, leadership and roles, and the process of conducting an occupational profile using semi-structured assessment. This course also addresses foundational concepts of professional development such as inter- and intraprofessional communication and giving/receiving feedback, necessary for professional growth as an occupational therapy practitioner.

Credit 2 units.

Typical periods offered: Fall

OT 6075 Fieldwork I: Immersion in Professional Practice Settings

This Level I fieldwork aims to provide an introductory immersion in practice settings of OT practice. This experience will provide students with an opportunity to apply their emerging interview and activity analysis skills in the context of a practice setting. Students will also receive feedback on their professional presence, communication, and cultural humility.

Credit 0 units.

Typical periods offered: Fall

OT 6115 Occupation and Society

This course is designed for first-year occupational therapy students, and explores the vital relationship between occupation and health, emphasizing how meaningful activities influence overall well-being. Through an engaging blend of theoretical frameworks and practical applications, you'll examine the ethical considerations in occupational therapy practice and the social impact of occupations on diverse populations. Join us as we lay the groundwork for your journey in understanding the science of occupation and its transformative power in enhancing quality of life. Prepare to think critically, act ethically, and advocate for the vital role of occupation in society!

Credit 2 units.

Typical periods offered: Fall

OT 6130 Theoretical Foundations Supporting Occupational Performance

This course explores the philosophical and theoretical foundations of the profession. The evolving theories, models, and frames of reference which support occupational therapy research and practice are compared and applied to case scenarios. Emphasis will be on the Person-Environment-Occupation-Performance model to guide the OT Process. The meaning and complexity of occupation and occupational performance will be explored as students gain an understanding of humans as occupational beings.

Credit 2 units.

Typical periods offered: Fall

OT 6155 Research Designs and Data Synthesis

Building on prerequisite knowledge, the student engages in research design and data analysis. Students locate sources of grant funding, identify appropriate statistical analyses of data based on the research question, and collect and analyze both qualitative and quantitative data.

Credit 2 units.

Typical periods offered: Spring

OT 6165 Professional Identity and Practice I: Role of OT in Community and Population Health

This course is designed for future occupational therapists to explore the diverse roles and responsibilities of entry-level practitioners in community and population health settings. You will gain a comprehensive understanding of how social determinants of health influence individual and community well-being while examining the policies and practices that shape occupational therapy in various environments. Through case studies, professional panels, and interactive learning activities, you'll develop critical insights into the importance of advocacy, collaboration, and culturally responsive care in enhancing health outcomes for diverse populations. Prepare to solidify your professional identity and impact the lives of those you serve.

Credit 2 units.

Typical periods offered: Spring

OT 6175 Fieldwork IB: Immersion in Mental and Behavioral Health Practice

This Level I fieldwork experience will provide an opportunity for students to refine their interview skills, active listening skills and interprofessional communication skills as they develop an understanding of the needs of individuals with psychosocial and behavioral health concerns.

Credit 0 units.

Typical periods offered: Spring

OT 6220 Impacts of Disease and Disability on Occupational Performance

This course aims to explore disease and disability across the lifespan as a social, cultural, political, and medical phenomenon through the lens of an interdisciplinary perspective. Students will explore the phenomenology of disability and disease processes, and how occupational participation is impacted by these processes (which may include understanding of prevalence, symptomatology, and medical knowledge). Through panel presentations, case analyses, and multimedia materials, students will explore how various cultures view the disease and disability process and assess and address ableist perspectives that are prevalent in healthcare practice.

Credit 2 units.

Typical periods offered: Spring

OT 6240 Using Evidence to Inform Practice

This course provides an in-depth exploration of evidence-based practice principles and their application in the field of occupational therapy. Students learn to critically appraise scientific literature and to integrate clinical expertise and client values to answer clinical questions and guide clinical decision-making. Results of this process are written in a scholarly report for presentation.

Credit 3 units.

Typical periods offered: Spring

OT 6250 Introduction to OT Assessment

This course focuses on developing knowledge and skills in the selection, administration, scoring and interpretation of standardized and non-standardized occupational therapy screens assessments. Students will learn to be independent in their ability to read and utilize assessment manuals, understand their psychometric properties as available, and use them to efficiently administer and interpret a variety of occupational therapy screens/assessments throughout the lifespan. Clinical reasoning in relationship to assessment will be emphasized and begin to be developed and throughout this course.



Credit 3 units.

Typical periods offered: Spring

OT 6265 Occupational Therapy in Mental and Behavioral Health

This course explores the person, environment, and occupation factors that influence occupational performance of adults and older adults with mental and behavioral health concerns. The role of social and structural determinants of health in mental and behavioral health is heavily threaded throughout the course, as students explore mental health at the intersection of systems and structures of society. In this course, students evaluate factors that affect occupational participation and performance for individuals with mental and behavioral health concerns, interpret findings, and design components of intervention plans for both individuals and groups using applicable theories, models, frames of reference, and best evidence. Emphasis is also placed on effective communication to develop, strengthen, and maintain therapeutic relationships throughout all aspects of the therapy process.

Credit 3 units.

Typical periods offered: Spring

OT 6282 Functional Anatomy and Neuroscience of Everyday Life

Students study the anatomical structures and functions that support daily activity. The neuromusculoskeletal substrates for activity, principles of kinesiology and biomechanics, and functions of the cardiorespiratory system are emphasized. Laboratory experiences, case studies, palpation, human cadavers, and Team Based Learning (TBL), all enhance student learning. Students practice clinical reasoning skills through the study of the human gross anatomy most relevant to occupational therapy practice. Students will apply anatomy content knowledge to the OT process through case studies. Upper extremity palpation skills provide hands-on reinforcement of anatomy knowledge while practicing the therapist-client relationship. This foundational course explores the structures and functions of the nervous system as they relate to occupational performance. Students develop a basic understanding of the neural mechanisms that underlie motor function, sensation, perception, cognition, and affect.

Credit 4 units.

Typical periods offered: Fall

OT 6290 Applying Biomechanical Approaches to Support Occupational Performance

Students learn to consider movement-related and physiological functions, functional mobility, and how to apply biomechanical principles to occupational performance.

Credit 3 units.

Typical periods offered: Spring

OT 6310 Elective MsOT to PhD Mentored Scholarship I

This is the first in a three-course sequence in which students participate in a mentored scholarship experience to prepare for entry into a PhD program. Students conduct clinical research or engage in the scholarship of teaching and learning under the direction of a researcher. Learning experiences include designing, implementing, evaluating, and disseminating research to advance knowledge translation, professional practice, service delivery, or professional issues. Students will actively participate in a research laboratory as a means to gain exposure to the skills needed to run an independent laboratory as a career scientist.

Credit 2 units.

Typical periods offered: Summer

OT 6325 OT With Children, Youth, and Families I

This is the first in a 2-course series designed to immerse students in the OT process with children, youth, and families. In this course, students will explore foundational knowledge regarding typical developmental trajectories and their associated adaptive functions within multiple contexts and applications to occupations. Students will then apply this knowledge to the OT process through case studies, exploring and practicing standardized assessments, non-standardized assessments, and functional observations. Common pediatric settings and their associated legislation will be discussed. Hands-on pediatric interaction will be provided in 1-2 lab sessions. Themes of identity-affirming practice (race, neurodiversity, gender, etc.) will be a thread throughout the course.

Credit 3 units.

Typical periods offered: Summer

OT 6335 Case-Based Learning: Clinical Reasoning and Applications in Pediatric Settings

In this first of a three-semester sequence, students study select health conditions and apply the occupational therapy process to cases with children and families under the guidance of a facilitator (CBL Tutor). Students integrate concepts learned in the evaluation and intervention coursework to analyze cases and design comprehensive evidence-based intervention plans using applicable theories, models, frames of reference and evidence. They select assessments, plan interventions, delineate OT/OTA roles, and make discharge recommendations that are client-centered and incorporate appropriate community resources.

Credit 2 units.

Typical periods offered: Summer

OT 6365 Professional Identity and Practice II: Role of OT in Medical Settings

This course is designed for future occupational therapists to explore the diverse roles and responsibilities of, and populations served by entry-level practitioners in medical settings. Students will engage in case studies, professional panels, and integrative learning activities designed to build clinical readiness to practice in medical settings along the continuum of care.

Credit 2 units.

Typical periods offered: Summer

OT 6370 Enabling Community Living and Assessing Environments

Students learn about the role of occupational therapy in population health and community environments. Topics include social determinants of health, universal design, environmental management, social policy, overview of durable medical equipment, factors related to community living and mobility. Students engage in environmental assessments and interventions for home and community environments

Credit 3 units.

Typical periods offered: Summer

OT 6375 FW IC: Immersion in Pediatric Practice

This Level I fieldwork experience will provide an opportunity for students to apply their emerging clinical reasoning skills for assessing and interpreting developmental milestones in children. Students will also practice effective communication with other professionals in pediatric settings.

Credit 0 units.

Typical periods offered: Summer

OT 6380 OTD Mentored Scholarship I

This is the first in a three-course sequence in which students participate in a mentored scholarship experience. Students conduct clinical research, clinical and community program development, or scholarship of teaching and learning within the mentor's line of scholarship. Learning experiences include designing, implementing, evaluating, and disseminating research to advance knowledge translation, professional practice, service delivery, or professional issues.

Credit 2 units.

Typical periods offered: Summer

OT 6390 Children and Youth With High Intensity Needs

This course is designed to provide students with in-depth training in working with children and youth with high intensity needs in the school setting. Students will have the opportunity participate in a variety of hands-on activities that facilitate the student's ability to apply evidence-based strategies for addressing the sensory, behavioral and communication needs of special education students in collaboration with a multidisciplinary team. Students will also participate in immersive learning experiences to apply learning in a school-based environment. Required for School Based Scholars.

Credit 1 unit.

Typical periods offered: Summer

OT 6410 Elective MsOT to PhD Mentored Scholarship II

This is the second in a three-course sequence in which students participate in a mentored scholarship experience to prepare for entry into a PhD program. Students conduct clinical research or engage in the scholarship of teaching and learning under the direction of a researcher. Learning experiences include designing, implementing, evaluating, and disseminating research to advance knowledge translation, professional practice, service delivery, or professional issues. Students will actively participate in a research laboratory as a means to gain exposure to the skills needed to run an independent laboratory as a career scientist.

Credit 2 units.

Typical periods offered: Fall, Spring

OT 6425 OT with Children, Youth, and Families II

This is the second in a 2-course series designed to immerse students in the OT process with children, youth, and families. In this course, students will build on the knowledge gained in the first course by further exploring pediatric practice within the OT process. Students will deepen their understanding of pediatric standardized assessments by administering, scoring, and interpreting assessments with peers and via online learning tools. Subsequently, students will build their skills of developing effective and occupation-based interventions for children and families. Intervention exploration will take place in active, experiential labs, including 1-2 hands-on pediatric labs, and case application. Intervention planning will be guided by evidence-based practice, client-centered considerations, and lived experience narratives. Considerations regarding practice setting and associated legislation will be applied in activities throughout the course. Themes of identity-affirming practice (race, neurodiversity, gender, etc.) will be a thread throughout the course.

Credit 3 units.

Typical periods offered: Fall

OT 6435 Case-Based Learning: Clinical Reasoning and Applications in Adult Outpatient and Community Settings

In this second of a three-semester sequence, students study various health conditions and apply the occupational therapy process to cases under the guidance of a facilitator. Students integrate concepts learned in the evaluation and intervention coursework to design

comprehensive evidence-based intervention plans using applicable theories, models, frames of reference and best evidence. They select assessments, plan interventions, delineate OT/OTA roles, and make discharge recommendations that are client-centered and incorporate appropriate community resources for outpatient and community settings.

Credit 3 units.

Typical periods offered: Fall

OT 6440 OT in Physical Rehabilitation and Assistive Technology

This course explores the person, environment, and occupation factors that influence occupational performance of adults and older adults in outpatient settings. Students evaluate these factors, interpret findings, and design components of intervention plans using applicable theories, models, frames of reference and best evidence. Students will be exposed to a variety of Assistive Technology to enable occupational performance. Mechanisms for reimbursement, re-evaluation, and discharge planning as applicable to outpatient rehabilitation practice settings are addressed.

Credit 3 units.

Typical periods offered: Fall

OT 6455 OT for Adults with Functional Cognition Challenges

This course explores the person, environment, and occupation factors that influence occupational performance of adults and older adults with cognitive challenges in outpatient and community settings. Emphasis is on strengthening interviewing and interpersonal communication skills, administering/interpreting/documenting performance based functional cognitive assessments, and being able to select/implement functional cognitive interventions according to evidenced based theories and frames of references. Clinical reasoning is strengthened through development of observational skills, decision making processes, therapeutic use of self and cultural sensitivity/awareness utilized as part of the OT process.

Credit 3 units.

Typical periods offered: Fall

OT 6475 Fieldwork I: Immersion in Adult Practice for Functional Cognitive Rehabilitation

This fieldwork experience will focus on providing students with guided practice experience through the OT process for live clients with functional cognitive challenges in the outpatient setting. Students will further hone clinical communication skills in written and verbal forms, demonstrate cultural humility in clients and team interactions as well as skills for self-assessment and professional goal setting.

Credit 0 units.

Typical periods offered: Fall

OT 6480 OTD Mentored Scholarship II

This is the second in a three-course sequence in which students participate in a mentored scholarship experience. Students conduct clinical research, clinical and community program development, or the scholarship of teaching and learning within the mentor's line of scholarship. Learning experiences will include designing, implementing, evaluating, and disseminating research to advance knowledge translation, professional practice, service delivery, or professional issues.

Credit 2 units.

Typical periods offered: Fall, Spring



OT 6510 Elective MsOT to PhD Mentored Scholarship III

This is the third in a three-course sequence in which students participate in a mentored scholarship experience to prepare for entry into a PhD program. Students conduct clinical research or engage in the scholarship of teaching and learning under the direction of a researcher. Learning experiences include designing, implementing, evaluating, and disseminating research to advance knowledge translation, professional practice, service delivery, or professional issues. Students will actively participate in a research laboratory as a means to gain exposure to the skills needed to run an independent laboratory as a career scientist.

Credit 2 units.

Typical periods offered: Spring

OT 6525 Management Skills for OT Professionals

The management course is designed to equip entry-level occupational therapy (OT) practitioners with the necessary skills for management across diverse treatment settings. The focus will be on essential management and organizational principles applicable to occupational therapy service provision. This includes aspects such as competency-based staff management and development, billing and financial oversight, program evaluation and leadership within the profession and marketing of occupational therapy services. The course will utilize real-world interactions with managers, clinic leaders, community agencies, interprofessional teams, and entrepreneurs to provide students with valuable experiential learning opportunities in multiple practice environments.

Credit 3 units.

Typical periods offered: Spring

OT 6535 Case-Based Learning: Clinical Reasoning and Applications in Adult Practice Settings

In this third of a three-semester sequence, students study select health conditions and apply the occupational therapy process to cases under the guidance of a facilitator. Students integrate concepts learned in prior coursework to design comprehensive evidence-based intervention plans using applicable theories, models, frames of reference and best evidence. They select assessments, administer assessments, plan interventions, administer interventions, delineate OT/JOTA roles, and make discharge recommendations that are client-centered and incorporate appropriate community resources applicable to adult practice settings including acute care, inpatient, outpatient and community.

Credit 3 units.

Typical periods offered: Spring

OT 6540 OT in Inpatient Rehabilitation

This course explores the person, environment, and occupation factors that influence occupational performance of adults and older adults in medical settings. Students evaluate these factors, interpret findings, and design components of intervention plans using applicable theories, models, frames of reference and best evidence. Mechanisms for reimbursement, re-evaluation, and discharge planning as applicable to inpatient rehabilitation practice settings are addressed. Students are engaged in hands-on laboratory learning to build confidence and competence in clinical skills required to effectively practice in acute care hospitals, inpatient rehabilitation facilities, and skilled nursing centers.

Credit 3 units.

Typical periods offered: Spring

OT 6565 Professional Identity and Practice III: Role of OT in Academic and Clinical Education Settings

This course introduces students to the various professional roles required of academic and fieldwork educators. Students will understand and apply the essentials of the teaching and learning process, including educational philosophies, learning theories, curriculum and instructional design, evidence-informed teaching strategies, and assessment of learning.

Credit 2 units.

Typical periods offered: Spring

OT 6575 Fieldwork IE: Immersion in Adult Practice for Physical Rehabilitation

This final level I fieldwork experience will provide students with the opportunity to participate in the OT process in physical rehabilitation settings with feedback from an OT practitioner. As the final experience prior to Level II Fieldwork, this rotation emphasizes the student's ability to modify their own behavior and therapeutic approach based on feedback and further develop their skills at self-monitoring their professional growth and setting goals for continued development in Level II fieldwork.

Credit 0 units.

Typical periods offered: Spring

OT 6580 OTD Mentored Scholarship III

This final level I fieldwork experience will provide students with the opportunity to participate in the OT process in physical rehabilitation settings with feedback from an OT practitioner. As the final experience prior to Level II Fieldwork, this rotation emphasizes the student's ability to modify their own behavior and therapeutic approach based on feedback and further develop their skills at self-monitoring their professional growth and setting goals for continued development in Level II fieldwork.

Credit 2 units.

Typical periods offered: Spring

OT 6585 Preparation for Level II Fieldwork and Entry-Level Practice

This course provides future occupational therapists with the knowledge, skills and support to navigate the transition from student to entry-level practitioner, and to develop strategies that promote the student's personal and professional growth as a representative of the profession and institution. Students will gain knowledge of the requirements for attaining and maintaining the credentials required for OT practice. Students will also practice strategies for ethical decision making, interprofessional collaboration, supervision of other OT personnel, managing conflict and effective strategies for feedback. Orientation to Level II fieldwork is covered.

Credit 3 units.

Typical periods offered: Spring

OT 6590 Specialized Elective in OT Practice I

Specialized Electives vary from year to year. More detailed descriptions of each option will be distributed when they are available.

Credit 1 unit.

Typical periods offered: Spring

OT 6595 Specialized Elective in OT Practice II

Specialized Electives vary from year to year. More detailed descriptions of each option will be distributed when they are available.

Credit 1 unit.

Typical periods offered: Spring

OT 6610 Practice Application: Fieldwork IIA

Provides fieldwork experience under the supervision of a licensed occupational therapist. Students receive in-depth practice experience and establish entry-level competency in delivering occupational therapy services within a practice setting. Students have the opportunity to practice in a variety of clinical or community-based settings. During the fieldwork process, students are expected to assume increasing responsibilities related to patient or client care. Duration is 12 weeks of full-time practice or equivalent.

Credit 6 units.

Typical periods offered: Fall, Spring, Summer

OT 6620 Practice Application: Fieldwork IIB

Provides fieldwork experience under the supervision of a licensed occupational therapist. Students receive in-depth practice experience and establish entry-level competency in delivering occupational therapy services within a practice setting. Students have the opportunity to practice in a variety of clinical or community-based settings. During the fieldwork process, students are expected to assume increasing responsibilities related to patient or client care. Duration is 12 weeks of full-time practice or equivalent.

Credit 6 units.

Typical periods offered: Summer

OT 6710 Designing Population Health Initiatives

Students design a population health initiative using the Person-Environment-Occupation-Performance (PEOP) approach. Students synthesize interdisciplinary knowledge from multiple sources to address a societal issue on a population level. This project can relate to the student's mentored scholarship, FW experiences, a personal interest or planned capstone experience to support best or emerging roles for OT practice, to address a societal need.

Credit 3 units.

Typical periods offered: Summer

OT 6720 Translational Science in Action

Students explore the construct of translational science and the challenges of integrating evidence into practice. Advocating for and using evidence in clinical settings has many barriers; strategies to influence professional practice through application of evidence are integral to this course.

Credit 3 units.

Typical periods offered: Summer

OT 6730 Leadership in Occupational Therapy

This course immerses students in the basic principles of personal and professional leadership theories and practices necessary for success in a dynamic healthcare environment, including emerging practice areas and advocacy roles. Key areas of focus include core values, personal and professional development and wellbeing, ethical leadership and supervision, program evaluation, continuous quality improvement, and managing change and transitions.

Credit 3 units.

Typical periods offered: Summer

OT 6910 Doctoral Capstone Proposal

Students prepare for the capstone experience in collaboration with their faculty mentor and deliver a proposal for the capstone experience and project in one of the following areas of focus: clinical skills, research skills, administration, program development and evaluation, policy development, advocacy, education or leadership.

This course builds from the Professional Identity and Practice and Fieldwork Preparation courses as students learn strategies for self-directed learning and developing a positive mentorship relationship with a content expert.

Credit 3 units.

Typical periods offered: Summer

OT 6920 Doctoral Capstone Project

Students document their scholarship work related to the capstone experience. Evidence of scholarship may be a variety of products as they are relevant to the student's chosen area of focus and project work, including but not limited to: a protocol or guide for a community program, a business development plan, a systematic review of the literature, a research manuscript, course syllabi or course development materials, policies and procedures, or other scholarly writing that demonstrates a synthesis of the knowledge and skills gained through the capstone experience. The course culminates with dissemination of the student's scholarly work. Taken concurrently with 6930 Doctoral Capstone Experience.

Credit 1 unit.

Typical periods offered: Fall, Spring, Summer

OT 6930 Doctoral Capstone Experience

This course provides a 14-week customized student experience specific to doctoral pursuits and allows for professional development in an area of interest under the mentorship of a content expert and faculty mentor. Students may engage in experiences that provide in-depth exposure to clinical skills, research skills, administration, leadership, advocacy, program development and evaluation, policy development, or education. Students work toward achieving individual learning objectives established in collaboration with their mentors. Taken concurrently with 6920 Doctoral Capstone Project.

Credit 7 units.

Typical periods offered: Fall, Spring, Summer

OT 7000 Leading Change and Advancing Practice

Using foundational professional and leadership theories, this course emphasizes the dynamic assets of occupational therapy across practice settings, populations, and impact areas. Students will enhance their ability to confidently articulate the unique role of occupational therapy as well as gain tangible skills to lead and engage in emerging and innovative practice areas.

Credit 3 units.

Typical periods offered: Fall, Summer

OT 7011 Literature and Ebp for the OT Practitioner

In this course, students will critically analyze professional and non-professional literature and evidence to answer occupational therapy practice questions and guide decision-making and professional reasoning. The course covers topics such as literature search strategies, critical appraisal of research articles and gray literature, and application of evidence to practice. Students will learn to use evidence-based practice to improve outcomes, increase efficiency, and enhance their own professional development. As part of the course, students will compile a literature review to guide their doctoral project.

Credit 3 units.

Typical periods offered: Spring



OT 7021 Advanced Theory Implementation

Students learn to critically analyze educational, developmental, and environmental theories and use them to guide decision-making and professional reasoning. By course completion, students will have the skills and knowledge necessary to apply a wide variety of theories and models in their professional and clinical practice. As part of the course, students will write a theoretical basis summary to guide their doctoral project.

Credit 3 units.

Typical periods offered: Spring

OT 7031 Outcomes and Evaluation

This course provides students with the knowledge and skills to assess and measure outcomes effectively, enabling them to contribute to evidence-based practice and improve person-centered care and services. Students will learn how to design and implement evaluation plans that align with organizational objectives and standards, including goal setting, selecting appropriate evaluation methods, data collection strategies, and analyzing and reporting findings. As part of the course, students will create an evaluation plan to assess the outcomes of their doctoral project.

Credit 3 units.

Typical periods offered: Summer

OT 7041 Advanced Practice Through Experiential Learning

This course provides students the opportunity to implement and evaluate their doctoral projects. In conjunction with the course instructor and the doctoral project mentor, students will implement a plan, document the outcomes, and strategically evaluate the results in preparation for dissemination. Student participation in this course is primarily self-driven with general oversight provided by the course instructor and doctoral mentor. There will be the opportunity for collaboration with peers throughout the course.

Credit 3 units.

Typical periods offered: Fall

OT 7051 Communicating Ideas

This course is designed for healthcare professionals to improve their communication skills to effectively and intentionally communicate ideas and concepts to a wide variety of audiences. The course covers topics such as effective communication strategies, public speaking and presenting, written communication, social media, and innovative ways of disseminating ideas and knowledge. As part of the course, students create dissemination materials for their doctoral projects.

Credit 3 units.

Typical periods offered: Spring

OT 7200 Healthcare Education: Theory and Foundations

This online doctoral-level course is designed to provide healthcare professionals with an understanding of the theory and foundations of healthcare education. It covers a variety of learning theories and models of content delivery. Students will engage in practical exercises and case studies to develop skills. The course offers flexibility with self-paced modules, interactive activities, and collaborative discussions to reinforce learning.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

OT 7215 Curriculum Design for Healthcare Education

This course is designed for healthcare professionals to develop their skills in designing effective healthcare education curricula and courses. The course covers topics such as instructional design principles, learning objectives, content selection, and backward design. This course equips students with the essential skills needed to design and develop learner-centered educational programs.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

OT 7220 Implementing Best Practices in Teaching

In this course, you will explore and implement evidence-based theoretical frameworks and practical teaching strategies designed to enhance student engagement and promote both personal and professional development. Through a combination of research-driven approaches and hands-on applications, you will gain the skills necessary to create learning environments that support all learners in achieving their full potential.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

OT 7230 Assessment and Program Evaluation in Healthcare Education

This course is designed for healthcare professionals who want to develop their skills in designing and implementing effective assessments for their educational programs. The course covers topics such as assessment design, validity and reliability, assessment types, and assessment strategies. Students will learn how to use assessments to measure learning outcomes and improve educational practices. By course completion, students will be able to design and deliver effective assessments that meet varied learning needs.

Credit 3 units.

Typical periods offered: Spring

OT 7300 Leadership: Theory and Practice

This doctoral-level course provides an overview of leadership and management theory and practice in organizations. Topics include leadership styles, organizational behavior, communication, and decision-making. Through engaging discussions, case studies, and assignments, students will develop the essential skills needed to lead effectively and create collaborative environments that maximize organizational performance across a wide range of professional settings.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

OT 7310 Outcomes Focused Leadership

This course focuses on developing leadership skills that prioritize outcomes and results in both healthcare and non-traditional settings. The course covers topics such as setting and measuring goals, outcome evaluation, data-driven decision-making, and accountability. Students will engage in case studies and practical exercises to develop hands-on experience. By course completion, students will be well-equipped to lead their teams towards achieving measurable and impactful outcomes.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

OT 7320 Identifying Value and Improving Performance

This online course is designed to provide professionals with the knowledge and skills necessary to identify and improve value and performance in their organizations. The course covers topics such as performance measurement, best practices for process and quality improvement, and advocacy. Students will learn how to design and implement strategies to improve the quality and effectiveness of

organizational services and measure and evaluate their impact. By course completion, students will be able to apply these concepts in their professional practice, leading to better outcomes and improved organizational performance.

Credit 3 units.

Typical periods offered: Summer

OT 7330 Effective Leadership for Change and Transition

This doctoral-level course focuses on developing leadership skills necessary to lead change and transition in their organizations. The course covers topics such as change management, strategic planning, innovation, and transformational leadership. Students will engage in case studies and practical exercises to develop hands-on experience. By course completion, students will be well-equipped to lead their teams through change and transition while effectively managing resistance and ensuring positive outcomes.

Credit 3 units.

Typical periods offered: Spring

OT 7400 Doctoral Project: Ideate

In this 1-credit course, students will learn the fundamentals of project management and collaborate with their doctoral mentor, the course faculty, and peers to begin to develop their doctoral project. This course integrates content from the core courses to facilitate the completion of an evidence-based and theory-driven doctoral project concept. This course also includes required networking and regular meetings with the student's doctoral mentor.

Credit 1 unit.

Typical periods offered: Spring

OT 7410 Doctoral Project: Design

This course builds upon the concept created in the previous Doctoral Project course and focuses on the overall design of the doctoral project. Using project management techniques and various design methods, students will develop a plan to implement and evaluate their doctoral project. This course also includes required networking and regular meetings with the student's doctoral mentor.

Credit 1 unit.

Typical periods offered: Summer

OT 7420 Doctoral Project: Implement and Evaluate

This course focuses on implementing and evaluating the doctoral project plan designed in the previous semester. It runs concurrently with the Advanced Practice through Experiential Learning course where the doctoral project is implemented. This course also includes required networking and regular meetings with the student's doctoral mentor.

Credit 1 unit.

Typical periods offered: Fall

OT 7430 Doctoral Project: Disseminate

This is the final course in the doctoral project sequence. It focuses on the dissemination of the doctoral project through various mediums, both traditional and non-traditional. It builds on the content learned in the Communicating Ideas course and will culminate in the public dissemination of the project at Scholarship Day. Students will also finalize their doctoral project portfolio, in conjunction with both faculty and their doctoral project mentor.

Credit 1 unit.

Typical periods offered: Spring

OT 8650 Theories, Models and Classifications

This course will explore the historical and theoretical foundations of Rehabilitation and Participation Science and track the development of rehabilitation models and classification systems. Students will find and use specific theories to ground their understanding of the area of their specialization, and they will be taught how to classify and apply levels of evidence to build the background for their doctoral work. The course will be team-taught with students and include faculty presentations and discussions.

Credit 3 units.

Typical periods offered: Fall

OT 8660 Biopsychosocial Factors Influencing Performance

The course will provide an in-depth understanding of the biomedical research literature pertaining to factors that influence performance. The course focuses on psychological, physiological, sensory, perceptual, motor, cognitive processes as well as subjective and objective assessments of the environment for home, work and community contexts that contribute to performance and performance changes with rehabilitation. The course will be team taught with a combination of lecture and seminar formats to lay the foundational principles of performance and to discuss how the capacity to perform supports participation.

Credit 3 units.

Typical periods offered: Spring, Summer

OT 8670 Environment Factors and Participation

The course will provide an in-depth understanding of person-environment interactions and the link between biomedical factors and community participation. The course focuses on the physical, technology and policy aspects of the environment that impact participation of persons with or at risk for chronic illness or disability. The course will be team taught with a combination of lecture and seminar formats.

Credit 3 units.

Typical periods offered: Fall, Spring

OT 8680 Measurement Theory and Development

The course will provide a broad framework and specific knowledge for assessment in areas of rehabilitation and participation. The course focuses on psychological, physiological, sensory, perceptual, motor, cognitive processes as well as subjective and objective assessments of the environment for home, work and community contexts. The course will be team taught with a combination of lecture and discussion formats.

Credit 3 units.

Typical periods offered: Fall, Spring, Summer

OT 8720 Teaching Practicum I

The teaching practicum provides an opportunity to engage in a focused and supervised classroom teaching experience. The student's teaching should be in a content area relevant to the student's area of interest.

Credit 1 unit.

Typical periods offered: Fall, Spring

OT 8770 Research Seminar

Regular meeting where research is presented and discussed. Presentations will be made by Washington University faculty, faculty outside the university, and students.

Credit 1 unit.

Typical periods offered: Fall, Spring



OT 8780 Research Practicum

The mentored research credit units will be used to develop the research skills of the student. The student will work with the mentor's guidance to conduct research that adds value to the laboratory and gains experience for the student. The mentored independent studies should lead to refereed publications and may contribute to the dissertation research.

Credit 1-12 units.

Typical periods offered: Fall, Spring, Summer

OT 9000 Full-Time Graduate Research/Study

Full-time graduate study and/or research.

Credit 0 units.

Typical periods offered: Fall, Spring

OT 9001 Full-Time Graduate Research in Absentia

Full-time graduate study and/or research.

Credit 0 units.

Typical periods offered: Fall, Spring

OT 9002 Full-Time Graduate Study Extension

Full-time graduate study and/or research.

Credit 0 units.

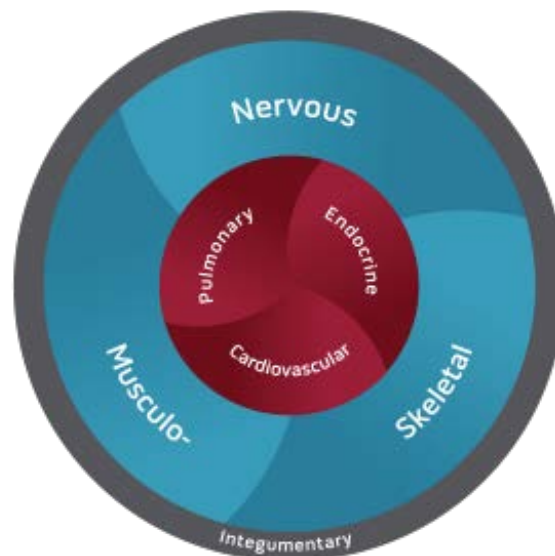
Typical periods offered: Spring

Physical Therapy

Physical therapy is the science of human movement applied to rehabilitation, injury, fitness, injury prevention and overall health. Practicing in a variety of settings, physical therapists diagnose and treat movement dysfunction in patients with skill, competence and compassion. The Program in Physical Therapy is committed to providing students with excellent scientific and clinical education in an environment that strives to continually lead the industry in practice, research, innovation and advocacy of movement health.

The Program in Physical Therapy at the School of Medicine offers two formal curricula that collectively foster opportunities for lifelong learning and comprehensive career development: the Doctor of Physical Therapy (p. 203) and the PhD in Movement Science (p. 205).

The Human Movement System Approach



The Program in Physical Therapy has pioneered a unique, movement-based approach to physical therapy. The human movement system is at the core of our approach to physical therapy education, research and patient care. This system consists of physiological organ systems that interact to produce and support the movement of the body and its parts. Movement science is the study of the movement system, and we believe physical therapists are the world's movement system experts.

Our program has pioneered the development of movement-focused physical therapy education, research and treatment. The human movement system continues to be our foundation for treating patients, conducting research, and training the next generation of leaders in physical therapy. Our vision is aligned with the vision of the American Physical Therapy Association (APTA), which is to "transform society by optimizing movement to improve the human experience."

Additional Information

Further information, including complete admissions instructions and program descriptions, may be obtained through direct correspondence with the Program in Physical Therapy:

WashU Medicine
Program in Physical Therapy
4444 Forest Park Avenue, CB 8502
St. Louis, MO 63108-2212
Phone: 314-386-1400
Fax: 314-286-1410

Phone: 314-286-1400
Email: ptadmissions@email.wustl.edu
Website: <https://pt.wustl.edu>

Degrees & Offerings

- Doctor of Physical Therapy (p. 203)
- PhD in Movement Science (p. 205)

Research

The mission of the Research Division is to understand how the movement system is affected by disease, injury, lifestyle, development and aging and to understand how movement can be used to promote health by enhancing physical function, activity and participation across the lifespan.

Our interdisciplinary scientific endeavors include mechanistic and translational investigations at all levels of organization, from the cell to society. Our research is supported by millions of dollars in federal, private foundation and university funding. We pursue knowledge in a collaborative work environment within the Movement Science Research Center.

Our doctoral and postdoctoral Research Training Programs prepare students for careers at the forefront of physical therapy and movement science research.

Research Areas

Research Area	Faculty Investigators
Foot & Ankle Injury & Recovery	Mary K. Hastings, PT, DPT, MSCI, ATC
Integrative Muscle Physiology	Gretchen A. Meyer, PhD
Movement & Neurodegenerative Disease	Gammon M. Earhart, PT, PhD
Movement & Neurodegenerative Disease	Ryan P. Duncan, PT, DPT
Neural Control of Movement Following Neurological Injury	Laura McPherson, PT, DPT, PhD
Neural Plasticity and Sensorimotor Integration	Jacob McPherson, PhD
Orthopaedic Biomechanics	Michael D. Harris, PhD
Prevention, Rehabilitation & Maintenance in Musculoskeletal Conditions	Linda Van Dillen, PT, PhD, FAPTA
Quantitative Methodology and Rehabilitation Informatics	Keith Lohse, PhD, PStat
Rehabilitation Research for Orthopaedic Conditions	Marcie Harris-Hayes, PT, DPT, MSCI
Shoulder Biomechanics and Rehabilitation	Rebekah Lawrence, PT, PhD
Stroke Recovery & Rehabilitation Accelerometry	Catherine Lang, PT, PhD

Stroke Recovery & Rehabilitation Accelerometry	Marghuretta D. Bland, PT, DPT, NCS
Stroke Recovery, Rehabilitation, and Accelerometry	Carey L. Holleran, PT, MPT, DHS, NCS
Tendon Rehabilitation	Jennifer Zellers, PT, DPT PhD
Whole Body & Joint-Level Orthopaedic Biomechanics	Michael D. Harris, PhD

Movement Science Research Center

The Movement Science Research Center is approximately 13,000 square feet of newly renovated space that provides a collaborative environment for faculty, PhD students and postdoctoral fellows to conduct rehabilitation research.

The facility includes numerous private rooms for clinical interventions and state-of-the-art equipment.

Equipment List	
Accelerometer activity monitors	Gene and protein quantification
Balance platform	Histology
Biological sample processing equipment	Motion capture
Biplane videoradiography	Muscle physiology testing equipment
Cell culture suite	Oscilloscopes
Dynamometers	Rotating treadmill
Electromyography	Simulated spaces for functional activities
Eye tracking	Split-belt treadmill
Force platforms	Treadmills
Function generators	Wheel mill system
GAITRite instrumented walkway	

Research Training Programs

We offer physical therapy research training programs designed to prepare students at the doctoral and postdoctoral levels for careers in groundbreaking physical therapy research.

PhD in Movement Science

Under the Movement Science Program, students work on the research topics that interest them while completing course work that prepares them for their research careers. The Movement Science Program encourages collaboration with other departments within the School of Medicine.



Visit the Program in Physical Therapy website for more information about the Movement Science Program.

Postdoctoral Fellowship in Movement Science

Our Postdoctoral Fellowship in Movement Science offers an opportunity to develop and complete research projects related to movement science and rehabilitation. Fellows are encouraged to collaborate with other faculty and programs in the School of Medicine.

Visit the Program in Physical Therapy website for more information about the Postdoctoral Fellowship.

Comprehensive Opportunities in Rehabilitation Research Training Program

The Comprehensive Opportunities in Rehabilitation Research Training (CORRT) Program is a multicenter career development program for physical and occupational therapists.

Visit the CORRT website for more information about the CORRT Program.

Institute of Clinical and Translational Sciences

The Institute of Clinical and Translational Sciences (ICTS) offers programs designed to support investigators at each phase of their clinical and translational research studies.

Visit the ICTS website for more information about the ICTS .

Clinical Research Training Center

The Clinical Research Training Center (CRTC) fosters clinical research training and career development for predoctoral students, house staff, postdoctoral fellows and faculty.

Visit the CRTC website for more information about the CRTC .

Faculty

Gammon Earhart, PT, PhD

Executive Director, Program in Physical Therapy

Steve Ambler, PT, DPT, PhD, MPH

Division Director of Education

Tammy L. Burlis, PT, DPT, CCS

Director of Clinical Education

Linda Van Dillen, PT, PhD, FAPTA

Division Director of Research

Gregory Holtzman, PT, DPT, SCS

Division Director of Clinical Practice

Visit our website for more information about our faculty and their appointments.

A

Steven B Ambler, M.P.H., D.P.T., Ph.D.

Professor of Physical Therapy (primary appointment)

Division Director of Professional Curriculum in Physical Therapy

Professor of Orthopedic Surgery

DPT Program Director of Physical Therapy

Bachelor of Science, University of Illinois at Urbana-Champaign, 2002

Doctor of Physical Therapy, Washington University in St Louis, 2005

Master of Public Health, University of South Florida, 2014

Doctor of Philosophy, University of South Florida, 2016

B

Jaimie Marie Bauerlein, D.P.T.

No Rank

Bachelor of Science, Augustana College Illinois, 2011

Doctor of Physical Therapy, Washington University in St Louis, 2014

Marghuretta Dakota Bland, M.S., D.P.T.

Professor of Physical Therapy (primary appointment)

Professor of Neurology

Professor of Occupational Therapy

Bachelor of Science, Canisius College, 2004

Master of Science, Washington University in St Louis, 2008

Doctor of Physical Therapy, Washington University in St Louis, 2008

Megan Maupin Burgess, D.P.T.

Assistant Professor of Physical Therapy (primary appointment)

Assistant Professor of Orthopedic Surgery

Bachelor of Science, University of Virginia, 2006

Doctor of Physical Therapy, Washington University in St Louis, 2010

Tamara Lavon Burlis, M.H.S., D.P.T.

Professor of Physical Therapy (primary appointment)

Associate Director of Professional Curriculum in Physical Therapy

Professor of Medicine

Bachelor of Arts, Wartburg College, 1988

Bachelor of Science, Washington University in St Louis, 1988

Master of Health Science, Washington University in St Louis, 1993

Doctor of Physical Therapy, Washington University in St Louis, 2003

C

Billie Ruth Clark, Ph.D.

Emeritus Professor of Physical Therapy

Bachelor of Science, Saint Louis University, 1974

Doctor of Philosophy, Saint Louis University, 1988

Beth Elaine Crowner, M.P.P., M.S., D.P.T.

Professor of Physical Therapy (primary appointment)

Professor of Neurology

Bachelor of Science, Washington University in St Louis, 1989
Master of Science, Washington University in St Louis, 1989
Master of Public Policy, University of Missouri in St Louis, 1997
Doctor of Physical Therapy, Washington University in St Louis, 2007

Mary Maureen Crumley, D.P.T.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Neurology
Bachelor of Arts, Luther College Iowa, 2011
Bachelor of Science, Luther College Iowa, 2011
Doctor of Physical Therapy, Saint Ambrose University, 2013

D**Rebecca Derringer DeMargel, M.S., D.P.T.**

Assistant Professor of Physical Therapy (Pending Dean Approval)
(primary appointment)
Bachelor of Arts, University of Kansas, 1998
Master of Science, Washington University in St Louis, 2000
Doctor of Physical Therapy, University of Montana Missoula, 2022

Robert H Deusinger, M.S., Ph.D.

Associate Professor Emeritus of Physical Therapy
Bachelor of Science, Slippery Rock University (Duplicate of Slippery Rock University of Pennsylvania), 1967
Master of Science, University of Massachusetts (Duplicate of University of Massachusetts Amherst), 1968
Doctor of Philosophy, University of Iowa, 1981

Susan S. Deusinger, M.A., Ph.D.

Professor Emeritus of Physical Therapy
Bachelor of Science, University of Kansas, 1969
Master of Arts, Washington University in St Louis, 1980
Doctor of Philosophy, Washington University in St Louis, 1987

Ryan Patrick Duncan, M.S., D.P.T.

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Neurology
Bachelor of Science, Maryville University of Saint Louis, 2007
Doctor of Physical Therapy, Washington University in St Louis, 2012
Master of Science, Washington University in St Louis, 2018

E**Gammon Marie Earhart, M.S., Ph.D.**

Professor of Physical Therapy (primary appointment)
Associate Dean for Physical Therapy
Professor of Neurology
Professor of Neuroscience
Bachelor of Science, Arcadia University, 1994
Master of Science, Arcadia University, 1996
Doctor of Philosophy, Washington University in St Louis, 2000

G**Kristopher Gordon, D.P.T.**

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopedic Surgery
Bachelor of Science, Murray State University, 2005

Doctor of Physical Therapy, University of Missouri Columbia, 2014

H**Michael Dennison Harris, Ph.D.**

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopedic Surgery
Associate Director of Movement Science PhD Program in Physical Therapy
Bachelor of Science, University of Utah, 2007
Doctor of Philosophy, University of Utah, 2013

Mary Kent Hastings, M.S., D.P.T.

Professor of Physical Therapy (primary appointment)
Professor of Orthopedic Surgery
Bachelor of Science, University of Illinois at Urbana-Champaign, 1990
Master of Science, Washington University in St Louis, 1993
Doctor of Physical Therapy, Washington University in St Louis, 2002

Marcie Harris Hayes, M.S., D.P.T.

Professor of Physical Therapy (primary appointment)
Professor of Orthopedic Surgery
Bachelor of Science, Missouri State University (Formerly Southwest Missouri State), 1994
Master of Science, Northwestern University, 1996
Doctor of Physical Therapy, Washington University in St Louis, 2003

Amanda Pennock Hennekes, D.P.T.

Assistant Professor of Physical Therapy (Pending Dean Approval)
(primary appointment)
Bachelor of Arts, Davidson College, 2005
Bachelor of Science, Davidson College, 2005
Doctor of Physical Therapy, Washington University in St Louis, 2008

Carey Lane Holleran, M.P.T., D.H.Sc.

Associate Professor of Physical Therapy (primary appointment)
Assistant Director of Student Assessment and Program Evaluation in Physical Therapy
Associate Professor of Neurology
Bachelor of Science, Duquesne University, 2003
Master of Physical Therapy, Duquesne University, 2004
Doctor of Health Science, University of Indianapolis, 2014

Gregory William Holtzman, M.S., D.P.T.

Professor of Physical Therapy (primary appointment)
Division Director of Clinical Practice in Physical Therapy
Professor of Orthopedic Surgery
Bachelor of Arts, Emory University, 1995
Master of Science, Washington University in St Louis, 2001
Doctor of Physical Therapy, Washington University in St Louis, 2007

Elizabeth Hughes, D.P.T.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Neurology
Bachelor of Science, Saint Louis University, 2016
Doctor of Physical Therapy, Saint Louis University, 2018

J**Jill Kristine Johnson, D.P.T.**



Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopedic Surgery
Doctor of Physical Therapy, Washington University in St Louis, 2006

K

Lynnette C Khoo-Summers, M.S., D.P.T.

Professor of Physical Therapy (primary appointment)
Professor of Orthopedic Surgery
Bachelor of Arts, Colorado State University, 1990
Master of Science, Washington University in St Louis, 1998
Doctor of Physical Therapy, Washington University in St Louis, 2008

Jeffrey Daniel Konrad, D.P.T., Ph.D.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Neurology
Bachelor of Science, University of Wisconsin Milwaukee, 2008
Doctor of Physical Therapy, University of Wisconsin Milwaukee, 2011
Doctor of Philosophy, Washington University in St Louis, 2024

L

Catherine Eckels Lang, M.S., Ph.D.

Professor of Physical Therapy (primary appointment)
Associate Director of Movement Science PhD Program in Physical Therapy
Professor of Neurology
Professor of Occupational Therapy
Barbara J Norton Professor of Physical Therapy
Division Director of Research in Physical Therapy
Bachelor of Science, University of Vermont, 1993
Master of Science, University of Vermont, 1997
Doctor of Philosophy, Washington University in St Louis, 2001

Vanessa Mae Lanier, D.P.T.

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopedic Surgery
Bachelor of Science, Washington University in St Louis, 2007
Doctor of Physical Therapy, Washington University in St Louis, 2012

Rebekah Lawrence, D.P.T., Ph.D.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopedic Surgery
Bachelor of Science, Bradley University, 2006
Doctor of Physical Therapy, Saint Ambrose University, 2008
Doctor of Philosophy, University of Minnesota, 2018

Sylvia Lin, M.S., D.P.T.

Professor of Physical Therapy (primary appointment)
Professor of Orthopedic Surgery
Bachelor of Arts, Washington University in St Louis, 2000
Master of Science, Washington University in St Louis, 2002
Doctor of Physical Therapy, Washington University in St Louis, 2011

Keith Robert Lohse, M.A., Ph.D.

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Neurology
Master of Arts, University of Colorado Boulder, 2009
Doctor of Philosophy, University of Colorado Boulder, 2012

M

Julian Magee, D.P.T.

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopedic Surgery
Associate Director of Student Affairs & Employee Engagement
Associate of Science, Hinds Community College, 2001
Bachelor of Science, University of West Alabama, 2004
Doctor of Physical Therapy, Alabama State University, 2007

Ammar Mahmood, Ph.D.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Cell Biology and Physiology
Associate of Science, Metropolitan Community College-Kansas City, 2012
Bachelor of Science, University of Missouri Kansas City, 2015
Doctor of Philosophy, Saint Louis University, 2023

Patricia Navarro McGee, D.P.T.

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopedic Surgery
Associate Professor of Pediatrics
Director for Clinical Education in Physical Therapy
Bachelor of Arts, Washington University in St Louis, 2001
Doctor of Physical Therapy, Washington University in St Louis, 2004

Jacob Graves McPherson, M.S., Ph.D.

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Anesthesiology
Bachelor of Science, University of North Carolina at Asheville, 2005
Master of Science, Northwestern University, 2008
Doctor of Philosophy, Northwestern University, 2011

Laura Crego Miller McPherson, D.P.T., Ph.D.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Neurology
Bachelor of Science, Vanderbilt University, 2006
Doctor of Physical Therapy, Northwestern University, 2012
Doctor of Philosophy, Northwestern University, 2014

Gretchen Ann Meyer, M.S., Ph.D.

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Neurology
Associate Professor of Orthopedic Surgery
Bachelor of Science, Washington University in St Louis, 2004
Master of Science, Washington University in St Louis, 2004
Doctor of Philosophy, University of California San Diego, 2011

Jennifer Elaine Miller-Katsafanas, D.P.T.

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Obstetrics and Gynecology
Bachelor of Arts, University of Missouri in St Louis, 1996
Doctor of Physical Therapy, Washington University in St Louis, 2012

Michael Jeffrey Mueller, M.H.S., Ph.D.

Professor Emeritus of Physical Therapy
Bachelor of Science, Washington University in St Louis, 1979
Master of Health Science, Washington University in St Louis, 1984
Doctor of Philosophy, Washington University in St Louis, 1992

N**Barbara Jean Norton, M.H.S., Ph.D.**

Professor of Physical Therapy (primary appointment)
Associate Director of Education Technology in Physical Therapy
Professor of Neurology
Bachelor of Science, Washington University in St Louis, 1966
Master of Health Science, Washington University in St Louis, 1985
Doctor of Philosophy, Washington University in St Louis, 1996

P**Deborah Athena Rose Rennard Priluck, D.P.T.**

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Neurology
Bachelor of Arts, Grinnell College, 2010
Bachelor of Science, Grinnell College, 2010
Doctor of Physical Therapy, Washington University in St Louis, 2019

R**Susan Beth Racette, Ph.D.**

Voluntary Research Professor of Physical Therapy
Bachelor of Science, Bucknell University, 1988
Doctor of Philosophy, University of Chicago, 1994

Jessica Randolph, M.S., Ed.D.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopedic Surgery
Assistant Director of Learning and Continuous Improvement in Physical Therapy
Bachelor of Arts, Carthage College, 2007
Master of Science, Logan College of Chiropractic, 2008
Doctor of Education, Lindenwood University, 2017

Sarah Jane Rands

No Rank

Kerri S Rawson, M.S., Ph.D.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Neurology
Bachelor of Arts, University of Texas Austin, 2004
Master of Science, University of South Florida, 2009
Doctor of Philosophy, University of South Florida, 2012

S**Shirley Ann Sahrman, M.A., Ph.D.**

Professor Emeritus of Physical Therapy
Bachelor of Science, Washington University in St Louis, 1958
Master of Arts, Washington University in St Louis, 1971
Doctor of Philosophy, Washington University in St Louis, 1973

Aubrey Sarpy, D.P.T.

No Rank
Bachelor of Science, McKendree University, 2017
Doctor of Physical Therapy, Washington University in St Louis, 2020

Sarah Sherman, D.P.T.

No Rank

Bachelor of Arts, Webster University, 2009
Doctor of Physical Therapy, Washington University in St Louis, 2015

David R Sinacore, M.H.S., Ph.D.

Voluntary Research Professor of Physical therapy
Bachelor of Science, State University of New York, 1979
Master of Health Science, Washington University in St Louis, 1983
Doctor of Philosophy, West Virginia University, 1992

Alyssa Nicole Skala, D.P.T.

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopedic Surgery
Bachelor of Science, University of California Irvine, 2011
Doctor of Physical Therapy, Washington University in St Louis, 2016

Nancy Bloom Smith, M.S., D.P.T.

Emeritus Professor of Physical Therapy
Bachelor of Arts, University of Virginia, 1976
Master of Science, Washington University in St Louis, 1979
Bachelor of Science, Washington University in St Louis, 1984
Doctor of Physical Therapy, Washington University in St Louis, 2002

Theresa M Spitznagle, M.H.S., D.P.T.

Professor of Physical Therapy (primary appointment)
Professor of Obstetrics and Gynecology
Bachelor of Science, Marquette University, 1986
Master of Health Science, Washington University in St Louis, 1994
Doctor of Physical Therapy, Washington University in St Louis, 2006

Jennifer S Stith, M.S., M.S.W., Ph.D.

Professor Emerita of Physical Therapy
Bachelor of Science, University of California, 1976
Master of Science, University of Southern California, 1979
Doctor of Philosophy, Washington University in St Louis, 1994
Master of Social Work, Washington University in St Louis, 2006

T**Dale Allen Thuet, D.P.T.**

Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopedic Surgery
Bachelor of Arts, University of Missouri Columbia, 2004
Doctor of Physical Therapy, Washington University in St Louis, 2009

Stacy Lynne Tylka, M.S., D.P.T.

Professor of Physical Therapy (primary appointment)
Professor of Orthopedic Surgery
Professor of Obstetrics and Gynecology
Bachelor of Science, Saint Louis University, 2000
Master of Science, Saint Louis University, 2002
Doctor of Physical Therapy, Washington University in St Louis, 2009

V**Linda R Van Dillen, M.S., Ph.D.**

Professor of Physical Therapy (primary appointment)
Professor of Orthopedic Surgery
Bachelor of Science, University of Missouri Columbia, 1979
Master of Science, Washington University in St Louis, 1985



Doctor of Philosophy, Washington University in St Louis, 1994

W

Corey B Woldenberg, D.H.Sc., D.P.T.

Assistant Professor of Physical Therapy (primary appointment)

Assistant Professor of Orthopedic Surgery

Assistant Director of Clinical Education in Physical Therapy

Bachelor of Science, University of Kentucky, 2007

Doctor of Physical Therapy, Washington University in St Louis, 2010

Doctor of Health Science, Radford University, 2024

Z

Jennifer Ann Zellers, D.P.T., Ph.D.

Assistant Professor of Physical Therapy (primary appointment)

Assistant Professor of Orthopedic Surgery

Bachelor of Science, Arcadia University, 2007

Doctor of Physical Therapy, Columbia University, 2010

Doctor of Philosophy, University of Delaware, 2018

Courses

PHYSTHER 5001 Independent Study

Independent research work under supervision of a faculty member in the Program in Physical Therapy.

Credit 1-6 units.

Typical periods offered: Fall, Spring

PHYSTHER 8101 Patient and Client Care 1

The learner will demonstrate a minimum of the level 1 benchmark in competency development to provide informed, effective, and efficient care for the management of movement-related health conditions and the promotion of health and wellness. The learner will choose topics organized through the clinician/scholar/educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8102 Knowledge for Practice 1

The learner will demonstrate a minimum of the level 1 benchmark in competency development to integrate knowledge from established and evolving movement and other relevant biomedical, clinical, epidemiological and social-behavioral sciences to guide practice. The learner will choose topics organized through the clinician/scholar/educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8103 Practice-Based Learning and Improvement 1

The learner will demonstrate a minimum of the level 1 benchmark in competency development to evaluate one's delivery of care, appraise and assimilate scientific evidence, and continuously improve performance based on self-evaluation. The learner will choose topics organized through the clinician/scholar/educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8104 Interpersonal & Communication Skills 1

The learner will demonstrate a minimum of the level 1 benchmark in competency development to use effective interpersonal and communication skills to interact and collaborate with others. The learner will choose topics organized through the clinician/scholar/educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8105 Professionalism 1

The learner will demonstrate a minimum of the level 1 benchmark in competency development to adhere to ethical and legal principles, model professional behaviors, and display a commitment to citizenship within the profession and the community. The learner will choose topics organized through the clinician/scholar/educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8106 Systems-Based Practice 1

The learner will demonstrate a minimum of the level 1 benchmark in competency development to function effectively and proactively within evolving systems and environments that contribute to the health of individuals and populations. The learner will choose topics organized through the clinician/scholar/educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8107 Interprofessional Collaboration 1

The learner will demonstrate a minimum of the level 1 benchmark in competency development to engage within interprofessional teams as an effective member and collaborative leader. The learner will choose topics organized through the clinician/scholar/educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8108 Personal & Professional Development 1

The learner will demonstrate a minimum of the level 1 benchmark in competency development to demonstrate the attributes required to engage in lifelong personal and professional growth. The learner will choose topics organized through the clinician/scholar/educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8110 Learning, Health and Equity

Learners will explore the impact of health and equity on achieving our profession's vision: Transforming society by optimizing movement to improve the human experience. Faculty will describe the learner-centered academic physical therapy learning environment, and learners will engage in partnership with faculty to form the foundation for their shared success. Learners will be guided to understand the importance and utility of competency-based physical therapist education, learning science principles, and both the stages and attributes of the master adaptive learner in professional formation and lifelong professional development.

Credit 1 unit.

Typical periods offered: Fall

PHYSTHER 8120 Professions and Movement

Learners will gain an understanding of their roles as ethical professionals and movement system practitioners. Faculty will guide learners' discovery of significant events in the history of the profession, with an emphasis on the concepts of movement and diagnosis. Faculty will introduce a model for integrating the movement system with health and movement across the lifespan. Learners will begin to develop skills in screening, interviewing, movement analysis, and clinical reasoning through case examples that will span the curriculum. Credit 1 unit.

Typical periods offered: Fall

PHYSTHER 8130 Movement and Population Health

Learners will integrate the foundations of movement and the movement system through a population health framework. The movement system practitioner's role in health promotion and prevention will prepare the learner to promote health and prevent movement-related problems for populations, groups, and individuals across the lifespan. Learners will be guided in the understanding of social and structural systems, moving beyond the health care system, and how they impact the health of society and the individual. The learner will continue to develop the patient-client relationship and begin to demonstrate the communication skills necessary to work in interprofessional teams to promote health and prevent movement-related problems.

Credit 2 units.

Typical periods offered: Fall

PHYSTHER 8140 Movement and Precision Health

Learners will focus on the role of the movement system practitioner in individual health. They will integration the foundations of movement, the movement system, and foundations of movement-related conditions through a precision health framework that includes interactions across the spectrum of the environmental level to the cell molecular level. Learners will be guided in a basic understanding of the health care system and how it impacts the health of individuals. The learner will begin to prevent and manage movement-related problems for individuals across the lifespan while developing an understanding of their professional responsibilities in practice and how to identify areas for improvement in their practice.

Credit 10-15 units.

Typical periods offered: Fall, Spring

PHYSTHER 8191 Clinical Experience I

An eight-week, full time clinical experience supervised by clinical faculty. Allows the student to practice evaluation and treatment skills acquired in the classroom and laboratory. Also emphasizes development of professional behaviors.

Credit 4 units.

Typical periods offered: Spring, Summer

PHYSTHER 8201 Patient and Client Care 2

The learner will demonstrate a minimum of the level 2 benchmark in competency development to provide informed, effective, and efficient care for the management of movement-related health conditions and the promotion of health and wellness. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8202 Knowledge for Practice 2

The learner will demonstrate a minimum of the level 2 benchmark in competency development to integrate knowledge from established and evolving movement and other relevant biomedical, clinical, epidemiological and social-behavioral sciences to guide practice. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8203 Practice-Based Learning and Improvement 2

The learner will demonstrate a minimum of the level 2 benchmark in competency development to evaluate one's delivery of care, appraise and assimilate scientific evidence, and continuously improve performance based on self-evaluation. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8204 Interpersonal & Communication Skills 2

The learner will demonstrate a minimum of the level 2 benchmark in competency development to use effective interpersonal and communication skills to interact and collaborate with others. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8205 Professionalism 2

The learner will demonstrate a minimum of the level 2 benchmark in competency development to adhere to ethical and legal principles, model professional behaviors, and display a commitment to citizenship within the profession and the community. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8206 Systems-Based Practice 2

The learner will demonstrate a minimum of the level 2 benchmark in competency development to function effectively and proactively within evolving systems and environments that contribute to the health of individuals and populations. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8207 Interprofessional Collaboration 2

The learner will demonstrate a minimum of the level 2 benchmark in competency development to engage within interprofessional teams as an effective member and collaborative leader. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer



PHYSTHER 8208 Personal & Professional Development 2

The learner will demonstrate a minimum of the level 2 benchmark in competency development to demonstrate the attributes required to engage in lifelong personal and professional growth. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8250 Prevention, Diagnosis and Management of Movement Problems

Learners will apply the foundations and moderators of movement in the prevention, diagnosis, and management of movement problems across the lifespan. An emphasis is placed on patient care and the impact of social, environmental, and health systems on patient/client management. Learners will begin to take on more responsibility for identifying and improving as a movement system practitioner to improve their practice, the profession, and the society the profession serves.

Credit 12 units.

Typical periods offered: Fall

PHYSTHER 8260 Prevention, Diagnosis and Management of Complex Movement Problems

Learners will apply the foundations and moderators of movement in the prevention, diagnosis, and management of movement-related conditions across the lifespan with an increasing complexity. An emphasis continues on patient care and the impact of social, environmental, and health systems on patient/client management. Learners will take responsibility for identifying and improving as a movement system practitioner to improve their practice, the profession, and the society the profession serves.

Credit 6 units.

Typical periods offered: Spring, Summer

PHYSTHER 8292 Clinical Experience II

An eight-week, full-time clinical experience supervised by clinical faculty. Allows the student to practice evaluation and treatment skills acquired in the classroom and laboratory. Also emphasizes development of professional behaviors.

Credit 4 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8301 Patient and Client Care 3

The learner will demonstrate a minimum of the level 3 benchmark in competency development to provide informed, effective, and efficient care for the management of movement-related health conditions and the promotion of health and wellness. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PHYSTHER 8302 Knowledge for Practice 3

The learner will demonstrate a minimum of the level 3 benchmark in competency development to integrate knowledge from established and evolving movement and other relevant biomedical, clinical, epidemiological and social-behavioral sciences to guide practice. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PHYSTHER 8303 Practice-Based Learning and Improvement 3

The learner will demonstrate a minimum of the level 3 benchmark in competency development to evaluate one's delivery of care, appraise and assimilate scientific evidence, and continuously improve performance based on self-evaluation. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PHYSTHER 8304 Interpersonal & Communication Skills 3

The learner will demonstrate a minimum of the level 3 benchmark in competency development to use effective interpersonal and communication skills to interact and collaborate with others. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PHYSTHER 8305 Professionalism 3

The learner will demonstrate a minimum of the level 3 benchmark in competency development to adhere to ethical and legal principles, model professional behaviors, and display a commitment to citizenship within the profession and the community. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PHYSTHER 8306 Systems-Based Practice 3

The learner will demonstrate a minimum of the level 3 benchmark in competency development to function effectively and proactively within evolving systems and environments that contribute to the health of individuals and populations. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PHYSTHER 8307 Interprofessional Collaboration 3

The learner will demonstrate a minimum of the level 3 benchmark in competency development to engage within interprofessional teams as an effective member and collaborative leader. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PHYSTHER 8308 Personal & Professional Development 3

The learner will demonstrate a minimum of the level 3 benchmark in competency development to demonstrate the attributes required to engage in lifelong personal and professional growth. The learner will choose topics organized through the clinician, scholar, educator thread to improve in this domain, as needed.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PHYSTHER 8370 Practice and Movement

The learner will participate in self-selected activities designed to promote growth of professional skills and attributes gained during situational learning experiences. Learners will hone their clinical reasoning skills across all areas of the movement system. The learner

will take action to further develop their professional identity. Learners and faculty will collaborate to optimize the learner's transition from supervised to independent practice with an emphasis on cultivating the master adaptive learner.

Credit 10 units.

Typical periods offered: Spring

PHYSTHER 8380 Practice, Health and Equity

Learners will reflect on experiences across the DPT curriculum in preparation for independent practice and lifelong professional development. Learners will engage in scholarly activities emphasizing practice, health, and equity. Learners will identify and advocate for professional and societal issues affecting physical therapist practice. Learners will enhance strategies to become lifelong master adaptive learners.

Credit 1 unit.

Typical periods offered: Spring

PHYSTHER 8393 Clinical Experience III

A 10-week, full-time clinical experience supervised by clinical faculty. Allows the student to practice evaluation and treatment skills acquired in the classroom and laboratory. Also emphasizes the development of professional behaviors.

Credit 5 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8394 Clinical Experience IV

A 12-week, full-time clinical experience supervised by clinical faculty. Allows the student to practice evaluation and treatment skills acquired in the classroom and laboratory. Also emphasizes the development of professional behaviors.

Credit 6 units.

Typical periods offered: Fall, Spring, Summer

PHYSTHER 8884 Doctoral Continuing Student Status

Full-Time Graduate Research

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

Population Health Sciences

The **Master of Population Health Sciences (MPHS)** offered by the School of Medicine is a 10-month degree program for clinicians, clinical doctorates, medical students and health sciences students seeking training in clinical research methods. The curriculum emphasizes the role of epidemiology and biostatistics in approaching clinical effectiveness and outcomes research for all medical specialties. The MPHS does not require a research thesis upon completion of the program. Instead, the program innovatively uses applied coursework to focus on the long-term mastery of skills. Using topics relevant to their careers and interests, MPHS students practice the art of developing research study protocols, performing systematic reviews, designing epidemiologic studies and much more. Many students go on to produce award-winning research using their applied coursework and skills learned in the program.

Contact:

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Degrees & Offerings

- MD/Master of Population Health Sciences (p. 193)
- Master of Population Health Sciences (p. 206)
- Certificate in Clinical Effectiveness (p. 207)
- Certificate in Health Equity and Disparities (p. 208)
- Clinical Epidemiology Concentration
- Health Equity and Disparities Concentration

Research

Research Projects & Assignments

The MPHS program uses applied coursework, which means students use their own research projects and interests for class discussions and assignments. This format helps our students apply and master research concepts quickly, and it maximizes research productivity during students' time in the program.

For example, students will write and design research protocols, systematic reviews and meta-analyses, grant proposals and more. In addition, our instructors select case studies, prioritize reading lists, and shape class discussions from current, in-the-news clinical outcomes research and population health topics.

Students are *not* required to complete a research project for graduation. The focus in the MPHS program is on the practice and mastery of clinical research skill sets for long-term benefit.

Students are encouraged to have a primary mentor connected to their research while in the MPHS program. If needed, our program leadership can help students find a research project or mentor.

Faculty

Graham Colditz, MD, DrPH
Director

Yikyung Park, ScD
Co-Deputy Director

Adetunji Toriola, MD, PhD
Co-Deputy Director

Allison King, MD, MPH, PhD
Associate Director for Medical Students

Visit our website for more information about our faculty and their appointments.

Courses

PHS 5000 Current Topics in Public Health

After interesting research studies are presented at meetings or published in journals, news media often disseminate results to a broader audience. As health care providers, we will be asked about these news stories by patients and other contacts. By the end of this course, students will be able to: 1) Facilitate discussions about the accuracy of scientific representation in news media. 2) Prepare future health care providers to review population health research and communicate findings accurately. Course note: This course is only required for MD/MPHS students.

Credit 1 unit.

Typical periods offered: Fall

PHS 5010 Introductory Clinical Epidemiology

The first course in the Epidemiology series, this course introduces the basic principles and methods of epidemiology, with an emphasis on critical thinking, analytic skills, and application to clinical practice and research. Class time will include lectures, group problem solving, article critiques and class discussion. The course will provide tools for critically evaluating the clinical literature and skills to practice evidence-based medicine.

Credit 3 units.

Typical periods offered: Fall Half A

PHS 5011 Intermediate Clinical Epidemiology

The second course in the Epidemiology series, this course builds upon the basic principles and methods of epidemiology and introduces additional tools and concepts that are critical to a comprehensive study design. Topics include risk and association, sampling strategies, interaction, confounding, adjustment, lifetables, applied causal inference, validity and reliability, social epidemiology, and approaches to data analysis. Upon exiting this course, students will be prepared to approach the study design portion of a protocol, as required by the final course in the Epidemiology series. Course activities: lectures, Midterm and final exams, class participation, problem sets, and papers.

Credit 3 units.

Typical periods offered: Fall Half B

PHS 5012 Ethics in Population and Clinical Health Research

This course will expose population and clinical health researchers to some of the ethical issues, challenges, and situations encountered in their research, with a focus on devising solutions. It will also familiarize them with principles of responsible conduct of research and available ethics and compliance resources. Case studies from the media will supplement discussion on topics such as informed consent and human subjects research, responsible conduct of research and allegations of misconduct, research with vulnerable populations, data management and presentation, publications and peer review, collaboration and sharing data, societal impact of research, and mentee-mentor relationships. Students who attend eight course sessions will fulfil the National Institutes of Health requirements for training in responsible conduct of research. This class is a seminar that will be held in person. This class is not based on lectures. Instead, it is based on discussion, and thus relies on full participation from all students. Students must come to each session prepared to be active and thoughtful participants. This requires thoughtful and careful reading of assigned course materials prior to each class session. Additionally, the class

covers timely research ethics issues in the media, to demonstrate how common ethical concerns arise and the multi-level factors that lead to ethical issues (e.g., system, organization, lab, individual). Students will be responsible for identifying these issues and discussing them in class. Credit 1 unit.

Typical periods offered: Spring

PHS 5020 Applied Research Independent Study

The purpose of the Independent Study course is to develop and refine the skills students learn in the fall core courses, Introductory and Intermediate Clinical and Epidemiology and Biostatistics series. Students enrolling in this course must come prepared with a circumscribed and well-defined project that relates to public health and population sciences. A research mentor within Washington University School of Medicine must be identified and approved of by MPHS leadership prior to the course enrollment. Objectives, a synopsis and milestones of the project per each student's individualized syllabus should be identified and submitted to the MPHS leadership and mentor prior to the start of the semester. Students will be expected to submit a report, for example, drafted manuscript, an abstract for a conference, data analysis results, at the end of the spring semester to the MPHS leadership for credit. Course credit will be evaluated by both the research mentor and MPHS leadership. This two-credit course will be offered only as a pass/fail course to current MPHS students.

Credit 2 units.

Typical periods offered: Fall, Spring

PHS 5040 Introductory Biostatistics for Clinical Research

This introductory course in biostatistics is designed for medical students, clinicians and health researchers. The course will introduce students to basic statistical concepts including hypothesis testing, probability distributions and relevant basic statistical methods. Through in-class and homework assignments, students will learn to apply statistical concepts to the medical context. Upon completion of the course, students will be able to summarize quantitative data and carry out and interpret simple data description and analyses using the R program.

Credit 3 units.

Typical periods offered: Fall Half A

PHS 5041 Intermediate Biostatistics for Clinical Research

This intermediate course is designed for medical students, clinicians and health researchers and builds on the skills developed in Introduction to Biostatistics for Clinical Research. The course will focus on more advanced statistical concepts as applied to clinical, public health, and population-based data sets, including linear, logistic, and Poisson regression analyses, and survival analyses. Through applied coursework, students will learn how to analyze and interpret clinical research data. Upon completion of the course, students will be able to perform statistical data analyses for regression models with continuous, categorical, count, and survival outcomes using the R program, and will be able to use these models to address their health research questions.

Credit 3 units.

Typical periods offered: Fall Half B

PHS 5070 Introduction to R for Clinical Research

This course is designed to introduce medical students, clinicians and health researchers to the R programming language. Students will learn how to operate R via R Studio; import external data; create data sets; create, format and manipulate variables; and export data and results. Each session will consist of a combination of lecture and practical hands on exercises. Upon completion of this course, students will have obtained a basic understanding of the R environment.

Credit 1 unit.

Typical periods offered: Summer Intersession

PHS 5080 Using Administrative Data for Health Services Research

The objective of this advanced graduate course is to prepare students to understand and use large administrative healthcare databases to perform epidemiologic / health services research. Lectures will cover the translation of clinical care into healthcare utilization data, review various types of national and state administrative databases, describe methods for administrative database research, and emphasize key issues related to data security and confidentiality. We will consider the strengths and limitations of observational studies using large databases to augment evidence from randomized clinical trials. Students will get hands-on experience with administrative data via programming with R statistical software. Students will develop and present to the class a research proposal in their own area of interest using administrative data. Students will further gain experience with healthcare database research by reviewing journal articles weekly. Course note: To register for this course, students must either have a terminal degree (e.g. PhD, PharmD, MD) or submit a one-page project idea to be approved by the instructor and have the commitment of a WashU clinical faculty mentor.

Credit 3 units.

Typical periods offered: Spring

PHS 5100 Development, Validation and Application of Risk Prediction Models

This course will provide the knowledge and principles of predictive modeling, with applications to clinical and population health settings. Topics covered will include design, conduct, and application of risk predictions; statistical methods and analysis for model development and validation; evaluation of prediction models; emerging new methods; and risk stratification to identify a risk group, to assess eligibility to clinical trials and interventions, and to guide prevention priorities. The student will learn these topics through lecture, class discussions, practice lab, and homework.

Credit 3 units.

Typical periods offered: Spring

PHS 5120 Applied Qualitative Methods for Health Research

This course will introduce students to the most commonly used qualitative methods for medical-related research. By the end of this course, students will learn applications of qualitative methods to health-related research, focusing on practical skills while laying the foundation for understanding why we make certain methodological decisions. The course addresses descriptive research, methods to develop or refine survey measures, formative and impact evaluation, implementation science, and mixed methods (quantitative and qualitative together). Topics will include uses of qualitative data, designing studies, sampling strategies, collecting data, and qualitative analysis. A variety of methods will be discussed, with an emphasis on using focus groups and interviewing techniques. Students will learn the best practices in qualitative research and how to critically evaluate qualitative studies and articles. The culminating project is qualitative research proposal; assignments are planned throughout the semester to intentionally build the skills toward that proposal. Students may integrate the activities with their research interests, but a pre-identified project is not required. Class-time includes interactive learning to reinforce lessons and work through common challenges encountered in qualitative research. Upon completion of the course, students will be able to plan, conduct, and analyze a qualitative study.

Credit 3 units.

Typical periods offered: Fall

PHS 5130 Decision Analysis for Clinical Investigation and Economic Evaluation

In this course, we will introduce students to the methods and applications of decision analysis and cost-effectiveness analysis in health care technology assessment, medical decision making, and health resource allocation. At the conclusion of the class, the student will have an understanding of the theoretical basis for economic evaluation and decision analysis, its application, and hands-on experience in the application of the methods. Among the topics covered are the development of a research question, choice of decision perspective, development of a decision analytic model, estimation of costs and benefits, use of preference based measures, addressing uncertainty and preparation of a manuscript presenting a decision analytic study.

Credit 3 units.

Typical periods offered: Fall

PHS 5140 Randomized Controlled Trials

This course provides a comprehensive introduction to randomized controlled clinical trials. Topics include types of clinical trials research (efficacy and effectiveness trials), study design, treatment allocation, randomization and stratification, quality control, analysis, sample size requirements, patient consent, data safety and monitoring plans, reporting standards, and interpretation of results. The role of randomized trials in comparative effectiveness research and the evaluation of prevention strategies is also addressed. Application of results of trials to inform practice is emphasized throughout. Evaluation: Students design a randomized controlled trial in their own field of interest, write a protocol for it, and critique recently published medical literature.

Credit 3 units.

Typical periods offered: Fall

PHS 5150 Systematic Reviews and Meta-Analysis

Introduction to the use of meta-analysis and related methods used to synthesize and evaluate epidemiological and clinical research in public health and clinical medicine. Concepts introduced and illustrated through case studies of public health and medical issues. Course activities: lectures, class discussion, group project, paper.

Credit 3 units.

Typical periods offered: Spring

PHS 5160 Dissemination and Implementation Science

This course provides an overview of dissemination and implementation (D&I) science (i.e., translational research in health). Topics include the importance and language of D&I science; designs, methods, and measures; differences and similarities across clinical, public health, and policy settings; selected tools for D&I research and practice; and future issues.

Credit 3 units.

Typical periods offered: Spring

PHS 5210 Communicating Research Findings to the Media and Lay Audiences

An important step in the dissemination of health research is effectively communicating key findings and messages to the media and lay audiences. And such skills are becoming increasingly critical in health and medicine in the face of competing narratives from influencers and others in social media, podcasts, and more traditional channels. This course will help students develop the experience, techniques and confidence to distill complex information into engaging and accessible messages that resonate with audiences across multiple media. Guest lecturers from throughout the medical school will also share their unique insight and experiences on topics from podcast production and



storytelling to community engagement and successful interviewing. Evaluation will center on students demonstrating – in class discussions, assignments and the final video/audio projects – the communication concepts learned throughout the week.

Credit 1 unit.

Typical periods offered: Spring Intersession

PHS 5212 Introduction to Health Disparities and the Structural and Social Determinants of Health

The purpose of this course is to explore how structural and social determinants of health (SSDoH) produce and maintain health disparities. There will be a variety of learning modalities, including expert guest lectures to discuss cutting-edge research, key foundational and recent readings related to SSDoH and health disparities, and in-class discussion. The course will use case studies and a research proposal to help students apply what they've learned to real-life situations.

Credit 3 units.

Typical periods offered: Fall

PHS 5215 Introduction to Propensity Score Methods

This introductory course on Propensity Score Methods is designed for medical students, clinicians and health researchers to understand propensity score methods and to foster the skills needed to plan and conduct their own research projects. This course will introduce the students to the techniques of using propensity score methods to control for confounding biases in non-randomized observational studies. Through lectures, labs, and homework assignments, students will learn the concept of propensity score methods and how to apply learnt statistical methods in a medical context.

Credit 1 unit.

Typical periods offered: Spring

PHS 5220 Grant Writing: Applying Clinical and Population Health Methods

This course provides students with the opportunity to apply methods and principles learned in previous MPHS classes to the development of a grant application. Students prepare this application on a research question of their own choosing and in the format expected for National Institutes of Health (NIH) R03, R21, or K grant applications (research plan only). Students also have the opportunity to evaluate research proposals for scientific merit. This course is required for medical graduates but optional for medical students.

Credit 3 units.

Typical periods offered: Spring

PHS 5230 Multilevel and Longitudinal Data Analyses for Clinical Research

The course covers basic statistical concepts and methods for continuous, categorical, count, and time-to-event outcome data in multilevel and longitudinal settings. The course focuses on the application of these methods in clinical and public health research, on the explanation of model specification, and on the interpretation of model results. The statistical methods are implemented using R packages. Prerequisite: Knowledge of generalized linear model and use of R.

Credit 3 units.

Typical periods offered: Spring

Public Health

The purpose of this joint degree is to train physicians in the knowledge and skills needed to recognize, analyze and solve the key problems affecting the health of our community and society. The Master of Public Health (MPH) degree offered through the Bursky School of Public Health is unique in that it prepares students to apply public health sciences and transdisciplinary approaches to problem solving for improving population health, especially in vulnerable communities. Courses involve learning systematic approaches to implement and sustain public health discoveries regionally, nationally and internationally. Both the Bursky School of Public Health and the School of Medicine are top-ranked academic centers, which makes this joint degree an outstanding opportunity.

Additional Information

For more information about the MD/MPH program, please visit the MD/MPH page on the Bursky School of Public Health website.

Degrees & Offerings

- Doctor of Medicine and Master of Public Health (p. 194)

Research

Please visit the Brown School MPH website for more information about our public health research.

Faculty

Angela Hobson

Associate Dean for Public Health
Teaching Professor
PhD, Saint Louis University

Ragini Maddipati

Assistant Dean for Academic Programs
Lecturer
MPH, Brown School at Washington University in St. Louis

For a complete list of Brown School faculty, please visit our website.

Courses

The Department of Public Health offers courses through the School of Public Health.

Reproductive Sciences

The Department of Obstetrics & Gynecology at the School of Medicine currently offers one degree program for graduate students who are interested in the field of reproductive sciences. The Master of Science in Reproductive Sciences (MSRS) program is positioned within the Center for Reproductive Health Sciences division of the department.

The Master of Science in Reproductive Sciences is a 21- or 24-month degree program. There are two concentrations — Research and Clinical Embryology — which are designed to prepare students for careers in their respective concentrations. The MSRS program includes a core curriculum shared between both concentrations that focuses on basic and advanced topics in human reproductive physiology and pathology; current tools in the reproductive sciences; and concentration-specific courses for students to learn the vast array of field-specific skills and related knowledge.

The Reproductive Sciences program offers world-class training for research or clinical embryology careers. MSRS students learn from both basic science and clinician experts working at the cutting edge of research and practice in key areas including reproductive aging, fertilization/contraception, gynecologic cancers, maternal-fetal immunobiology, pregnancy, and preterm birth. Research concentration students will perform mentored thesis research in a state-of-the-art lab, and Clinical Embryology concentration students will gain the hands-on skills and experience needed for the clinical embryologist profession.

Applicants to the program must have a bachelor's degree, and most applicants will have majored in life sciences or a related field.

Additional Information

Erin Reinl, PhD
Program Director
Email: erin.reinl@wustl.edu

Ali Ahmady, PhD
Associate Program Director
Email: ahmady@wustl.edu

Julie Emmerich, BA
Program Coordinator
Email: ejulie@wustl.edu

Email: msreprosci@wustl.edu
Website: <https://msrs.washu.edu/>

Degrees & Offerings

- Master of Science in Reproductive Sciences (p. 208)

Research

The Department of Obstetrics & Gynecology at WashU Medicine is a national leader in both clinical and translational research spanning the breadth and depth of obstetrics and gynecology. The well-funded investigators and diverse research projects within the department provide ample opportunity for research experience for students, residents, faculty, and visitors. Please visit the WashU Medicine's Department of Obstetrics & Gynecology research profiles page to dive into the department's active research topics and collaborations.

- The Reproductive Sciences master's program is positioned within the Center for Reproductive Health Sciences division of the Department of Obstetrics & Gynecology. The Center comprises more than a dozen faculty members and their research programs dedicated to basic and translational research in women's health and reproduction.
- The Reproductive Endocrinology and Infertility division of Department of Obstetrics & Gynecology administers the Fertility and Reproductive Medicine Center. The Center has been a leader in assisted reproductive technologies from the start, and it housed the first IVF program in the state of Missouri. Students will have access to the latest medical advancements to learn best practices and cutting-edge techniques.

All students in the Reproductive Sciences program will develop essential research skills through coursework and laboratory experience, including the ability to do the following:

- Procure, evaluate, and summarize reproductive science literature and use it to inform decision making.
- Perform laboratory techniques and methods common to reproductive science research and explain the reasons behind their use and procedures.
- Demonstrate an understanding of research integrity, including the ethics of human and animal research, data collection and presentation, and dissemination of knowledge.
- Effectively communicate research findings through accurate and appealing data visualization, written communication, and oral presentation.

Students in the Research concentration will complete a master's thesis comprised of the following:

- Original research that makes a substantial contribution to the body of knowledge in their field of study; and
- Data that could encompass or contribute to a peer-reviewed research manuscript.

Students in the Clinical Embryology concentration will complete a systematic literature review on topics including the following:

- The history or leading edge of a particular IVF lab procedure; and
- A basic science question that is foundational to the clinical embryology field.



Additional research-related activities include the Center for Reproductive Health Sciences Seminar, which is required for all MSRS students.

Faculty

Erin Reinl, PhD
Program Director

Ali Ahmady, PhD
Associate Program Director

Courses

REPRSCI 5000 Human Reproductive Physiology

This course is designed to give students a comprehensive foundation in human reproductive physiology through a variety of learning modalities. The course focuses primarily on normal physiology of human reproductive systems, although some lecturers will introduce pathologies and/or relevant animal models as a way to strengthen subject matter understanding. This course aims to deepen student knowledge of the human reproductive systems down to the cellular and molecular levels to 1) connect them with their own physiology, and 2) broaden their understanding of the biological systems integral to the human experience. The course material will provide students with foundational knowledge in reproductive physiology that will help prepare them for medical school, biomedical research, and careers in the field of reproductive sciences. Although primarily lecture-based, this course also includes discussion of peer-reviewed journal articles and dialog with lecturers regarding pre-assigned questions. These additional modalities are intended to give students an opportunity to apply their new knowledge in the classroom. Lecture topics will occur in three modules of varying lengths throughout the semester. To give students the most up-to-date knowledge, lectures will be presented by experts on the given topic of the day, and thus students should be prepared for differing lecture styles from each lecturer. Module I - Development to Reproduction - gonads and gametogenesis, puberty, hormonal cycles and neuroendocrinology, fertilization, infertility, assisted reproductive technology, and contraception. Module II - Embryogenesis and Gestation - early embryo, implantation, placentation, embryogenesis, maternal adaptation to pregnancy, and fetal programming Module III - Parturition and Beyond - parturition, lactation, early parental behavior, menopause and reproductive aging, transgender health and reproductive considerations, social determinants of reproductive health, and the role of reproductive sciences in society.

Credit 3 units.

Typical periods offered: Fall

REPRSCI 5005 Current Tools in Reproductive Sciences (CTRS)

This wet-lab course will introduce (or reinforce) basic concepts of working in a laboratory, common techniques and research methods employed by reproductive science laboratories, topics in the responsible conduct of research and research fundamentals, and data analysis, visualization, and reporting. Reproductive physiology concepts taught in Human Reproductive Physiology will be reinforced, and new topics including mouse IVF, molecular biology, tissue culture, and microscopy will be introduced. 1.) Lab techniques and observations will include: Mouse anatomy and reproductive tissue dissection (ovary, testis, epididymis, endometrium, myometrium, oviduct, ovarian follicles, decidua, placenta); Embryology lab techniques taught through mouse IVF procedure (Assessing sperm morphology; Assessing oocyte quality; Embryo staging); Fluorescent Microscopy; Tissue culture; Molecular and cell biology techniques,

PCR, qPCR, transfection, Western blot; NCBI database usage. 2.) Research fundamentals topics will include: Rigor and reproducibility; Responsible note keeping and data management; Formulating a scientific question, hypothesis, and predictions. 3.) Students will also be expected to visit translationally relevant sites (e.g., IVF lab (research concentration only); Labor & Delivery; Nursery and/or NICU; Engineering labs (Center for Women's Health Engineering)).

Credit 3 units.

Typical periods offered: Fall

REPRSCI 5010 Advanced Topics in Reproductive Sciences (ATRS)

This course provides a survey of special topics in human reproduction with an emphasis on disease states, their cellular and molecular underpinnings, current therapies (or lack thereof), and state-of-the-art research in respective fields. Faculty experts will provide lectures on their own research and related pressing research in their field of expertise, including high-tech advances. Students will be instructed on a range of topics, some of which will be new to the students and others will be expanded upon from what they learned in HRP. These topics may include: gamete development, stem cell biology, fertility preservation, preimplantation genetic diagnosis, preeclampsia, placental pathology, non-invasive diagnostic tools including imaging and ultrasound, the aging reproductive tract, preterm birth, uterine contractility, immunology of pregnancy, epigenetics, reproductive cancers, engineering as an approach to improve reproductive health, and the role of reproductive sciences in society.

Credit 3 units.

Typical periods offered: Spring

REPRSCI 5015 Reproductive Sciences Communication I

This course will introduce students to science communication skills including the following topics: 1.) Critical reading; 2.) Writing an abstract; 3.) Preparing effective graphs; 4.) Preparing effective PowerPoint slides; 5.) Practicing presentation skills with journal articles; 6.) Discussing their research with a non-scientist; 7.) Writing a curriculum vitae and cover letter.

Credit 1 unit.

Typical periods offered: Spring

REPRSCI 5020 Reproductive Sciences Communication II

This course will introduce students to developing and writing an effective set of specific aims, and will add to and reinforce science communication skills from the previous semester by working on the following assignments: 1.) Writing an abstract on their thesis work; 2.) Writing a specific aims page on their thesis work; 3.) Presenting their drafted specific aims; 4.) Writing a manuscript style introduction, methods, and results section for their thesis research; 5.) Writing an outline of a discussion section on their thesis research.

Credit 1 unit.

Typical periods offered: Summer

REPRSCI 5025 Current Tools in Reproductive Sciences II (CTRS II)

In this course, students will be exposed to and have the opportunity to practice a variety of advanced techniques used in reproductive science laboratories, reinforce their skills in experimental design, and learn and apply statistical analyses to their weekly lab findings. The aim of this course is to expose students to these techniques, add depth to their knowledge of the related subject areas, provide additional formal training in research methods, and introduce statistical methods. Class time will include a combination of lecture, laboratory demonstration and practice, and data analysis. Of note, mouse surgical procedures will be demonstrated by instructors and practice performed by students will be on euthanized mice. The course will be broken into four units covering four biological themes, and four analytical/statistical themes. Unit I: Gamete Analyses; Comparing

Two Groups (Mouse handling and husbandry; Sperm motility and capacitation analysis; In vitro oocyte maturation; Introduction to descriptive statistics and tests of significance). Unit II: In vivo Models of Pregnancy, Parturition, and Parenting; Relating Numerical Quantities (Mouse surgeries [Osmotic pump insertion surgery and intrauterine pressure telemeter insertion]; Mouse behavior; Linear regression and analysis of numerical/categorical data). Unit III: Tissue Physiology and Modeling; Processing Complex Data (Myometrial tension recordings; Measures of cervical stiffness and fetal membrane strength; Organoid culture and analysis; Advanced analytical techniques, such as smoothing, imputation, visualization, etc.). Unit IV: Microscopy; Introduction to Machine Learning (Advanced microscopy and tissue clearing; Exploratory data analysis and machine learning; Establish the machine learning model to analyze microscopic data).

Credit 3 units.

Typical periods offered: Spring

REPRSCI 5030 Reproductive Sciences Journal Club

Summer journal club takes the place of the CRepHS seminar during the summer months. Students will attend, provide written feedback to their peers on their presentations, and present their own journal club articles.

Credit 1 unit.

Typical periods offered: Summer

REPRSCI 5035 Reproductive Sciences Research I

Students will begin by rotating through three reproductive science research laboratories for two weeks each. Students will write a summary of the research performed in each laboratory and submit to the program their ranked preference for their thesis research. By week 8, they will be matched with a laboratory, where they will begin doing research. There will be one mandatory meeting with the assistant program director mid-semester to review research expectations and discuss appropriate and effective mentor-mentee relationships. Students are expected to spend their non-class time in the laboratory, amounting to approximately 15-20 hours per week. They should work with their lab-assigned mentor to schedule time appropriately.

Credit 2 units.

Typical periods offered: Fall

REPRSCI 5040 Reproductive Sciences Research II

Students will perform mentored research for their thesis project. They will work with their mentor and program advisor to develop their research proposal. They will begin to write the methods and introduction chapters of their theses, and drafts of these will be due by the end of the semester. Students are expected to spend a minimum of 15-20 hours per week in the laboratory.

Credit 2 units.

Typical periods offered: Spring

REPRSCI 5045 Reproductive Sciences Research III

Students will perform mentored research for their thesis project. They will write a thesis project proposal to be reviewed at least once by their faculty mentor before they present it to their thesis committee by the end of the term. Students are expected to spend 30-40 hours per week doing thesis research.

Credit 3 units.

Typical periods offered: Summer

REPRSCI 5050 Reproductive Sciences Research IV

Students will continue performing mentored research for their thesis project. They will begin drafting their thesis introduction, methods, and an outline of their results and discussion sections. They will receive feedback from their mentor and/or program advisor. Students are expected to spend at least 30 hours per week doing thesis research in the laboratory.

Credit 3 units.

Typical periods offered: Fall

REPRSCI 5055 Reproductive Sciences Research Thesis

Students will finish their thesis project research. They will finalize all sections of their thesis document and submit it for committee review. They will present their thesis project at the CRepHS Seminar. They will defend their thesis before their thesis committee.

Credit 5 units.

Typical periods offered: Spring

REPRSCI 5060 IVF Clinic Fundamentals

This course introduces students to the in vitro fertilization (IVF) laboratory through a combination of assigned readings, lectures, laboratory observation, and basic procedure practice (practice is limited to discarded or rodent tissue only). Students will gain a basic understanding of IVF lab design and layout, including policies, procedures, regulations, equipment, and personnel. Under the direction of a Senior Embryologist, students will observe and perform: quality control, Epic data entry, chart review, dish preparation, semen processing, vitrification and warming of embryos, oocyte preparation after retrieval, and cumulus removal. Assessments of procedures will be completed via direct observation of procedural skills (DOPS) by the IVF lab director, and knowledge checks will take place regularly via quarterly quizzes and a final exam. Students will be expected to be present in the IVF lab from the hours of 7:00 a.m. to 3:30 p.m. each day, with the exception of the time they will be in their other classes. Weekly lectures, presented by either the IVF lab director or Reproductive Endocrinology and Infertility clinical faculty will be at least 30 minutes in duration, followed by time for questions and discussion of the assigned readings. There will also be biweekly check-ins with the lab director to discuss laboratory troubleshooting.

Credit 3 units.

Typical periods offered: Fall

REPRSCI 5065 IVF Clinic Intermediate Studies

This course provides students a combination of assigned readings, lectures, and intermediary hands-on IVF laboratory skills practice that is directly supervised by lab personnel (practice of new procedures is limited to discarded or rodent tissue only). Students will be taught additional concepts behind IVF lab design and layout, including policies, procedures, regulations, equipment, and personnel, as well as theory behind culture techniques, anti-sperm antibody testing, embryo selection, and embryo transfer. Throughout this course, students will continue independently performing the procedures learned in semester one, and also, under the direction of a Senior Embryologist, observe and perform embryo selection and embryo transfer. Assessments of procedures are completed via direct observation of procedural skills (DOPS) by the lab director, and knowledge checks will take place regularly via quarterly quizzes and a final exam. Students will be expected to be present in the IVF lab from the hours of 7:00 a.m. to 3:30 p.m. each day, with the exception of the time they will be in their other classes. Weekly lectures, presented by either the IVF lab director or Reproductive Endocrinology and Infertility clinical faculty will be at least 30 minutes in duration, followed by time for questions and discussion of the assigned readings. There will also be biweekly check-ins with the lab director to discuss laboratory troubleshooting.

Credit 4 units.

Typical periods offered: Spring

REPRSCI 5070 Advanced Topics in ART

This course will consist of a Reproductive Endocrinology & Infertility summer seminar series focusing on topics related to ART techniques, outcomes, and performance measures (e.g., HPG axis, clinical endocrinology, frozen embryo transfer, preimplantation genetic testing, epigenetics, male factor infertility, key performance indicators) and a journal club. There will also be an introduction to methods for literature review. These will be necessary to complete their capstone project.

Credit 2 units.

Typical periods offered: Summer

REPRSCI 5075 Junior Embryology I

This course will be a continuation of the first two semesters, with students practicing already learned techniques, and being taught (under the direction of a Senior Embryologist) to observe and perform micromanipulation techniques in Assisted Reproductive Technology (ART), including intracytoplasmic sperm injection (ICSI). Conceptual focus for the summer term will be on male factor infertility, reasons for using ICSI, and concepts behind ICSI methodology. Assessments of procedures are completed via direct observation of procedural skills (DOPS) by the IVF lab director, and knowledge checks will take place regularly via quarterly quizzes and a final exam. Students will be expected to be present in the IVF lab from the hours of 7:00 a.m. to 3:30 p.m. each day, with the exception of the time they will be in their other classes. There will also be biweekly check-ins with the lab director to discuss laboratory troubleshooting.

Credit 4 units.

Typical periods offered: Summer

REPRSCI 5080 Junior Embryology II

In this course, students will independently perform procedures learned in semesters one through three and select a topic to initiate their capstone literature review. Students will observe and perform embryo biopsy under the direction of a Senior Embryologist. Students will begin accrual of the 30 cases required for Embryology Laboratory Scientist - ELS(AAB) certification eligibility. Knowledge of embryology procedures and protocols will be added to and reinforced through lectures, class discussions, and assigned reading. New concepts, including quality control vs. quality assurance, and the concepts behind embryo biopsy and preimplantation genetic testing will be introduced. Additionally, students will be introduced to and engage in discussions regarding societal ethics and laws around ART. Lastly, a detailed outline of their literature review will be due mid semester, and their methods and introduction chapters will be due at the end of the semester. Students will be expected to be present in the IVF lab from the hours of 7:00 a.m. to 3:30 p.m. each day, with the exception of the time they will be in their other classes. Weekly lectures, presented by either the IVF lab director or Reproductive Endocrinology and Infertility clinical faculty will be at least 30 minutes in duration, followed by time for questions and discussion of the assigned readings. There will also be biweekly check-ins with the lab director to discuss laboratory troubleshooting.

Credit 4 units.

Typical periods offered: Fall

REPRSCI 5085 Embryology Capstone I

In this course, students will continue supervised performance of learned procedures and independently perform intracytoplasmic sperm injection (ICSI) and embryo biopsy. They will continue accruing their 30 cases required for Embryology Laboratory Scientist - ELS(AAB) certification eligibility. Students will continue developing their capstone literature review, meet periodically with a program advisor

to guide their progress, and submit revisions of their introduction and methods chapters and formal drafts of the results, conclusions, and discussion chapters. Students will register for the AAB Andrology and Embryology online module as preparation for the ELS(AAB) certification exam. They will also apply online for the ELS(AAB) examination. Students will be expected to be present in the IVF lab from the hours of 7:00 a.m. to 3:30 p.m. each day, with the exception of the time they will be in their other classes. Weekly lectures, presented by either the IVF lab director or Reproductive Endocrinology and Infertility clinical faculty will be at least 30 minutes in duration, followed by time for questions and discussion of the assigned readings. There will also be biweekly check-ins with the lab director to discuss laboratory troubleshooting.

Credit 5 units.

Typical periods offered: Spring

REPRSCI 5090 Embryology Capstone II

Students will complete and submit their literature review capstone and present it at the CREPHS Seminar and to first year embryology students during the "Advanced Topics in ART" course. Students will finish documenting their performance of 30 assisted reproductive technology (ART) laboratory procedures in humans to be eligible for Embryology Laboratory Scientist - ELS(AAB) certification. Students will make final preparations to sit for the ELS(AAB) exam by taking the AAB Andrology and Embryology online module. They will meet with their program advisor to discuss their career next steps. Students will be expected to be present in the IVF lab from the hours of 7:00 a.m. to 3:30 p.m. each day, with the exception of the time they will be in their other classes. Weekly lectures, presented by either the IVF lab director or Reproductive Endocrinology and Infertility clinical faculty will be at least 30 minutes in duration, followed by time for questions and discussion of the assigned readings. There will also be biweekly check-ins with the lab director to discuss laboratory troubleshooting.

Credit 5 units.

Typical periods offered: Summer

REPRSCI 5095 Introduction to Statistics for Reproductive Sciences

Instructors will introduce students to foundational statistical concepts (types of data, hypothesis testing, experimental design, etc.) and facilitate practical discussion of common statistical analyses performed in reproductive sciences-focused studies. The course is designed to balance concepts, approaches, and challenges associated with both basic & translational (lab-based) research and clinical studies. Students will practice analyzing realistic data sets, get instructor feedback on their data analyses, and assess the appropriateness of statistical analyses performed in published research studies. Assignments will be performed in field-preferred software including GraphPad Prism, SPSS, and R. Students do not need previous experience with these software packages to take the course. The final grade for the course will be based on attendance, participation, homework assignments, and a final report.

Credit 2 units.

Typical periods offered: Fall

REPRSCI 8884 Full-Time Graduate Research/Study

Full-Time Graduate Research

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

Degrees & Offerings

Audiology and Communication Sciences

- Doctor of Audiology (p. 113)
- PhD in Speech and Hearing Sciences (p. 113)
- Master of Arts in Speech and Hearing Sciences (p. 115)
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- Minor in Speech and Hearing Sciences (p. 116)

Biology & Biomedical Sciences

- Biochemistry, Biophysics, & Structural Biology, PhD (p. 117)
- Biomedical Informatics & Data Science, PhD (p. 120)
- Cancer Biology, PhD (p. 123)
- Computational & Systems Biology, PhD (p. 126)
- Developmental, Regenerative, & Stem Cell Biology, PhD (p. 129)
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Clinical Investigation

- Master of Science in Clinical Investigation (p. 150)
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Genetic Counseling

- Master of Science in Genetic Counseling (p. 152)

Informatics, Data Science, and Biostatistics

- Master of Science in Biomedical Data Science and AI (p. 153)
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- Doctor of Medicine (p. 156)
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Nursing Science

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Occupational Therapy

- Master of Science in Occupational Therapy (p. 201)
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Population Health Sciences

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Reproductive Sciences

- Master of Science in Reproductive Sciences (p. 208)

Audiology and Communication Sciences

Doctor of Audiology

The Doctor of Audiology (AuD) program is a three-year course of study that prepares students as independent clinical audiologists. The program emphasizes learning through hands-on experiences, coursework taught by experts in the field, and the integration of current research. The program operates within the Department of Otolaryngology–Head & Neck Surgery and the School of Medicine, which offers students an exceptional interdisciplinary learning environment. From day one, students are immersed in clinical experiences, lab activities, weekly staffings, and 24/7 access to clinical learning labs devoted to student learning.

Curriculum

The three-year AuD curriculum integrates coursework, clinical experiences, and research opportunities, with students completing a capstone project and a full-time clinical externship during the third year. Specialization tracks in both pediatrics and research are also available.

Clinical Experiences

Students in the AuD program begin clinical practicum during the first semester of study, and hands-on experiences become more immersive with each successive semester. These clinical education experiences culminate during the third year with a full-time clinical externship. Housed within the Department of Otolaryngology–Head & Neck Surgery in the Washington University School of Medicine, AuD students benefit from a wide variety of clinical opportunities across the life span and scope of practice. Students gain experience alongside our medical faculty and clinicians in our nationally ranked teaching hospitals and in a wide variety of on-campus and off-campus clinical sites.

Research Training

The integration of research into the curriculum is a distinctive feature of the AuD program. All students receive research training through coursework and the completion of the capstone project during the third year, and a Research Specialization is also available. Students are encouraged to pursue their individual research interests through a variety of elective interdisciplinary research opportunities, including an elective summer research experience.

Additional Information

Additional information, including Student Outcome Data and information about Accreditation & Certification, can be found on the Program in Audiology & Communication Sciences website.

PhD in Speech and Hearing Sciences

Degree Requirements

The PhD in Speech and Hearing Sciences prepares students for academic and research careers, with students generally focusing on one of three areas: hearing science and audiology, language and education, or auditory neuroscience. Established in 1947, the program operates in collaboration with the Department of Otolaryngology–Head & Neck Surgery, with research topics including basic science, applied and clinical science, and clinical outcomes research. The department is among the largest and most heavily funded otolaryngology research groups in the country, consistently ranking among the top nationally in National Institutes of Health (NIH) funding.

Curriculum

The curriculum combines interdisciplinary academic coursework, teaching experiences, and immersive research work, culminating in a dissertation. Each student's experience is tailored to their individual interests.

Teaching Experiences

Teaching experiences prepare students to become effective teachers and communicators of their discipline and their own research. All PhD students receive training in pedagogy and complete teaching experiences at the introductory and advanced levels under the guidance of a faculty mentor.

Research

Students immerse themselves in the world-class research environment of Washington University. As they conduct their own original work, they participate in colloquia, Grand Rounds, brown bag seminars, research seminars, journal clubs, and similar opportunities. The program fosters opportunities to publish and participate in professional conferences. During the final year of the program, students present and defend their dissertations.

Affiliated Research

Affiliated research labs include those focusing on applied, basic, and clinical sciences within otolaryngology. The department also operates one of the nation's largest research programs specifically focusing on hearing and deafness.

AuD/PhD Program

Students who have dual interests in clinical audiology and research can pursue the AuD and PhD in a combined program. Enrolled AuD students are eligible to apply for PhD admission during the fall semester of their second year, with enrollment beginning in the third year of study. The remaining AuD coursework is completed in parallel with PhD coursework over an extended period of time. An individualized study plan is developed for each AuD/PhD student based on their background and interests. For students completing both degrees, the externship can be completed over two years on a part-time basis when combined with part-time coursework/research as part of the PhD program. The AuD is then awarded when those degree requirements are complete, with the student continuing enrollment in the PhD program. This model offers the benefit to students of receiving the AuD degree before both degree requirements are completed, transferring up to 48 hours of credit from the AuD to the PhD, and having access to additional funding opportunities as a PhD student. Students completing the AuD and PhD generally also complete the Summer Research Program and the Research Specialization during their AuD studies.

Visit the Program in Audiology & Communication Sciences website for more information.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as the *MER*.

Mentored Experience Requirement (MER)

Philosophy of Teaching

The Speech and Hearing PhD program prepares students for academic and research careers in speech and hearing sciences. Teaching experiences are designed to prepare PhD students to become effective teachers and communicators of their discipline and their intellectual research endeavors. Objectives of these teaching experiences include the following:

- Providing students with adequate breadth and depth of teaching experiences
- Providing faculty mentoring
- Enhancing the overall training for PhD students, including experiences that align with the student's academic/career goals

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

The following activity is required:

- Center for Teaching and Learning (CTL) Teaching Orientation

Students also choose one of the following:

- One additional 90-minute CTL teaching workshop
- Workshop on teaching/professionalism offered by the program
- Other preapproved experience related to teaching and learning

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.



Mentored Independent Teaching (MIT)

MIT is a semester-long experience for PhD students who engage as the primary instructor or co-instructor of a course *under the mentorship of a faculty member* as part of the MER. Students and mentors complete a mentorship plan prior to the start of each MIT experience. To complete each MIT assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number (ASGS 8020 MTE - Mentored Independent Teaching Experience) for each semester of engagement. Refer to the "Required Pathways for Completion" section below for more details.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MER. Students register during the normal registration period for courses in accordance with one of these approved pathways.

Student complete the Preparatory Engagement activities first.

Students are required to have 30 MER units total to complete their MER. This can be done either by three AI engagements for 10 MER units each or one AI at 10 MER units and one Mentored Independent Teaching (MIT) at 20 MER units.

Pathway #1

MGS 8010	Take one time
MGS 8020	Take one time

Pathway #2

MGS 8010	Take three times

Optional Activity: Teaching Intensive Pathway (TIP)

The TIP is an optional pathway for those students whose career interests lie in academia or another field that would benefit from extended teaching experiences. This immersive experience allows students to further explore the breadth and depth of teaching best practices and pedagogy related to their respective field. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the TIP will not receive compensation.

Students interested in gaining additional teaching experience may elect to complete the TIP. This pathway will provide MIT opportunities, which may include classroom instruction and/or laboratory courses. Sample courses are listed below, though specific courses will be selected in consultation with the student's advisor based on the student's background and interests, as well as department needs.

Optional Pathway

MGS 8020	Take two times

Master of Arts in Speech and Hearing Sciences

The Master of Arts (MA) in Speech and Hearing Sciences requires a minimum of 30 credit units of graduate coursework — generally drawn from graduate-level coursework offered through the Program in Audiology and Communication Sciences (PACS) and/or integrated into the PhD in Speech and Hearing Sciences curriculum — and the successful completion of a culminating or qualifying examination equivalent to that required by the PhD program. Students must also maintain satisfactory academic progress (minimum cumulative program GPA is 3.0 or higher) and fulfill residence requirements (a minimum of one-year of full-time enrollment).

The MA in Speech and Hearing Sciences may be awarded to students for work done in the PhD in Speech and Hearing Sciences if they are leaving the PhD program without completing it. The minimum requirements listed must be completed for the student to be eligible for this master's program in lieu of the PhD option.

Master of Science in Deaf Education

The Master of Science in Deaf Education (MSDE) program prepares early interventionists and teachers to work with infants and children who are deaf or hard of hearing (d/hh). The early identification of hearing loss and advanced hearing technologies have increased the national need for professionals with experience in listening and spoken language to work in early intervention and as teachers of the d/hh, creating opportunities for our graduates across the country and in a wide variety of settings.

With origins dating back to 1914, the program is recognized internationally as one of the most prestigious of its kind. Our program's intensive curriculum, emphasis on immersion in practice teaching, and experienced faculty attract students nationally from a wide variety of backgrounds.

Curriculum

Two curriculum paths are available:

1. *The Certification Track* is a four-semester curriculum that is rooted in the development of speech, language, and academics. With that as a foundation, students study the factors necessary for high-quality education for children who are d/hh. The MSDE program is recognized as an approved teacher training program,

with graduates of the Certification Track eligible for teacher certification recommendation (Missouri, Deaf/Hearing Impaired, Birth-Grade 12) and national certification by the Council on Education of the Deaf (CED).

2. *The Degree-Only Track* is a two-semester intensive curriculum that provides advanced education and experience in deaf education. This track is designed for qualified students with a degree and teacher certification in deaf education and for related professionals seeking to expand their training in deaf education. Coursework and experiences are tailored to meet the individual interests and background of each student who enrolls. The Degree-Only Track does not lead to recommendation for teacher certification or licensure.

Student Teaching Experiences

Our students build their knowledge and skills through classroom instruction and immersive, hands-on student teaching experiences. They learn about and engage in the teaching process, from the first diagnosis and early intervention through family-centered counseling and educational options for the child. Teaching experiences are available at a number of local and national sites serving children ages birth through grade 12. These sites include both public and private schools, including the on-campus Central Institute for the Deaf. In addition, our nationally recognized medical school and hospitals provide unique opportunities, such as observing cochlear implant surgery seminars and touring a hospital neonatal intensive care unit.

Additional Information

Additional information, including Student Outcome Data and information on Accreditation & Certification, can be found on the Program in Audiology & Communication Sciences website.

Minor in Speech and Hearing Sciences

The Minor in Speech and Hearing Sciences (p. 116) is designed for current undergraduate students interested in exploring topics related to human communication. Course work provides an overview of the fields of hearing, deafness, language, and speech, with opportunities to explore related topics in more depth. This minor is especially valuable for students in fields such as psychology, education, philosophy-neuroscience-psychology (PNP), and linguistics, but it has broad applicability for many fields of study. Course work completed as part of this minor can also be used to fulfill prerequisites for graduate studies in audiology, deaf education, and speech-language pathology.

Speech and Hearing Minor

Program Requirements

- **Total Units Required:** 15
- **Grade Requirement:** C– or better; Pass/No Pass grades do not count for the minor.

Required Course

Code	Title	Units
EDUC 2100	Introduction to Speech, Language, and Hearing Sciences	3

Elective Courses

At least four of the following, totaling at least 12 units:

Code	Title	Units
LING 1600	Introduction to Linguistics	3
LING 3050	Phonetics	3
PACS 3000	Acoustics and Speech Perception	3
PACS 3010	Introduction to Audiology	3
PACS 3993	Observation in Audiology	3
PACS 3994	Observation and Methods in Speech-Language Pathology	3
PACS 4000	Anatomy and Physiology of Speech and Hearing	3
PACS 4050	Sign Language I	2
PACS 4051	Sign Language II	2
PACS 4052	Sign Language III	2
PACS 4060	Typical Language Development	3
PACS 4080	Speech and Language Disorders	3

Additional Information

- This minor is composed of a minimum of 15 units that focus on the study of speech, language, and hearing, of which 3 units must be EDUC 2100 Introduction to Speech, Language, and Hearing Sciences. Of the 15 required units, at least 9 units must be at the 3000 level or higher and at least 9 units must be offered by the department.
- To count toward the minor, courses must be selected from the courses listed above or approved in advance by the minor advisor.
- A grade of C– or higher is required for a course to count toward the minor; Pass/No Pass grades do not count for the minor.



- For students who intend to pursue graduate studies in audiology, speech-language pathology, or deaf education, we recommend meeting with the minor advisor to develop a course of study that will fulfill prerequisite requirements for the intended area of study.
- Because the Speech and Hearing Minor is offered by the Program in Audiology and Communication Sciences (PACS) in the School of Medicine, it may not be used as an Integration and does not otherwise fulfill any Arts & Sciences distribution requirements.

Contact: Kate McClannahan
Phone: 314-747-0109
Email: k.mcclannahan@wustl.edu
Website: <http://pacs.wustl.edu>

Biology and Biomedical Sciences Biochemistry, Biophysics, & Structural Biology, PhD

Degree Requirements

Biochemistry, Biophysics, & Structural Biology

The Biochemistry, Biophysics, & Structural Biology Program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

The BBSB program brings together scientists who are interested in a quantitative understanding of biological systems from single molecules to whole organisms. Students investigate topics such as protein structure and dynamics, the molecular mechanisms of nucleic acid and cytoskeletal motors, membrane ion channels, metabolic enzyme function and trafficking, immunological signaling, and more. This work informs our understanding of biological processes including DNA repair, muscle function, metabolic regulation, transcription regulation,

cancer, and mechanisms of infectious diseases caused by bacteria and viruses. BBSB faculty on both campuses share ties with DBBS programs such as Microbiology, Cell Biology, Immunology, and Plant and Microbial Biosciences. The program spans three interrelated areas:

- *Biochemistry* seeks to explain the molecular basis of biological phenomena through chemical principles, focusing on interactions and transformations of biomolecules. Examples include enzymology, ligand binding studies, metabolite analyses, and the effects of post-translational modifications.
- *Biophysics* applies physical principles and quantitative models to explain, predict, and experimentally test biological systems, at the molecular level and across scales. Examples include computational modeling, fluorescence and other modalities of spectroscopy, single-molecule approaches, as well as thermodynamic and kinetic analyses.
- *Structural Biology* determines the three-dimensional structures of biological macromolecules and complexes to understand their functions and mechanisms. Examples of approaches include cryo-electron microscopy and X-ray crystallography.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter with regard to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
 - **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, students will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.

- Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

BBSB Specific Requirements

- BBS 5357 Chemistry and Physics of Biomolecules
- Four semesters of BBS 5469 Biochemistry, Biophysics, and Structural Biology Seminar

Students complete a peer-review seminar series in which they present their current work and receive feedback on both their science and their presentation.

9 Credit Units of Advanced Electives

Courses must be offered through DBBS or through the Chemistry, Physics, or Mathematics departments as 5000-level or above graduate courses unless otherwise approved by program directors. MSTP students may use their medical courses to satisfy this requirement.

Three Journal Clubs

DBBS and WashU have journal clubs on a variety of topics aligned with student interests. Participating students present at least once per semester for credit and will receive feedback. Students are encouraged to continue participation in journal clubs throughout their graduate experience.

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows, and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as *MERs*.

Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.



Prior to beginning their MTE and typically during their first graduate year, Division of Biology & Biomedical Sciences (DBBS) students will be required to complete the Graduate Student Teaching Orientation, including three Foundations in Teaching (FiT) workshops offered by the Center for Teaching and Learning. Students will meet with assigned course director(s) prior to the start of the semester and complete a teaching expectations form.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

DBBS students will serve as mentored AIs in courses approved by the Associate Dean. Units for a given course will be determined ahead of the assignment. A unit is equivalent to approximately one hour per week, so 5 units would involve five hours of support (on average per week) for a course. The PhD student is formally listed as instructional support in the course listings and receives mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

The PhD student should receive regular feedback or evaluation from the mentor throughout the semester, a formal evaluation of teaching skills by the faculty at the end of the semester, and evaluation by the students at the end of the term as part of the course evaluation. If the course director determines that the PhD student's facility with essential teaching skills is unsatisfactory, the student will be counseled by the course director and the Associate Dean of Graduate Education and then will complete another MTE to attain mastery of these skills. Mentored teaching opportunities will be reviewed annually to ensure that the experiences meets the requirements established in this policy.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time

Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each

student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

Prior to the start of an MPE, the student and the site mentor will submit a plan to DBBS detailing the scope of the project(s) to be undertaken and including a schedule and list of anticipated outcomes, and the mentor will provide an explicit commitment to the mentorship. This plan should be directly related to the goals developed via the student's recent completion of an Individual Development Plan, and students should enroll in MGS 8120 MTE - Mentored Professional Experience. During the semester, the mentor and the mentee should meet frequently (i.e., weekly or biweekly) to track the progress of the student's work. At the end of the MPE, the mentor should provide a written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120	Take one time

Biomedical Informatics & Data Science, PhD

Degree Requirements

Biomedical Informatics & Data Science

The Biomedical Informatics & Data Science Program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS). PhD training in Biomedical Informatics and Data Science (BIDS) at Washington University is offered by the Division of Biology and Biomedical Sciences with faculty leadership from the Institute for Informatics, Data Science and Biostatistics (I²DB).

Mission

The mission of I²DB is to focus on the informatics, data science, and biostatistics landscape at WashU Medicine to transform research, education, and patient care. It emphasizes precision medicine and efforts to improve the quality of healthcare and public health initiatives locally, nationally, and worldwide.

Purpose

The BIDS PhD program provides opportunities for graduate students with diverse backgrounds to gain expertise in the field of biomedical informatics, to train as future biomedical researchers and industry leaders in biomedical informatics and data science core competencies, and to engage in scholarly activities under the guidance of experienced informatics faculty. Beyond an educational program, the mission of BIDS is to support biomedical informatics practice through applied research in real-world settings. The objectives of BIDS are to do the following:

- Expand students' knowledge in data science theories and applications in biomedical informatics;
- Provide training and hands-on research and industry experience in biomedical informatics and data science;
- Assist students in enhancing and applying their skills in translational science, real-world problem solving, and dissemination of knowledge;
- Encourage students to pursue careers in academia and/or industry through exposure to professional role models or mentors; and
- Develop and improve students' skills in interdisciplinary teamwork and communication.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
 - **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain fulltime status. Prior to completing 36 credit units, students will enroll in BBS 5900 Research for research credit; after completing 36 credit units,



students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.

- Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BDSAI 5001 R for Biomedical Sciences
- BDSAI 5002 Python for Biomedical Sciences
- BDSAI 5003 Introduction to Biomedical Data Science
- BDSAI 5004 Introduction to Biomedical Informatics
- BDSAI 5112 Advanced AI Topics in Biomedical Informatics: Deep Learning, Transformers, and Large Language Models
- Two semesters of BBS 5999 Independent Work

Advanced Electives

BIDS students must take one to four semesters of advanced electives, dependent upon Program Director advising. Common elective coursework includes the following:

- BMI 5204 Mixed Methods in Biomedical Informatics
- BMI 5205 The Electronic Health Record
- MSB 503 Statistical Computing with SAS
- MSB 560 Biostatistics I
- MSB 570 Biostatistics II
- MSB 621 Computational Statistical Genetics
- MSB 550 Intro to Bioinformatics
- BBS 5910 Nano Topics in Biology and Biomedical Sciences

Journal Clubs

BIDS students must complete two semesters of journal clubs. BMI 5200 Biomedical Informatics Research in Progress is a recommended journal club for BIDS students.

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as *MERs*.

Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Prior to beginning their MTE and typically during their first graduate year, Division of Biology & Biomedical Sciences (DBBS) students will be required to complete the Graduate Student Teaching Orientation, including three Foundations in Teaching (FiT) workshops offered by the Center for Teaching and Learning. Students will meet with assigned course director(s) prior to the start of the semester and complete a teaching expectations form.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

DBBS students will serve as mentored AIs in courses approved by the Associate Dean. Units for a given course will be determined ahead of the assignment. A unit is equivalent to approximately one hour per week, so 5 units would involve five hours of support (on average per week) for a course. The PhD student is formally listed as instructional support in the course listings and receives mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

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Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs.

Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time

Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration.



Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

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Optional Pathway

MGS 8120	Take one time

Cancer Biology, PhD

Degree Requirements

Cancer Biology

The Cancer Biology Program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

The goal of research within this program is to explain the mechanisms of the fundamental processes of cancer biology in molecular terms. Such processes include cell motility and metastasis, proliferation and growth, the tumor microenvironment, adhesion of cells to matrix and to each other, receptor-ligand interactions, DNA, RNA and protein

modifications, tumor suppressor and oncogene function, and cell signaling. A common theme that unites these diverse endeavors is the desire to push the limits of our understanding of these processes to the highest possible molecular resolution.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
 - **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, student will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.
 - Continued support is guaranteed for the duration of the student's graduate studies, provided that they maintain satisfactory progress toward completion of the degree.
 - **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5920 Foundations in Cancer Biology
- BBS 5929 Experimental Cancer Biology

Journal Club Requirement

- Students must complete 2 credit units of journal clubs. They should consult the program guidelines for common journal club options.

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

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Mentored Teaching Experiences (MTEs)

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mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

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Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time

Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

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Optional Pathway

MGS 8120	Take one time

Computational & Systems Biology, PhD

Degree Requirements

Computational & Systems Biology

The Computational and Systems Biology Program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

The goal of the Computational and Systems Biology Program is to train the next generation of scientists in technology intensive, quantitative, systems level approaches to molecular biology. We aim to graduate students who are as comfortable operating the latest high-end instrumentation as they are manipulating the mathematical formalisms that are required to make sense of their data. It is our hope that the students who join the Computational and Systems Biology Program will apply these approaches to unravel the complex genetic circuits that control the cell and to understand the genetics of human disease.

Technological advances are having a major impact on molecular biology. Advances in experimental techniques mean that large amounts of sequence, expression, and localization data are now routinely gathered by individual investigators. In addition, terabytes of these kinds of data are stored in various public and private databases. Concurrently, access to large scale computing resources has become more and more common in molecular biology laboratories. Students in the Computational and Systems Biology Program will learn to leverage these advances in both experimental and computational resources.

Some of the general areas in which faculty work include the following:

- Large-scale genetic network analysis and reconstruction
- Technology development for high-throughput collection of genetic and biochemical data
- Molecular modeling of genetic regulatory circuits
- Real time, single cell analyses of genetic regulatory circuits
- Specificity and evolution of DNA-protein interactions
- Algorithm development for comparison of DNA, RNA, and protein sequences
- Synthetic biology
- Human microbiome and other health-relevant microbial communities
- Complex trait analysis
- Population genetic analysis of genetic variation
- Functional genomic approaches to disease gene identification

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
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 - Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- CSE 5807 Algorithms for Computational Biology
- BBS 5488 Genomics



Three Advanced Electives

In consultation with their advisor, students choose a minimum of three advanced electives or special topics of at least 3 credit units each. Students may substitute one of these three elective requirements by combining multiple 1- and 2-credit courses totaling at least 3 credits. To pursue this substitution option, students must submit a petition in advance to the Program Directors for each 1- or 2-credit course that they wish to substitute with a brief rationale. Because students will be expected to demonstrate substantive command of molecular biology, applied mathematics, and computer science in their qualifying exam, the advanced electives will typically be chosen in areas in which the student does not feel adequately prepared or will emphasize areas of primary interest for the student. The interdisciplinary nature of the program allows considerable flexibility in choosing these courses, depending upon the student's needs. Common choices for these electives include the following:

- BBS 5014 Biotech Industry Innovators
- BBS 5312 Macromolecular Interactions
- BBS 5357 Chemistry and Physics of Biomolecules
- BBS 5483 Human Genetic Analysis
- BBS 5491 Advanced Genetics
- SDS 5210 Statistical Computation
- SDS 5010 Probability
- SDS 5020 Mathematical Statistics
- CSE 5104 Data Mining
- SDS 5480 Topics in Statistics : Machine Learning Methods in Biological Sciences
- INFO 5558 Applications of Deep Neural Networks
- MSB 5555 Computational Statistical Genetics
- BBS 5910 Nano Topics in Biology and Biomedical Sciences

Three Semesters of Journal Clubs

Students are required to register for three semesters of journal clubs. First-year students must enroll in BBS 5496 Seminar in Computational Molecular Biology for two semesters and then may choose another journal club or seminar to fulfill their third semester, as long as it has a presentation requirement. Students may take BBS 5496 Seminar in Computational Molecular Biology for a third time to fulfill the final requirement, if interested.

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as *MERs*.

Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Prior to beginning their MTE and typically during their first graduate year, Division of Biology & Biomedical Sciences (DBBS) students will be required to complete the Graduate Student Teaching Orientation, including three Foundations in Teaching (FiT) workshops offered by the Center for Teaching and Learning. Students will meet with assigned course director(s) prior to the start of the semester and complete a teaching expectations form.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

DBBS students will serve as mentored AIs in courses approved by the Associate Dean. Units for a given course will be determined ahead of the assignment. A unit is equivalent to approximately one hour per week, so 5 units would involve five hours of support (on average per week) for a course. The PhD student is formally listed as instructional support in the course listings and receives mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

The PhD student should receive regular feedback or evaluation from the mentor throughout the semester, a formal evaluation of teaching skills by the faculty at the end of the semester, and evaluation by the students at the end of the term as part of the course evaluation. If the course director determines that the PhD student's facility with essential teaching skills is unsatisfactory, the student will be counseled by the course director and the Associate Dean of Graduate Education and then will complete another MTE to attain mastery of these skills. Mentored teaching opportunities will be reviewed annually to ensure that the experiences meets the requirements established in this policy.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs.

Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time

Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration.



Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

Prior to the start of an MPE, the student and the site mentor will submit a plan to DBBS detailing the scope of the project(s) to be undertaken and including a schedule and list of anticipated outcomes, and the mentor will provide an explicit commitment to the mentorship. This plan should be directly related to the goals developed via the student's recent completion of an Individual Development Plan, and students should enroll in MGS 8120 MTE - Mentored Professional Experience. During the semester, the mentor and the mentee should meet frequently (i.e., weekly or biweekly) to track the progress of the student's work. At the end of the MPE, the mentor should provide a written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120	Take one time

Developmental, Regenerative & Stem Cell Biology, PhD

Degree Requirements

Developmental, Regenerative, & Stem Cell Biology

The Developmental, Regenerative, & Stem Cell Biology (DRSCB) graduate training program at WashU is housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

The various research groups in the DRSCB program study problems in embryonic development and cell and tissue differentiation in a variety of model systems, ranging from vertebrates such as fish and mice to invertebrates such as *Drosophila* and *C. elegans* as well as stem cell and reprogramming models. Genetic (both classical and molecular), genomics, cell biological, immunological, and biochemical approaches are utilized to elucidate the molecular mechanisms that underlie many key processes of development and diseases. Research areas include embryo and tissue organization, cell-cell and cell-matrix interactions, and control of cell fate, differentiation, tissue-specific gene expression, and pattern formation.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.

- **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate units, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, student will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.
- Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5617 Development Biology PhD Program Seminar
- BBS 5352 Development Biology
- BBS 5491 Advanced Genetics Advanced Genetics
- Two of the following three courses:
 - BBS 5480 Nucleic Acids & Protein Biosynthesis
 - BBS 5068 Fundamentals of Molecular Cell Biology
 - BBS 5075 Introduction to Coding and Statistical Thinking for Genetics and Genomics

Advanced Elective

Students may select one or more of the following, subject to approval by the DRSCB Steering Committee:

- BBS 5224 Molecular, Cell and Organ Systems
- BBS 5053 Immunobiology I
- BBS 5054 Immunobiology II
- BBS 5488 Genomics
- BBS 5312 Macromolecular Interactions
- BBS 5392 Molecular Microbiology & Pathogenesis

Journal Clubs

Students are required to complete two credit hours of journal clubs. Second-year students are required to take the BBS 5152 Rad Journal Club (Regeneration, Aging, and Development) in the fall semester. Students may choose an option that is listed below for their second requirement:

- BBS 5138 Journal Club for the Molecular Mechanism of Aging
- BBS 5128 Cell Biology of Extracellular Matrix Journal Club
- BBS 5235 Genetics Journal Club
- BBS 5123 Experimental Hematopoiesis Journal Club
- BBS 5137 Ion Channels Journal Club
- BBS 5192 Cancer Biology Journal Club
- BBS 5255 Experimental Skeletal Biology Journal Club
- BBS 5284 Current Research in Chromatin, Epigenetics and Nuclear Organization
- BBS 5412 Tropical and Molecular Parasitology
- BBS 5445 DNA Metabolism Journal Club
- BBS 5484 Genetics and Development of *C. Elegans* Journal Club
- BBS 5496 Seminar in Computational Molecular Biology
- BBS 5416 Molecular Microbiology & Pathogenesis Journal Club

Laboratory Rotations

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Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.

Mentored Experience Implementation Plan

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Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Prior to beginning their MTE and typically during their first graduate year, Division of Biology & Biomedical Sciences (DBBS) students will be required to complete the Graduate Student Teaching Orientation, including three Foundations in Teaching (FiT) workshops offered by the Center for Teaching and Learning. Students will meet with assigned course director(s) prior to the start of the semester and complete a teaching expectations form.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

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each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

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The PhD student should receive regular feedback or evaluation from the mentor throughout the semester, a formal evaluation of teaching skills by the faculty at the end of the semester, and evaluation by the students at the end of the term as part of the course evaluation. If the course director determines that the PhD student's facility with essential teaching skills is unsatisfactory, the student will be counseled by the course director and the Associate Dean of Graduate Education and then will complete another MTE to attain mastery of these skills. Mentored teaching opportunities will be reviewed annually to ensure that the experiences meets the requirements established in this policy.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time

Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

Prior to the start of an MPE, the student and the site mentor will submit a plan to DBBS detailing the scope of the project(s) to be undertaken and including a schedule and list of anticipated outcomes, and the mentor will provide an explicit commitment to the mentorship. This plan should be directly related to the goals developed via the student's recent completion of an Individual Development Plan, and students should enroll in MGS 8120 MTE - Mentored Professional Experience. During the semester, the mentor and the mentee should meet frequently (i.e., weekly or biweekly) to track the progress of the student's work. At the end of the MPE, the mentor should provide a

written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120	Take one time

Immunology, PhD

Degree Requirements

Immunology

The Immunology program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

Immunology is the discipline of biology that examines the mechanisms of host defense against pathogenic agents. The study of the immune system offers a unique opportunity to analyze a complex multicomponent system consisting of molecules and cells that have documented physiologic relevance. Immunology has a strong foundation in biochemistry, molecular biology, and cell biology.

We recognized our program as a top program in the nation and we aim to retain that standing, along with our reputation for rigor and high standards. Supporting and promoting student wellness, success, and resilience is at the center of this goal. The primary objective of the program is to provide our students with a solid foundation of skills as a scientist overall and specifically in the conduct of immunology research. The program aims to achieve this by providing formal educational training to our students, while also incorporating our students in semi-formal and informal settings, incorporating them in all that we do as faculty to sharpen our own skills and keep abreast of our fields. We provide opportunities for our students to interact weekly with each other as they present annual progress talks on their research, and we aim for high levels of participation by affiliated faculty at these events. In addition, we provide weekly opportunities to meet with and host outside immunology speakers in our seminar series. We set up these opportunities so that our students regularly interact with other immunologists at a variety of career stages, including postdocs and junior faculty.

Washington University School of Medicine has a large community of investigators who make immunology their primary focus. The research within our program spans a broad spectrum, ranging from studies at the basic structural and molecular levels of host defense all the way to clinical applications directed at significant health problems, such as cancer immunotherapy. The program in Immunology has



grown to include more than 100 research laboratories and continues to increase. This unusual concentration of immunologists was the stimulus that led to the founding of the Immunology graduate program in 1986.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
 - **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, student will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.
 - Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5053 Immunobiology I
- BBS 5272 Advanced Topics in Immunology
- BBS 5054 Immunobiology II

One 3-Credit Advanced Elective (or equivalent)

Examples of common elective choices include the following:

- BBS 5068 Fundamentals of Molecular Cell Biology
- BBS 5392 Molecular Microbiology & Pathogenesis
- BBS 5312 Macromolecular Interactions
- BBS 5325 Protein Structure and Function
- BBS 5352 Developmental Biology
- BBS 5384 Advanced Cell Biology/Biochemistry of Membranes
- BBS 5480 Nucleic Acids & Protein Biosynthesis
- BBS 5910 Nano Topics in Biology and Biomedical Sciences

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Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time



Optional Activity: Professional Intensive Pathway (PIP)

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Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

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written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120

Take one time

Molecular Cell Biology, PhD

Degree Requirements

Molecular Cell Biology

The Molecular Cell Biology Program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

The overarching mission of the Molecular Cell Biology program is to provide rigorous training in elucidating the molecular mechanisms that underlie fundamental cellular processes in normal and disease contexts. These include autonomous and cooperative processes such as cell motility and adhesion, cell cycle regulation, transcription, translation, molecular trafficking, signal transduction, and metabolism. A unifying theme across these areas is a commitment to achieving a comprehensive molecular understanding of how cells function and adapt to internal and external pressures. By advancing mechanistic insights into these essential processes, our work enriches fundamental biological knowledge while establishing the molecular foundations for translational discovery. Ultimately, we aim to bridge mechanistic cell biology with patient-centered research — transforming molecular insights into actionable strategies for diagnosis, prevention, and therapy to improve human health worldwide.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
- **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, students will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.
- Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5480 Nucleic Acids & Protein Biosynthesis
- BBS 5068 Fundamentals of Molecular Cell Biology

One Advanced Elective

MCB students are required to complete one three-credit advanced elective that has a grant writing component. Please consult with Program Directors for course recommendations.

Two Semesters of Journal Clubs

- BBS 5123 Experimental Hematopoiesis Journal Club
- BBS 5128 Cell Biology of Extracellular Matrix
- BBS 5137 Ion Channels
- BBS 5148 Metabolism Journal Club
- BBS 5152 Rad Journal Club (Regeneration, Aging, and Development)
- BBS 5192 Cancer Biology Journal Club
- BBS 5235 Genetics Journal Club
- BBS 5255 Experimental Skeletal Biology Journal Club
- BBS 5393 Molecular Virology Journal Club
- BBS 5412 Tropical and Molecular Parasitology
- BBS 5417 Hematology Division Journal Club: Current Topics in Cellular, Molecular, and Stem Cell Biology
- BBS 5445 DNA Metabolism Journal Club
- BBS 5484 Genetics and Development of *C. Elegans* Journal Club
- BBS 5496 Seminar in Computational Molecular Biology

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as *MERs*.

Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Prior to beginning their MTE and typically during their first graduate year, Division of Biology & Biomedical Sciences (DBBS) students will be required to complete the Graduate Student Teaching Orientation, including three Foundations in Teaching (FiT) workshops offered by the Center for Teaching and Learning. Students will meet with assigned course director(s) prior to the start of the semester and complete a teaching expectations form.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete

each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

DBBS students will serve as mentored AIs in courses approved by the Associate Dean. Units for a given course will be determined ahead of the assignment. A unit is equivalent to approximately one hour per week, so 5 units would involve five hours of support (on average per week) for a course. The PhD student is formally listed as instructional support in the course listings and receives mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

The PhD student should receive regular feedback or evaluation from the mentor throughout the semester, a formal evaluation of teaching skills by the faculty at the end of the semester, and evaluation by the students at the end of the term as part of the course evaluation. If the course director determines that the PhD student's facility with essential teaching skills is unsatisfactory, the student will be counseled by the course director and the Associate Dean of Graduate Education and then will complete another MTE to attain mastery of these skills. Mentored teaching opportunities will be reviewed annually to ensure that the experiences meets the requirements established in this policy.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time

Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

Prior to the start of an MPE, the student and the site mentor will submit a plan to DBBS detailing the scope of the project(s) to be undertaken and including a schedule and list of anticipated outcomes, and the mentor will provide an explicit commitment to the mentorship. This plan should be directly related to the goals developed via the student's recent completion of an Individual Development Plan, and students should enroll in MGS 8120 MTE - Mentored Professional Experience. During the semester, the mentor and the mentee should meet frequently (i.e., weekly or biweekly) to track the progress of the student's work. At the end of the MPE, the mentor should provide a

written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120	Take one time

Molecular Genetics & Genomics, PhD

Degree Requirements

Molecular Genetics & Genomics

The Molecular Genetics and Genomics is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

Advances in genetics and genomics over the past two decades have revolutionized our understanding of development, homeostasis, and disease and ushered in a new era of personalized medicine. Much remains, however, to be learned about fundamental genetic, genomic, and epigenetic mechanisms and how alterations to these processes perturb development and homeostasis and lead to disease. For example, how are specific genes turned on in defined cell types to drive specific outcomes and how does perturbation to regulated gene expression lead to disease, such as cancer and neurodevelopmental disorders? How do seemingly identical cells employ distinct genetic regulatory networks to create the diversity of cell types found in our body and brain? How do coding and non-coding mutations alter gene function and drive evolution and disease? How can we leverage powerful new genetic tools to cure disease? Uncovering answers to these fundamental questions places genetics and genomics at the forefront of biomedical research and the quest to clarify the genetic and genomic regulatory mechanisms that normally control organismal development and homeostasis, but when perturbed drive disease.

Laboratories in the Molecular Genetics and Genomics (MGG) program leverage forward and reverse genetics and genomic and computational approaches to address key outstanding questions in all areas of biomedical research with a focus on human disease. Integrating wet and dry bench approaches, students in the MGG program advance our understanding of the genetic, cellular, and molecular basis of how cells, tissues, and organs develop and function and how alterations in these processes lead to disease. MGG laboratories at WashU have been at the vanguard of human molecular genetics, the



Human Genome Project, and in developing new genetic and genomic technologies that clarify how genetic changes alter gene function. MGG laboratories further apply these methods across many areas, including cancer biology, neuroscience, developmental biology, and more. Students interested in leveraging the power of genetic and genomic approaches to learn about fundamental biological mechanism and their application to human biology will find scores of laboratories within the program in which to pursue their doctoral research.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 credits
- **Degree Length:** 7 years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
 - **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, student will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.
 - Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5491 Advanced Genetics
- BBS 5488 Genomics

Two Semesters of Journal Clubs

MGG students are required to take two semesters of BBS 5235 Genetics Journal Club. Students may petition the Program Directors for exceptions.

Two Advanced Electives

In general, MGG students select two of the following courses:

- BBS 5480 Nucleic Acids & Protein Biosynthesis
- BBS 5075 Introduction to Coding and Statistical Thinking for Genetics and Genomics
- BBS 5068 Fundamentals of Molecular Cell Biology

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as *MERs*.

Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Prior to beginning their MTE and typically during their first graduate year, Division of Biology & Biomedical Sciences (DBBS) students will be required to complete the Graduate Student Teaching Orientation, including three Foundations in Teaching (FiT) workshops offered by the Center for Teaching and Learning. Students will meet with assigned course director(s) prior to the start of the semester and complete a teaching expectations form.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete

each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

DBBS students will serve as mentored AIs in courses approved by the Associate Dean. Units for a given course will be determined ahead of the assignment. A unit is equivalent to approximately one hour per week, so 5 units would involve five hours of support (on average per week) for a course. The PhD student is formally listed as instructional support in the course listings and receives mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

The PhD student should receive regular feedback or evaluation from the mentor throughout the semester, a formal evaluation of teaching skills by the faculty at the end of the semester, and evaluation by the students at the end of the term as part of the course evaluation. If the course director determines that the PhD student's facility with essential teaching skills is unsatisfactory, the student will be counseled by the course director and the Associate Dean of Graduate Education and then will complete another MTE to attain mastery of these skills. Mentored teaching opportunities will be reviewed annually to ensure that the experiences meets the requirements established in this policy.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time



Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

Prior to the start of an MPE, the student and the site mentor will submit a plan to DBBS detailing the scope of the project(s) to be undertaken and including a schedule and list of anticipated outcomes, and the mentor will provide an explicit commitment to the mentorship. This plan should be directly related to the goals developed via the student's recent completion of an Individual Development Plan, and students should enroll in MGS 8120 MTE - Mentored Professional Experience. During the semester, the mentor and the mentee should meet frequently (i.e., weekly or biweekly) to track the progress of the student's work. At the end of the MPE, the mentor should provide a

written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120	Take one time

Molecular Microbiology & Microbial Pathogenesis, PhD

Degree Requirements

Molecular Microbiology & Microbial Pathogenesis

The Molecular Microbiology & Microbial Pathogenesis (MMMP) program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

Our program is tailored to the needs and interests of the individual student and emphasizes laboratory research, supported by coursework, journal clubs and seminars. The program teaches comprehensive and modern approaches to understanding microbes and the diseases they cause. Our faculty spans both the Medical and Danforth campuses at WashU.

This program includes two major areas of research:

Molecular Microbiology

Research in molecular microbiology employs genetics, cell biology, biochemistry, and biophysics to investigate fundamental biological problems including environmental sensing and cell-cell signaling, transcriptional and post-transcriptional regulation, secretion, energy generation, and the bacterial cell cycle. State-of-the-art computational and comparative genomic approaches are used to study commensal, pathogenic, and environmental organisms in their natural environment.

Microbial Pathogenesis and Host Defense

Research in the molecular biology and biochemistry of pathogenic bacteria, fungi, protozoa, helminths and viruses, with an emphasis on mechanisms of virulence and host-parasite interactions. Applying a wide range of emerging technologies in molecular genetics and cell biology, this work includes the discovery and analysis of virulence-associated genes, the study of innate and acquired immunity to pathogens, and the identification and exploration of novel targets for chemotherapy.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
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- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5392 Molecular Microbiology & Pathogenesis
- BBS 5217 Special Topics in Microbial Pathogenesis
- One of the following:
 - BBS 5480 Nucleic Acids & Protein Biosynthesis
 - BBS 5068 Fundamentals of Molecular Cell Biology

One or More Advanced Electives (3 units)

MMMP students have commonly selected the following courses for this requirement:

- BBS 5014 Biotech Industry Innovators
- BBS 5053 Immunobiology I
- BBS 5054 Immunobiology II
- BBS 5488 Genomics
- BBS 5910 Nano Topics in Biology and Biomedical Sciences

Journal Clubs

Students must complete one credit of journal or specific emphasis pathway course. Please consult with Program Directors for recommendations for this requirement.

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

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Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

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Mentored Teaching Experiences (MTEs)

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DBBS students will serve as mentored AIs in courses approved by the Associate Dean. Units for a given course will be determined ahead of the assignment. A unit is equivalent to approximately one hour per week, so 5 units would involve five hours of support (on average per week) for a course. The PhD student is formally listed as instructional support in the course listings and receives mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

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Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time

Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each

student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

Prior to the start of an MPE, the student and the site mentor will submit a plan to DBBS detailing the scope of the project(s) to be undertaken and including a schedule and list of anticipated outcomes, and the mentor will provide an explicit commitment to the mentorship. This plan should be directly related to the goals developed via the student's recent completion of an Individual Development Plan, and students should enroll in MGS 8120 MTE - Mentored Professional Experience. During the semester, the mentor and the mentee should meet frequently (i.e., weekly or biweekly) to track the progress of the student's work. At the end of the MPE, the mentor should provide a written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120	Take one time

Neurosciences, PhD

Degree Requirements

Neurosciences

The Neuroscience Program at WashU is a graduate training program within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

Washington University has a long-standing tradition of excellence in neuroscience. Historic milestones include Erlanger's pioneering work on nerve conduction velocity and its relationship to axon diameter, as well as the 1950s discovery of the first neuronal trophic factor, nerve growth factor, by Levi-Montalcini, Cohen, and Hamburger. Today, a large and collaborative faculty is engaged in nearly every area of modern neuroscience, from molecular studies of ion channels to positron emission tomography (PET) imaging of the human brain, and the genetics of neurological diseases.

Faculty from a variety of departments — including Neuroscience, Anesthesiology, Biochemistry and Molecular Biophysics, Biology, Biomedical Engineering, Cell Biology and Physiology, Developmental Biology, Genetics, Molecular Microbiology, Neurology, Neurosurgery, Ophthalmology and Visual Sciences, Pathology and Immunology,



Physics, Psychiatry, Psychological & Brain Sciences, and Radiology — serve as advisors for thesis research and as teaching faculty. The diverse expertise of the faculty ensures students gain exposure to a wide range of neurobiological challenges and research methods.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
 - **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, students will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.
 - Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5571 Cellular Neurobiology
- BBS 5648 Coding and Statistical Thinking in the Neurosciences
- BBS 5651 Neural Systems
- BBS 5646 First-Year Fundamentals
- BBS 5565 Oral Presentation of Scientific Research Materials

Specialized Advanced Electives

Students must complete 1 credit of NanoCourses. Note that NanoCourses may be assigned 0.5 or 1 credit, depending on the course.

- BBS 5989 Advanced Topics in Neuroscience and/or BBS 5910 Nano Topics in Biology and Biomedical Sciences

Journal Clubs

Students can select from a variety of ongoing journal clubs that best align with their interests, with topics ranging from circuits to behavior to glial biology.

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as *MERs*.

Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Prior to beginning their MTE and typically during their first graduate year, Division of Biology & Biomedical Sciences (DBBS) students will be required to complete the Graduate Student Teaching Orientation, including three Foundations in Teaching (FIT) workshops offered by the Center for Teaching and Learning. Students will meet with assigned course director(s) prior to the start of the semester and complete a teaching expectations form.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete

each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

DBBS students will serve as mentored AIs in courses approved by the Associate Dean. Units for a given course will be determined ahead of the assignment. A unit is equivalent to approximately one hour per week, so 5 units would involve five hours of support (on average per week) for a course. The PhD student is formally listed as instructional support in the course listings and receives mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

The PhD student should receive regular feedback or evaluation from the mentor throughout the semester, a formal evaluation of teaching skills by the faculty at the end of the semester, and evaluation by the students at the end of the term as part of the course evaluation. If the course director determines that the PhD student's facility with essential teaching skills is unsatisfactory, the student will be counseled by the course director and the Associate Dean of Graduate Education and then will complete another MTE to attain mastery of these skills. Mentored teaching opportunities will be reviewed annually to ensure that the experiences meets the requirements established in this policy.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time



Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

Prior to the start of an MPE, the student and the site mentor will submit a plan to DBBS detailing the scope of the project(s) to be undertaken and including a schedule and list of anticipated outcomes, and the mentor will provide an explicit commitment to the mentorship. This plan should be directly related to the goals developed via the student's recent completion of an Individual Development Plan, and students should enroll in MGS 8120 MTE - Mentored Professional Experience. During the semester, the mentor and the mentee should meet frequently (i.e., weekly or biweekly) to track the progress of the student's work. At the end of the MPE, the mentor should provide a

written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120

Take one time

Plant & Microbial Biosciences, PhD

Degree Requirements

Plant & Microbial Biosciences

The Plant and Microbial Biosciences Program is a graduate training program at WashU, housed under the Roy and Diana Vagelos Division of Biology and Biomedical Sciences (DBBS).

The Plant and Microbial Biosciences (PMB) Program trains PhD students to have a strong background in modern biology, as well as research training specific to vascular plants, mosses, algae, plant-associated microbes, photosynthetic prokaryotes, and other microbes as experimental organisms to address both fundamental and applied biological questions. Formal coursework requirements, teaching assistantship, and qualifying exam are usually satisfied in the first two years. Research training is accomplished by a combination of required research rotations in the first year followed by a significant thesis research project. Seminars and journal clubs help members of the program stay current with the latest scientific advances. DBBS also provides a wide variety of "beyond the bench" opportunities for students, including internships, career workshops, and science outreach opportunities to ensure that PMB graduates are well prepared for future careers in academia, industry, entrepreneurship, policy, science communication, and beyond.

To earn a PhD at within the Roy and Diana Vagelos Division of Biology and Biomedical Sciences at Washington University, a student must complete all courses required by their department; maintain satisfactory academic progress; pass the qualifying examination; complete all requirements for doctoral candidacy; create a Research Advisory Committee (RAC); submit a Title, Scope, and Procedure Form; fulfill residence and Mentored Experience Requirements; write, defend, and submit a dissertation; and apply for program completion (graduation) via Workday Student.

Program Requirements

- **Total Units Required:** 36 units
- **Degree Length:** Seven years
 - Students are expected to maintain satisfactory academic progress in accordance with academic milestones. Students entering their seventh year in the program will receive a warning letter in regards to reaching their stated degree length. Students entering their eighth year in the program will be required to obtain permission from the Associate Dean of Graduate Education. Across DBBS programs, the average time to degree is 5.6 years.
- **Note:** Students must be enrolled in 9 graduate credits each semester to retain full-time status. As students complete their coursework, if enrolled in fewer than 9 graduate credits, they must enroll in a specific Biology & Biomedical Sciences research graduate course to maintain full-time status. Prior to completing 36 credit units, students will enroll in BBS 5900 Research for research credit; after completing 36 credit units, students will enroll in BBS 9000 Full-Time Graduate Research/Study, which will show 0 credit units but fulfills full-time status. Students should follow advising instructions to ensure proper enrollment prior to Add/Drop.
- Continued support is guaranteed for the duration of the student's graduate studies, provided that the student maintains satisfactory progress toward completion of the degree.
- **Grade Requirement:** Required courses generally consist of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

Required Courses

DBBS Required Courses

- BBS 5098 Graduate Research Fundamentals
- BBS 5011 Ethics & Research Science

Program Required Courses

- BBS 5703 Experimental Design and Analysis in Biological Research
- BBS 5702 Current Approaches in Plant and Microbial Research
- One of the following:
 - BBS 5480 Nucleic Acids & Protein Biosynthesis
 - BBS 5068 Fundamentals of Molecular Cell Biology

6 Credits of Advanced Electives

Common electives include the following:

- BBS 5491 Advanced Genetics
- BBS 5068 Fundamentals of Molecular Cell Biology
- BBS 5352 Developmental Biology
- BBS 5392 Molecular Microbiology & Pathogenesis
- BBS 5495 Computational Molecular Biology
- BBS 5488 Genomics
- BBS 5014 Biotech Industry Innovators
- BBS 5053 How Plants Work: Physiology, Growth, and Metabolism
- BBS 5523 Laboratory in Protein Analysis, Proteomics, and Protein Structure
- BBS 5910 Nano Topics in Biology and Biomedical Sciences

Two Semesters of Journal Clubs

PMB students are required to take BBS 5723 Seminar in Plant and Microbial Bioscience. Other common journal clubs include the following:

- BBS 5820 Ethnobiology Journal Club
- BBS 5235 Genetics Journal Club Genetics Journal Club
- BBS 5148 Metabolism Journal Club Metabolism Journal Club
- BBS 5121 Development, Regeneration & Stem Cell Biology Journal Club

Laboratory Rotations

Selecting a thesis advisor is the most important decision a student makes in graduate school. To help each student make an informed, thoughtful choice, the Division builds in flexibility to explore options. Students usually participate in three lab rotations during their first year. Additional rotations can be arranged, and rotation lengths are flexible. Students usually begin their thesis research by the end of their first year.

Scientific Scholarship

Keeping abreast of scientific developments is critical for faculty and students alike. The Division offers many ways to stay current. More than 15 weekly biology seminars provide excellent opportunities to meet outstanding scientists from outside Washington University. Several annual symposia bring internationally recognized speakers to campus. Journal clubs meet weekly for students, postdoctoral fellows and faculty to present and discuss current scientific literature. A number of Interdisciplinary Research Pathways allow students to enhance their PhD program. Program retreats allow for informal interaction among students and faculty. The Division also provides funds for each student for professional development.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as *MERs*.

Mentored Experience Requirements (MERs)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for biomedical research scientists. Although much of the teaching that scientists engage in is through one-on-one interactions with individuals in the laboratory, all scientists must have fundamental instruction in and experience with pedagogy principles, be able to deliver effective lectures to a wide audience, and be prepared to teach courses to undergraduate and graduate students. These represent the goals of the required Mentored Teaching Experience (MTE).

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Prior to beginning their MTE and typically during their first graduate year, Division of Biology & Biomedical Sciences (DBBS) students will be required to complete the Graduate Student Teaching Orientation, including three Foundations in Teaching (FiT) workshops offered by the Center for Teaching and Learning. Students will meet with assigned course director(s) prior to the start of the semester and complete a teaching expectations form.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete

each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

DBBS students will serve as mentored AIs in courses approved by the Associate Dean. Units for a given course will be determined ahead of the assignment. A unit is equivalent to approximately one hour per week, so 5 units would involve five hours of support (on average per week) for a course. The PhD student is formally listed as instructional support in the course listings and receives mentorship from the faculty member in best practices for classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. The mentored teaching training must incorporate at least one of the following activities: delivering lectures, leading lab activities or discussion groups, or conducting review sessions for groups of students. Grading exams or papers, holding office hours, administrative tasks, one-on-one tutoring, and so on may also be components of the assistantship and should be counted in the 5 units; however, these activities are not sufficient to meet the DBBS teaching training requirement. In general, AI assignments connect to undergraduate or lower-level graduate courses that the AI has taken previously. Students must enroll in MGS 8005 MTE - Assistant in Instruction experience during the semester(s) of their assigned MTEs.

The PhD student should receive regular feedback or evaluation from the mentor throughout the semester, a formal evaluation of teaching skills by the faculty at the end of the semester, and evaluation by the students at the end of the term as part of the course evaluation. If the course director determines that the PhD student's facility with essential teaching skills is unsatisfactory, the student will be counseled by the course director and the Associate Dean of Graduate Education and then will complete another MTE to attain mastery of these skills. Mentored teaching opportunities will be reviewed annually to ensure that the experiences meets the requirements established in this policy.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement completed during the first year

Pathway #1

MGS 8005	Take one time

Optional Activity: Professional Intensive Pathway (PIP)

The PIP is an optional pathway for those students whose career interests lie outside of academia or who want to benefit from mentored professional experiences (MPEs). An MPE is an unpaid professional experience for PhD students that allows students to develop skills and experiences relevant to their intended career outcomes. Students and mentors complete a mentorship plan prior to the start of each MPE. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the PIP will not receive compensation.

Students and mentors complete a mentorship plan prior to the start of each MPE. To complete each MPE assignment and ensure that it applies toward their degree requirements, students must submit the Mentorship Registration Request form for approval and register for the appropriate course number (MGS 8120 MTE - Mentored Professional Experience) for each semester of engagement.

The DBBS MPE via the PIP is an optional activity. Students should engage in activities that enhance their professional development and record these activities at their thesis update meetings. For some students, an optional MPE is encouraged. The DBBS MPE can be fulfilled by a wide range of activities that advance the careers and professional development of DBBS PhD students. These could include, for example, opportunities in biotech or pharmaceuticals (including at a startup or established company); science communication; science outreach; diversity, equity, and inclusion work; government or policy opportunities; consulting; or higher education administration. Academic-track students may use the MPE to learn a new technique at a core facility or other lab. The duties and responsibilities of the MPE should be intellectually substantive and offer opportunities for the student to develop new skills and experiences. MPEs are distinct from internships in that they are considered part of the PhD training and are recorded on students' transcripts as courses. The scope of the MPE will be determined in conversation among the student, the site mentor, and DBBS staff, and the final plan must be approved by the principal investigator and the program director. An average of 10 hours per week of MPE for a total of 150 to 180 hours is expected for each student. The nature of some MPEs may take students away from their academic pursuits for full-time participation. In these cases, coverage of a percentage of the student's stipend may be pursued by consulting DBBS leadership.

Prior to the start of an MPE, the student and the site mentor will submit a plan to DBBS detailing the scope of the project(s) to be undertaken including a schedule and list of anticipated outcomes, and the mentor will provide an explicit commitment to the mentorship. This plan should be directly related to the goals developed via the student's recent completion of an Individual Development Plan, and students should enroll in MGS 8120 MTE - Mentored Professional Experience. During the semester, the mentor and the mentee should meet frequently (i.e., weekly or biweekly) to track the progress of the student's work. At the end of the MPE, the mentor should provide a

written assessment (approximately 500 words) of the overall learning experience for the student and the quality of the work completed, and the student will submit a self-reflection statement detailing the skills and experiences gained and how their career goals may (or may not) have changed. The mentor will register the completion of MGS 8120 MTE - Mentored Professional Experience as Pass/No Pass.

Optional Pathway

MGS 8120	Take one time

Clinical Investigation Master of Science in Clinical Investigation

The Master of Science in Clinical Investigation (MSCI) is an innovative, one- to five-year program that prepares young investigators for academic careers in clinical research. On average, scholars complete program requirements within two to three years. All coursework must be completed within five years of admission to the program.

The evening course format allows for full- or part-time enrollment that can accommodate clinical schedules.

The MS is available in four different tracks: Clinical Investigation, Translational Medicine, Genetics/Genomics, and Dissemination and Implementation.

Program Requirements

Didactic Coursework

All MSCI scholars must complete 33 credit units of didactic coursework, including 16 core credits, 4 credits of Clinical Investigation Seminar, at least 6 credits of electives, and a variable number of credits (6-8) of mentored independent research. For additional information about the specific courses required for each of the concentrations, please visit the MSCI Concentrations webpage.

Core courses include the following:

Code	Title	Units
CLNV 5070	Ethical and Legal Issues in Clinical Research	2
CLNV 5110	Mentored Independent Research (6-8 units required)	1-8
CLNV 5140	Clinical Investigation Seminar (4 units required, 1 credit per semester)	1-2



CLNV 5150	Introduction to Statistics for Clinical Research	3
CLNV 5151	Intermediate Statistics for the Health Sciences	3
CLNV 5160	Grantsmanship (CLNV 5160 Grantsmanship *or* CLNV 5170 Scientific Writing and Publishing)	2
Total Units		12-20

In addition to didactic requirements, admitted scholars are required to complete the following:

- A thesis
- Seminar
- Mentorship
- Responsible conduct of research
- Institutional Review Board approvals
- Individual development plans
- Career development retreat
- Program evaluation

Please visit the application section of the Master of Science in Clinical Investigation website, or email crtcmsci@wustl.edu with any questions about the MSCI program's application, requirements, or curriculum.

Eligibility

Level of Education

Candidates must have completed a bachelor's degree. However, most scholars are enrolled in a predoctoral or postdoctoral mentored research program at WashU Medicine or hold a postdoctoral appointment in health science at Washington University or one of the Institute of Clinical and Translational Sciences (ICTS) affiliates.

Citizenship

Eligible applicants must be citizens or noncitizen nationals of the United States, or they must have been lawfully admitted to the United States for permanent residence and have in their possession an Alien Registration Receipt Card (I-151 or I-551) or other legal verification of admission for permanent residence. Individuals on temporary or student visas are eligible provided that they hold a valid U.S. visa and a postdoctoral appointment at Washington University or one of the ICTS affiliates. The MSCI program is unable to sponsor visas. Typically, students who desire to enter the program obtain a visa sponsored through their research department. Students must obtain approval from their employer or sponsor and ensure that participating in the program will not affect their visa status.

Research Project

All applicants must be conducting clinical and translational research. Clinical research is defined as patient-oriented research: research conducted with human subjects or on material of human origin (e.g., tissues, specimens, cognitive phenomena).

Mentorship

Applicants must have an established relationship with a senior faculty member prior to beginning the MSCI program. Applicants should look for mentors who match their research interests. They should contact each mentor they are interested in working with directly, stating their interest in the mentor's research and their desire to work with the mentor.

Admissions

Applications are open August 15 through November 1 for January start date and January 1 through April 15 for a fall start date.

Only complete applications will be reviewed. Applications will not be considered complete until all supporting documents have been submitted.

In addition to the online application form, applicants must submit the following:

- A current biosketch or curriculum vitae
- An individual development plan, including a course plan
- A research plan
- A letter of support from a mentor
- A recommendation letter from the Department Chair or Division Chief
- Official transcripts

Please visit the application section of the Master of Science in Clinical Investigation website, or email crtcmsci@wustl.edu with an questions about the program's application or curriculum.

Academic Policies

Academic Policies for Clinical Investigation programs can be found in the Student Handbook.

Graduate Certificate in Clinical Investigation

The Graduate Certificate in Clinical Investigation (CI) is a 16-credit certificate program for young investigators committed to pursuing academic careers in clinical research. Students will gain knowledge in the core competencies of clinical research and investigation, such as study design, research implementation, statistical approaches, responsible conduct of research, scientific communication and literature critique, leadership, and community engagement.

On average, scholars complete the certificate requirements within one to two years. All coursework must be successfully completed within five years from the start of the first course. Credits cannot be transferred into the program.

The evening course format allows for full- or part-time enrollment that can accommodate clinical schedules.

The certificate is available in four different tracks: Clinical Investigation, Translational Medicine, Genetics/Genomics, and Dissemination and Implementation.

Program Eligibility

Level of Education

Candidates must have completed a bachelor's degree. However, most scholars are enrolled in a predoctoral or postdoctoral mentored research program at WashU Medicine or hold a postdoctoral appointment in health science at WashU or one of the ICTS affiliates.

Citizenship

Eligible applicants must be citizens, non-citizen nationals, permanent residents, or hold a valid U.S. visa and a postdoctoral appointment at WashU or one of the ICTS affiliates.

English Language Proficiency

Federal regulations require that F-1 and J-1 international student applicants and prospective J-1 scholars demonstrate proficiency in the English language. For additional information, please visit the Office for International Students & Scholars website.

Admissions

Applications for the Certificate in Clinical Investigation are reviewed on a rolling basis. Students can be admitted for a fall or spring entry, based on the submission of their application.

In addition to the online application, students will be required to submit the following:

- Current biosketch or curriculum vitae
- Official transcripts

Please visit the application section of the Graduate Certificate in Clinical Investigation website or email crtcmsci@wustl.edu with any questions about the application or curriculum.

Required Core Courses for the Graduate Certificate

Core courses for the certificate program will be dependent on which track the student chooses. Please consult the Certificate Requirements and Concentrations Table for the requirements of each concentration.

All certificate students are required to take the below courses, regardless of their chosen concentration, which make up 10 of the 16 credits.

Code	Title	Units
CLNV 5070	Ethical and Legal Issues in Clinical Research	2
CLNV 5100	Designing Outcomes and Clinical Research	3
CLNV 5150	Introduction to Statistics for Clinical Research	3
CLNV 5160 or CLNV 5170	Grantsmanship Scientific Writing and Publishing	2
Total Units		10

Academic Policies

Academic Policies for Clinical Investigation programs can be found in the Student Handbook.

Genetic Counseling Master of Science in Genetic Counseling

Applicants to the Master of Science in Genetic Counseling (MSGC) program must hold a bachelor's degree (or equivalent if from a foreign college or university), and they must have completed prerequisite courses from an accredited college or university. The Program in Genetic Counseling is accredited by the Accreditation Council for



Genetic Counseling (ACGC). The ACGC is a member of the Association of Specialized and Professional Accreditors (ASPA). The ASPA is dedicated to enhancing quality in higher education through specialized and professional accreditation.

The MSGC program prepares students to become certified genetic counselors. In addition to course work, students will complete clinical fieldwork rotations and complete a research project prior to graduation. The MSGC degree program is a 21-month, full-time program.

Graduates of the Program in Genetic Counseling will be eligible to sit for the American Board of Genetic Counseling (ABGC) certification examination. The School of Medicine has determined that, as a result of its ACGC accreditation, its genetic counseling program curriculum meets the educational requirements needed for graduates to sit for the ABGC Certification Examination and to pursue licensure in all states and territories of the United States and Washington, DC, in which licensure is available.

Informatics, Data Science, and Biostatistics Master of Science in Biomedical Data Science and AI

The Master of Science (MS) in Biomedical Data Science and AI is a 37-credit-unit program that offers excellent training in informatics, data science, and biostatistics for students who earned undergraduate or higher degrees with majors in Mathematics, Statistics, Computer Science, Biomedical Engineering, or other related fields. It prepares graduates for rewarding employment in academia and industry and for further graduate studies.

It offers three distinct concentrations, allowing students to tailor their training to align with their interests and career goals. After completing a shared first semester of foundational coursework, students select one of the following tracks to dive deeper into advanced topics: 1) Biostatistics; 2) Biomedical Informatics; or 3) Data Science. Each concentration equips students with the tools and perspectives needed to lead in the rapidly evolving landscape of healthcare, research, and artificial intelligence. Whether the student's passion lies in clinical applications, statistical research, or AI innovation, our program provides a robust and flexible pathway to success.

All students will participate in a practicum project that will have an option to transition into a thesis pathway. Each option requires a two-semester commitment in which students will earn 3 credit units per semester. We require a minimum of 150 hours per semester for the practicum and thesis components to ensure that students gain substantial and meaningful hands-on experience.

Core Courses (16 credit units)

Code	Title	Units
BDSAI 5001	R for Biomedical Sciences	1
BDSAI 5002	Python for Biomedical Sciences	1
BDSAI 5003	Introduction to Biomedical Data Science	2
BDSAI 5004	Introduction to Biomedical Informatics	2
BDSAI 5005	Fundamentals of Biostatistics	2
BDSAI 5006	Research Design for Biomedical Data Science	2
BDSAI 5301	Seminar Series for Biomedical Sciences	1
BDSAI 5302	Journal Club for Biomedical Sciences	1
BDSAI 5303	Scientific Communication for Biomedical Sciences	2
BDSAI 5304	Ethics for Biomedical Data Science	2
Total Units		16

Concentration Courses (6 credit units)

Biostatistics

Code	Title	Units
BDSAI 5131	Survival Analysis	3
BDSAI 5132	Statistical Analysis of Longitudinal Data	3

Biomedical Informatics

Students choose two of the following courses:

Code	Title	Units
BDSAI 5121	Electronic Health Records: Foundations	3
BDSAI 5122	Electronic Health Records Analytics	3
BDSAI 5123	Advanced Multi-Omic Modeling and Systems Analysis	3

Data Science

Code	Title	Units
BDSAI 5111	Data Visualization	3
BDSAI 5112	Advanced AI Topics in Biomedical Informatics: Deep Learning, Transformers, and Large Language Models	3

Experiential Learning (6 credit units)

Code	Title	Units
BDSAI 5901	Biomedical Data Science and AI Practicum	3
BDSAI 5902	Biomedical Data Science and AI Mentored Research	3

Elective Courses

All students will complete 9 credit units of electives. This structure provides flexibility, enabling students to customize their educational path while still benefiting from a broad knowledge base. Electives allow students to tailor their education to their specific interests in advanced topics within their field. Students receive guidance for making elective choices that best suit their study area.

Academic Policies

Academic policies for I²DB degree programs can be found in the Student Handbook.

Prospective Students

Those interested in applying or who would like more information may contact the program recruiter (i2db-education@wustl.edu).

Washington University School of Medicine

Institute for Informatics, Data Science and Biostatistics (I²DB)
660 S. Euclid Ave., MSC 8067-0013-05
St. Louis, MO 63110-1093

Master of Science in Biomedical Informatics

The information presented here is only for students who matriculated prior to Fall 2026/before the creation of the Biomedical Data Science and AI programs (p. 153). Curriculum requirements can be provided by the Program Manager (i2db-education@wustl.edu).

Master of Science in Biomedical Informatics

- 36 units
- Internship/Mentored Research
- Two to five years for program completion
- Full-time and part-time options

Washington University School of Medicine

Institute for Informatics, Data Science and Biostatistics (I²DB)
660 S. Euclid Ave., MSC 8067-0013-05
St. Louis, MO 63110-1093

Master of Science in Biostatistics

The information presented here is only for students who matriculated prior to Fall 2026/before the creation of the Biomedical Data Science and AI programs (p. 153). Curriculum requirements can be provided by the Program Manager (i2db-education@wustl.edu).

This four-semester, 42-credit-unit program offers excellent training in Biostatistics and Statistical Genetics for students who earned undergraduate or higher degrees with majors in Mathematics, Statistics, Computer Science, Biomedical Engineering, or other related fields. It prepares graduates for rewarding employment in academia and industry and for further graduate studies. Students choose between a Traditional Biostatistics pathway or a Statistical Genetics pathway. An internship or mentored research project is a required component of the program.

Academic Policies

Academic policies for degree programs can be found in the Student Handbook (PDF).

Washington University School of Medicine

Institute for Informatics, Data Science and Biostatistics (I²DB)
660 S. Euclid Ave., MSC 8067-0013-05
St. Louis, MO 63110-1093



Master of Science in Biostatistics and Data Science

This two-year, 42-credit-unit program offers excellent training in Biostatistics and Data Science for students who earned undergraduate or higher degrees with majors in Mathematics, Statistics, Informatics, Computer Science, Biomedical Engineering, or other related fields. It prepares graduates for rewarding employment in academia and industry and for further graduate studies. Students will choose between an internship experience or a mentored research project.

Courses from the Biomedical Data Science and AI program (p. 153) will be used to fill the academic requirements. Curriculum information will be provided by the Program Manager (i2db-education@wustl.edu).

Academic Policies

Academic policies for degree programs can be found in the Student Handbook.

Prospective Students

Those interested in applying or who would like more information may contact the program recruiter (i2db-admissions@wustl.edu).

Washington University School of Medicine

Institute for Informatics, Data Science and Biostatistics (I²DB)

660 S. Euclid Ave., MSC 8067-0013-05

St. Louis, MO 63110-1093

Certificate in Biomedical Data Science and AI

The Graduate Certificate in Biomedical Data Science and AI is designed for professionals who want to build technical fluency in health-related data analysis, artificial intelligence, and biomedical informatics.

Whether the student is a researcher, analyst, clinician, or industry professional, this flexible, part-time program will expand their impact in data-driven healthcare without the need to commit to a full degree.

The Certificate in Biomedical Data Science and AI requires 18 credit units and begins in the fall semester. Students will complete six core courses and three specialization courses in their area of interest.

Core Courses (9 credit units)

Code	Title	Units
BDSAI 5001	R for Biomedical Sciences	1
BDSAI 5002	Python for Biomedical Sciences	1
BDSAI 5003	Introduction to Biomedical Data Science	2
BDSAI 5004	Introduction to Biomedical Informatics	2
BDSAI 5005	Fundamentals of Biostatistics	2
BDSAI 5301 or BDSAI 5302	Seminar Series for Biomedical Sciences Journal Club for Biomedical Sciences	1

Concentration Courses (9 credit units)

Students choose between courses in the lists below and 3 credit units of electives.

Biostatistics

Code	Title	Units
BDSAI 5131	Survival Analysis	3
BDSAI 5132	Statistical Analysis of Longitudinal Data	3
BDSAI 5213	Causal Artificial Intelligence for Healthcare	3

Biomedical Informatics

Code	Title	Units
BDSAI 5121	Electronic Health Records: Foundations	3
BDSAI 5122	Electronic Health Record Analytics	3
BDSAI 5123	Advanced Multi-Omic Modeling and Systems Analysis	3

Data Science

Code	Title	Units
BDSAI 5111	Data Visualization	3
BDSAI 5112	Advanced AI Topics in Biomedical Informatics: Deep Learning, Transformers, and Large Language Models	3
BDSAI 5212	Biomedical Data Mining	3

Academic Policies

Academic policies for I²DB degree programs can be found in the Student Handbook.

Prospective Students

Those interested in applying or who would like more information may contact the program recruiter (i2db-education@wustl.edu).

Washington University School of Medicine

Institute for Informatics, Data Science and Biostatistics (I²DB)
660 S. Euclid Ave., MSC 8067-0013-05
St. Louis, MO 63110-1093

Certificate in Biomedical Informatics

The program information presented here is only for students who matriculated prior to Fall 2026/before the creation of the Biomedical Data Science and AI programs (p. 153).

The Institute for Informatics, Data Science and Biostatistics (I²DB) is pleased to offer a certificate program in biomedical informatics. The certificate program is conferred through Washington University School of Medicine.

More information about our programs can be found on the I²DB website.

Certificate Program

- 16 units
 - Four core courses (12 units)
 - 4 remaining units can be taken as a mix of Journal Club, mini-Internship, or elective credit
- One to three years to program completion
- Full-time and part-time options

Washington University School of Medicine

Institute for Informatics, Data Science and Biostatistics (I²DB)
660 S. Euclid Ave., MSC 8067-0013-05
St. Louis, MO 63110-1093

Certificate in Biostatistics and Data Science

The program information presented here is only for students who matriculated prior to Fall 2026/before the creation of the Biomedical Data Science and AI programs (p. 153).

The Institute for Informatics, Data Science and Biostatistics (I²DB) is pleased to offer a certificate program in biostatistics and data science. The certificate program is conferred through Washington University School of Medicine.

Certificate Program

- 18 units of core courses
- Full-time and part-time options

Academic Policies

Academic policies for degree programs can be found in the Student Handbook.

Washington University School of Medicine

Institute for Informatics, Data Science and Biostatistics (I²DB)
660 S. Euclid Ave., MSC 8067-0013-05
St. Louis, MO 63110-1093

Medical Education Doctor of Medicine

Admissions

Admission Requirements for the Study of Medicine

Entrance requirements for WashU Medicine include the following:

1. Evidence of superior intellectual ability and scholastic achievement;
2. Completion of at least 90 semester units of college courses in an approved college or university;
3. Completion of the Medical College Admission Test of the Association of American Medical Colleges (AAMC);
4. Completion of the AAMC PREview professional readiness exam; and
5. Evidence of character and integrity, a caring and compassionate attitude, scientific and humanitarian interests, effective communication skills, and motivation suitable for a career in medicine.



Chemistry, physics, and mathematics provide the tools for modern biology, for medicine, and for the biological basis of patient care. Thus, a firm grounding in these subjects is essential for the study of medical sciences. Entering students are expected to have accomplished at least the equivalent of one-year courses at the undergraduate level in physics and biology; mathematics through calculus; and chemistry, including one year of general or inorganic chemistry and one year of organic chemistry. Coursework in biochemistry is encouraged although not required. In addition, one semester of biochemistry can be substituted for one semester of organic chemistry. Similarly, one semester of statistics can be substituted for one semester of calculus. In selected instances, one or more of these prerequisites may be waived by the Committee on Admissions.

A major goal of undergraduate college work should be the development of the intellectual talents of the individual. This often involves the in-depth pursuit of some area of knowledge, whether in the humanities, the social sciences, or the natural sciences.

The admission requirements for the study of medicine were last reviewed by the Committee for the Oversight of Medical Student Education in August 2025.

Technical Standards Statement

Washington University welcomes diverse applicants, including those with physical, sensory, learning, psychological, and chronic disease-related disabilities. WashU Medicine is committed to advocating for its students with disabilities and to educating a medical workforce that mirrors the diversity of the national population. We aim to be leaders in accessibility and inclusion.

Individuals seeking to graduate from WashU Medicine with a Doctor of Medicine degree are expected to gain broad competence in the skills that underlie the practice of medicine and surgery. With or without accommodations, they must have the knowledge, attitudes, and skills necessary to meet WashU Medicine's educational program objectives and meet the Technical Standards outlined in the Washington University School of Medicine Technical Standards for the Medical Program (p. 451), which is available in the Policies & Guidelines section (p. 413) of this *Bulletin*.

Application Procedure

General information for prospective medical students and instructions for how to apply can be found on the Medical Student Admissions website.

WashU Medicine participates in the American Medical College Application Service (AMCAS) of the Association of American Medical Colleges. AMCAS provides a centralized system for applying to any participating medical school with only one application and one set of official transcripts of academic work.

The AMCAS Application for Admission, which is common to all participating medical schools, is available online. Applicants are urged to file their applications as early as possible.

Applicants to the first-year class must submit their AMCAS application no later than October 15 of the year prior to that in which they want to matriculate. In addition, applicants must complete a supplemental application, submit letters of recommendation, and pay a nonrefundable application fee of \$100. These materials must be received no later than October 29. The Committee on Admissions will only evaluate an application when it is complete. Fee waivers are available for participants in the AMCAS Fee Assistance Program.

Selected applicants are invited to interview. Admission decisions are made by the Committee on Admissions on a rolling schedule beginning in December. Applicants are notified as soon as a final decision has been made on their application. By April 15, every applicant will be notified whether they are accepted, not accepted, or offered a place on the alternate list.

Accepted applicants are encouraged to visit the WashU Medicine campus. Visiting the campus or attending a WashU Medicine Admissions event provides extensive opportunities for applicants to meet and talk with students and faculty members.

After the applicant has been accepted, matriculation is contingent upon sustained superior academic performance as well as continued ethical, honest and mature deportment. Accepted applicants must report to the Registrar of WashU Medicine all institutional judicial or academic sanctions and/or legal actions to which they have been a party prior to matriculation at WashU Medicine. Accepted applicants must report all institutional judicial and academic charges and/or legal charges brought against them before matriculation at WashU Medicine, where such charges could result in sanctions. Concealing or failing to report such sanctions and/or charges promptly and, more generally, failing to maintain high standards of moral and ethical behavior may result in rescission of acceptance, dismissal from WashU Medicine, or revocation of the Doctor of Medicine degree.

Acceptance Protocols

As a participant in the American Medical College Application Service (AMCAS), WashU Medicine abides by the Application and Acceptance Protocols established by the Association of American Medical Colleges and requires students to use the accompanying AMCAS Choose Your Medical School Tool. Applicants holding at least one acceptance from any medical school will have the option to "Plan to Enroll" in mid-February.

Per WashU Medicine Admissions policy, applicants who have been offered admission to WashU Medicine and who intend to matriculate at WashU Medicine should indicate that they "Plan to Enroll" through the Choose Your Medical School Tool as soon as possible but no later than May 1 of the year in which they will matriculate. WashU Medicine reserves the right to rescind offers of acceptance if an

applicant has not selected "Plan to Enroll" by May 1. After May 1, although applicants will maintain their "Plan to Enroll" status at WashU Medicine, they may continue to hold positions on the waitlists of other schools.

Beginning May 1, accepted applicants have the option to "Commit to Enroll" at WashU Medicine. When an applicant selects "Commit to Enroll" at WashU Medicine, they should notify all other institutions where they hold an acceptance or position on the waitlist that they wish to withdraw their acceptance or position from the waitlist of that school. WashU Medicine reserves the right to rescind an offer of admission to any applicant still holding an active acceptance or waitlist position at another institution while having a "Commit to Enroll" status with WashU Medicine. WashU Medicine reserves the right to rescind offers of admission from any applicant still holding a WashU Medicine acceptance while indicating that they either "Plan to Enroll" or "Commit to Enroll" at another institution after May 1.

For applicants accepted after May 1, the timeline for selecting "Plan to Enroll" will be specified by the Associate Dean for Admissions.

All MD applicants planning to matriculate at WashU Medicine should select the "Commit to Enroll" option no later than three weeks before the first day of orientation.

Should an applicant have an extenuating circumstance preventing compliance with this policy, it is the applicant's responsibility to notify the WashU Medicine Admissions Office and seek an extension or exception.

Merit-Based Scholarships

Merit-based scholarships are awarded in various amounts as funds allow. Recipients are selected based on their personal and academic accomplishments and their perceived potential to lead and contribute to the profession. All accepted students are considered for merit-based scholarships without additional applications. Please consult the Financial Information section (p. 463) of this *Bulletin* for further details.

Background Checks and Screening for Controlled Substances

Students entering WashU Medicine and who will have contact with patients are required to undergo criminal background checks and screening for controlled substances (e.g., THC/cannabis, cocaine, opiates, amphetamines, phencyclidine) to qualify for participation in patient care activities at WashU Medicine-affiliated facilities. Drug screening usually will be conducted during student orientation prior to the start of classes. Incoming prematriculant students and visiting students will be disqualified from study at WashU Medicine if they

do not consent to background checks, if they have significant positive findings on the background checks, or if they have illicit substances detected on drug screening without a bona fide medical indication. Disqualified prematriculant students and disqualified visiting students will be precluded from matriculation and will not be registered as students at WashU Medicine.

Important Dates

- AMCAS application deadline: October 15
- WashU Medicine supplemental application deadline: October 29
- "Plan to Enroll" required: May 1

Visit the Important Dates page of the Admissions website for a complete list of dates and deadlines.

Advanced Standing Transfers

Due to the specifics of the Gateway Curriculum, WashU Medicine does not accept advanced standing (transfer) students from other medical schools. For more details of this policy, please refer to the Washington University School of Medicine Advanced Standing Transfers Policy for Medical Students. (p. 453)

Visit the Medical Student Admissions website for full admissions information and to check the status of an application.

Curriculum

By conferring the MD degree, the university certifies that the student is competent to undertake a career as a doctor of medicine. It certifies further that, in addition to medical knowledge and skills, the graduate possesses qualities of personality — compassion, emotional stability and a responsible attitude — essential to an effective professional life.

Accreditation

The Washington University School of Medicine's MD program is nationally accredited by the Liaison Committee on Medical Education (LCME). The LCME is recognized by the U.S. Department of Education as an accrediting agency for medical education programs leading to the MD degree.

Most state boards of licensure require that applicants graduate from a U.S. medical school accredited by the LCME as a condition for licensure. In addition, most state boards of licensure require that U.S. applicants take and pass the United States Medical Licensing Examination (USMLE). For U.S. medical students to be eligible to



sit for the USMLE, their school must be accredited by the LCME. Graduates of LCME-accredited schools are also eligible for residency programs accredited by the Accreditation Council for Graduate Medical Education (ACGME).

The School of Medicine has determined that, as a result of its LCME accreditation, its MD program curriculum meets the educational requirements to sit for the USMLE and to pursue licensure and certification in all states and territories of the United States and Washington, DC.

For Students Entering the MD Program in July 2020 or After

The Gateway Curriculum ensures that students are not only exceptional physicians but that they are also prepared to lead the transformational changes needed to improve the future of health care delivery and the understanding of health and social determinants of health. The curriculum will include three phases.

Phase 1

Phase 1 will consist of 62 total weeks of curricular time: 1 week of orientation, 47 weeks of Integrated Science Foundational Modules, 9 weeks of Clinical Immersions, 4 weeks of the EXPLORE Immersion, and 1 week of Phase 1 Capstone.

The Integrated Foundational Science Modules will present core science content in fundamental areas (basic, clinical, social, behavioral, and health system sciences). The Clinical Immersions consist of clinical experiences that are authentic, varied in content, and appropriate for the student's level of ability. Every student will have an immersion in each of the following areas: inpatient, ambulatory, and procedural. Throughout Phase 1, there will be substantial emphasis on professional identity formation and the social, behavioral, and health systems sciences. The EXPLORE Immersion will focus on four key areas: research, medical education, advocacy/global health, and innovation.

Phase 2

Phase 2 will include 12 months (48 weeks) of clinical clerkship experiences in the content areas of Internal Medicine, Neurology, Obstetrics & Gynecology, Pediatrics, Psychiatry, and Surgery. Each clerkship will begin with one week of specialty-specific foundational science that consists of the purposeful reiteration and expansion of prior material and new material. This material will be taught in a "signs and symptoms" framework in order to facilitate core knowledge transfer to clinical reasoning. Each clerkship will end with one week dedicated to assessment, reflection, coaching, and communities (ARCC).

Phase 3

Phase 3 will consist of 56 weeks total. Students will engage in 24 weeks of required elements that will include a 4-week Internal Medicine Advanced Clinical Rotation (ACR); two 4-week ACRs (8 weeks total); two 4-week Keystone Integrated Science Courses (KISCs; 8 weeks total); and 4 weeks of Phase 3 Capstone. In addition, students will take 32 weeks of electives (clinical, research, other non-clinical). Up to 8 of the 32 weeks of elective time may be used for USMLE study (4 weeks for Step 1 and 4 weeks for Step 2). Students may use as much elective time for research time as their schedule allows after completing the requirements. During Phase 3, there are 4 weeks of School of Medicine holiday time, and students may also opt to take up to 8 weeks of unscheduled (no credit) time.

For Students Entering the MD Program Prior to July 2020

The curriculum includes a core experience based upon a sequence of courses that introduces students to the many domains and disciplines of medicine. The principles, methods of investigation, problems and opportunities in each of the major disciplines of medical science and medical practice are presented in such a way as to help students select the career best suited to their abilities and goals. Through all four years of the curriculum, key topics known as *Threads* are woven throughout the learning experience, linking clinical and course work and enhancing the learning experience.

The preclinical curriculum provides a science and investigative foundation for future clinical practice. First-year and second-year course work combines basic science taught via a variety of didactic means, including lectures, small groups, simulations and case-based learning. It also includes a Practice of Medicine course that uses regular patient interactions and integrative cases to teach students to skillfully interview and examine patients while integrating current health disparities and issues in the present global spectrum.

In addition, students have the opportunity during their first year to complete four 10-hour selective courses in the humanities, the basic sciences, and various clinical areas, which provides enrichment and in-depth focus on areas beyond the core curriculum. The preclinical curriculum is pass/fail.

The overall goal of the third year is the implementation of the fundamental interactive clinical skills necessary for the practice of medicine at the highest possible level of excellence. Students achieve this goal by participating in intensive, closely supervised training experiences in the core clinical clerkships, which involve inpatient and ambulatory settings and interactions with patients who present a spectrum of emergent, urgent, routine and chronic clinical problems. Through these experiences, students exhibit growth

and maturation in their abilities to take medical histories, perform complete physical examinations, synthesize findings into a diagnosis, formulate treatment plans, and document and present information in a concise, logical and organized fashion.

During the final year of the medical school curriculum, the required elective program helps students to decide where their major interests lie. It also enables them to benefit from the wide range of specialized knowledge and skills found in the faculty, and it lays the foundation for lifelong learning and the application of principles. The elective program permits students to select, according to their desires, the areas that they wish to explore or to study in depth. The fourth year also offers students the opportunity to synthesize the learning from the third year in preparation for clinical residency. Toward this end, students are required to complete a Capstone course prior to graduation.

Washington University School of Medicine Medical Student Program Objectives

The educational program is designed to ensure that each student will demonstrate the following:

Foundational Knowledge for Practice

1. Demonstrate knowledge of normal human structure and function at the molecular, genetic, cellular, tissue, organ-system and whole-body level in growth, development and health maintenance.
2. Demonstrate knowledge of the epidemiology and basic mechanisms involved in the pathogenesis of common human diseases and their influence on clinical presentation and therapy.

Patient Care

1. Obtain appropriate medical histories that include psychosocial and behavioral factors that influence health.
2. Perform accurate physical examinations.
4. Formulate a prioritized differential diagnosis based on the patient's risk factors and clinical presentation.
5. Develop individualized diagnostic and treatment plans across the broad spectrum of acute and chronic conditions.

Interpersonal and Communication Skills

1. Demonstrate respectful and effective verbal and nonverbal interpersonal and communication skills with patients, families, colleagues, and all members of the educational and health care teams.

2. Discuss preventive strategies and diagnostic and treatment options in a manner that will facilitate the participation of patients and their families in shared decision making.
3. Maintain accurate and thorough medical records.
4. Provide succinct and organized oral patient presentations.
5. Work collaboratively and effectively in teams.

Professionalism

1. Maintain a professionally appropriate demeanor.
2. Exhibit high standards of professional integrity.
3. Apply legal and ethical principles governing the physician-patient relationship.

Systems-Based Practice

1. Recognize the roles of various members of the interprofessional health care team and the scope of their practice.
2. Recognize barriers to and facilitators of high-value patient care, where value equals quality over cost.
3. Demonstrate the ability to identify medical errors when they occur, and describe the individual, team, and/or system factors that may contribute to them.

Practice-Based Learning and Improvement

1. Demonstrate the skills needed for lifelong learning, including the ability to identify and address personal strengths and weaknesses, to incorporate formative feedback, and to self-assess knowledge and performance to develop a self-improvement plan.
2. Apply an evidence-based approach to selecting, appraising and utilizing evidence from scientific studies related to clinical questions and patients' health problems.

Contact Information

For additional information or specifics about the MD curriculum, please use the following contact information:

Washington University School of Medicine
Office of Medical Student Education
Bernard Becker Medical Library, 3rd Floor
MSC 8033-12-167
660 S. Euclid Ave.
St. Louis, MO 63110
Hours: 8:00 a.m. to 5:00 p.m., Monday through Friday
Phone: 314-273-6673
Fax: 314-362-6951
MD Program Website



Core Requirements

Gateway Curriculum

Phase 1 Core Courses

Total number of weeks: 66

Integrated Foundational Modules

Specifically regarding the foundational sciences content, what is depicted here is intended to provide a reasonable approximation of how the content could be disbursed across curricular units and to provide a general indication of relative amounts of coverage time allotted to content areas. Modules will include the following:

Code	Title	Units
MEDPHASE1 5001	Transition to Gateway	1
MEDPHASE1 5002	Health and Homeostasis	7
MEDPHASE1 5005	Defense & Response to Injury	7
MEDPHASE1 5010	Circulation & Breathing	8
MEDPHASE1 5030	Ins & Outs	7
MEDPHASE1 5040	Metabolism & Reproduction	3
MEDPHASE1 5045	Scaffolding & Movement	5
MEDPHASE1 5050	Brain & Behavior	7
MEDPHASE1 5055	Phase 1 Capstone	1

Clinical Immersions

Courses in the Clinical Immersions will include the following:

Code	Title	Units
MEDPHASE1 5015	Clinical Immersion: Ambulatory/Ed	3
MEDPHASE1 5020	Clinical Immersion: Inpatient	3
MEDPHASE1 5025	Clinical Immersion: Procedural	3

EXPLORE Immersion

Code	Title	Units
MEDPHASE1 5035	Explore Immersion	4

Step Preparation

Code	Title	Units
MEDPHASE1 5060	Step Preparation	4

Phase 2 Core Courses

Total number of weeks: 49

Code	Title	Units
MEDPHASE2 6001	Transition to Clerkships	1
MEDPHASE2 6010	Internal Medicine Clerkship - Patient Care	8
MEDPHASE2 6110	Surgery Clerkship - Patient Care	8
MEDPHASE2 6210	Pediatrics Clerkship - Patient Care	8
MEDPHASE2 6310	Psychiatry Clerkship - Patient Care	8
MEDPHASE2 6410	Neurology Clerkship - Patient Care	8
MEDPHASE2 6510	Obstetrics & Gynecology Clerkship - Patient Care	8

Phase 3 Core Courses

Total number of weeks: 64

Advanced Clinical Rotations (ACRs)	12 weeks/credits total inclusive of Internal Medicine ACR. The remaining two must be completed at WUSM.
Keystone Integrated Science Courses (KISCs)	8 weeks/credits total of KISCs (MSTP students complete 0 KISCs)
Phase 3 Capstone	MEDPHASE3 8040
Electives	32 weeks/credits total. May include four weeks of dedicated USMLE Step Exam study time (MEDPHASE3 8010), if necessary. Students may also take 1-12 weeks/credits of an Away Elective (MEDPHASE3 9998) or 1-4 weeks of an International Away Elective (MEDPHASE3 9999).

* Course numbers and descriptions can be found in Workday.

Additional Graduation Requirements

- All students must pass the Comprehensive Clinical Exam (CCX) (MEDICINE 8330 Comprehensive Clinical Exam).
- All students are required to take the USMLE Step 1 and Step 2CK examinations prior to graduation.

Department-Based Courses

- Anesthesiology (p. 209)
- Biochemistry and Molecular Biophysics (p. 223)
- Cell Biology and Physiology (p. 228)
- Developmental Biology (p. 233)
- Genetics (p. 238)
- Medicine (p. 243) (Internal Medicine)
- Molecular Microbiology (p. 253)
- Neurology (p. 256)
- Neuroscience (p. 272)

- Neurosurgery (p. 277)
- Obstetrics and Gynecology (p. 282)
- Ophthalmology and Visual Sciences (p. 293)
- Orthopaedic Surgery (p. 302)
- Otolaryngology (p. 309)
- Pathology and Immunology (p. 316)
- Pediatrics (p. 326)
- Psychiatry (p. 361)
- Radiation Oncology (p. 373)
- Radiology (p. 378)
- Surgery (p. 393)

Research

Students pursuing the Doctor of Medicine degree may receive elective credit for research projects completed during their fourth year. For additional information about the enrollment process and to learn more about research elective opportunities, please email the Electives Office (wusmelectives@wustl.edu).

Research opportunities are not mandatory, but the majority of MD students participate in some form of research during their educational career at Washington University School of Medicine. Our Medical Student Research Program provides a wide array of research opportunities to complement different student interests and to suit various career paths. For more information about these research opportunities and the application process, please reference the Office of Medical Student Research website.

Faculty

2024-25 Course & Clerkship Directors

Thread Leads

Basic Sciences Thread

Amy Bauernfeind, PhD (Anatomy & Embryology/Development)
Linda Pike, PhD (Biochemistry)
Ian Hagemann, MD, PhD (Genetics & Genomics)
Erika Crouch, MD, PhD (Pathology & Histology)
Simon Haroutounian, PhD, MSc (Pharmacology)
Lai Kuan Dionne, PhD (Physiology)

Basic/Clinical Sciences Thread

Nigar Kirmani, MD (Microbiology & Infectious Diseases)
Ashley Veade, MD (Women's & LGBTQIA+ Health)

Clinical Sciences Thread

Jonathan Mullin, MD (Clinical Skills & Diagnostic Reasoning)
Timothy Yau, MD (Clinical Skills & Diagnostic Reasoning)
Suzanne Thibodeaux, MD, PhD (Laboratory Medicine)
Michelle Miller-Thomas, MD (Radiology)

Social, Behavioral, and Health Systems Sciences Thread

Jay Piccirillo, MD, FACS (Clinical Epidemiology & Evidence-Based Medicine)
Piroska Kopar, MD (Ethics & Law)
Radhika Jain, MD (Health Equity & Justice)
Kaytlin Reedy-Rogier, MSW (Health Equity & Justice)
TBD (Health Systems Science)
Dennis Chang, MD (Interprofessional Collaboration)
Colleen Wallace, MD (Professional Identity Formation)
Aimee James, PhD, MPH (Public/Population Health)

Coaching

Nichole Zehnder, MD
Amjad Musleh, MD

Phase 1

Module 1: Molecules to Society

Colleen Wallace, MD
Amy Bauernfeind, PhD

Module 2: Defense and Response to Injury

Erika Crouch, MD, PhD
Brian Edelson, MD, PhD

Module 3: Circulation and Breathing

Justin Sadhu, MD, MPH
Jeffrey Atkinson, MD

Module 4: Ins and Outs

Steven Cheng, MD
Sandeep Tripathy, MD, PhD

Module 5: Metabolism and Reproduction

Linda Pike, PhD
Marina Litvin, MD
Amy Riek, MD

Module 6: Scaffolding and Movement

Kari Allen, PhD
Mariam Malik, MD
Allyson Zazulia, MD

Module 7: Brain and Behavior

Allyson Zazulia, MD
Brendan O'Connor, MD

Phase 1 Capstone

Steven Lawrence, MD, MSc

Immersion Lead

Steven Lawrence, MD, MSc

Ambulatory/ED Immersion

Kaytlin Reedy-Rogier, MSW
Heidi Tastet, MD

Procedures Immersion

Michelle Miller-Thomas, MD
Erica Traxel, MD

Inpatient Immersion

Dennis Chang, MD

TBD

EXPLORE

Terrance Kummer, MD, PhD (Director, Explore Inquiry Lead)
Sara Greer, MD (Education Pathway Lead)
Koong-Nah Chung, PhD (Research Pathway Lead)
Dorina Kallogjeri, MD, MPH (Research Pathway Lead)
Darrell Hudson, PhD, MPH (Advocacy/Global Health Pathway Lead)
Caline Mattar, MD (Advocacy/Global Health Pathway Lead)
Linda Wu, DO (Innovation Pathway Lead)

Phase 2 Clerkships

Integrated Surgical Disciplines Clerkship

Bethany Sacks, MD, Med, FACS (Director)
T.K. Pandian, MD, MPH (Associate Director)

Medicine Clerkship

Lisa Zickuhr, MD, MHPE (Director)
Prashanth Thakker, MD (Associate Director)

Neurology Clerkship

Douglas Larsen, MD, MEd (Director)
Salim Chahin, MD, MSCE (Associate Director)

Obstetrics and Gynecology Clerkship

Tammy Sonn, MD, FACOG (Director)
Katherine Massa, MD (Associate Director)

Pediatrics Clerkship

Laura Hall, MD (Director)
Sarah Bram, MD (Associate Director)

Psychiatry Clerkship

Max Rosen, MD (Director)
Brendan O'Connor, MD (Associate Director)

Phase 3 Keystone-Integrated Science Courses (KISCs)

Advancing End-of-Life Care

Ellen Binder, MD
Brian Carpenter, PhD
Patrick White, MD, HMDC, FACP, FAAHPM

Comprehensive Approach to Disability

Thy Huskey, MD
Kerri Morgan, PhD, ORT/L, ATP

Diabetes Care from A to Z

Linda Pike, PhD
Maamoun Salam, MD
Alexis McKee, MD, CDCES

Holistic and Interdisciplinary Approach to Surgical Critical Care

Justin Knittel, MD
Jessica Nelson, MD

Infectious Diseases and Health Equity

Caline Mattar, MD
Darrell Hudson, PhD, MPH

Integrated Oncology: Basic, Clinical, and Social Science Perspectives

Jason Frankel, MD
Erica Waters, PhD, MPH

Introduction to Addiction Medicine

Kevin Baumgartner, MD
David Liss, MD

Multidisciplinary Adult Neuro-Oncology

Albert Kim, MD, PhD
Michelle Miller-Thomas, MD
Sonika Dahiya, MD

Pediatric Neurocritical Care: Onset to Outcomes

Jennifer Griffith, MD, PhD
Mary Hartman, MD, MPH

Precision Medicine: Incorporating Genomics into Cutting-Edge

Patient Care

Ian Hagemann, MD, PhD
Felicia Gomez, PhD

Recognizing and Mitigating Maternal and Infant Health Disparities

Colleen Wallace, MD
Jeannie Kelly, MD, MS

Science, Medicine, and Societal Effects of Pain

Jordan McCall, PhD, MPH
Loc Thang, MD, PhD

Phase 3 Advanced Clinical Rotations (ACRs)

Pediatrics

Sarah Bram, MD

Plastic and Reconstructive Surgery

Joani Christensen, MD

Psychiatry

Marcie Garland, MD

Radiation Oncology

Maria Thomas, MD, PhD

Surgical Critical Care

Justin Knittel, MD
Jessica Nelson, MD

Urologic Surgery

Erica Traxel, MD
Gregory Murphy, MD

Phase 3 Elective Courses and Capstone

Fourth-Year Electives

Faculty members within all departments and divisions at Washington University School of Medicine offer a vast selection of clinical elective rotations and independent study opportunities for students in their final year of the MD program.

Fourth-Year Capstone

Tosin Adeyanju, MD
Michael DeVita, MD, FACP
Suzanne O’Nan, MD
T.K. Pandian, MD, MPH

Courses

- MEDPHASE 1 Courses (p. 164)
- MEDPHASE 2 Courses (p. 166)
- MEDPHASE 3 Courses (p. 167)

MEDPHASE 1

MEDPHASE1 5001 Transition to Gateway

Transition to Gateway Orientation will consist of both online and in person sessions to prepare students for the curriculum.
Credit 1 unit.

Typical periods offered: Medicine Year

MEDPHASE1 5002 Health and Homeostasis

Module 1 is organized around the concepts of health and homeostasis, the ability of the body to maintain stable internal conditions despite changes in the external environment. Students will explore mechanisms by which the human body preserves a balanced state and the tools available to physicians to evaluate and support a patient’s health. The Module applies these concepts across the age spectrum and applies basic and clinical science, health systems, and social-behavioral considerations through four patient care well-visit scenarios.

Credit 7 units.

Typical periods offered: Medicine Year

MEDPHASE1 5005 Defense & Response to Injury

Module 2 builds on the first module to broadly examine host defense and the ways complex systems can be compromised or fail and thereby contribute to loss of health. This foundational knowledge is first applied to the skin, but lays foundations for all the subsequent Phase 1 modules, which examine health and disease in the context of the other major organ systems of the body. Additionally, health and disease will be examined through the lens of social and structural determinants in most strands as the module progresses. The module is organized as a series of seven strands or units: 1. Introduction - The Big Picture provides an overview of the module. 2. Cellular Homeostasis and Cell Injury examines how cells maintain homeostasis and adapt to stress, as well as the etiologies and mechanisms of cell injury and pathologic cell death. 3. Host Defense examines the important roles of innate and acquired immunity, how abnormal immune regulation can contribute to tissue damage, and the processes of wound healing and tissue repair. 4. Microbial Pathogenesis examines our diverse interactions with microorganisms and the clinical manifestations of infection. 5. Hemostasis examines how platelets and coagulation factors minimize blood loss in the face of damage to blood vessels, as well as the clinical consequences of hemorrhage and abnormal clotting. 6. Neoplasia builds on knowledge of normal cellular growth to examine how genetic and environmental factors contribute to the development of benign and malignant neoplasms. It examines the potential clinical manifestations and clinical approaches to cancer. 7. Approach to Skin Disease examines the manifestations of common cutaneous

disorders and how the skin can inform physicians of systemic disease. Each of the above units contributes to our ongoing discussion of patients, physicians, societies, and systems. In the context of these units we examine: the core foundational concepts of medical ethics. how physicians can contribute to the recognition of disorders related to environmental agents and the tools physicians have to advocate for the health of affected populations. how healthcare systems can fail and contribute to poor health of the populations they are intended to serve. how physicians and other healthcare professionals can act to enhance the healthcare of underserved populations and mitigate systemic deficiencies that contribute to health inequities. how epidemiological studies and clinical informatics contribute to healthcare and their potential future roles. the growing problems of antimicrobial resistance and decreased rates of vaccination on population health and patient care. We also examine the vast implications of epidemics and pandemics. how cancer screening programs can contribute to the early recognition and expeditious treatment of preneoplastic disorders and cancers, but may also lead to unnecessary medical interventions. In addition, there are parallel activities in relation to clinical skills, Health Equity and Justice, and professional development.

Credit 7 units.

Typical periods offered: Medicine Year

MEDPHASE1 5010 Circulation & Breathing

This module provides an overview of the systems of perfusion (delivery of blood to tissues) and gas transport and exchange. Throughout the module, knowledge of typical organ structure and function will lay the foundation for discussions of health and disease in these systems, while integrating core concepts of patients, physicians, societies, and systems. Afternoon sessions will focus on further developing students’ clinical skills and professional identity in preparation for Immersion I. Community engagement activities will continue in parallel. Weeks 1-5 focus primarily on the cardiovascular system, and weeks 6-8 cover the respiratory system. These systems are further subdivided into topics: Cardiovascular: 1. Regulation and dysregulation of blood pressure - examines the physiologic mechanisms that regulate blood flow, volume, and pressure. 2. Coronary circulation and ischemic heart disease - examines disease resulting from impaired perfusion of the heart. 3. Heart failure - examines diseases that result from abnormalities of heart contractility or filling. 4. Pericardial diseases. 5. Valvular heart disease - examines diseases secondary to disrupted mobility or integrity of the heart valves; infections of the heart valves and bloodstream are also included here. 6. Vascular disease - examines diseases of the aorta, large arteries, and veins. 7. Congenital heart disease - examines disorders resulting from abnormal embryogenesis of the heart. 8. Arrhythmias - examines disorders of the electrical activity of the heart. Respiratory: 1. Ventilation - examines the movement of air into and out of the lungs. 2. Red blood cells & Gas exchange - examines the acquisition and transportation of oxygen and carbon dioxide to and from the lung. 3. Pathogens - examines infections of the airways and alveolar spaces. 4. Interstitial lung disease - examines diseases that alter the compliance of the lung. 5. Chest wall/pleural cavity - examines the impact of structures outside the lung and airways on breathing. 6. Pulmonary vascular disease - examines the vascular bed of the lung and pressure volume relationships with the heart. Patients, Providers, Systems, and Societies: This Patients, Providers, Systems, and Societies (PPSS) content is woven into the sessions across the weeks. Dedicated PPSS sessions will reinforce and synthesize the content with other module content. Topics covered include: 1. Public Health - includes novel models for healthcare delivery; treatment adherence; tobacco control and smoking cessation; infectious lung diseases; and disparities and health equity. 2. Quality Improvement, Health Systems, and Health Policy - using Process Mapping as a quality improvement tool and to understand health care seeking; health policy in cardiovascular disease. 3. Environmental and community factors affecting breathing and circulation - highlighting instances such as hypertension, asthma,



and occupational health where environment and setting are key contributors. 4. Clinical Epidemiology - builds on prior modules, and adds cardiovascular cohort studies, and efficacy/effectiveness studies. 5. Ethics - Informed consent, treatment refusal, shared decision making.

Credit 8 units.

Typical periods offered: Medicine Year

MEDPHASE1 5015 Clinical Immersion: Ambulatory/Ed

Throughout Phase 1, students will have three three-week clinical immersions encompassing three settings: ambulatory/ED, procedural/surgical, and inpatient medical. The Immersions are not intended to be a deep dive into the content of a specific specialty, rather, the experiences are designed to integrate all aspects of medical practice including social determinants of health, patient experiences, interprofessional education, health systems, foundational sciences, and clinical skills.

Credit 3 units.

Typical periods offered: Medicine Year

MEDPHASE1 5020 Clinical Immersion: Inpatient

Throughout Phase 1, students will have three three-week clinical immersions encompassing three settings: ambulatory/ED, procedural/surgical, and inpatient medical. The Immersions are not intended to be a deep dive into the content of a specific specialty, rather, the experiences are designed to integrate all aspects of medical practice including social determinants of health, patient experiences, interprofessional education, health systems, foundational sciences, and clinical skills.

Credit 3 units.

Typical periods offered: Medicine Year

MEDPHASE1 5025 Clinical Immersion: Procedural

Throughout Phase 1, students will have three three-week clinical immersions encompassing three settings: ambulatory/ED, procedural/surgical, and inpatient medical. The Immersions are not intended to be a deep dive into the content of a specific specialty, rather, the experiences are designed to integrate all aspects of medical practice including social determinants of health, patient experiences, interprofessional education, health systems, foundational sciences, and clinical skills.

Credit 3 units.

Typical periods offered: Medicine Year

MEDPHASE1 5030 Ins & Outs

All of us are perpetually burning energy to maintain life-sustaining processes, and we rely on our Gastrointestinal and Renal/Urinary systems to work in tandem, bringing in new fuel and taking out generated waste products. The Ins and the Outs - one can't function without the other, and the human body can't function without either one. But how does food become fuel? How do we separate metabolic trash from nutrient-rich treasure? And what happens when one part of the system (a cell, a structure, an organ, a person, or a community) is traumatized? This 7-week course will take you on a journey through the gastrointestinal and renal/urinary systems of the human body. We'll discuss the beautiful engineering of normal function, the disruptive mechanisms of disease processes, the diverse manifestations in our patients, and the profound impacts on our society. Welcome to Module 4: The Ins and the Outs.

Credit 7 units.

Typical periods offered: Medicine Year

MEDPHASE1 5035 Explore Immersion

The EXPLORE Immersion is four weeks of dedicated time to (1) learn the foundations of scholarship through the Inquiry Curriculum and (2) gain knowledge and skills in the pathway you've selected. The EXPLORE immersion is also intended to be a time of personal growth and exploration, where students have flexible time to network, find mentors, or work on scholarly projects. All non-MST students will participate in both the Inquiry and Pathway components of the EXPLORE Immersion. The Inquiry Curriculum will prepare students to be responsible and impactful scholars in any of the four pathways. This curriculum purposefully builds upon content students have learned in prior modules, such as critical appraisal of research, thinking about systems of care and the health of populations and translation of evidence to patient care. This curriculum also revisits and builds upon content from Community Engagement and Patients, Physicians, Societies, and Systems in relation to scholarship. In the afternoons, student curriculum will depend on the Pathway they've selected to participate in. The Pathway Leads have designed curricula targeting the critical knowledge and skills needed for physicians to succeed in scholarly work and other career aspects of that Pathway. The Pathway curricula have also been designed to build upon both prior module content related to that Pathway and the Inquiry Curriculum, allowing students to see the connections between their respective Pathway and their training in the Gateway Curriculum. Since the Pathways represent smaller communities of students, it is our hope that the Pathways within EXPLORE will allow students to develop a network of both peers and faculty members with whom they may connect and grow with throughout their time here at WashU.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE1 5040 Metabolism & Reproduction

Module 5 is six weeks long and is made up of three inter-related topic areas: 1. Metabolism and Nutrition: this includes a discussion of what you need to eat to maintain a healthy body and how this material is biochemically converted into the chemical energy you need to live. It also includes a description of how this homeostasis is dysregulated in obesity and diabetes. 2. Endocrinology: this section provides an in-depth look at the endocrine glands, the hormones they produce, and the systems that they regulate. It also includes a discussion of bone and mineral metabolism and growth from birth through adolescence. 3. Reproduction: in this section, you will study the reproductive tracts across the gender spectrum as well as pregnancy and parturition. This section also includes discussion of hormonal use across the lifespan, public health issues in reproductive medicine, and sessions on contraception, abortion, and the use of reproductive technologies.

Credit 3 units.

Typical periods offered: Medicine Year

MEDPHASE1 5045 Scaffolding & Movement

The Scaffolding and Movement module will focus on the what and how of human movement and the necessary scaffolding-anatomical and societal structures-that supports this movement. Learners will integrate their knowledge of neuromusculoskeletal structure and function with the many factors, from the level of the cell to society, that allow an individual to move through their environment and participate fully in their community across the lifespan.

Credit 5 units.

Typical periods offered: Medicine Year

MEDPHASE1 5050 Brain & Behavior

The final module of Phase 1 of the Gateway Curriculum, Brain & Behavior, will uncover the beautifully complex human brain that allows you to be, feel, think, learn, do, and interact with and change the world around you. While the nervous system plays a role in the function of every organ within the body, and every organ within the

body can impact the function of the nervous system, the clinical disciplines of neurology, psychiatry, neurosurgery, neuroradiology, neuropathology, ophthalmology, otolaryngology, and pain medicine have their primary homes in this module. Importantly, Module 7 will heavily use and build upon knowledge gained in Module 6, reflecting the continuum of the nervous system that extends from the brain through to the nerves and muscles they innervate.

Credit 7 units.

Typical periods offered: Medicine Year

MEDPHASE1 5055 Phase 1 Capstone

Phase 1 Capstone

Credit 1 unit.

Typical periods offered: Medicine Year

MEDPHASE1 5060 Step Preparation

This course is to allow for dedicated study time for USMLE Step 1 and Step 2. It is only for Phase 1 students in the Doctor of Medicine program.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE 2

MEDPHASE2 6001 Transition to Clerkships

This course is designed to onboard students into the Gateway clerkships.

Credit 1 unit.

Typical periods offered: Medicine Year

MEDPHASE2 6010 Internal Medicine Clerkship - Patient Care

The Medicine Clerkship provides supervised study of adult medicine patients in the inpatient and ambulatory settings. During inpatient rotations, students are assigned as clinical clerks to patients admitted to the teaching services of Barnes-Jewish Hospital and the Veterans Administration Medical Center. For outpatient rotations, students learn ambulatory care in internal medicine, family medicine, and medicine subspecialty clinics at Barnes-Jewish Hospital, the Veterans Administration Medical Center, or community-based practices. The eight weeks of the clerkship are distributed among one Foundational Week, six weeks of clinical experiences, and one Assessment, Reflection, Coaching, and Community (ARCC) Week.

Credit 8 units.

Typical periods offered: Medicine Year

MEDPHASE2 6110 Surgery Clerkship - Patient Care

The Gateway Curriculum Phase 2 surgery clerkship will consist of eight weeks. The experience will include one foundational week, six weeks of clinical experience, and a final week of Assessment, Reflection, Community, and Coaching (ARCC) events.

Credit 8 units.

Typical periods offered: Medicine Year

MEDPHASE2 6210 Pediatrics Clerkship - Patient Care

The emphasis of the Pediatric Clerkship will be on common pediatric illnesses, injuries, and normal development. We also want you to experience the unique opportunity within Pediatric medicine to care for patients from infancy through adolescence and into adulthood. Each age presents its own challenges, and its own rewards. To help expose our students to each age and stage within Pediatrics, our students

will rotate on inpatient pediatric teams at St Louis Children's Hospital, attend newborn deliveries and participate in the newborns care, and spend time in an acute care setting with a focus on bread and butter chief complaints. We are very excited to hear from any students considering Pediatrics as a career and look forward to a long-term relationship with you where you will learn much more about Pediatrics than we can teach in 8 weeks. We feel this clerkship is most essential, however, for those students who will NOT become pediatricians as this short time may be the only experience you will have learning about Pediatrics. Some basic Pediatric knowledge is essential for any physician. At some point, someone will almost certainly approach you in your personal life with questions about their children, and we want you to be competent and comfortable to triage these concerns. If you can determine whether a child is in imminent danger, should probably see a pediatrician in the near future, or is totally fine - we will consider your time in Pediatrics to have been a success.

Credit 8 units.

Typical periods offered: Medicine Year

MEDPHASE2 6310 Psychiatry Clerkship - Patient Care

Psychiatry is the specialty of medicine that focuses on the prevention, evaluation, and treatment of mental disorders. Mental disorders are disorders of the mind, by which we mean what results from the operation of specific brain networks that underlie the mental trilogy of cognition, emotion, and motivation (From Synaptic Self by Joseph Le Douarin, 2002). Regardless of the specialty you end up choosing, it is very likely that you will take care of patients with severe mental illness (SMI). SMI is common, and ranks as one of the top causes of disability worldwide and in the United States alike. Washington University School of Medicine is committed to the education of tomorrow's leaders in biomedicine and our mission requires a solid foundation in the knowledge, skills, and attitudes required to care for people with mental disorders.

Credit 8 units.

Typical periods offered: Medicine Year

MEDPHASE2 6410 Neurology Clerkship - Patient Care

As students experience the neurology clerkship, they will build on their knowledge of neuroanatomical localization and neurophysiology to diagnose, treat, and care for patients with a wide array of neurological disorders. Students will develop their skills in the neurological history and exam in a variety of inpatient and ambulatory settings. They will learn the various therapeutic modalities that are used to improve the lives of patients with neurological conditions. Students will experience the interprofessional aspects of neurological care and explore medical disciplines closely connected to neurology. The overarching emphasis of the clerkship will be to provide learning experiences through active participation in patient care.

Credit 8 units.

Typical periods offered: Medicine Year

MEDPHASE2 6510 Obstetrics & Gynecology Clerkship - Patient Care

The Obstetrics and Gynecology (OB/GYN) clerkship enables students to apply foundational knowledge gained in Phase 1 in the context of reproductive health and disease across a wide range of clinical environments and clinical conditions. Students will be exposed to and learn about obstetrics, gynecology, and associated subspecialties. The eight-week clerkship is divided into five parts: 1. Foundational Week - 1 week 2. Labor & Delivery (L&D) Rotation - 2 weeks 3. Inpatient Gynecology Rotation - 2 weeks 4. Ambulatory Rotation - 2 weeks 5. ARCC Week - 1 week Core OB/GYN clinical topics are introduced over the foundational week of the clerkship, using a variety of instructional methods. During the two-week L&D rotation, students work with the resident team and many delivering physicians. Students will be asked to work 8 hour shifts that can be in either the day, evening, or night times. L&D will offer experiences that largely are learning how



to appropriately follow patients along labor curves and learning what management efforts are done to assist routine vaginal deliveries. Both delivery types will be attended routinely by students. When on this rotation, shifts in the Women's Assessment Center (WAC) otherwise known as OB Triage will give students first hand encounters in learning how to workup common OB concerns. Another two-week rotation will be Inpatient Gynecology (Gyn) and will involve a combination of intraoperative management and inpatient evaluation of perioperative patients. Various Gyn subspecialty exposures will include Gynecologic Oncology (GynOnc), Urogynecology (Urogyn), Minimally Invasive Gynecologic Surgery (MIGS), and Benign Gynecology. The final two-week rotation will be in ambulatory settings that are largely general OBGYN which is bread and butter OBGYN that most correlates to clerkship objectives. Additionally, you may have various subspecialty exposures giving you further insight into ambulatory care. The clerkship ends with ARCC: Assessment, Reflection, Coaching & Community, during which assessments take place, as well as several sessions designed to help students reflect on what they learned, how the specialty works to maintain the health of communities, and how complex ethical and legal issues are addressed in OBGYN.

Credit 8 units.

Typical periods offered: Medicine Year

MEDPHASE 3

Anesthesiology

ANESTH 8000 General Anesthesiology (Clinical Elective)

This clinical elective is designed to familiarize the student with basic aspects of anesthesiology practice. The primary teaching method is patient care in a clinical setting. The student will learn the basics of preoperative evaluation of surgical patients, the use of intraoperative monitoring inpatient management and postoperative care. In addition to perioperative care, the student will be exposed to other clinical areas which include our pain management clinic, regional anesthesia / acute pain management, cardiothoracic intensive care unit, labor and delivery, pediatric anesthesia, and the Center for Preoperative Assessment and Planning.

During the four-week rotation, the student will learn airway management skills, basic IV skills, practical perioperative fluid and electrolyte therapy, along with general and regional anesthetic techniques. As an integral part of the anesthesia care team, the student will participate actively in the anesthetic management of surgical patients.

The student's specific requests to be assigned to certain types of cases will be honored as time and availability dictate. The rotation will include at least one clinical simulator session using a simulator mannequin for practical management of airway problems. NOTE: Presence and participation in Presentation on the last day of the rotation are required to receive a grade.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8010 Cardiothoracic Anesthesiology (Clinical Elective)

This clinical elective offers practical experience in the perioperative assessment and management of surgical patients undergoing cardiothoracic procedures. The student, as an integral part of the cardiothoracic anesthesia team that is composed of faculty members, fellows and residents, will learn basic principles of airway management

and lung ventilation, essential aspects of pharmacologic treatment of hemodynamic abnormalities and cardiac dysrhythmias, and management of intraoperative coagulation disturbances. Emphasis will be placed on the interpretation of intraoperative hemodynamic data, echocardiographic finding (TEE), and laboratory results. During this rotation, the student will also gain practical experience in endotracheal intubation as well as the placement of intravenous lines and invasive monitoring lines, including radial artery and pulmonary artery catheters. Students will learn how to use these parameters in clinical decision making during anesthesia. At the conclusion of the rotation, the student will have a better understanding of invasive monitoring and data interpretation, as well as a more systematic approach to the management of intra- and post-operative hemodynamic, pulmonary and coagulation abnormalities. The students are expected to attend the didactic sessions of CTA and the Department of Anesthesiology.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8015 Pediatric Anesthesiology (Clinical Elective)

The primary goal of this rotation is to gain exposure to the field of anesthesiology within the pediatric patient population. This elective provides the opportunity to take part in anesthetics across the range of surgeries and procedures, patient age, and acuity. With the entire elective taking place at St. Louis Children's Hospital, learners are able to observe the differences in physiology, medical/surgical problems, and patient care considerations in pediatric patients.

Credit 2 units.

Typical periods offered: Medicine Year

ANESTH 8020 CTICU: Cardiothoracic Intensive Care Unit (Clinical Elective)

This clinical elective offers practical experience in the postoperative management of cardiothoracic patients. The student will be fully integrated into one of the intensive care teams and have the opportunity to contribute to the management of critically ill patients. Students will have the opportunity to follow specific patients over the course of their stay in the ICU, during which time they will gain insight into holistic management of patients with multi-organ dysfunction.

The CTICU environment is both challenging and exciting. Students will gain unique insight into cardiorespiratory physiology and pharmacology which will be demonstrated at the patients' bedside, an invaluable and unforgettable learning experience. Students will have opportunities to learn and sometimes assist with procedures, such as central lines, chest tubes, bronchoscopy and pulmonary artery catheter insertion as well as bedside ultrasound including TTE and TEE. Principles of management and resuscitation of hemodynamically unstable patients following surgery will be emphasized as well as ventilator management. Students will also see and help manage patients with unique physiology such as those patients on ventricular assist devices, and on ECMO. We also have a very busy and heart and lung transplantation program at the hospital - all of these patients are cared for in the CTICU.

At the conclusion of the rotation, the student will have a better understanding of shock, sepsis, multi-organ failure, organ system support and compassionate withdrawal of life support. In addition to bedside teaching, there will be informal teaching sessions on a wide variety of topics as well as teaching on interpreting hemodynamic data and waveforms, and cardiac echo exams. Students will be encouraged to present on their patient at morning rounds, during which constructive feedback and interactive teaching will occur. Medical students will be asked to present a short discussion on a topic of their choice. This should be a short 20 - 30 minute presentation followed by a discussion on the topic which will be moderated by the attending. Discuss the time and topic of choice with the attending of service.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8030 Pain Management (Clinical Elective)

Acute pain is the most common symptom of medical illness and is ubiquitous after major surgery. Chronic pain is the leading cause of worker disability. Severe pain afflicts most people with advanced cancer. Learning the fundamentals of pharmacologic, interventional, and multidisciplinary pain management is important for all areas of clinical medicine.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8040 Anesthesiology for Neurosurgery (Clinical Elective)

This clinical elective is designed to familiarize the student with basic aspects of anesthesiology practice. The primary teaching method is patient care in a clinical setting. The student will learn the basics of preoperative evaluation of surgical patients, the use of intraoperative monitoring inpatient management and postoperative care. In addition to perioperative care, the student will be exposed to other clinical areas which include our pain management clinic, regional anesthesia / acute pain management, cardiothoracic intensive care unit, labor and delivery, pediatric anesthesia, and the Center for Preoperative Assessment and Planning. During the four-week rotation, the student will learn airway management skills, basic IV skills, practical perioperative fluid and electrolyte therapy, along with general and regional anesthetic techniques. As an integral part of the anesthesia care team, the student will participate actively in the anesthetic management of surgical patients. The student's specific requests to be assigned to certain types of cases will be honored as time and availability dictate. The rotation will include at least one clinical simulator session using a simulator mannequin for practical management of airway problems.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8050 Obstetrical Anesthesiology (Clinical Elective)

The medical students will learn the different analgesia/anesthetic options for the labor patient. They will also learn how the physiological adaptations of pregnancy influence anesthetic management. They will be actively involved in the parturient's management, i.e., starting an IV, placement of spinal, epidural or CSE (combined spinal epidural) anesthetics. They will also attend the OB anesthesia conferences and interview patients in labor (with an OB anesthesia attending).

Credit 2 units.

Typical periods offered: Medicine Year

ANESTH 9100 Anesthesiology Advanced Clinical Rotation (ACR)

This Advanced Clinical Rotation is similar to the General Anesthesiology elective in exposure to anesthesiology, but the level of participation and assessment is enhanced. The expectation is that the students act at the level of a Clinical Anesthesia Year 1 resident. Though a prior elective in anesthesia is not required, it is encouraged, if possible. Students will learn the basics of preoperative evaluation of surgical patients, the use of intraoperative monitoring in patient management, and postoperative care. In addition to perioperative care, they will be exposed to other clinical areas which include labor and delivery, pediatric anesthesia, and the Center for Preoperative Assessment and Planning. The students will interact with patients across all age ranges and demographics. During the four-week rotation, the student will learn airway management skills, practical perioperative fluid and electrolyte therapy, along with general and regional anesthetic techniques. As an integral part of the anesthesia care team, the student will participate actively in the anesthetic management of surgical patients. Grading will be based on

competency of anesthesia skills such as preoperative evaluation, bag mask ventilation, intubation, vascular access, handoffs, postoperative pain orders, etc. The student's specific requests to be assigned to certain types of cases will be honored as time and availability dictate. The rotation will include clinical simulator sessions using a simulator mannequin for practical management of airway problems, resuscitation, and trauma emergencies as well as supplemental educational sessions covering relevant topics in anesthesiology.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 9150 Surgical Critical Care Advanced Clinical Rotation (ACR)

The 4400 Surgical ICU provides an exciting and challenging opportunity to care for some of the sickest patients in the hospital and offers incredible teaching and education about a variety of medical topics and conditions. The ACR SICU rotation integrates medical students into one of the two SICU teams, and each medical student, in conjunction with a resident or Advanced Practice Provider, will care for 3-5 patients on the service. Working with the resident, medical students will develop a problem list, as well as an organized plan for their patients. They will then need to follow up on the execution of all determined labs/interventions/consults, closely communicating with the rest of the ICU team throughout the shift, as well as presence for sign-outs each morning/evening at shift change. This rotation takes place at the Barnes-Jewish Hospital 4400 ICU Surgical and Burn/Trauma Intensive Care Unit. This ICU takes care of patients from a variety of backgrounds, including general surgery, trauma/acute care surgery, transplant surgery, vascular surgery, urology, as well as medical ICU overflow patients.

Credit 4 units.

Typical periods offered: Medicine Year

Emergency Medicine

EMED 8010 Medical Toxicology (Clinical Elective)

This rotation offers practical experience in the evaluation and management of the acutely ill, poisoned, envenomated, or intoxicated patient. Students will gain familiarity and experience evaluating and treating patients who have intentionally and unintentionally overdosed on medications or illicit drugs, have substance use disorders, have been envenomated, or have been exposed to toxic substances. Students will also gain experience in prescribing antidotes and learning to properly decontaminate patients after an ingestion or exposure. There are no overnight or weekend shifts. While not required, students are welcome to participate during off hours to see new consults and enhance their experience and learning. A core content of lectures will be provided. The students will also be assigned small projects during their rotation. Students will be able to rotate in the outpatient toxicology and addiction medicine clinic if desired. Students desiring a letter of recommendation from a toxicology faculty member or those interested in pursuing a career in Emergency Medicine or Medical Toxicology should take this elective. Also, students considering specialties such as Pediatrics, Psychiatry, Neurology, Critical Care Medicine or Internal Medicine should consider this rotation as they will be responsible for evaluating toxicologic conditions as part of their inpatient or outpatient practice.

Credit 4 units.

Typical periods offered: Medicine Year



EMED 8015 Emergency Ultrasound (Clinical Elective)

This elective involves the use of Point Of Care Ultrasound (POCUS) and its integration into clinical care. Students who take this elective will get in person didactics on basic POCUS applications and go scanning with both EM residents and faculty in person. Skills learned and practiced during the elective include POCUS image acquisition, clinical interpretation of POCUS images, and help use POCUS to answer clinical questions for patients and the physicians who care for them. Students will end the elective learning about how POCUS continues to expand its impact into multiple fields of medicine and has wide impacts and implications on patient care and patient centered outcomes.

Credit 2 units.

Typical periods offered: Medicine Year

EMED 8021 Emergency Medicine (Clinical Elective)

This four week elective will encompass all aspects of Emergency Medicine, with clinical time spent in the main urban trauma center as well as in a community setting. In addition, to seeing a wide range of pathology at the two sites, students will be given the opportunity for a 1:1 teaching shift, toxicology shift, and nursing shift, as well as a shift with ancillary departments such as social work and respiratory therapy. Students will be expected to attend grand rounds and teaching lectures as well as team-based learning and simulation sessions. Students will work in the trauma/critical care area and general medicine areas of the ED, and are expected to see patients independently, present to the team, perform basic procedures with guidance, call consults, and sign out patients to the oncoming team.

Credit 4 units.

Typical periods offered: Medicine Year

EMED 8301 EMS: Emergency Medical Services (Clinical Elective)

The Emergency Medical Services (EMS) elective is hosted by the Division of EMS within the Department of Emergency Medicine. EMS is a growing subspecialty of medicine that focuses on the care of patients in the prehospital setting. EMS physicians provide direct and indirect medical direction, build systems of care, and treat patients in the prehospital setting. EMS cares for patients of all ages and all acute medical problems. This elective offers students an immersive EMS experience through observational ride along shifts with local EMS agencies, time with EMS physician medical directors, and self-directed learning assignments. EMS conference is held Friday mornings and includes didactics, workshops, and simulations with EMS faculty, EMS fellows, and emergency medicine residents. Many elective activities are off site and a vehicle is recommended.

Credit 2 units.

Typical periods offered: Medicine Year

EMED 9100 Emergency Medicine Advanced Clinical Rotation (ACR)

This rotation offers practical experience in the evaluation and management of acutely sick and injured patients. Students will function as subinterns, initially evaluating their assigned patients, and developing a plan for further diagnostic studies and therapy. They will report to a senior level resident or an attending physician.

The student can expect the opportunity to perform or assist with a wide variety of procedural skills such as suturing, splinting, peripheral and central venous access, ultrasound, and cardiopulmonary resuscitation. Shifts will be eight hours and students will rotate between day, evening, and night shifts (including weekend shifts) to gain maximum exposure to all types of emergencies. The majority of shifts will occur at Barnes-Jewish Hospital; however, additional shifts may be scheduled at Barnes-Jewish West County Hospital and Missouri Baptist hospital, community teaching hospitals approximately 8 miles away.

Students will also be expected to attend weekly grand rounds and student lectures covering aspects of the core content of Emergency Medicine as well as attend a departmental journal club and student simulation sessions.

Students will gain an understanding of other disciplines closely associated with Emergency Medicine by doing rotations with either social work, nursing, or respiratory therapy. Students will also gain knowledge of the triage system during their time in the department.

Students desiring a Standard Letter of Evaluation (SLOE) should take the Emergency Medicine ACR. Students will be scheduled for required weekend and overnight shifts and changes will not be allowed to the schedule unless approved prior to the start of the rotation by the course coordinator.

Please be advised that there is a limit of days off while on this rotation during interview season; otherwise, students should arrange to take the elective

Credit 4 units.

Typical periods offered: Medicine Year

Internal Medicine

MEDICINE 8010 Rheumatology (Clinical Elective)

Students will participate in the diagnostic work-up and management of patients with conditions such as: systemic lupus erythematosus, rheumatoid arthritis, scleroderma, vasculitis, spondyloarthropathies, and gout. There is less exposure to osteoarthritis and regional musculoskeletal problems. By working closely with faculty members, fellows, and medical residents, students actively contribute to the care of rheumatology patients through inpatient consultations and outpatient clinics at Barnes-Jewish Hospital. An emphasis is placed on the physical examination of joints and the musculoskeletal system, synovial fluid analysis, and interpretation of diagnostic tests and radiographs. Students attend rheumatology conferences. This elective enrolls students in the inpatient rheumatology consult service. Please contact the elective Course Director if you prefer a predominantly outpatient rotation, a mixed (inpatient and outpatient) learning experience, or exposure to a specific interest (i.e. adult-pediatric rheumatology, autoimmune eye disease, dermatology-rheumatology, etc).

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8020 Geriatric Medicine (Clinical Elective)

This rotation is designed to familiarize students with the principals of comprehensive geriatric evaluation and management, including pertinent medical, psychological, social, and functional assessments of older adults. Students participate in clinical evaluations at the Geriatric Assessment Clinic, Geriatric Medicine Primary Care clinics, Parc Provence Nursing Home, outpatient clinics at the VA Medical Center-Jefferson Barracks (optional), and participate in a home hospice visit. Students attend weekly Geriatric Medicine conferences and are expected to give an oral presentation on a topic or journal article of their choice.

Many clinical activities are off-site from the medical campus; students will be required to coordinate their own transportation to and from such sites.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8030 Inpatient Cardiology (Clinical Elective)

Students will participate as members of the General Cardiology Consult Service at Barnes Jewish Hospital/Washington University School of Medicine. They will be part of a team composed of cardiologists, fellows, and residents that sees a large population of patients with cardiovascular issues and follows them through all aspects of their in-hospital care. Emphasis will be placed on physical examination and the interpretation of cardiac diagnostic tests including electrocardiograms, echocardiograms and coronary angiograms and their role in clinical decision making.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8045 Cardiac Arrhythmias and Electrophysiology (Clinical Elective)

Students will be members of the Cardiac Electrophysiology Consultation Team, which includes faculty members, fellows, residents, and nurse practitioners. The student will serve at the primary assessor for consultations and will, in concert with the rest of the team, complete the patient's assessment and initiation of recommendations and plan, as well as follow up. There is an emphasis on ECG evaluation and gaining familiarity with indications and details of arrhythmia therapeutics, including catheter ablation procedures, implantable device procedures, assessment, and programming, as well as antiarrhythmic drug therapy.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8050 Heart Failure and Transplant Cardiology (Clinical Elective)

This rotation is intended to provide trainees with a comprehensive experience managing patients with advanced heart failure. In addition to daily inpatient rounds, trainees are invited to attend both heart failure and transplant clinics. Further, the curriculum is supplemented by a syllabus that contains the critical literature pertinent to this patient population. The trainees will also have experience with the evaluation of patients for operative heart failure therapies and will have the opportunity to observe these surgical procedures.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8055 Dermatology (Clinical Elective)

The aim of this elective is to provide a guide for students so they are able to appreciate dermatology within the broader perspectives of medicine and biology. Emphasis will be placed on the dermatologic variations encountered in a normal physical examination of the skin, the identification of common skin diseases, dermatologic clues to systemic disease, as well as those dermatologic conditions that are life-threatening. The student will participate in outpatient care in the Barnes-Jewish Hospital, VA, and affiliated clinics. Students will attend all clinical teaching rounds and conferences in addition to the basic science and cutaneous histopathology conferences.

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 8075 Clinical Gastroenterology and Hepatology (Clinical Elective)

The GI Hepatology elective is integrated into a very active inpatient and endoscopy service at Barnes-Jewish Hospital. Students will participate in the evaluation of inpatients with a spectrum of gut and liver disorders, make patient rounds with the faculty and fellows, and have responsibility for patients on whom consultations have been requested. In addition, they will observe general endoscopic techniques and participate in GI conferences.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8080 Management of Inflammatory Bowel Disease (Clinical Elective)

This immersive elective provides a comprehensive exploration of inflammatory bowel disease, focusing on the diagnosis and management of patients with Crohn's disease and ulcerative colitis. Students will actively participate in outpatient clinics where patients are referred for specialized care, gaining firsthand experience in the use of biologics and advanced immunomodulatory therapies. The elective also covers the inpatient management of patients with active IBD, including the integration of multidisciplinary care and the nuances of therapeutic decision-making in acute and complex cases. Additionally, students will observe the endoscopic evaluation of IBD, including advanced therapeutic endoscopy procedures, to better understand disease assessment and procedural interventions in this specialized field.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8090 Hematology and Hemostasis (Clinical Elective)

Activities include work-up of patients at Barnes-Jewish Hospital under the supervision of the hematology fellow and faculty; attendance at daily clinical rounds for 1 - 1.5 hours per day. These are staffed by a senior faculty in the Division of Hematology.

In addition to evaluation of patients with hematologic disorders, the student will gain additional analytic skills including:

1. Interpret and integrate laboratory data in the diagnosis of anemia and other cytopenias
2. Review peripheral blood and bone marrow morphology,
3. Analyze laboratory data for the diagnosis of thrombophilia and bleeding
4. Discern the principles of blood banking and pheresis

The students will have the opportunity to follow patients with sickle cell disease and understand the treatment of this disorder. The student is expected to attend and participate in the weekly hematology conference.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8095 Bone and Mineral Diseases (Clinical Elective)

This course is designed to acquaint the student with the clinical, radiological and pathological manifestations and treatment of disorders of bone and mineral metabolism, including osteoporosis, Paget's disease of bone, hyperparathyroidism, osteomalacia, chronic kidney disease bone and mineral disease and more rare disorders of bone development and mineral homeostasis. During the pediatric rotations will have exposure to pediatric metabolic bone diseases (heritable or acquired), heritable disorders of connective tissue, skeletal dysplasias and clinical dysmorphology.

The student will rotate through the clinics of the Bone Health Program and see patients at the Center for Advanced Medicine, Barnes-Jewish West County Hospital, Center for Advanced Medicine South, and St. Louis Children's Hospital, under the guidance of Division faculty. The student will also learn the principles and best use of bone densitometry in clinical practice, and participate in the histological assessment of bone biopsies, based on case availability. Medical students will present interesting cases or a pertinent topic related to bone metabolism at the Metabolic Bone Disease Case Conference.

Credit 2 units.

Typical periods offered: Medicine Year



MEDICINE 8100 Inpatient Infectious Diseases Consult Service (Clinical Elective)

This elective offers medical students an immersive experience in the evaluation and management of infectious diseases in hospitalized patients across Barnes-Jewish Hospital. Students are typically assigned to one of the general inpatient Infectious Diseases (ID) consult teams, where they will learn the fundamentals of diagnosing and treating a broad spectrum of infections, from common community-acquired illnesses to complex hospital-acquired and opportunistic infections. Under daily supervision by an ID faculty attending, students will follow their own patients, participate actively in clinical decision-making, and engage closely with ID fellows, residents, advanced practice providers, and multidisciplinary teams. They are expected to read relevant literature about their patients' conditions, attend teaching rounds, and participate in ID conferences and educational sessions. Core learning topics include antimicrobial selection and stewardship; appropriate use of antibiotics, antifungal, and antiviral agents; infection control principles; and the role of surgical versus medical management. Students with a strong interest in Transplant Infectious Diseases or Orthopedic/Bone and Joint Infectious Diseases may request assignment to one of these subspecialty consult services. Because these teams have limited capacity, students must contact the course director as early as possible and at least one month in advance to request a subspecialty placement. Subspecialty rotations provide focused exposure to infections in immunocompromised hosts (including solid organ and stem cell transplant recipients and patients with hematologic malignancies) or to the evaluation and management of native and prosthetic joint infections. Students rotating on these services will gain additional experience with immunosuppressive drug interactions, neutropenic fever, invasive fungal infections, surgical management of bone and joint infections, and collaboration with transplant and orthopedic surgical teams, respectively. Across all rotations, students will develop skills in clinical reasoning, evidence-based management, and multidisciplinary communication while caring for patients with diverse and challenging infectious diseases.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8115 Ambulatory Infectious Disease (Clinical Elective)

The elective is designed to teach students the fundamentals of evaluating clinical infections in the outpatient setting. Students see patients under the supervision of a faculty member and interact with Infectious Disease Fellows and Internal Medicine Residents. Students will participate in the care of patients living with HIV or otherwise immunosuppressed patients as well as general infectious disease patients. The clinic is the primary provider for many patients living with HIV, and students will learn the pathogenesis of HIV, become familiar with most antiretroviral medications, and have the opportunity to learn about opportunistic infections and their prophylaxis. They will also have the opportunity to see patients with bone and joint infections, endovascular infections, endemic and opportunistic mycoses, mycobacterial infections, sexually transmitted diseases, and many other infections. Patients seen will have a wide range of acute and chronic infections, and will include indigent and insured patients across a wide range of ages. The students will play an important role in the management of these patients and will present their assessments and plans to the supervising attending. They are expected to write clinic notes, read the literature about their patients, and participate in clinical conferences.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8125 Inpatient Oncology Consult Service (Clinical Elective)

Medical Oncology is a complex subspecialty that is undergoing a rapid evolution as a result of new systemic treatment approaches that stem from biological insights into the nature of cancer. During the course of the elective, medical students will be able to interact with attending

physicians and patients for bedside teaching and attend tumor boards and lectures focused on the care of patients with solid tumors. The student will function as a member of the consult service team. Duties will include performing initial consultations and follow-up care under the supervision of an Oncology attending and an Oncology fellow. At the end of the rotation, the students will appreciate the principles of our approach to cancer patients and should have gained insights into the evaluation and management of patients with newly diagnosed malignancies. The role of surgery, radiation, and systemic treatment will also be an important theme, as well as the conduct of clinical research in this patient population. Students will also learn to care for hospitalized patients suffering from complications from their cancer or from toxicities due to treatments. Oncologic emergencies will be covered. Issues such as palliative care treatment options and end-of-life decision making will be explored as well.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8135 Hospice and Palliative Medicine (Clinical Elective)

The Palliative Medicine elective will focus on the care of patients with life-threatening or debilitating illness throughout the course of their care. Skills in symptom management, communication, and interdisciplinary team-based care will be the focus. Students will spend the majority of their time on the BJH Palliative Care Service. Based on the individual student's interest, there may also be opportunities to work with the BJC Hospice Team and the St. Louis Children's Hospital Pediatric Advance Care Team (PACT). Students wishing to work with either team should contact the Course Director and Administrative Contact, as well as the instructors of the appropriate team, with as much advance notice as possible as trainee spots are very limited for both. While in the hospital, students will be responsible for seeing patients upon initial assessment as well as delivering follow-up care with the team. Patients will be seen for both end-of-life care as well as symptom management. Students will learn to assess and treat refractory symptoms and participate in complicated advanced care planning. Students will attend interdisciplinary team meetings and may participate in conversations about goals of care and coping with bad news. They may also get hospice experiences at our hospice house (Evelyn's House) and shadow those care providers, if desired. Emphasis will be placed on observing and understanding the psychosocial and spiritual needs of the patients, as well as the impact of the burden on caregivers. Students will be required to give a 10–15-minute presentation to the BJH Palliative Care team at the end of their rotation.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8140 Endocrinology, Diabetes, and Metabolism (Clinical Elective)

The rotation will be divided across general endocrinology and diabetes inpatient consultative services, as well as outpatient faculty clinics as desired. Students will perform evaluations of patients with endocrine and metabolic diseases under supervision of fellows and faculty at Barnes-Jewish Hospital and/or in WashU clinics. They will present cases daily on teaching rounds and participate in case conferences and seminars on a weekly basis. Caring for patients with diabetes and gaining experience with the latest glycemic control technologies (e.g., continuous glucose monitoring, insulin pump therapy) are important parts of the rotation, as is interacting with patients presenting for transgender care and patients with thyroid, pituitary, adrenal, gonadal, bone, and lipid disorders. A variety of outpatient clinics are offered in the division and students will be given the opportunity to customize the learning experience to match their career goals. At the end of the rotation, it is expected that students will have the ability to evaluate and treat a variety of endocrine disorders, as well as initiate inpatient and outpatient management of diabetes including insulin dosing and glucose monitoring.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8145 Outpatient Oncology (Clinical Elective)

Students will gain experience in the initial treatment of newly-diagnosed malignancies and the outpatient management of oncology patients. Participation in multidisciplinary tumor conferences will stress a combined-modality approach to management, incorporating systemic therapy, radiotherapy and surgery. Students will see patients with a variety of malignancies, including lymphoma, myeloma, and tumors of the lung, breast, and colon. Management of hypercalcemia and other paraneoplastic syndromes, as well as cancer pain management, will be covered.

Students will have the opportunity to see how most oncologists spend 90% of their workday. They will observe different styles that oncologists use when presenting news about prognosis, treatment options, and other information to patients while they also learn about the molecular basis for cancer, the mechanisms of action for our therapies (particularly the newer agents which target specific molecular abnormalities), and the key studies that justify the use of therapies (e.g. randomized studies showing that after surgery, chemotherapy will reduce the risk of recurrence from a particular cancer with a particular regimen). By spending time with clinicians, students will learn how to identify hereditary syndromes, use drugs for symptom relief, and also learn how radiographic and laboratory tests allow oncologists to care for patients.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8160 Pulmonary Medicine (Clinical Elective)

Students will acquire skills in the evaluation and management of patients with pulmonary diseases and in the interpretation of pulmonary function tests. They will gain experience on the inpatient pulmonary consult service, and in the outpatient clinic if desired. They will attend regular pulmonary and critical care medicine conferences.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8165 Bone Marrow Transplantation and Stem Cell Biology (Clinical Elective)

This elective is designed to introduce students to the general inpatient, intensive care, and outpatient management of patients with multiple hematologic malignancies including leukemia, lymphoma, marrow failure states and myeloma. These patients will be treated with chemotherapy, targeted therapies and cellular immunotherapies including chimeric receptor T cells (CART), natural killer cells, bispecific antibody treatments and stem cell transplant (both autologous and allogeneic). As the primary team, the BMT service is responsible for diagnosing and treating all medical problems including many critical care issues that may occur in these patients. These complex patients are often severely immunocompromised, coagulopathic, and at high-risk of multi-organ complications from both their disease and their therapy. Students work closely with residents, fellows, and faculty to develop treatment plans for patients. Students participate in daily rounds discussing general inpatient and intensive care BMT patients and attend outpatient clinic 1 day/wk to see how BMT physicians approach patients faced with difficult decisions to make regarding their care. In addition to multiple weekly conferences, students also attend daily teaching rounds led by faculty to learn the basic science of hematopoiesis, the genomics of leukemia, stem cell biology, gene therapy and cell therapy, transplantation immunology, graft vs host disease and infectious diseases seen in these immunocompromised patients. The average medical student will contribute to the care of inpatients (30-40 patients/day) and will be directly involved in the assessment and care of selected outpatients as well.

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 8175 Clinical Nephrology (Clinical Elective)

Students rotate through inpatient and outpatient experiences to gain exposure to all facets of nephrology. They will spend the majority of their time on an inpatient consult service, gaining exposure to acute and chronic renal failure, glomerulonephritis, and electrolyte disorders. During this time, they will serve as a fully integrated member of the consult team, evaluating underlying causes of kidney disease, performing diagnostic procedures, formulating management plans, and engaging in decision-making discussions with primary services and families. In addition, students will have the opportunity to experience ICU nephrology, transplant nephrology, the various CKD clinics, and all modalities of dialysis, including in-center, home, and peritoneal dialysis.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8180 Kidney Transplantation (Clinical Elective)

This elective course offers medical students an introduction to the field of kidney transplantation. Through a blend of didactic sessions, case discussions, and clinical exposure, students will gain foundational knowledge and practical insight into the multidisciplinary care of kidney transplant patients.

Course Topics Include: Overview of kidney transplantation: indications, evaluation, and surgical principles, basic immunology relevant to transplant rejection and tolerance, principles and protocols of immunosuppressive therapy, post-transplant care and long-term management of kidney transplant recipients, and common complications and their clinical management

By the end of the elective, students will be able to describe the transplant process from evaluation of the potential kidney transplant recipient to post-operative care, understand the rationale behind immunosuppressive regimens, and recognize the critical aspects of caring for kidney transplant recipients.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8185 Adult Allergy and Clinical Immunology (Clinical Elective)

Students will participate in the outpatient Allergy Clinics located in Highlands Medical Building, Barnes-Jewish West County, and the Center for Advanced Medicine South County. Students will participate in allergy skin testing, pulmonary function testing, and drug challenges. They will have the opportunity to see patients with allergic rhinitis, asthma, hives, food allergy, immunodeficiency, eosinophilic esophagitis, hereditary angioedema, mastocytosis, contact allergic dermatitis, eczema, and more. They can attend allergy conferences on Thursday morning. Students have the option to follow a fellow and see inpatient consults at Barnes-Jewish Hospital.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8190 Interventional and Structural Cardiology (Clinical Elective)

This rotation provides medical students with immersive exposure to contemporary interventional and structural cardiology within the high-volume, quaternary-care environment of Barnes-Jewish Hospital and the Washington University School of Medicine. Students observe the full spectrum of diagnostic and therapeutic procedures performed in the cardiac catheterization laboratories, including coronary angiography, percutaneous coronary intervention, intracoronary imaging, coronary physiology assessment, and structural heart



interventions. In addition to cath lab exposure, students participate in outpatient interventional and structural cardiology clinics, gaining insight into pre-procedural evaluation, shared decision-making, longitudinal management of coronary and valvular disease, and post-procedural follow-up. During the outpatient phase of the rotation, students will be expected to see patients independently, obtain focused histories, perform targeted examinations, and draft clinical notes that contribute to the visit documentation and care plan. Students engage with interventional cardiology faculty, fellows, advanced practice providers, and the multidisciplinary structural heart team. Emphasis is placed on understanding indications, procedural steps, imaging interpretation, hemodynamic assessment, complication recognition, and the integration of interventional findings into both inpatient and outpatient care pathways.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8300 Internal Medicine at Missouri Baptist for Visiting Students (Clinical Elective)

This elective is designed to provide final-year medical students with an immersive clinical experience in internal medicine, focusing on the diagnosis and management of adult medical conditions in both inpatient and outpatient settings. Students will function as active members of a multidisciplinary medical team, working under the supervision of internal medicine faculty and residents. Emphasis is placed on critical thinking, clinical decision-making, professionalism, and preparation for internship/residency. By the end of this elective, students are expected to: Develop advanced clinical skills in patient assessment, including comprehensive history-taking and focused physical examination tailored to presenting complaints. Formulate problem lists, differential diagnoses, and evidence-based diagnostic and management plans for common and complex internal medicine conditions. Interpret diagnostic tests, including laboratory studies and imaging, in the context of patient care. Integrate pharmacologic and non-pharmacologic treatment strategies appropriate for adult medical patients. Communicate effectively and professionally with patients, families, and healthcare team members. Demonstrate accountability and ethical comportment in clinical decision-making, patient safety, and professional responsibilities. Participate in teaching conferences: A. On inpatient ward medicine, present cases whom they have cared for in resident report and lead the discussion B. On specialty electives, develop case discussions and literature reviews as requested by the elective director C. Select papers for discussion at intern journal club, analyze, and lead the discussion D. Attend grand rounds weekly E. Attend CPC weekly Meet bi-weekly with Dr. Goodenberger or designee for bilateral feedback

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 8330 Comprehensive Clinical Exam

Comprehensive Clinical Exam

Credit 0 units.

Typical periods offered: Medicine Year

MEDICINE 8880 Outpatient Hematology (Clinical Elective)

Students will gain experience in the diagnostic workup of hematological conditions like low or high blood counts, thrombosis, bleeding, and paraproteinemia. They will get familiar with treatment strategies for a wide variety of benign hematological conditions (e.g. thrombotic microangiopathies, sickle cell disease, thrombosis, and hemophilias) and malignant hematological disorders (e.g. myeloproliferative neoplasms and myelodysplastic syndromes). Students will also learn about the role of procedures like blood/blood fraction exchange (apheresis) and bone marrow biopsy. Participation in hematology case conference will provide insight into approaching a case with evidence-based management strategies and hematology

grand rounds will offer formal learning experience in hematology from experts in the area. Students will observe hematologists going through a typical workday and managing difficult conversations (e.g. breaking bad news). They will learn about gaps in the field of hematology, which generate rationale for future research. Students will rotate through outpatient hematology clinics at Siteman Cancer Center and attend the Hematology Case Conference, and Hematology Grand Rounds.

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 9100 Internal Medicine Advanced Clinical Rotation (ACR)

This rotation is designed to imitate intern year in caring for adult hospitalized patients. It is a four-week rotation, which includes night shifts. You will be expected to put in discharge and admission orders, write daily notes, communicate with ancillary staff and consultants, and communicate updates to patients and their families. During the day, you will be expected to take care of 4-6 patients. At night, you will be expected to provide cross-cover for existing patients and complete new admissions. This rotation will take place at the John Cochran VA Hospital and at Barnes-Jewish Hospital on the medicine firm, cardiology firm or hospitalist services.

Hospitalist and medicine firm see patients admitted for a medical reason. Cardiology firm takes care of patients admitted primarily for a cardiac reason, but these patients often have many medical comorbidities reflective of a general medicine population. The team structure of cardiology and medicine firm services include one attending, one resident and two interns. The team structure of hospitalist will include working directly with a hospitalist attending. The John Cochran VA Hospital sees common medical illnesses but is still a referral center. The VA teams consist of one attending, one resident, and one intern.

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 9150 Medicine Intensive Care Advanced Clinical Rotation (ACR)

The Medical Intensive Care Unit ACR is designed to introduce medical students to critical care medicine. The rotation will provide the opportunity to care for critically ill medicine patients presenting with a wide variety of diagnoses including shock, respiratory failure, metabolic derangements, and acute gastrointestinal hemorrhage, amongst others. Students will be expected to learn the basic pathophysiology and treatment approaches of these common MICU disease processes. The MICU ACR will take place in the 8300 and 8400 Medical Intensive Care Units, and the medical students will work on a team comprised of internal medicine residents, pulmonary and critical care fellows, and attending physicians. The rotation will consist of three weeks of days and one week of nights. While on days, the students on the MICU ACR will be expected to follow 3-4 ICU patients, present these patients on rounds, and develop management plans. While on nights, the students will join the residents and fellows in cross covering established patients and admitting new patients to present on rounds the next morning. The management of critically ill patients is an essential skill for an intern in a variety of medical specialties, and the pathology seen in the Medical ICU will allow for students to gain experience in this environment prior to starting their residency.

Credit 4 units.

Typical periods offered: Medicine Year

Medicine Interdisciplinary

MEDINTER 8010 Hot Topics in Health Law: Where Medicine, Law, and Business Collide (Non Clinical Elective)

Medicine, and indeed science and technology more broadly, often collide with the law. These collisions often complicate the path to effective solutions. Navigating this increasingly dynamic and complex landscape comprises an arduous task. But synergy is not impossible. Many examples of successful partnerships do exist. Hot Topics in Health Law: Where Medicine, Law and Business Collide will examine both collisions and effective solutions to these challenges in partnership with the School of Law and Cordell Institute.

Credit 2 units.

Typical periods offered: Medicine Year

MEDINTER 8015 Clinical Mentoring (Longitudinal Elective)

This elective is designed to develop the teaching and mentoring skills of our Phase 3 medical students through structured hospital sessions with early Phase 1 medical students in Gateway. The primary format of the elective is observation of 2 first-year students during hospital sessions that span from August-April. During these hospital sessions the Phase 1 learners will start by observing H and Ps being done on real patients. As they gradually learn history taking skills, they will start performing the history and documenting it. After winter break, they will also start performing portions of the physical exam in addition to taking histories. All sessions will be observed by the Phase 3 mentor, who will provide immediate post-session feedback. Additionally, documentation of the clinical encounter (a written H and P) by the Phase 1 learners is to be reviewed and critiqued by the mentor. Additional practice sessions for physical exam components will be coordinated by the clinical skills director. A total of 4 sessions are required throughout the year, and should be completed from August - April. Sessions should be spaced so that they occur approximately one month apart, to allow for students to reflect and build on the skills needed to improve on subsequent experiences. The individual dates are flexible, and will be coordinated by the individual group of mentors/mentees. If you are unable to participate in a session due to being out of town or on away rotations, it is your responsibility to find a substitute mentor.

Credit 2 units.

Typical periods offered: Medicine Year

MEDINTER 8016 Interprofessional Education (IPE) Student Teaching Certificate (Longitudinal Elective)

The Center for Interprofessional Education (CIPE) is offering this IPE Teaching Certificate to all senior level students across the Washington University Medical Campus. Through a series of workshops and experiential teaching experiences with other interprofessional students, students will gain valuable interprofessional communication, teamwork, teaching and precepting skills.

Credit 2 units.

Typical periods offered: Medicine Year

MEDINTER 8021 Community-Based Family Medicine at Affinia Healthcare (Clinical Elective)

This immersive outpatient elective offers medical students the opportunity to develop core clinical skills in a high-volume, community-based Family Medicine setting. Based at Affinia Healthcare's Federally Qualified Health Center (FQHC) locations, students will work alongside residency leadership and faculty to care for a diverse patient population across the lifespan — from pediatrics to geriatrics. Students will engage in the diagnosis and management of a wide range of acute and chronic conditions, preventive care and health maintenance. Clinical experiences include well-child checks, prenatal care, adult wellness visits, chronic disease management and same-day acute visits. Students will have opportunities to observe and participate in common office-based procedures such as joint

injections, skin biopsies, contraceptive insertions and point-of-care testing. The rotation emphasizes continuity, patient-centered care and interprofessional teamwork within an underserved urban context. Through hands-on clinical work and case-based learning, students will gain a practical understanding of comprehensive outpatient Family Medicine in alignment with the mission of the Affinia Family Medicine Residency Program. This rotation is ideal for students considering careers in primary care and health equity.

Credit 2 units.

Typical periods offered: Medicine Year

MEDINTER 8045 Ethical Challenges in Surgery and Medicine (Non-Clinical Elective)

This elective will involve exploration of the ethical challenges discussed during didactic conferences and in clinical settings within the Department of Surgery at Washington University in St. Louis School of Medicine. The student will be guided through readings, discussions, and projects by department faculty members with expertise in clinical ethics. The elective will result in a manuscript ready to be revised/finalized for publication submission with the student as lead author. This elective provides the opportunity to work closely with faculty mentors and should appeal to any student interested in the ethical and humanitarian challenges facing physicians in particular and society in general.

Credit 4 units.

Typical periods offered: Medicine Year

MEDINTER 8055 Care of the Homeless (Non-Clinical Elective)

This is an online course which reviews the physical and mental health consequences causes of becoming unhoused, and the challenges of providing care to this population. Special emphasis is given to barriers to care and the creating a therapeutic relationship for unhoused persons in the healthcare system. St. Louis City shelters, agencies, and other resources which provide services to this population are also discussed. This is an online course. Students email their assignments to the instructor for review. Students are welcome to make site visits with the instructor but this activity is optional.

Credit 2 units.

Typical periods offered: Medicine Year

MEDINTER 8065 Medical Education Scholarship (Non-Clinical Elective)

This elective will introduce types of education scholarship; provide guidance for selecting a topic, writing a question, and developing project objectives; illustrate meaningful outcomes for evaluation of education scholarship projects; introduce qualitative and quantitative methods appropriate for education scholarship. Enrolling for four weeks will provide time for more complete development of a proposal that could be used as the plan for a study or draft of an application to the IRB.

Credit 2 units.

Typical periods offered: Medicine Year

MEDINTER 8070 Clinical Informatics (Non-Clinical Elective)

Clinical informatics is the application of information technology and human resources in transforming data, information, and knowledge into meaningful healthcare improvement. Physicians practicing in this discipline provide oversight in the effective use of information systems and the development of innovative clinical pathways for patient care. During this rotation, trainees will assist in the operations of clinical informatics teams, including information system management (e.g. incident response and improvement requests), reporting (data analysis



and visualization), and clinical decision support. Trainees will support teams related to their clinical interests and participate in strategic meetings. Additional training in the use of reporting tools in Epic will be provided.

Credit 4 units.

Typical periods offered: Medicine Year

MEDINTER 8320 Patient Safety and Quality Improvement (Non-Clinical Elective)

This elective provides students practical experience with the application of patient safety and quality improvement principles. Students will bring their own experiences with patient safety or systems-based problems to serve as the foundation of learning and project development. Students will have the opportunity to meet and learn from the interprofessional team that supports patient safety and quality improvement work.

Credit 4 units.

Typical periods offered: Medicine Year

MEDINTER 8580 Humanities in Medicine: Reflecting About Professional Identity (Non-Clinical Elective)

This elective provides a creative space for using many types of activities in which to reflect about the professional identity of physicians. Creative activities may include narrative writing, poetry, drawing, video, graphic design, textile creations, and others, as well as activities for which classes and studios are available in the community at places like the Craft Alliance and the South Broadway Art Project. The elective offers faculty and/or WUSM alumni as reflective partners, as well as collaborations among students or with community organizations. Students will create independent proposals (as individuals or small groups) for a reflection project that involves the arts/humanities and relates to medicine/physicians' roles/professional identity, and make plans to complete a project to share online at the end of the elective or in another way. The course will involve students reading individually the course outline in Keystone, then drafting proposals for their projects, to include an outline of what they are going to do, the expected timeline, the resources/materials they might need and use, and what they hope to get out of this project (how this will help them grow individually as medical professionals). The course requirements are to produce some reflective product, in each student's choice of medium (visual art, writing, etc.) and to write a brief reflective narrative at the end of the session on their experience and inspiration for their work and how they have grown/changed while participating in this project.

Credit 2 units.

Typical periods offered: Medicine Year

MEDINTER 8900 Dissecting the Past (Non-Clinical Elective)

During this four-week elective, students will draw on primary texts and an immersive travel experience to explore the history of evolving scientific thought and cultural influences on our current understanding of medical ethics and practice. This course consists of weekly sessions using primary source materials from the WUSM Archives and Rare Books collections as a springboard for discussion. Each week focuses on a different aspect of medical history, beginning with an overview of the underlying medical theories of the early modern period, and then moving into detailed investigations of key figures and themes that will be explored in a week-long trip abroad.

The culminating travel experience allows students to immerse themselves in the course themes by visiting historical medical collections in Europe.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE 3

MEDPHASE3 7000 Introduction to Addiction Medicine (KISC)

Substance use disorders and addiction impact every area of medicine, from primary care and psychiatry to plastic surgery and PM&R. This KISC will introduce students to this important field and equip them with the tools to understand the science and socioeconomics of addiction medicine. The course will also supply students with the practical bedside experience and focused coaching necessary to provide empathetic evidence-based care to patients with substance use disorders in any clinical setting. Students in the Introduction to Addiction Medicine KISC will explore the foundations of addiction in genetics, neuroscience, and psychopharmacology, as well as evidence-based treatment of substance use disorders and systemic and societal barriers to care. Learning will take place through didactics, asynchronous and independent work, team-based learning, patient and expert panels. Clinical experience will occur in a diversity of settings including inpatient addiction medicine consultation services, outpatient clinics, and residential treatment facilities.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7005 Multidisciplinary Adult Neuro-Oncology (KISC)

The Multidisciplinary Adult Neuro-Oncology KISC teaches the foundational science behind adult primary central nervous system tumors and applies those foundational principles to modern multidisciplinary care of patients through the lenses of neuroradiology, neuropathology, neurosurgery, neuro-oncology, and radiation oncology. Students participate in the care of patients from diagnosis through treatment, exploring how tumor biomarkers inform treatment plans and how bench research and clinical trials contribute to the advancement of clinical care. Students spend the first week of the course learning about the basic science and clinical foundations of neuro-oncologic care through lectures, case-based group learning, and independent study. Students rotate with neuroradiologists, neuropathologists, neurosurgeons, and neuro-oncologists in their respective clinical spaces, applying the foundational principles of neuro-oncology to patient care and observing how these specialties plus an interdisciplinary team of healthcare professionals interact in the care of complex neuro-oncology patients. Students may elect to spend additional time in clinical areas related to the course during their free time.

Credit 2 units.

Typical periods offered: Medicine Year

MEDPHASE3 7010 Diabetes Care From A to Z (KISC)

The focus of the Diabetes Care from A to Z KISC is to fully understand diabetes mellitus across a continuum from the standpoint of a basic scientist to its translation as a skilled bedside clinician. The course curriculum will explore basic science topics such as normal glucose metabolism in addition to the pathophysiology of type 1 and type 2 diabetes. Students will learn about the exciting landscape of therapies for diabetes including novel oral and injectable medications along with advanced technologies such as continuous glucose monitoring, insulin pumps and automated insulin delivery systems. Students will be given the opportunity to assess the output of these devices and learn how to incorporate that information into their management of patients with diabetes. Finally, emphasis will be placed on helping the students understand the need for collaboration among an interdisciplinary team of specialists to provide optimal care for individuals with diabetes. This KISC is four weeks long. The first week is primarily classroom-based and provides the foundation for the subsequent 3 one-week clinical rotations on an in-patient service, out-patient services (diabetes/endocrine/other related subspecialty), and at community-based sites

(on-campus and possibly off-campus). This approach will allow the students to cultivate an appreciation for the racial/ethnic disparities in access to diabetes medications and technology and how this impacts outcomes in individuals with type 1 and type 2 diabetes. This will help students to incorporate consideration of the social determinants of health into their patient management strategies. One day during each of the clinical weeks will be set aside for case presentations and journal club style presentations by students, additional hands-on activities, and seminars on the latest advances in understanding and treating diabetes by Washington University School of Medicine faculty. Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7015 Comprehensive Approach to Disability (KISC)

Persons with a disability (mobility, cognition, sensory, mental health, etc.) make up 25% of the population and are three times more likely than persons without a disability to interact with healthcare. However, research has shown that most physicians are not confident in their ability to provide quality care and tend to have an erroneous perceptions on the quality of life for people with disability. The goal of Comprehensive Approach to Disability - From Bedside to Living Well is to offer students the opportunity to build comfort and confidence working with patients with disabilities and to understand the wider context of their lives beyond the healthcare setting. The information offered in this course is useful for any specialty which demands a high degree of patient interactions, and is especially pertinent, but not limited to: PM&R, Orthopaedic Surgery, Neurology, Neurosurgery, General Surgery, Internal Medicine, Pediatrics, OB/GYN, and Psychiatry.

In this course, medical students will be immersed in the complex and often challenging world of living with a disability. Topics that will be explored include: models of disability; the World Health Organization's approach to human functioning; disability history; ableism; community programs and services; environmental modifications for access; assistive technology; physical activity and adaptive sports; health care access and support; sexuality and parenting; employment; rehabilitation hospitals; and governmental structures and policies. We will enhance students' ability to answer questions such as, "What will my patient's life look like after discharge?", "How can I help my patients live in a way that is meaningful to them?", "How can I practice in a way that is accessible to all patients?", and "How do I interact effectively with patients with a disability?". The course will use didactic strategies, such as assigned readings, lectures, videos, and small group discussions, as well as active participation at designated sites, such as the Rehabilitation Institute of St. Louis and Paraquad, a community disability organization.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7020 Infectious Diseases and Health Equity (KISC)

Health inequities place those who are already the most socially and economically marginalized at even greater risk for infection, severe disease and death. This 4-week KISC will engage learners in identifying determinants and propose solutions to disrupt the systemic health inequities that disproportionately affect disparity populations. It will blend didactic and experiential learning focusing on the intersection of Health Equity/Social Determinants and key infectious diseases, both at WUSTL, the county and city health departments and the North County multi-specialty clinic. Students will have a two-week outpatient focused rotation and two weeks of hospital-based learning. Every week, a full day or equivalent will be dedicated to public health experiential learning and didactics. The students in all their clinical rotations will be expected to develop a critical, Social Determinants lens and will have the opportunity to learn about the available resources to assist patients. Weekly Social Determinants of Health Rounds, meeting local public health leaders are few of the innovative experiences planned for this course.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7025 Integrated Oncology: Social Science and Clinical Research Perspectives Across the Cancer Continuum

This course aims to provide learners with experiences that will foster their ability to gain a broad knowledge base regarding the social science aspects of cancer care. The course will take the student on a journey through the spectrum of cancer care, including foundational social science frameworks, cutting-edge applied translational science, and the impact of cancer and cancer care on the community. The student will be exposed to a diverse array of topics, including strategies for cancer screening and management as well as structural factors influencing the delivery of care. Activities will include lectures from local experts, readings, discussions, and, critically, exposure to clinical and community activities. Central to this course is social science as a foundational science applied and integrated to topics throughout the cancer continuum. There will be a strong emphasis on health equity principles (e.g., the equal worth of all human beings and nondiscrimination and equality in opportunities to achieve optimal health). Assignments will include reflections and analysis that can be completed through a variety of methods including writing, audio, or video recording. A longitudinal case study will enable the student to tailor their experience to a specific oncologic interest and delve into the primary literature to understand the cancer continuum and how it applies to cancer care. Learners will gain a deeper, more meaningful understanding of the rich variety of social and scientific factors that shape the health and well-being of patients with cancer. This understanding, in turn, will translate into more effective and equitable cancer care.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7030 Pediatric Neurocritical Care: Onset to Outcomes (KISC)

Effective delivery of pediatric neurocritical care (PNCC) requires the integration of highly complex, multisystem care in the pediatric intensive care unit (PICU) with cutting-edge science. However, for PNCC patients and their families, the acute experience of and recovery from a devastating neurologic injury is inherently a human experience that also requires a coordinated, compassionate and dedicated approach from their health care team. The goal of the Pediatric Neurocritical Care KISC is to reinforce the relationships between management in the acute care environment, long-term outcomes, and the scientific inquiry that supports both of these endeavors. In this KISC, students will complete 3-4 modules (each 1-1.5 weeks in duration, organized around a core PNCC condition). Each module consists of reading/independent study and journal club, exposure to patient care and family narratives, exposure to the multi-professional health care providers within each condition/specialty, and recurring debrief and thematic exploration sessions with the KISC co-directors. For each module, patients are identified (as possible), and students will follow the PNCC patients through multiple clinical environments (PICU, inpatient ward, neurorehabilitation, and outpatient NCFP clinic), evaluating how the healthcare systems change during a patient's care. Students will work with both physicians and non-physician team members, participate in multidisciplinary meetings, and have multiple shadowing opportunities. The key applied activity for the students will center on use of the module curriculum and clinical exposure to develop semi-structured interviews for (at least one) of the PNCC patients and/or families to elucidate a richer understanding of the medical experience. In the journal clubs, students will be led by Wash U investigators who are advancing PNCC basic science in traumatic brain injury (TBI), cardiac arrest, epileptogenesis, stroke/metabolic stress, neuromonitoring, extracorporeal membrane oxygenation (ECMO), neuroplasticity, and post-ICU syndrome. Group debriefs will



allow students to compare experiences and reflect on how social determinants of health have impacted care or outcomes. In the final project, students will combine science, health systems, and social factors into a narrative of the patient's illness from onset to outcome. Credit 2 units.

Typical periods offered: Medicine Year

MEDPHASE3 7035 Science, Medicine and Societal Effects of Pain (KISC)

The prevalence of pain, the negative consequences of untreated pain, disparities in access to pain treatment, and the potential for misuse and abuse of commonly-prescribed analgesics makes pain management a critical public health challenge. This KISC introduces students to the neuroscience, sociology, and psychology of pain. Students will learn about the neurocircuitry of pain perception, modulation, and related psychological phenomena. They will understand fundamental basic science behind preclinical pain research and begin to be able to interpret these types of studies. They will investigate how social determinants of health affect pain. Students will apply these neuroscience principles and their understanding of social determinants of health into the practice of pain medicine, and learn how to assess, measure, examine, and treat patients with various pain conditions. Students will consolidate these aspects of pain medicine into a multidimensional biopsychosocial model. This course uses a variety of instructional methods including didactics, case-based discussions, clinical care of patients in and out of the hospital settings, self-learning through research, reflective project completion, laboratory discovery, and scientific journal club presentation. This course is designed to more properly prepare future physicians to tackle the important public health challenge that improper pain management presents.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7040 Advancing End-of-Life Care (KISC)

Medical professionals from across specialties need specific knowledge and skills to help patients and their care partners navigate the challenges of serious and end-stage illness. The goal of the Advancing End-of-Life Care KISC is to immerse students into contemporary issues surrounding serious illness and end-of-life care. Students will gain foundational knowledge about basic physiological processes in serious illness, how they influence the illness trajectory and experience, and how they are managed clinically. In parallel, students will learn about working with an inter-professional team to address quality of life across domains, with information about evidence-based interventions from psychological-social-spiritual perspectives. Students will learn and demonstrate ways to effectively communicate bad news to patients and family members experiencing end-of-life care issues and related medical decisions. Finally, students will learn about legal and ethical principles in the context of end-of-life and terminal illness care. During the KISC, students rotate through four different clinical settings, each for one week, including a residential hospice, inpatient palliative care consult service, outpatient geriatrics clinics, and a palliative care and hospice unit. These rotations are structured primarily as observerships emphasizing breadth of exposure across clinical settings and interprofessional teams over direct patient care. By the close of the KISC, students will leave with a comprehensive knowledge about the end-of-life care landscape and skills in navigating serious illness care.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7045 Holistic and Interdisciplinary Approach to Surgical Critical Care (KISC)

This KISC aims to provide learners with the skills needed to excel in the unique and challenging environment of the Surgical Intensive Care Unit. This course is a combination of education and instruction on critical care concepts, hands-on skills sessions, and case-based discussions, revolving around longitudinal, clinical care of critically ill patients. Students will integrate into one of the ICU teams, participating in rounds each morning by formulating a care plan for each of their patients. Afternoon education sessions will revolve around core concepts in critical care medicine, such as mechanical ventilation, shock, and transfusions, while also exploring more holistic topics, such as leading a medical team, family meetings, and post-ICU placement. Students will examine the question of how health equity, race, and ethnicity play significant roles in outcomes for critically ill patients through interactions with the ICU social workers, who are an integral part of the ICU team and help address some of the profound barriers to health that critically ill patients can experience. In addition, time will be spent exploring some of the cutting-edge areas in critical care, including telemedicine, the digitization of healthcare, and the role of artificial intelligence. Multiple hands-on skill sessions led by faculty and fellows that cover the basics of line placement, airway management, ICU monitoring, and ultrasound assessment will also be established using simulation and 3D models. Upon completion of this rotation, students will have a greater grasp of the complex, multi-faceted approach needed to treat these complicated and critically ill patients.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7050 Precision Medicine: Incorporating Genomics Into Cutting-Edge Patient Care (KISC)

This KISC will expose learners to the many facets of precision medicine, provide an opportunity for experiential learning, and create a space to discuss the benefits and potential harms of precision medicine. Some students will choose this course in preparation for a career in pediatrics, medical genetics, hematology/oncology, nephrology, cardiology, or pathology—all fields in which precision medicine will play a role. Others will choose it to gain hands-on experience using the tools of precision medicine, which are dual-purposed as tools for biomedical research. Finally, for some students the course will be valuable as a window into social issues including advocacy, communication, diversity, equity, and medical ethics, and systems issues including health economics and biomedical innovation. Students will initially engage in interactive small group didactics to understand basic and clinical foundations of precision medicine as well as relevant social and systems issues. In wet-laboratory sessions, students will apply what they learned in class to extract DNA from tissue samples, create a sequencing library and generate genomic data. Through dry-lab exercises, they will then analyze the resulting data using bioinformatics tools. Students will spend three half-days during the rotation in a clinical setting where they will observe the clinical practice of precision medicine. Anticipated assignments include a reflective writing assignment, patient presentation, and group presentation of wet and dry lab experiences. This KISC will provide a comprehensive experience of precision medicine from the perspective of the physician, the laboratory, and the patient. This multi-level appreciation will allow the learner to approach further interactions with precision medicine with the confidence that comes from firsthand experiences.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7055 Recognizing and Mitigating Maternal and Infant Health Disparities (KISC)

Disparities in maternal and infant health are a significant problem in the St. Louis region, and in the nation overall. The Recognizing and Mitigating Maternal and Infant Health Disparities KISC will explore the many factors contributing to these disparities, including historical trauma, structural racism, and barriers to accessing to care. Specific topics include opioid use disorder, mental health, diabetes, cardiac disease, intimate partner violence, breastfeeding and infant nutrition, and infant safe sleep practices. Additionally, a significant amount of time will be spent in advocacy activities and with community care partners where students will experience alternative models of providing prenatal care with an interprofessional focus. Students will gain a strong understanding of the factors contributing to disparities in maternal and infant health and develop strategies to improve health outcome equity for mothers and children. This KISC will incorporate individual pre-work, active classroom-based pedagogies, and experiential learning. Students will be provided time for Required Preparation, such as the biologic basis for opioid use disorder and impact on exposed infants, best practices in supporting women who are victims of violence, and background readings such as "For the Sake of All Report" and "Setting the Standard for Holistic Care of and for Black Women -Black Mamas Matter Alliance." Classroom-based learning will include interactive discussions with guest speakers and experts from all the fields represented, which will prepare students to fully engage in the experiential learning elements of the KISC. The experiential learning component of this KISC will include participation in a variety of clinical settings and with several community partners committed to improving maternal/ infant health in the St. Louis region. Clinical sites include Affinia Health Care, the CARE Clinic for pregnant women with substance use disorders, Psychiatry clinics for pregnant women.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7060 Memory, Dementia, and Clinical Therapeutics (KISC)

Learning and remembering are central to our health, well-being, and individuality. This KISC reviews the latest neuroscience of how memories are made and what happens as these functions go awry in dementing disorders such as Alzheimer disease. The course opens with foundational neuroscience lectures and discussions focusing on how experiences are converted into long-lasting memories through the activation of neuronal circuits. Learners then receive a comprehensive introduction to Alzheimer disease and related dementias (ADRD) and engage in didactic and experiential learning activities related to biomarkers and imaging in dementia, neuropsychology, neuropathology, differential diagnosis in dementia and more. Learners will refine their dementia interviewing skills and will see patients with dementia clinicians. Learners will have unique exposure to cutting edge dementia diagnostics and therapeutics (including advanced immunotherapy clinics) and dementia therapeutics research. Learners attend rounds at a dementia care facility and visit a local non-profit specializing in the support of people with dementia and their caregivers. Learners will develop a broad understanding of cognitive processes and cognitive decline and the future treatment for these disorders.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 7065 Surgical Oncology (KISC)

The Surgical Oncology KISC teaches a bench-to-bedside foundation for the diagnosis, management and basic/translational science surrounding solid tumor malignancies. With a focus on head and neck, hepatobiliary, and aerodigestive tract tumors, students will learn how to approach patients with a new diagnosis of cancer, the anatomy and

principles governing surgery, and the long-term sequela of treatment. Through immersive experiences in the clinic, operating room, and research lab, students will gain insight and experience into how cancer biology, patient factors, and treatment plans impact clinical outcomes. Students will spend time rotating through the surgical, medical and radiation oncology clinics, head and neck operating room, surgical oncology operating room, and translational oncology research labs. Students will be exposed to the multidisciplinary tumor board discussion consisting of surgeons, medical and radiation oncologists, radiologists and pathologists. Additionally, didactics will include lectures covering a range of topics from tumor genomics to principles of surgery and radiation oncology, journal clubs and case conferences. Our goal is to provide a road map connecting how basic and translational research is directly impacting patient care, treatment decisions and how this translates to clinical outcomes.

Credit 2 units.

Typical periods offered: Medicine Year

MEDPHASE3 7070 The AI Imperative (KISC)

The AI Imperative course provides medical students with a comprehensive understanding of clinical decision support systems and explores the transformative impact of artificial intelligence on these historically rule-based systems. Through in-depth discussions, students will learn about the integration of AI in medicine, focusing on its ethical implications, benefits, and challenges. Emphasizing practical knowledge over technical programming skills, the course aims to empower future physicians to critically evaluate and implement AI-driven solutions in their medical specialties. By the end of the course, students will be adept at discussing the broader implications of AI in healthcare and will be well-prepared to guide and support AI initiatives in their professional careers.

Credit 2 units.

Typical periods offered: Medicine Year

MEDPHASE3 7075 Integrated Abdominal Transplantation (KISC)

The course is designed to provide a holistic overview of abdominal transplantation, primarily focused on providing students with an in-depth introduction to the multiple facets, both foundational science and clinical, within this field. The primary goal is to enhance the senior medical student curriculum through providing a multidisciplinary and integrated experience spanning the major service lines of transplant hepatology, transplant nephrology, and transplant surgery. Small group discussions throughout the course will center on the background foundational science inherent to transplant, with ample opportunities then to observe and to apply that knowledge in patient management and evidence-based care. The two main components of this course will involve the following: a classroom component consisting of didactics, small group sessions, and journal club; and an experiential component involving clinical exposure to transplant nephrology, transplant hepatology, and transplant surgery as well as real-time interaction with ancillary services such as HLA lab, pathology, radiology, and Mid-America Transplant.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 8010 Step Preparation

This course may be scheduled to allow for dedicated study time for USMLE Step 1 and Step 2.

Credit 1-4 units.

Typical periods offered: Medicine Year



MEDPHASE3 8040 Phase 3 Capstone

The Phase 3 Capstone course is highly structured. To provide students with the absolute best experience, many elements of the course require attendance; these will be indicated in Keystone. Most sessions will be scheduled from 8 am - 5pm. Some sessions may be scheduled after 5 pm when necessary. The course calendar will be made available 4 weeks before the start of each block. By the end of this four-week course, students will be able to demonstrate improved knowledge and clinical skills needed to enter the internship year of graduate medical training. Coursework will be divided between self-study, didactic, small group discussions, hands-on skills practice, and simulation. Parts of the course will be tailored to specialty interests.

Credit 4 units.

Typical periods offered: Medicine Year

MEDPHASE3 8970 Reading Elective

Reading electives allow in-depth study of a topic of particular interest to the student, related to the study or practice of medicine as appropriate for credit toward the MD degree. Reading electives must be independent projects, and cannot be related to any other independent elective experience (for example, students may not use a reading elective to conduct a literature review before beginning an EXPLORE research project). Expected effort for a reading elective is approximately 30 hours per week.

Credit 1-4 units.

Typical periods offered: Medicine Year

MEDPHASE3 8980 Special Study Elective

Clinical special study electives allow students to participate in a clinical experience not offered in the Electives Catalog. Clinical special study electives tend to be highly specialized and focused on a particular subspecialty, individual procedure, or population; they may also qualify as interdisciplinary. Non-clinical special study electives allow in-depth study of a topic of particular interest to the student, related to the study or practice of medicine as appropriate for credit toward the MD degree. They tend to be projects that do not qualify as clinical, but are more involved than reading and writing about a topic (for example, a past project involved intensive study of a foreign language focused on patient care, including both independent study and conversational practice with community groups and native speakers). Non-clinical special study electives cannot be used as a secondary occurrence of a reading elective, cannot be research-based, and cannot be related to any other independent elective experience (for example, students may not use a non-clinical special study elective to prepare for an EXPLORE research project).

Credit 1-4 units.

Typical periods offered: Medicine Year

MEDPHASE3 8990 EXPLORE Elective

Phase 3 EXPLORE Electives allow focused scholarly work on a project of particular interest to the student.

Credit 1-32 units.

Typical periods offered: Medicine Year

MEDPHASE3 9998 Away Elective

Away Elective

Credit 1-12 units.

Typical periods offered: Medicine Year

MEDPHASE3 9999 International Away Elective

Credit 1-4 units.

Neurology

NEUROL 8020 Neuro-Oncology (Clinical Elective)

The Phase III elective experience in adult neurology is designed to adapt to the individual goals and objectives of students. The elective takes place in one or two 2-week blocks that can occur among four possible venues as chosen by the student after discussion with the course director:

1. Adult Inpatient General Service
2. Adult Inpatient Stroke Service
3. Adult Inpatient Consult Service
4. Outpatient Clinics (with 8-10 clinics/week)

The combination of services and experiences will be arranged directly between the student and the Course Director prior to beginning the rotation. Students rotating on the inpatient services will work closely with neurology residents to develop neurology-specific care plans for general neurology or stroke patients and will function above a clerkship level. No call or weekend duties will be expected on this rotation. On the general consult team, students will see patients in the ER and on other services who have neurologic issues or complications. In the outpatient clinics, students will rotate between a variety of subspecialty clinics and work with a variety of attendings in order to experience the breadth of outpatient neurology.

Credit 4 units.

Typical periods offered: Medicine Year

NEUROL 8030 Neonatal Neurology (Clinical Elective)

The Neonatal Neurology elective will consist of a combination of inpatient and outpatient experiences designed to provide medical students with comprehensive exposure to the field. Through the rotation, students will actively participate in all aspects of patient care, acquiring the knowledge and skills necessary to effectively evaluate infants with a wide range of neurological disorders including encephalopathy, stroke, seizures, hypotonia, intraventricular hemorrhage, periventricular leukomalacia, and genetic disorders, among others.

Clinical activities will be tailored to fit the interests and goals of the individual student and include a combination of inpatient and outpatient exposures. Inpatient activities will occur in the St. Louis Children's Hospital Neonatal Intensive Unit as part of the Neonatal Neurology Consultation service. Outpatient activities will occur in the St. Louis Children's Hospital Outpatient Clinics. Students will also attend educational conferences specific to the field during the rotation, including Neonatal Neurology Clinical Conference and Neonatal Neuroradiology Conference.

Credit 2 units.

Typical periods offered: Medicine Year

NEUROL 8035 Pediatric Neurology (Clinical Elective)

The Phase III elective experience in child neurology is designed to adapt to the individual goals and objectives of students. The elective takes place among five possible venues as chosen by the student after discussion with the course director: 1. Inpatient ward service 2. FL/ED consult service 3. PICU consult service 4. Outpatient Clinics (with 8-10 clinics per week) 5. Video EEG (VEEG) monitoring service.

The combination of services and experiences will be arranged directly between the student and the Course Director prior to beginning the rotation. In outpatient clinics, students will rotate between a variety of subspecialty clinics and work with a variety of attendings in order to experience the breadth of outpatient pediatric neurology. Students rotating on the inpatient ward service will work closely with the pediatric neurology resident to develop neurology-specific care

plans and will function above a clerkship level. On the FL/ED consult services, students will work with the consult attending and pediatric neurology residents on that team to see consults in the ER and other hospital floors.

Credit 4 units.

Typical periods offered: Medicine Year

NEUROL 8040 Neurointensive Care Unit (Clinical Elective)

The student will be integrated into the Critical Care Team that provides care in the Neurology/Neurosurgery ICU. Diseases frequently encountered include intracerebral hemorrhage, head trauma, subarachnoid hemorrhage, stroke, spinal cord disease, and neuromuscular disease.. The student will follow patients, participate in rounds and may participate in some procedures under supervision. Didactic sessions will be provided as conferences or lectures from the ICU attending and fellow.

Credit 4 units.

Typical periods offered: Medicine Year

NEUROL 8045 Adult Epilepsy (Clinical Elective)

Students will learn how epileptologists diagnose and manage epilepsy in adults. They will learn how to use the history and physical exam and ancillary studies such as EEG, MRI, PET, and SPECT to diagnose and manage patients with new onset epilepsy, established epilepsy, and medically intractable epilepsy. They will become familiar with the medical management of epilepsy as well as the treatment options for medically intractable epilepsy including epilepsy surgery. They will also learn how to manage the co-morbid conditions that accompany epilepsy such as depression, behavioral problems, cognitive impairment, sleep disturbance, and non-epileptic events. Students will accomplish these goals by rounding on the inpatient epilepsy service (Epilepsy Monitoring Unit and Critical Care EEG Monitoring) with the epilepsy team at Barnes-Jewish Hospital. Students will attend outpatient epilepsy clinic one half-day per week. They will attend the Adult Epilepsy Conference, EEG Review Conference, EEG/Epilepsy Didactics, and Neurology Grand Rounds.

Credit 2 units.

Typical periods offered: Medicine Year

NEUROL 8201 Neurology (Clinical Elective)

The Phase III elective experience in adult neurology is designed to adapt to the individual goals and objectives of students. The elective can occur at four possible venues chosen by the student after discussion with the course director: 1. Adult Inpatient General Service 2. Adult Inpatient Stroke Service 3. Adult Inpatient Consult Service 4. Outpatient Clinics (with 8-10 clinics per week) The combination of services and experiences will be arranged directly between the student and the Course Director prior to beginning the rotation. Students rotating on the inpatient services will work closely with neurology residents to develop neurology-specific care plans for general neurology or stroke patients and will function above a clerkship level. On the consult team, students will see patients in the ER and on other services who have neurologic issues or complications. In the outpatient clinics, students will rotate among a variety of subspecialty clinics and work with a range of attendings to experience the breadth of outpatient neurology.

Credit 4 units.

Typical periods offered: Medicine Year

NEUROL 9100 Neurology Advanced Clinical Rotation (ACR)

The Neurology Advanced Clinical Rotation (ACR) offers graduated, supervised patient care responsibility in adult or pediatric neurology, where students are expected to act and perform at the intern level. Students typically spend the rotation on one of three services:

- Inpatient General Adult Neurology at Barnes-Jewish Hospital
- Adult Stroke Neurology at Barnes-Jewish Hospital or
- Inpatient General Pediatric Neurology at St. Louis Children's Hospital

(Split rotations are considered on a case-by-case basis by the ACR Director)

Under the supervision of senior residents and attending physicians, students gain increased autonomy evaluating and treating acute and chronic neurological disorders. Key responsibilities include performing complete histories and neurological examinations, independently establishing differential diagnoses and care plans, and, when possible, writing orders, admission notes, progress notes, and discharge summaries. Students manage a tailored patient load determined by case complexity and their individual clinical skills to ensure adequate experience. Additionally, ACR students are required to attend departmental rounds and clinical conferences to further advance their neurological knowledge.

Credit 4 units.

Typical periods offered: Medicine Year

Neuroscience

NEUROSCI 8005 Advanced Dissection (Non-Clinical Elective)

Students will perform detailed dissections on a discrete region of the body of their choosing - i.e. head/neck, thorax, abdomen, pelvic cavity, or limbs. Students will compile a list of personal learning objectives with the approval of the course director(s). A minimum of 30 hours of self-paced individual dissection is required and may include the practice of surgical approaches, and/or the study of cross-sectional anatomy and medical imaging. At the end of the course, each student will demonstrate their dissection results to the faculty and submit a final project. The final project allows students to synthesize their laboratory experience with primary literature on the clinically-relevant anatomy in their region of interest.

Credit 4 units.

Typical periods offered: Medicine Year

Neurosurgery

NEUROSUR 8101 Neurosurgery (Clinical Elective)

The Neurosurgery elective is a 4-week rotation where you will spend 1-2 weeks at a time on a specific neurosurgical service between vascular, tumor, or spine neurosurgery. There is also a possibility to go in pediatric neurosurgery. You will learn how to do basic neurosurgical procedures, rounding on complex patients in the ICU or the ward, be on-call with the neurosurgery mid-level residents, participate in the residents' clinic and in the operating room. Note that this course is a pre-requisite for the ACR course in neurosurgery.

Credit 4 units.

Typical periods offered: Medicine Year



NEUROSUR 9100 Neurosurgery Advanced Clinical Rotation (ACR)

The goal of our four-week Advanced Clinical Rotation is to provide an overview of neurological surgery for medical students planning to apply for neurosurgery residency in the next year. The ACR takes place on the campus of Washington University School of Medicine, and at nationally ranked Barnes-Jewish Hospital and St. Louis Children's Hospital. Enrolled students must first complete the neurosurgery elective and will then be assigned to one of our neurosurgical services to spend four weeks on for the ACR. The medical student will act like an intern. During the ACR, the medical student will participate in patient work-ups, pre-, intra- and postoperative care, and diagnostic procedures, learn how to perform basic neurosurgical procedures such as lumbar punctures, ICP monitor placement, and ventricular drain placement, spend some days in clinic, take overnight call. They are also encouraged to participate in Grand Rounds, Neurosurgery Resident Curriculum conference, and Journal Club with the neurosurgery residents.

Credit 4 units.

Typical periods offered: Medicine Year

Obstetrics & Gynecology

OBGYN 8010 OBGYN Reproductive Endocrinology & Infertility (Clinical Elective)

The student will participate (in the office and hospital) in the study and treatment of women with reproductive endocrine disorders and infertility. The student will attend and present in conferences, attend surgery, observe assisted reproductive technology procedures, have assigned reading and be an integral part of the reproductive endocrine service. Opportunities for clinical research projects in reproductive endocrinology are also available. In addition, the student may spend one week of the rotation on night shift in labor & delivery which will help acquaint the student with the residents and hospital.

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 8035 OBGYN Ultrasound - Genetics (Clinical Elective)

Working with the attending physicians in the Ultrasound Units at the Center for Outpatient Health and the Center for Women's Wellness at Missouri Baptist Medical Center, the student will learn the principles and techniques of non-invasive screening for fetal disorders and observe the performance of invasive prenatal diagnostic procedures. The student will also learn the standards and guidelines for performance of the antepartum obstetrical ultrasound examination and female pelvic examination. Normal and abnormal fetal and gynecologic anatomy will be reviewed. Experience will be gained in pedigree analysis and familial risk factor assessment by working with genetic counselors. One day is spent in the Cytogenetics Laboratory observing the preparation of prenatal specimens for karyotype analysis. Opportunities for participation in clinical research are also available.

Credit 2 units.

Typical periods offered: Medicine Year

OBGYN 8040 Complex Family Planning (Clinical Elective)

Students will attend a variety of outpatient and inpatient clinics to interact with patients seeking different reproductive health services including contraception, abortion care, pregnancy loss, and gender-affirming health care. These clinics include family planning and abortion care services at the Hope Clinic and BJH; Pediatric and

Adolescent Gynecology, The SPOT, the Contraceptive Choice Center (C3 Clinic); gynecology clinic at the Faculty Practice Gyn clinic located in COH 7 and the Complex Family Planning clinic (COH 3); and the Transgender Care Clinic (CAM 5C).

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 8051 Outpatient OBGYN Generalist Care (Clinical Elective)

This experience is designed to primarily acquaint the student with the diagnosis and care of outpatients. Students will work one-on-one with attending staff, to focus on an overview of evaluation, diagnosis, and treatment of common obstetric and gynecologic concerns. The student will spend the majority of time attending half day clinics and private offices. In addition, the student will spend one week of the rotation on night shift in labor & delivery which will help acquaint the student with the residents and hospital. If desired, additional time can be arranged to participate in/observe outpatient surgical procedures. A 30-45 minute presentation to attendings and house staff will culminate the rotation on a selected OB/GYN topic.

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 8450 Outpatient Maternal-Fetal Medicine (Clinical Elective)

Students will see a variety of high risk obstetrical patients in the outpatient setting in the Center for Outpatient Health. The student will evaluate various types of reproductive-age patients with medical or obstetrical complications, including preconception consultations, prenatal care consultations and initial prenatal visits. The student will also see return patients to experience the continuity of prenatal care. Students will participate in antenatal testing and learn basic ultrasonography skills. In addition, the student will spend one week of the rotation on night shift in labor & delivery which will help acquaint the student with the residents and hospital. The student will be responsible for one presentation to be given to the OB teams at the end of the rotation. Students are provided independent study time to put together the presentation which should be in power point and on a topic of their choice, inspired by a patient-related clinical condition that piqued their interest during the block.

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 9100 Inpatient Maternal-Fetal Medicine Advanced Clinical Rotation (ACR)

This experience is designed to prepare you for a career in obstetrics and gynecology. The rotation is divided into 2-week blocks alternating with Labor & Delivery and Antepartum. Depending on the number of 4th year students during the rotation you may start on Labor & Delivery or Antepartum. You will be treated as an acting intern and will be expected to become a functioning member of the team. The purpose of the Labor & Delivery segment is to allow you to participate in monitoring and delivery of patients in labor including spontaneous vaginal deliveries and cesarean sections. The team will be comprised of PGY1,2, 4, fellow, and attendings. You will participate in team rounds and board signout, perform histories & physical exams, and write admit orders/progress notes for co-signature. You will be taught how to perform cervical exams and to interpret fetal monitoring during labor. During your antepartum block your primary team includes a PGY2, 4, fellow, and attending. You will learn how to diagnose, evaluate, and manage obstetric conditions including preterm labor, preterm pre-labor rupture of membrane, hypertensive disorders of pregnancy, diabetes, and fetal growth restriction. You will also be exposed to uncommon conditions and expected to generate appropriate differential diagnoses. You will round with the team, perform detailed histories & physical exams, write admit orders/ progress notes for co-signature, and assist with the

interpretations of antepartum fetal testing. You will be introduced to basic ultrasonography skills. The student will be responsible for one topical presentation to be given to the OB teams at the end of the rotation. On your first day:

Antepartum: Students should report to board sign out at 8 am to listen to the night team's handoff. At the conclusion of board sign out you will meet the team on the antepartum floor to start rounds.

Labor & Delivery: Students should report to board sign out at 8 am to listen ...

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 9150 Gynecologic Oncology Advanced Clinical Rotation (ACR)

This course is designed to prepare students for a career in Obstetrics and Gynecology. By the end of the ACR, students are expected to be functioning near the level of a matriculating intern and should be fully integrated with the team, which includes an attending and a fellow (who rotate weekly), a resident team (R4, 2 R3's, R2, R1, rotating every 6w), and often Phase 2 and Phase 1 students. The student will take part in the work-up of patients on the gynecology service prior to surgery and/or radiotherapy, assist in surgery, participate in rounds with residents/fellows/faculty, assist in managing the inpatient unit including writing notes and entering orders for MD co-signature, accompany chief residents/fellows/faculty on consultations, and attend gynecologic oncology clinics and conferences. Opportunities for clinical or basic research projects in gynecologic malignancy are also available. A 30-minute presentation to the division reviewing a topic in gynecologic oncology is required.

Credit 4 units.

Typical periods offered: Medicine Year

Ophthalmology and Visual Sciences

OPHTH 8010 Ophthalmology (Clinical Elective)

The Ophthalmology elective is designed to provide a foundational experience in clinical and surgical ophthalmology for medical students, whether they are interested in ophthalmology or other fields of medicine for their future career. Time will be divided among the University Eye Service clinic, adult inpatient consults, and ophthalmology subspecialties (e.g. Pediatric Ophthalmology, Glaucoma, Cornea, Oculoplastics, and Retina).

The amount of time at each location will depend on length of the rotation and the student's specific interests. There are weekly case conferences with Dr. Andrew Lee, Dr. Cynthia Montana, and other faculty members. Students will attend departmental grand rounds weekly, when applicable. At the end of the experience, the student is expected to be familiar with the routine eye exam, common eye conditions and their treatment, and the use of the slit lamp and ophthalmoscope.

Credit 2 units.

Typical periods offered: Medicine Year

OPHTH 8015 Neuro-Ophthalmology (Clinical Elective)

This elective will be offered by invitation only to select fourth-year medical students with a career interest in Neuro-Ophthalmology. During the four-week rotation, students will be busy in the Neuro-Ophthalmology clinic. Students will be expected to work-up new patients and present them to the Neuro-Ophthalmology attending. After clinic students should read about diagnoses encountered in clinic. In addition, there will be required reading. Comprehension of

the reading will be assessed by scheduled quizzes which will then be reviewed with the student by one of three faculty members. There may be opportunities to join the operating room for strabismus surgery. Interested students will be encouraged to engage in a research project with one of the faculty members, although this is not required for the rotation. This will be a busy clinical elective; students can expect to spend ten half-days working in clinic or the OR per week. By the end of the rotation, students will feel comfortable recording a chief complaint, focused Neuro-Ophthalmic history, and performing a Neuro-Ophthalmic examination. Students should achieve resident level knowledge of common Neuro-Ophthalmic pathology.

Credit 2 units.

Typical periods offered: Medicine Year

OPHTH 8030 Orbital and Oculofacial Plastic Surgery (Clinical Elective)

Hands-on experience with clinical and surgical aspect of Orbital and Oculofacial Plastic Surgeons. Students will work with Dr. Couch and Dr. Maamari in the clinic and the operating room in the care of diverse patients both on the pediatric and adult sides.

Credit 2 units.

Typical periods offered: Medicine Year

OPHTH 9100 Ophthalmology Advanced Clinical Rotation (ACR)

On the Ophthalmology Advanced Clinical Rotation, medical students will rotate on the ophthalmology adult consult service, the University Eye Service clinic, and the subspecialty clinics of the full time faculty of the Department of Ophthalmology and Visual Sciences (cornea, glaucoma, oculoplastics, neuro-ophthalmology, pediatric ophthalmology). Students will care for patients of all ages and backgrounds, and ophthalmic diseases seen will range from common eye conditions to complex diseases requiring subspecialty care.

In clinic and on consults, students will perform the ophthalmic history and physical examination and also develop their ability to diagnose, manage, and treat common ophthalmic conditions. In the operating room, students will participate in all phases of perioperative patient care and learn basic ophthalmic surgical principles and techniques.

Academic curriculum for the rotation will include weekly case presentations with ophthalmology faculty, resident lectures and conferences, and weekly departmental grand rounds. Each student will also present a case at grand rounds during the final week of the rotation with the assistance of a resident mentor.

Students will participate in ophthalmology call approximately one evening per week. During that time, the medical student is expected to be present to work with the primary call ophthalmology resident.

Credit 4 units.

Typical periods offered: Medicine Year

Orthopedic Surgery

ORTHO 8071 Physical Medicine and Rehabilitation (Clinical Elective)

The elective is designed to provide the student with a broad introduction to the field of Physical Medicine and Rehabilitation (PMR). Major objective of this clinical elective is to achieve greater knowledge of the neurological and musculoskeletal diseases and their treatment, and gain understanding of basic principles of rehabilitation. The student will learn the clinical and rehabilitative care of patients with strokes, traumatic brain injury, spinal cord trauma and diseases, and limb amputations. Student will gain clinical skills in evaluating in management of functional impairments. Students will be expected to participate in daily rounds on inpatient rehabilitation units with the



clinical care team, follow 3-4 patients, attend multidisciplinary team conferences and family meetings, attend outpatient rehabilitation clinics in spinal cord, stroke, traumatic brain injury, and amputee. Teaching and supervision is provided by the Division of Neuro-Rehabilitation faculty. PMR residents are involved in student teaching as well. Students are required to participate in didactic teaching conferences within the PM&R residency. Participation in Musculoskeletal PMR clinic in the Orthopedic surgery department can be arranged on individual basis. This rotation is particularly useful for students considering careers in Rehabilitation, Neurology, Geriatrics, Primary care, Neurosurgery, Orthopedic surgery, Polytrauma, or any other field that will require experience in the evaluation and management of patients with physical impairment and disabilities. Credit 2 units.

Typical periods offered: Medicine Year

ORTHO 8150 Orthopedic Surgery (Clinical Elective)

This elective will allow for immersion within one of the orthopedic surgery subspecialties. The student will be assigned to a mentor/preceptor and work primarily with a single attending within the available subspecialties including orthopedic oncology, hand surgery, orthopedic trauma, sports medicine, arthroplasty and adult reconstruction, pediatric orthopedics, spine, foot and ankle or shoulder and elbow. The student will have the opportunity to care for patients in the inpatient and outpatient setting, and working within a team to include residents, fellows, and attendings. Emphasis will be on the evaluation and treatment of degenerative and acute orthopaedic conditions. Surgical education on anatomy, surgical approaches and operative rationale will also be central to the rotation. Participation in department and service specific lectures and conferences will be expected. Overnight call responsibilities will allow for further exposure to the management of acute orthopedic problems in the emergency room.

Credit 2 units.

Typical periods offered: Medicine Year

ORTHO 8160 PM&R Musculoskeletal and Sports Medicine (Clinical Elective)

In this outpatient Physical Medicine and Rehabilitation rotation, students will assess patients with musculoskeletal and sport medicine concerns, develop a diagnostic approach, and design treatment plans. Common presenting concerns include acute or chronic pains, strains, and sprains. Students will be exposed to a variety of outpatient procedures including diagnostic ultrasound, electrodiagnostic testing, as well as anatomic, ultrasound, and fluoroscopic-guided injections. This rotation is useful for any student, especially those interested in PM&R, primary care, emergency medicine, radiology, and orthopedic surgery.

Credit 2 units.

Typical periods offered: Medicine Year

ORTHO 8170 PM&R and Orthopedic Injury Clinic (Clinical Elective)

In this outpatient Physical Medicine and Rehabilitation rotation, students will assess patients presenting to the Orthopedic Injury Clinic, our orthopedic urgent care clinic. Common presenting concerns include acute or chronic pains, fractures, strains, and sprains. Students will help develop a diagnostic approach and design treatment plans. Students will be exposed to a variety of outpatient procedures including diagnostic ultrasound, anatomic, ultrasound, and fluoroscopic-guided injections. This rotation is useful for any student, especially those interested in PM&R, primary care, emergency medicine, pediatrics, radiology, and orthopedic surgery.

Credit 2 units.

Typical periods offered: Medicine Year

ORTHO 9100 Orthopedic Surgery Advanced Clinical Rotation (ACR)

This will be a 4-week inpatient and outpatient clinical experience involving the evaluation, diagnosis and treatment of orthopedic conditions, with exposure to a variety of degenerative and acute orthopedic conditions. Students will be expected to function at the level of a PGY1 with regard to clinical responsibilities. Participation will involve floor management, ER evaluation, OR participation and outpatient clinic experience. Emphasis will be on correlating anatomy to function in normal and pathologic states.

Credit 4 units.

Typical periods offered: Medicine Year

Otolaryngology

OTO 8030 Otolaryngology for Visiting Students (Clinical Elective)

This is four-week rotation for visiting students seeking a sub-internship experience with the WashU Department of Otolaryngology Head and Neck Surgery. Students participate as active team members within our clinical services, working closely with faculty and residents, and providing care in the clinic, hospital, and operating room settings. They also will have the opportunity to participate in educational activities and conferences. A typical rotation assignment would include 2 weeks on the Head and Neck service at Barnes-Jewish Hospital, and two additional 1-week experiences on other sub-specialty services (based on student's choice and availability). Although optional, participation at some of our clinical sites will require off-campus travel.

Credit 4 units.

Typical periods offered: Medicine Year

OTO 8040 Otolaryngology (Clinical Elective)

This rotation introduces the student to clinical Otolaryngology (ENT), including the diagnosis and treatment of conditions in the ear, nose, throat, head, and neck. This may include experiences in the clinic, hospital, and operating room, and may include time with audiology, speech-language pathology, and the vestibular laboratory. Students will also attend academic activities/conferences. The emphasis of the ENT Elective is to provide experience in common problems one would see in primary care or family practice. For example, this may be valuable for students going into primary care who would like ambulatory ENT experience, or going into pediatrics who would like pediatric ENT experience. Students should communicate with the course directors regarding their specific goals prior to start of rotation, so that their experience can be tailored accordingly. Students interested in ENT as a career are encouraged to take ENT as a rotation while on their Phase 2 Surgery Clerkship and then take the ENT ACR towards the beginning of Phase 3. Those who did not take ENT during Phase 2 should touch base with the course directors to make an appropriate plan.

Credit 2 units.

Typical periods offered: Medicine Year

OTO 9100 Otolaryngology Advanced Clinical Rotation (ACR)

The Otolaryngology Advanced Clinical Rotation (ENT-ACR) is a four-week rotation designed to provide a comprehensive sub-internship otolaryngology experience during the Phase III Gateway WUSM Curriculum. A typical schedule would include 2 weeks on the Head and Neck Service at Barnes-Jewish Hospital and 2 weeks on the Pediatric Otolaryngology Service at St. Louis Children's Hospital, although different service assignments may be considered at times based on availability. During the ACR, students will get direct practice with patient care, common bedside procedures (e.g., dressing changes, flexible Naso laryngoscopy; control of epistaxis; laceration repair), assisting in the operating room, and continuity of care via the clinic

and inpatient rounding. They are expected to be active team members – helping with morning rounds, taking responsibility for assigned patients, communicating plans with nursing staff, and assisting with progress notes and orders. Throughout the day students are expected to maintain communication with staff regarding patient care and provide updates to otolaryngology residents and attendings. ACR students take two 12-hour weekend calls during the rotation, taken alongside the on-call ENT resident. Additional weekend assistance with rounds and cases will mirror internship expectations. Students interested in ENT as a career are encouraged to take the ENT ACR towards the beginning of Phase 3. Those who did not have a prior ENT rotation while on their Phase 2 Surgery Clerkship should touch base with the course directors for guidance.

Credit 4 units.

Typical periods offered: Medicine Year

Pathology

PATH 8005 Autopsy Pathology (Clinical Elective)

This elective is designed to introduce students to autopsy pathology. Students will assist in performing autopsies and, together with the first-year pathology residents, will participate in all of the activities of the autopsy service including brain cutting, specialty microscopic conferences, and biweekly autopsy case conferences. Students will have the opportunity to review topics in forensic pathology. Students will be under the direction of senior pathology faculty.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 8010 Dermatopathology (Clinical Elective)

The student will be involved in all activities of the dermatopathology service. These include review, discussion, and sign-out of microscopic skin specimens. Sign-out occurs each day with a team that includes an attending, fellow, and residents from both dermatology and pathology. The medical student will work closely with the residents and fellow to preview cases prior to sign-out. Dermatology Grand Rounds is held Thursday mornings and is mandatory. Other learning opportunities include informal unknown slide sessions, consensus conferences, and journal clubs. Medical students will be required to complete at least one evidence-based medicine presentation during the rotation. The primary goal of this elective is to acquire basic competence in the diagnosis of skin diseases at the microscopic level.

Credit 4 units.

Typical periods offered: Medicine Year

PATH 8015 Cytopathology (Clinical Elective)

This elective is designed to familiarize students with the discipline of cytopathology and to encourage the development of basic skills. Cytopathology impacts many different areas of patient care and medical practice. The cytopathology laboratory at Barnes-Jewish Hospital receives a broad range of medical cytology material involving fine needle aspiration biopsies (FNA), body fluids and Pap tests. As a result, the elective is beneficial for students considering a career in pathology and for students planning careers in internal medicine, surgery, OB-GYN, ENT and radiology. The focus of the experience can be customized based on the interest of the student. Desk space and a microscope are provided.

Students on the elective will: 1. Learn how patient specimens are received and processed 2. Acquire skills in the microscopic diagnosis of disease through active participation 3. Learn the role of the cytopathologist in the care and management of patients.

Students will have the opportunity to function as junior house staff managing their own cases with supervision from residents, fellows and attending cytopathologists. There are textbooks and extensive study sets to permit students to focus on specific areas of interest.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 8020 Molecular Pathology (Clinical Elective)

This elective is designed to introduce students to the field of molecular pathology, including established molecular diagnostics and Next Generation Sequencing clinical assays. Students will learn through observation in the laboratory, didactic sessions, resident and fellow presentations, sign-out with attending pathologists and clinical informatics workshops. Students will work with residents/fellows on the rotation and participate as part of the team.

Credit 4 units.

Typical periods offered: Medicine Year

PATH 8030 Surgical Pathology (Clinical Elective)

This elective is designed to familiarize students with the discipline of surgical pathology and to encourage the development of basic skills in gross pathology and histopathological interpretation. The laboratory of surgical pathology at Barnes-Jewish Hospital receives a broad range of medical biopsy material in addition to specimens derived from the busy surgical subspecialty practices. As a result, this elective is beneficial not only for students considering a career in pathology but also for students planning careers in internal medicine, surgery, obstetrics-gynecology, pediatrics, radiology, radiation oncology and dermatology. Students on this elective will: 1. Learn how patient specimens are received and processed 2. Acquire skills in the gross examination and microscopic diagnosis of disease through active participation 3. Learn the role of the pathologist in the preoperative, intraoperative and postoperative care and management of patients. Students will function as junior house staff managing their own cases with supervision from residents, fellows and attending pathologists. Students may also wish to participate in ongoing research projects within the department as time, and interest allows. At the end of the rotation, the students are required to do a formal case presentation for the residents, fellows and attending staff.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 8035 Introduction to Neuropathology (Clinical Elective)

The course is structured to give the student a full-time immersion in the specialty of neuropathology including both neurosurgical and neuroautopsy derived material. There are daily didactic sessions that cover the spectrum of neurological diseases, review gross and microscopic neuroanatomy, discuss approaches to the diagnosis of nervous system disease and point out the interrelationships of research to clinical problems. Multiple clinical conferences and diagnostic working sessions complement reading, use of a large microscopic divisional study set and project work. Time: 35 to 40 hours per week.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 8045 Clinical Laboratory Medicine (Clinical Elective)

This elective rotation is designed to teach the student how clinical laboratory assays are used in the diagnosis of disease and to understand the quality assurance tools the laboratory utilizes to assure the reliability of tests. The elective includes rotations through a variety of clinical laboratories including clinical chemistry, clinical microbiology, hematopathology, molecular pathology, and transfusion medicine. During the elective the student will have a daily schedule, which includes didactic sessions with faculty and regular interactions



with house staff. Some examples of useful clinical skills acquired during the experience include: morphologic review of peripheral blood smears and bone marrow biopsies; interpretation of coagulation tests, biomarkers of cardiac damage and serum protein electrophoresis patterns; identification of infectious organisms; and appropriate use of blood component therapy and therapeutic apheresis. The rotation culminates with a case discussion presented by the medical student which focuses on application of clinical laboratory evaluations to direct patient care.

Credit 4 units.

Typical periods offered: Medicine Year

PATH 8170 OBGYN Pathology (Clinical Elective)

This elective stresses the principles of anatomic pathology when applied to operative material in obstetrics and gynecology. The subintern will examine gross and microscopic specimens in the ob-gyn pathology lab and review pertinent literature with a senior pathologist. Ample time will be available for attending regular conferences in ob-gyn and pathology.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 9100 Anatomic Pathology and Laboratory Medicine Advanced Clinical Rotation (ACR)

The purpose of the Anatomic Pathology and Laboratory Medicine Advanced Clinical Rotation involves the development of expertise related to diagnostic pathology and laboratory testing in a well-supervised teaching environment. ACR students are under the supervision of anatomic pathology and laboratory medicine residents, fellows and attending pathologists. ACR students have the same daily schedules as first year anatomic pathology/clinical pathology residents. They are assigned the primary workup of patient specimens or patients on each sign-out day. An approach to the specimen or patient and required follow up or ancillary testing is planned in consultation with the resident, fellow or attending physician. The trainees assume the primary responsibility for generating any required reports and communication with other healthcare providers. As for most entering residents, there is no formal after-hours call schedule. Students attend the same conferences as the house staff.

Credit 4 units.

Typical periods offered: Medicine Year

Pediatrics

PEDS 8010 Pediatric Asthma and Allergy (Clinical Elective)

In a predominantly outpatient setting, students will evaluate patients with a wide variety of allergic and immunologic disorders including asthma, allergic rhinitis, anaphylaxis, food allergy, atopic dermatitis, urticaria, angioedema and primary immunodeficiency. Rotation goals include: (1) the extension of history-taking skills to include environmental exposures, (2) the recognition of physical findings suggestive of allergic disease, (3) understanding the indications and interpretation of diagnostic testing including skin testing and assessment of pulmonary function, and (4) application of appropriate therapeutic strategies to these disorders. Weekly didactic conferences and inpatient consultations provide additional educational opportunities to the student.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8020 Pediatric Critical Care (Clinical Elective)

This elective is designed to familiarize the student with the diagnosis and treatment of critical illness in infants and children. The student will be part of the PICU team at St. Louis Children's Hospital which includes an attending, fellow, residents, and nurse practitioners. The student will be expected to function as the front line provider for 2-3 patients daily, depending on acuity. The schedule will consist of primarily day shifts with the option of having some night shifts as well.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8025 Pediatric Cardiac Catheterization (Clinical Elective)

This course will provide the student with an introduction to the anatomy and physiology of congenital heart disease. In addition, there will be exposure to treatment of congenital heart disease through interventional cardiology.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8030 Outpatient Pediatric Cardiology (Clinical Elective)

Students will be exposed to the wide spectrum of pediatric cardiology on an outpatient basis. In addition to general cardiology clinics, several subspecialty clinics are also available, including heart failure/transplant, electrophysiology/inherited arrhythmias, pulmonary hypertension, Williams' syndrome, Down syndrome, cardiac neurodevelopmental, COVID-19/MIS-C, Fontan, aortopathy, dysautonomia, and preventive cardiology clinics. Students will independently evaluate clinic patients referred for a variety of cardiac complaints, including a wide variety of congenital cardiac lesions, cardiac murmurs, chest pain, syncope, and arrhythmias and report their findings to the attending. Cardiac auscultation skills will be enhanced through auscultation of cardiac patients in a clinic environment.

Students will learn basics of ECG and echocardiogram interpretation by reviewing studies performed during clinic with the attending. Clinics are held at St. Louis Children's Hospital, the Children's Specialty Care Center West County, the Children's Specialty Care South County, Graham Road clinic in North St. Louis County, and Shiloh clinic in Shiloh, IL. Students also have the option to participate in outreach clinics that occur on a monthly basis (locations include Cape Girardeau, Rolla, Bonne Terre, and Columbia). Depending on interest, students may spend additional time in the echocardiography laboratory for more in-depth exposure to echocardiography, including fetal echocardiography. Participation in weekly surgical conference and daily cardiology educational conferences is encouraged.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8035 Genetics and Genomic Medicine (Clinical Elective)

From diagnosis to management, and from rare diseases to the most common conditions, medical genetics is changing how we practice and increasingly guiding our day-to-day healthcare decisions. We now have the ability to treat and even cure some genetic disorders with gene therapy or targeted medication. We can diagnose extremely rare disorders using exome and genome sequencing, and even describe new, previously unrecognized disorders -ending our patients' diagnostic odyssey and changing their lives for the better. Regardless of your future specialty, you will be increasingly exposed to genetic testing requests and results. Our goal in the Division of Genetics and Genomic Medicine is to provide you with an opportunity to increase your knowledge base and skills in human genetics and directly apply it to the care of your patients. Students will actively participate in

the evaluation, diagnosis, and management of adult and pediatric patients in the ambulatory and inpatient setting. They will be expected to participate in weekly case conference. Students will have an opportunity to visit clinical laboratories if desired.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8045 Pediatric Rheumatology (Clinical Elective)

Opportunities are available to care for children with a variety of rheumatologic and immunologic disorders. Students will see patients in outpatient clinics and inpatient consultations. An in-depth approach to evaluating autoimmune disease and disorders of the immune system will be provided. Students will participate in evaluation of new and return patients with a variety of rheumatologic diseases, including juvenile idiopathic arthritis (JIA), systemic lupus erythematosus (SLE), juvenile dermatomyositis (JDM), auto-inflammatory/periodic fever syndromes, and scleroderma. The student will also learn the approach to patients with positive autoantibodies, joint pain, muscle pain, and other common complaints that a general pediatrician may encounter. Locations include SLCH inpatient/outpatient, SLCH Specialty Care Center clinics, and Shriners Hospital clinics. Students will have the opportunity to attend multiple conferences.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8050 Pediatric Gastroenterology, Hepatology, and Nutrition (Clinical Elective)

The rotation in Pediatric Gastroenterology, Hepatology, and Nutrition provides broad exposure to specialized and common pediatric gastrointestinal and hepatobiliary problems. Division patients are seen in the outpatient suites, in the procedure room, and in the inpatient floors at St. Louis Children's Hospital and satellite locations. Students evaluate outpatients with common pediatric complaints like abdominal pain, constipation, and poor growth. Additionally, students experience the ongoing outpatient care of patients with liver disease, inflammatory bowel disease, short-gut syndrome, celiac disease, eosinophilic esophagitis, and other rare disorders. The inpatient service provides experience in caring for patients with acute illnesses such as gastrointestinal bleeding, malnutrition, liver failure, complications of inflammatory bowel disease, and pancreatitis. Students participate in diagnostic and therapeutic endoscopic procedures. Students may participate in a weekly GI didactic conference, GI/Surgery conference, and/or GI/Pathology conference.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8055 Antimicrobial Use, Resistance, and Stewardship (Clinical Elective)

In 2019, the CDC estimated that 2.6 million Americans develop an infection with an antimicrobial resistant (AMR) organism each year; of these individuals, nearly 44,000 will die from their infection. Worldwide, more than 250,000 children die annually at least in part from infections due to AMR organism. The primary driver of AMR is the use – and, more importantly, the misuse – of antibiotics. Approximately 20% of pediatric ambulatory and emergency department visits result in an antibiotic prescription, and between 35-70% of hospitalized children receive at least one dose of an antibiotic during their hospitalization. Of these antibiotics, more than 30% are thought to be prescribed inappropriately. Antimicrobial stewardship programs (ASPs) aim to combat AMR but ensuring the judicious use of antibiotics within healthcare systems. This elective rotation will be focused on educating students on the current state of domestic and global antibiotic resistance and the mechanisms by which healthcare systems are addressing the problem of AMR.

Students will participate in the daily antimicrobial stewardship activities conducted by the St. Louis Children's Hospital ASP, attend weekly stewardship and clinical infectious diseases meetings, and review antimicrobial use data.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8060 Pediatric Infectious Diseases (Clinical Elective)

This elective is designed to engage students in the clinical aspects of routine and complex infectious diseases in children (ages birth to 18 years). Students will perform ID specialty consultations on both inpatients and outpatients. Regular daily activities will include evaluation of new patients, work rounds on inpatient consults, and teaching rounds with the ID fellow and/or attending. Students will attend the general pediatric ID clinic and the pediatric HIV clinic, one half-day each per week. Formal teaching includes HIV and ID Core Curriculum sessions, a weekly pediatric ID case conference, a weekly joint clinical conference with the adult ID division, and weekly clinical microbiology teaching rounds with Pathology faculty from the bacteriology and molecular diagnostics labs.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8065 Pediatric Emergency Medicine (Clinical Elective)

The goal of this elective is to provide the senior medical student with a broad introductory clinical experience in pediatric emergency medicine. Functioning as a sub-intern in the Emergency Unit of St. Louis Children's Hospital, the student will have the opportunity to evaluate and manage patients with a wide variety of emergent and urgent medical and surgical problems, including respiratory distress, abdominal pain, lacerations, musculoskeletal injuries, rashes, fever, etc. The Emergency Department offers a unique clinical learning experience, seeing a large clinical variety and many undifferentiated patients in a fast-paced environment. Teaching conferences are provided by the attending staff in the Emergency Department. Attending staff and senior pediatric residents provide 24-hour on-site supervision.

Credit 4 units.

Typical periods offered: Medicine Year

PEDS 8070 Child Abuse Pediatrics (Clinical Elective)

The medical student will work with the Child Protection Program (CPP) at St. Louis Children's Hospital, which consists of two Child Abuse Pediatrics attending physicians, a Pediatric nurse practitioner, a clinic nurse, and social workers. Pediatric residents or Pediatric Emergency Medicine fellows also may be rotating with the team at the same time. The student will observe inpatient consults for physical and sexual abuse and outpatient clinic patients for physical and sexual abuse. The student may attend court cases (off campus) and watch expert witness testimony by the CPP physicians/nurse practitioner. The student may attend Fatality Review meetings (off campus). The student will observe a forensic interview at the Child Advocacy Center (off campus). The student may see acute sexual assault cases conducted by the Sexual Assault (SANE) nurse practitioners in the Emergency Department. The student will be asked to complete a short project on a topic related to child maltreatment and will present it to the team at the end of the rotation. The student will be given a list of readings/didactic activities to do during the rotation. The student will have daily (45 minute) lectures with one of the child abuse attending physicians on a variety of topics related to child maltreatment and will attend the Child Protection team meeting (1 hour) every day. The student can also attend Pediatric Residency noon conference during this rotation.

Credit 2 units.

Typical periods offered: Medicine Year



PEDS 8075 Pediatric Endocrinology and Diabetes (Clinical Elective)

Students will be exposed to a broad array of endocrine disorders including diabetes, thyroid, growth, puberty, calcium, adrenal, and pituitary disease. The student will round with the inpatient consult team including faculty and fellows (1-3 weeks) and see patients with endocrine attendings in outpatient clinics (1 week). Outpatient clinics include general endocrinology, diabetes, and pediatric weight management clinics.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8080 Clinical Pediatric Pulmonary Medicine (Clinical Elective)

This elective provides an excellent opportunity for students to be exposed to the full scope of respiratory diseases and sleep disorders in infants and children. Pediatric referrals will be seen in both inpatient and outpatient settings.

Rotation goals for students include:

1. Gain greater insights into the genetics, epidemiology, pathophysiology, and clinical presentations of lung diseases in children.
2. Learn the importance of the physical examination using inspection, percussion, and auscultation.
3. Understand indications and interpretation of diagnostic tests, such as chest imaging, blood gas measurements, polysomnography, pulmonary function testing, and flexible bronchoscopy.
4. Learn about various treatment modalities available for common lung diseases.

Unique aspects of this rotation include:

- A broad exposure to children with asthma, cystic fibrosis, sleep disorders, ciliopathies, interstitial lung diseases, chronic lung disease of infancy, congenital lung malformations, and advanced cardiopulmonary diseases referred for lung transplantation.
- Weekly didactic sessions and divisional clinical conferences provide opportunities for the trainee to develop his or her presentation skills.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8085 Newborn Critical Care (Clinical Elective)

This elective will take place in the Neonatal Intensive Care Unit (NICU) at St. Louis Children's Hospital and will provide valuable exposure to neonatal care for future pediatric providers. Students will join one of the acute care NICU teams consisting of an attending, fellow, resident, nurse practitioners, dietician, pharmacist, and discharge coordinator. They will follow 3-5 patients under the direct supervision of their resident, fellow, and attending, participating in formulation of diagnostic and treatment plans, coordination of care, and communication with families. Throughout the rotation, students will broaden their understanding of pathophysiology as it relates to the transition from fetal to neonatal life, and in common neonatal disease processes. There will be emphasis on improving clinical problem-solving skills, communication within the team, as well as with ancillary staff and families.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8090 Pediatric Clinical Immunology (Clinical Elective)

In this two-week pediatric immunology elective, students will gain experience applying immunologic knowledge to clinical practice. Students will participate in the evaluation and management of a variety of outpatient clinics, including Pediatric Immunology, Allergy, Rheumatology, and Immunology Bone Marrow Transplant (BMT). They will also participate in inpatient consultations and join rounds with Pediatric Immunology faculty and fellows.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8095 Pediatric Nephrology (Clinical Elective)

This course is designed to provide the student with a broad exposure to all aspects of pediatric kidney disease and an opportunity to explore a desired aspect of the field in-depth. The student will be an integral part of the Nephrology team and as such will see both inpatients through our consult service and outpatients in various clinics at St. Louis Children's Hospital (general nephrology, dialysis, transplant, other specialized clinics). Discussions and rounds with the attending staff and fellows emphasize the relationship between clinical problems and the pathophysiology of the underlying disease. These informal teaching sessions are supplemented by more formal didactic sessions including nephrology attending rounds, a weekly division-wide educational conference, renal research rounds and Renal Grand Rounds, which are conducted weekly in conjunction with the Division of Nephrology at Barnes-Jewish Hospital. Kidney biopsy material is reviewed with the renal pathologists. Attendance at the weekly pediatric grand rounds and pediatric case conferences is encouraged. Opportunities in clinical and translational research projects will be discussed with interested students.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8245 Pediatric Hematology and Oncology (Clinical Elective)

The course follows a standard sub-intern rotation format, with the student performing most of the tasks of the house staff in the care of hematology/oncology patients in pediatrics. There is no required overnight call or weekend coverage. At the end of the rotation the student will be required to present an evidence based presentation on an compelling topic in our discipline during our weekly educational conference.

Credit 4 units.

Typical periods offered: Medicine Year

PEDS 8900 Primary Care Pediatrics (Clinical Elective)

This elective is a unique opportunity for medical students to take a deeper dive into the knowledge, skillsets, and relationships that comprise primary care pediatrics. Students will be expected to see patients in the primary care outpatient setting for well child checks and sick visits. Students will be expected to create an Individual Learning Plan to direct their learning outside of clinic time.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 9100 Pediatrics Advanced Clinical Rotation (ACR)

This is the general inpatient pediatric ACR. The student will be assigned to an inpatient pediatric floor team at St. Louis Children's Hospital. With supervision, students will be expected to manage 4-6 patients. Students are expected to preround on their patients, present on rounds, perform daily tasks including calling consults and PMDs, write orders (to be cosigned), write notes (to be cosigned), and participate in handoffs. Students will spend 3 weeks on day shifts and 1 week on night shifts.

The elective will provide experience in the management of many pediatric medical conditions and will include the care of patients with various diseases including but not limited to pulmonary, infectious diseases, gastrointestinal, renal, endocrine, neurological, and rheumatologic issues. Other common conditions include failure to thrive, altered mental status, and fever of unknown origin.

Credit 4 units.

Typical periods offered: Medicine Year

PEDS 9200 Newborn Critical Care Advanced Clinical Rotation (ACR)

This rotation will take place in the Neonatal Intensive Care Unit (NICU) at St. Louis Children's Hospital. Students will join one of the acute care NICU teams consisting of an attending, fellow, resident, nurse practitioners, dietician, pharmacist, and discharge coordinator. They will follow 4-8 patients under the direct supervision of their resident, fellow, and attending, participating in formulation of diagnostic and treatment plans, coordination of care, and communication with families. Throughout the rotation, students will broaden their understanding of pathophysiology as it relates to the transition from fetal to neonatal life, and in common neonatal disease states. There will be emphasis on improving clinical problem-solving skills, communication within the team, as well as with ancillary staff and families. This rotation provides valuable exposure to neonatal care for the future pediatric provider.

Credit 4 units.

Typical periods offered: Medicine Year

PEDS 9250 Pediatric Critical Care Advanced Clinical Rotation (ACR)

Critical care of the pediatric patient is an important part of training for anyone interested in caring for children in their careers. This rotation will offer students the opportunity to be an integral part of the care of these children and their families. The rotation will take place in the Pediatric Intensive Care Unit (PICU) at St. Louis Children's Hospital. The student will be part of a team of providers made up of an attending, fellow, residents and nurse practitioners. The schedule will include 3 weeks of day shift and 1 week of night shift. Students will be expected to function as a sub-intern and act as the front line provider for 3-4 patients each day, depending on acuity. In addition to refining their understanding of pathophysiology, students will develop communication skills with both families, ancillary staff, consulting services and community providers.

Credit 4 units.

Typical periods offered: Medicine Year

Psychiatry

PSY 8005 Psychiatry Consult (Clinical Elective)

Students spend four weeks on the psychiatry consult service at Barnes-Jewish Hospital. Under the supervision of house staff and attending physicians, students participate in the evaluation and collaborative management of inpatients on medical and surgical units for a broad range of psychiatric and behavioral concerns. They learn about the intersection between psychiatry and other medical specialties and important skills for collaborative patient care. Students attend departmental conferences and other educational sessions, and they also prepare and present a clinical topical review of their choice.

Credit 4 units.

Typical periods offered: Medicine Year

PSY 8010 Outpatient Community Psychiatry (Clinical Elective)

This elective will provide the student with a significant outpatient experience in Psychiatry. Students will be paired with a Resident physician and have exposure to two adult clinics and one child clinic over the course of the rotation. Students will observe and assist in the diagnosis and treatment of patients in the clinic setting. Students will attend scheduled lectures and conferences over the course of the rotation relevant to outpatient Psychiatry and meet weekly with the outpatient clinic attending for clinical discussion and review. During the elective, the student will learn about the outpatient presentations of psychiatric disorders, a variety of treatment techniques (psychotherapy and psychopharmacology), and general principles of outpatient clinical management.

Credit 4 units.

Typical periods offered: Medicine Year

PSY 8015 Inpatient Psychiatry (Clinical Elective)

This is a senior rotation that provides the students with an opportunity to expand their knowledge of inpatient clinical psychiatry by functioning as interns. Students attend all staffing and teaching conferences given to first-year psychiatry residents and are responsible for the assessment and management of acute psychiatric patients. Immediate supervision is provided by the inpatient attending, and additional supervision can be arranged as desired. Teaching emphasis is directed toward psychiatric diagnosis, appropriate use of psychopharmacologic agents, psychotherapeutic intervention, use of community resources and pursuit of the psychiatric scientific literature. The student will write a self-selected clinical topic relevant to treatment and management of psychiatric inpatients.

Credit 4 units.

Typical periods offered: Medicine Year

PSY 8020 Child Psychiatry (Clinical Elective)

This elective in child psychiatry offers rich experiences in St. Louis Children's Hospital Pediatric Behavioral Health Unit and the Consult-Liaison service. It provides experience in age-appropriate diagnostic and treatment methods in children and adolescents and families with mental health conditions. You will also have the opportunity to work as part of our multi-disciplinary team with physicians, nurse practitioners, therapists, and social workers. A portion of your time may be spent in the outpatient clinics if interested and if circumstances permit.

Credit 2 units.

Typical periods offered: Medicine Year

PSY 8025 Forensic Psychiatry (Non-Clinical Elective)

The medical student will learn many aspects of forensic psychiatry including criminal competency, the insanity defense, civil litigation, workman's compensation, malpractice, civil commitment, and guardianship. The rotation is primarily self-directed through selected readings, but the student will have opportunities to observe and participate in forensic evaluations depending on faculty availability. The student will meet with the Course Director a minimum of two hours per week to discuss readings and case law. They will also shadow at the St. Louis Psychiatric Rehabilitation Center, a nearby forensic hospital, as well as observed the Sexually Violent Predator unit in Farmington, Missouri. The student will also be assigned readings of landmark cases, textbooks, psychiatric expert opinions, and attend civil hearings. There may be the opportunity to witness sexually violent predator evaluations and/or treatment. The student will be required to write a forensic report based on an evaluation during the rotation or using materials from a previously pre-recorded evaluation. The objectives will be measured by attendance and by formal evaluation of the student's participation and knowledge during the supervision discussion. It will also be determined by the thoroughness and quality of their written forensic report.

Credit 4 units.



Typical periods offered: Medicine Year

PSY 8030 Schizophrenia Precursors & Prodromal States (Clinical Elective)

This is an opportunity for trainees to gain knowledge and experience related to evaluation of children and adolescents who may be at high risk for schizophrenia or other psychotic disorders. It is mainly a reading elective, in which students are required to read scientific related to the topic of the elective, discuss readings with the course director, and write a brief paper reviewing existing literature on a related sub-topic. There may also be opportunity to see about 1-2 patients per week through an outpatient consultation clinic which evaluates patients with characteristics suggestive of prodromal schizophrenia (such as new-onset attenuated psychotic symptoms along with recent deterioration in functioning) and/or early life characteristics that may indicate risk for developing schizophrenia later in life. Since the full symptoms of schizophrenia are often preceded by a wide range of childhood behavioral and developmental abnormalities, this rotation helps trainees integrate information regarding the continuity between childhood development and adult psychopathology. There may be opportunities to learn how to administer and score specialized assessments. The amount of direct clinical care of patients is usually not more than one half-day per week. Credit 2 units.

Typical periods offered: Medicine Year

PSY 8035 Interventional Psychiatry (Clinical Elective)

The Phase III elective experience in child neurology is designed to adapt to the individual goals and objectives of students. The elective takes place in one or two 2-week blocks that occur among five possible venues as chosen by the student after discussion with the course director:

1. Outpatient clinics,
2. Inpatient ward service,
3. Inpatient general consult service,
4. NICU consult service, and
5. Video EEG (VEEG) monitoring service.

The combination of services and experiences will be arranged directly between the student and the Course Director prior to beginning the rotation.

In the outpatient clinics, students will rotate between a variety of subspecialty clinics and work with a variety of attendings in order to experience the breadth of outpatient pediatric neurology. Students rotating on the inpatient ward service will work closely with the pediatric neurology resident to develop neurology-specific care plans and will function above a clerkship level. No call or weekend duties will be expected on this rotation. On the general consult services, students will work with the consult attending and pediatric neurology residents on that team to see consults in the PICU, CICU, ER, and other hospital floors. The NICU consult team focuses on infants in the NICU. Student rotating on the VEEG monitoring service will focus on learning the indications and uses of VEEG and basic EEG reading skills.

Credit 2 units.

Typical periods offered: Medicine Year

PSY 9100 Psychiatry Advanced Clinical Rotation (ACR)

This is an advanced rotation that provides the students with an opportunity to expand their knowledge of inpatient clinical psychiatry by functioning as interns. While rotating through the inpatient psychiatry units on the main campus, students will encounter patients with a variety of severe psychiatric illnesses that are oftentimes complicated by various medical comorbidities requiring consultation services. Students will work on patient care teams with a PGY-1, and an attending psychiatrist. Students attend all staffing and teaching conferences given to first-year psychiatry residents and are responsible

for the assessment and management of acute psychiatric patients. This includes writing notes, entering orders, and updating the handoff list. The students will also complete one week of night-float with a PGY-1, and shadow a PGY-2 in the Emergency Department's behavioral health unit. Immediate supervision is provided by the inpatient attending, senior resident, and intern on the service. Teaching emphasis is directed toward psychiatric diagnosis, appropriate use of psychopharmacologic agents, psychotherapeutic intervention, the use of community resources and pursuit of the psychiatric scientific literature.

Credit 4 units.

Typical periods offered: Medicine Year

Radiology

RADIOL 8005 General Radiology (Clinical Elective)

This four-week Radiology elective allows students to rotate through four of the following Radiology services: Abdomen, Musculoskeletal, Neuroradiology, Nuclear Medicine, Emergency Radiology, Mammography, Chest, Pediatrics, and Interventional Radiology.

The primary course objectives are to familiarize students with the scope of diagnostic and interventional radiology, including the consulting role radiologists provide to primary care and specialty providers; risks/benefits and cost effectiveness of radiologic examinations; guidelines for ordering common studies; and the radiologic appearance and workup of specific disease entities.

Students spend most of each day in the Radiology reading rooms with residents, fellows, and faculty for interactive teaching at the workstation, driven by daily clinical cases. Students will attend morning and noon didactic conferences with the residents. The students will have a primarily observational role in conferences and in the clinical setting. On Thursday afternoons, students will participate in an interactive conference led by a Radiology resident on a scheduled topic in Radiology. Prior to each Thursday conference, students are expected to view assigned lectures from the course material available online (WUSTL Box). On Friday afternoons, students will present an interesting case from the week in the format of a PowerPoint presentation. All of the PowerPoint presentations will be submitted at the end of the rotation for grading. Students will also be evaluated on their preparedness and participation in the afternoon conferences.

Credit 4 units.

Typical periods offered: Medicine Year

RADIOL 8015 Clinical Nuclear Medicine (Clinical Elective)

The clinical service in Nuclear Medicine (NM) is divided into five sections: outpatient general NM, inpatient general NM, Positron Emission Tomography (PET), Pediatric NM studies, NM Cardiac studies, and radionuclide therapy. The recommended schedule will be to spend weeks 1 and 3 in the Center for Advanced Medicine/BJH North Campus (second floor), where the emphasis will be on outpatient general and pediatric Nuclear Medicine with some time in the PET reading room. Week 2 will be in South Campus (West Pavilion 9th floor) and split between inpatient general nuclear medicine, outside PET facilities (morning), cardiac NM services (afternoon), and radionuclide therapy. The schedule for Week 4 will be Monday to Wednesday Center for Advanced Medicine/BJH North Campus and Thursday to Friday on South Campus. This rotation's primary objective is to provide exposure to the full range of clinical nuclear medicine studies. Under the direct supervision of the NM attendings, the student in person (or via Zoom when in-person training is unavailable) will participate in planning and interpreting imaging

studies for patients referred to the Division. An opportunity also exists to explore instrumentation techniques, including dedicated computer applications utilized to interpret NM studies. In addition to the clinical experience, the student will attend the NM daily morning conference, held via Zoom or in person from 8-9:00 am. Also, the student may attend the daily diagnostic radiology resident noon conference via Zoom or in-person from 12-1:00 pm. The student will also be able to participate in any conferences within the Department of Radiology and case management conferences where NM studies are discussed. The students are encouraged to prepare a case for the Friday follow-up conference under an NM faculty member's supervision during their rotation.

Credit 2 units.

Typical periods offered: Medicine Year

RADIOL 8030 Cardiothoracic Radiology (Clinical Elective)

A four-week elective emphasizing the interactions between cardiothoracic radiologists and the various clinical services, to include thoracic surgery, thoracic oncology, pediatric and adult cardiology, and pulmonary medicine. Learn to read chest radiographs at the viewing console while providing liaison with the clinical teams. This active elective will include the daily chest teaching conference and participation in weekly pulmonary case conference, thoracic surgery, thoracic oncology conferences, as well as the imaging of the heart using CT and MR. Students spend most of each day in the Radiology reading rooms with residents, fellows, and faculty for interactive teaching at the workstation, driven by daily clinical cases. The students will have a primarily observational role in conferences and in the clinical setting and will attend morning and noon didactic conferences with the residents. The student will be expected to present a single case from what they have seen during the rotation at a 7AM teaching conference.

Credit 4 units.

Typical periods offered: Medicine Year

RADIOL 9100 Diagnostic Radiology Advanced Clinical Rotation (ACR)

As part of this 4 week Advanced Clinical Rotation in Diagnostic Radiology (DR-ACR), trainees will participate in interpretation and communicating results of various imaging modalities, such as radiography, CT, and ultrasound. Students will perform duties similar to a radiology resident dictating preliminary reports with an attending radiologist, determining most appropriate imaging examinations for patients, and communicating time-dependent results and alternative imaging strategies with ordering providers. There will be opportunity to observe the read out sessions of other residents to enhance the medical students exposure to numerous cases and familiarize them with the process of image interpretation. While the course material will be most applicable to students interested in Diagnostic Radiology, the resulting knowledge, skills and abilities in image interpretation and appropriateness will prove useful for students in any specialty who routinely order imaging examinations. All students will gain experience in interpretation of chest radiographs and based on their future residency of interest, the rotation will be customized to allow rotations in the various areas of diagnostic imaging to help set them up for success in their future residencies (for example neuroimaging). The DR-ACR will include image interpretation and performing examinations for adult patients at Barnes-Jewish Hospital in diagnostic reading rooms including inpatient, outpatient and emergency department.

Credit 4 units.

Typical periods offered: Medicine Year

RADIOL 9150 Interventional Radiology Advanced Clinical Rotation (ACR)

As part of this 4 week Advanced Clinical Rotation in Interventional Radiology (IR-ACR), trainees will participate in image-guided procedures as well as the care of patients before and after those procedures. The opportunities include participating in the care of patients requiring innovative IR treatments for their uterine fibroids, prostatic hypertrophy, peripheral arterial disease, venous disease, portal hypertension and numerous types of cancer. In addition, the increasing use of ultrasound, fluoroscopy and computer tomography to guide an ever increasing array of minimally invasive procedures means that trainees preparing for a broad array of specialties may benefit from this course. While the experiences will be most applicable to students interested in Interventional and Diagnostic Radiology, the resulting knowledge, skills and abilities will also likely prove useful for students interested in Critical Care, Emergency Medicine, Anesthesiology and multiple surgical specialties. The IR-ACR will include caring for adult and pediatric patients at Barnes-Jewish Hospital, Barnes-Jewish West County Hospital and St Louis Children's Hospital. The course will include inpatient as well as outpatient experiences.

Credit 4 units.

Typical periods offered: Medicine Year

Radiation Oncology

RADONC 8005 Clinical Radiation Oncology (Clinical Elective)

The Radiation Oncology clinical division offers an elective with emphasis on the evaluation, planning, and administration of radiation therapy in patients with malignant tumors. Students will have the opportunity to enhance their knowledge of the natural history of cancer, as well as its pathological and biological features. Students will sharpen their clinical skills by participating in the management of cancer patients. Students will be mentored to prepare and lead a department noon conference on the management of a specific patient's care, including literature review and discussion. Students will be expected to prepare for clinical consultations by reviewing patient records and relevant literature, obtaining the patient's history and performing a physical examination. This will be followed by presenting findings and a proposed care plan to the attending and resident physicians.

Credit 2 units.

Typical periods offered: Medicine Year

RADONC 9100 Radiation Oncology Advanced Clinical Rotation (ACR)

The Radiation Oncology clinical division offers an elective with emphasis on the evaluation, planning, and administration of radiation therapy in patients with malignant tumors. The objective of this course is to expose students to the field of Radiation Oncology through clinical experience. Students will have the opportunity to enhance their knowledge of the natural history of cancer, as well as its pathological and biological features. Students will sharpen their clinical skills by participating in the management of cancer patients. Students will be expected to prepare for clinical consultations by reviewing patient records and relevant literature, obtaining the patient's history and performing a physical examination. This will be followed by presenting findings and a proposed care plan to the attending and resident physicians.

Credit 4 units.

Typical periods offered: Medicine Year

Surgery

SURGERY 8000 General Surgery (Clinical Elective)

Students in the General Surgery Clinical Elective are placed in one of eight services. During this rotation, students take on responsibilities that closely mirror those of a first-year surgical resident, allowing them to gain hands-on experience, build essential surgical skills, and manage patients more independently under the supervision of attendings, fellows and residents. Students are involved in pre-operative, intra-operative, and post-operative care of surgical patients the outpatient setting, operative room and hospital ward. This includes performing histories and physicals, participating in surgical procedures, and engaging in rounds. The student will also participate in affiliated conferences and in-house call with the surgical team. General Surgery services include: Abdominal Transplant Surgery, Acute & Critical Care Surgery, Colon & Rectal Surgery, Hepatobiliary-Pancreatic Surgery, Minimally Invasive Surgery, Pediatric Surgery, Surgical Oncology & Endocrine Surgery, and Trauma Night Float & Emergency Surgical Consults

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 8010 Minimally Invasive Surgical Skills (Non-Clinical Elective)

The Minimally Invasive Surgical Skills (MISS) Elective is designed to provide surgery-bound MS4 learners with early, structured exposure to foundational robotic and laparoscopic surgical principles and technical skills. Through a combination of asynchronous didactic modules, in-person introductory instruction, proctored simulation sessions, and self-directed practice, MISS prepares learners to enter residency with foundational competence in minimally invasive surgery. This supports accelerated skill development, enhanced learner confidence, and earlier operative participation. Students will practice and demonstrate proficiency in laparoscopic camera navigation, Fundamentals of Laparoscopic Surgery (FLS) tasks, robotic bedside assisting, and robotic console skills.

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 8015 Cardiothoracic Surgery (Clinical Elective)

The elective in cardiothoracic surgery is a four-week clinical rotation with two-week blocks divided between adult cardiac, pediatric cardiothoracic, and general thoracic surgery (according to the student's preference). Students will participate in morning work rounds, attend the operative procedures of their choice, and attend weekly conferences and teaching rounds. Students will be introduced not only to the surgical procedures, but also to the postoperative care of the surgical patients. On the pediatric and adult cardiac services, students will be introduced to the principles of cardiopulmonary bypass, repair of congenital heart defects, ventricular assist devices, heart lung transplantation and procurement, coronary artery bypass surgery (on and off pump), valve repair and replacement, complex aortic surgery, the MAZE procedures and others. On the adult cardiac surgery service, students will function as sub-interns under the direct supervision of a faculty member. On the thoracic surgical rotation, students will have the opportunity to perform bronchoscopy, esophagoscopy, gastroscopy, and participate in surgical resections of lung cancer and esophageal cancer, as well as surgery for emphysema and for benign esophageal conditions. Students will also participate in lung transplantation surgery. Medical students are also invited to participate in ongoing research projects under the mentorship of surgery faculty. Please contact the course director if you are interested in this option.

Credit 4 units.

Typical periods offered: Medicine Year

SURGERY 8020 Plastic & Reconstructive Surgery (Clinical Elective)

The period on Plastic Surgery may either be spent as a clinical clerkship or conducting a research project. The purpose of the clinical clerkship is to familiarize the student with the basic principles of Plastic Surgery. The student will have successive assignments to each of the attending staff and the ward resident services during the four weeks. This will expose the student to the breadth and depth of plastic surgery. Alternatively, if the student has identified a focus of interest, the student may participate on those services of special interest, such as hand or pediatric plastic surgery. The student will assume an active role on the plastic surgery service and will participate in the total management of a wide variety of surgical problems including congenital anomalies, microvascular surgery, surgery of the upper extremity, peripheral nerve surgery, cosmetic surgery, and general reconstructive plastic surgery.

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 8030 Urologic Surgery (Clinical Elective)

The clinical elective will offer the interested student experience with a spectrum of problems in clinical urology - both adult and pediatric. The student will learn the basic diagnostic procedures and management of surgical and non-surgical aspects of patient care under the supervision of the attending staff and house staff. Clinical conferences are held every Wednesday.

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 8050 Vascular Surgery (Clinical Elective)

This elective is designed to give students in-depth experience in the clinical management of patients on the Vascular Surgery Service. The elective will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative management of patients with surgically treated vascular diseases/conditions. Students will serve as clerks and will be responsible for patient management with house staff under the guidance of the fellow and attending surgeons. There will be opportunity for students to evaluate patients, decide on a diagnostic and management strategy, and provide care under house staff and faculty guidance, as well as ample opportunity to attend and participate in conferences. Notice: If a student desires to work more closely with a specific attending, he/she must make special arrangements with the faculty member prior to beginning this elective.

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 9100 General Surgery Advanced Clinical Rotation (ACR)

Students in the General Surgery ACR are placed in one of the following eight services. Students may enroll in this ACR twice, with the second assignment on a different service than the first. On each Surgical service, participation will involve floor management, ER evaluation, operating room participation and outpatient clinic experience. Emphasis will be on correlating anatomy to function in normal and pathologic states and clinical management of Surgical patients. Duties: rounding on inpatients, participating in service and department wide education conference, participating/assisting in operations, seeing and evaluating new, return and postoperative patients in clinic, taking call in the emergency room. This will be done under the guidance of attendings, fellows and residents. **Acute and Critical Care Surgery** The ACCS service provides experience with a broad range of general surgical problems. Typically, students encounter patients with acute traumatic injuries or burns and are exposed to many acute surgical problems such as acute abdominal emergencies, skin and soft tissue infections (including some amputations), acute appendicitis, and

acute cholecystitis. Students will likely experience a combination of laparoscopic, robotic, and open operations. Students also gain experience with pre-operative evaluation and operative management of patients undergoing elective surgical procedures such as hernia repair and cholecystectomy. **Colorectal Surgery**

The Colorectal Surgery rotation covers all aspects of benign and malignant colorectal and anal disease. The operative procedures vary from simple anorectal procedures to large open abdominal, robotic and laparoscopic operations. Students will likely encounter both urgent/emergent and elective operations. **Hepatobiliary and Pancreatic Surgery**

The HPB service exposes students to a variety of surgical conditions of the pancreas, liver, stomach, and biliary tract. This includes benign and cancerous conditions. Students may also encounter surgeries for various types of sarcomas. They will encounter laparoscopic, robotic, and large open operations. **Minimally Invasive Surgery**

The MIS service exposes students to patients with a variety of surgical problems (including hernias, gallstone disease, gastrointestinal foregut problems, morbid obesity, and endocrine disorders). Students are exposed to basic and advanced minimally invasive surgery (laparoscopic and robotic operations) as well as complex open operations. **Pediatric Surgery**

Pediatric surgery is essentially general surgery on children. Students are exposed to a wide variety of conditions involving the gastrointestinal tract, genitourinary tract, lung, diaphragm, etc. The service handles a significant amount of penetrating and blunt trauma, burns, and other acute surgical emergencies such as appendicitis, intestinal obstruction, and perforated viscus. In addition, the student will be exposed to surgery on newborns for vascular access and intestinal and abdominal wall conditions. Students will be exposed to a variety of surgical approaches including open, laparoscopic, and thoracoscopic procedures. **Surgical Oncology**

The Surgical Oncology (formerly Endocrine/Oncology) service is primarily dedicated to the treatment of some of the most common cancers in adults (including breast, melanoma, and thyroid). Students will also obtain experience with many other surgeries for benign disease processes in breast and endocrine glands (thyroid, parathyroid, and adrenal). Students may also encounter surgery for sarcomas and a unique operation that involves heated intra-peritoneal chemotherapy for advanced cancers (HIPEC). They will likely encounter some laparoscopic procedures (adrenalectomy). **Transplant Surgery**

Abdominal Organ Transplantation exposes students to a blend of medical and surgical care of solid-organ transplant patients (kidney, pancreas, and liver). Organ procurements provide the ultimate exposure to human anatomy in a heart-beating, brain-dead donor. Students will likely experience other hepato-biliary procedures (liver resection, pancreatic resection, biliary tract surgery etc) for benign/malignant conditions and vascular access procedures (AV fistula formation), providing broad anatomical exposure. Most of these operations are performed with large, open incisions but students may encounter some laparoscopic procedures (cholecystectomy). **Vascular Surgery**

Vascular Surgery exposes the student to a broad range of surgical vascular pathology, from varicose veins and peripheral arterial disease to the most complex thoracoabdominal and abdominal aneurysms. They may also see some amputations. Students will likely encounter a mix of urgent/emergent and elective procedures. The students will be exposed to the use of endovascular technology, in addition to the use of standard open surgical techniques.

Credit 4 units.

Typical periods offered: Medicine Year

SURGERY 9150 Cardiothoracic Surgery Advanced Clinical Rotation (ACR)

This will be a four-week clinical experience focusing on evaluation, diagnosis and treatment of cardiac and thoracic surgical conditions as well as postoperative care and common on-call problems. This is a mostly inpatient experience, with some outpatient clinic. Students

will learn how to preform clinical duties and responsibilities of a PGY-1. Participation will involve ICU management (beginning with reporting and interpretation), floor management, evaluation of new consultations and presenting to attendings, operating room participation at an intern level, and outpatient clinic experience. This rotation does include heavy operating room exposure, but the focus is on preparation for intern and junior resident responsibility rather than on observation. Students will spend their time 50/50 on cardiac and thoracic rotations. Students can rotate for up to one week on Congenital CT upon approval from the instructor. Patient Population: adult

Services: 50% cardiac surgery, 50% thoracic surgery

Duties:

Rounding on inpatients

Presenting patients to senior residents/fellows and attendings

Work in close collaboration with (not under supervision) of mid-level providers, to enhance communication skills and teamwork

Participating in service and division education conference

Bedsides procedures with direct supervision (chest tube removal, pacing wire removal)

Participating in preoperative planning, following up and evaluation of radiologic and imaging studies

Active participation as a team player in operating rooms (transfer patient, indwelling catheters, prepping and positioning patients) including supervised assistance with closures.

Seeing and evaluating new and established preoperative patients in the inpatient and outpatient settings. This will be done under the supervision of attending surgeons, fellows and residents.

Credit 4 units.

Typical periods offered: Medicine Year

SURGERY 9200 Plastic and Reconstructive Surgery Advanced Clinical Rotation (ACR)

The period on Plastic Surgery may either be spent as a clinical clerkship or conducting a research project. The purpose of the clinical clerkship is to familiarize the student with the basic principles of Plastic Surgery. The student will have successive assignments to each of the attending staff and the ward resident services during the four weeks. This will expose the student to the breadth and depth of plastic surgery. Alternatively, if the student has identified a focus of interest, the student may participate on those services of special interest, such as hand or pediatric plastic surgery. The student will assume an active role on the plastic surgery service and will participate in the total management of a wide variety of surgical problems including congenital anomalies, microvascular surgery, surgery of the upper extremity, peripheral nerve surgery, cosmetic surgery, and general reconstructive plastic surgery.

Credit 4 units.

Typical periods offered: Medicine Year

SURGERY 9250 Urologic Surgery Advanced Clinical Rotation (ACR)

The Phase 3 Urology ACR will be a clinical sub-internship. The purpose of the 4 week rotation is to provide students with exposure to the full spectrum of clinical urology and to prepare them for Internship as a Urology Resident.

The student will play an active role in patient management and is expected to demonstrate progressive understanding of:

- The basic evaluation of the urologic patient, including performing a focused urologic history and physical examination
- The work-up of the urologic patient, including ordering and interpreting diagnostic tests/imaging/procedures



- The management (both surgical and non-surgical) of urologic conditions
- Basic procedural skills, including suturing and bedside procedures like Foley catheter placement

Throughout the Urology ACR, the student will be under the supervision of the attending staff and house staff.

Note that students have the opportunity for exposure to the spectrum of subspecialties within Urology, including Urologic Oncology, Reconstructive Urology, Endourology/Minimally Invasive Urology, Men's Health/Infertility, Female Urology, and Pediatric Urology. If a student has a specific request for distinct exposure to one or more of these subspecialties, they should reach out to the Course Director in advance, and efforts will be made to accommodate those requests.

Credit 4 units.

Typical periods offered: Medicine Year

Doctor of Medicine (Five-Year Program)

In addition to the regular four-year program that leads to the MD degree, students are permitted to spend one additional academic year in a research or other scholarly program. In exceptional circumstances, a further additional year may be permitted. The student may receive a stipend but may not be considered an employee of the university. The student must conduct research with a Washington University faculty member, and the research project is subject to the approval of the Associate Dean for Medical Student Research and Scholarship. Students enrolled in the five-year program must sign up for insurance coverage through Student Health Services. Students interested in this program can contact the Office of Medical Student Research and Scholarship.

Doctor of Medicine and Master of Science in Clinical Investigation

The School of Medicine offers a combined MD/MSCI program. Please visit the Clinical Investigation (p. 64) section of this *Bulletin* for more information.

Doctor of Medicine and Master of Population Health Sciences

The MD/MPHS provides medical students with an opportunity to supplement their clinical training and coursework with a quantitative approach to population health science research. Students develop core skills in epidemiology and biostatistics, and these can be applied to research in any clinical field, from primary to specialty care. The program is intended for medical students who plan to incorporate clinical or population health research into their clinical careers, including clinical effectiveness and outcomes research. The program is not restricted to Washington University medical students; students from other medical schools are encouraged to apply. The program combines the traditional medical school curriculum with one additional year of full-time study for the MPHS degree. This added year is typically taken after the second or third year of medical school.

Requirements

Program Format

The MD/MPHS program is offered in a full-time, 10-month format. The degree requires a minimum of 33 total credits, including seven core courses (15 credits) and 18 credit units of elective courses. 12 credit units are required for full-time student status, and the maximum course load is 18 credit units per semester. Part-time study options are available.

Core MPHS Courses

Code	Title	Units
PHS 5000	Current Topics in Public Health	1
PHS 5010	Introductory Clinical Epidemiology	3
PHS 5011	Intermediate Clinical Epidemiology	3
PHS 5012	Ethics in Population and Clinical Health Research	1
PHS 5040	Introductory Biostatistics for Clinical Research	3
PHS 5041	Intermediate Biostatistics for Clinical Research	3
PHS 5070	Introduction to R for Clinical Research	1

Elective Courses

Code	Title	Units
PHS 5020	Applied Research Independent Study	2
PHS 5080	Using Administrative Data for Health Services Research	3
PHS 5100	Development, Validation and Application of Risk Prediction Models	3
PHS 5120	Applied Qualitative Methods for Health Research	3
PHS 5130	Decision Analysis for Clinical Investigation and Economic Evaluation	3
PHS 5140	Randomized Controlled Trials	3
PHS 5150	Systematic Reviews and Meta-Analysis	3
PHS 5160	Dissemination and Implementation Science	3
PHS 5210	Communicating Research Findings to the Media and Lay Audiences	1
PHS 5212	Introduction to Health Disparities and the Structural and Social Determinants of Health	3
PHS 5215	Introduction to Propensity Score Methods	1
PHS 5230	Multilevel and Longitudinal Data Analyses for Clinical Research	3

Doctor of Medicine and Master of Public Health

The School of Medicine offers a combined MD/MPH program. Please visit the Public Health (p. 107) section of this *Bulletin* for more information.

Applicants should be in the third year of their medical school program. Prior to entering the MPH program, students should have taken courses (up to 11 credit units) that count toward the MPH degree.

The MD/MPH provides medical students with an opportunity to supplement their clinical training with courses and experiences designed to create transdisciplinary competencies related to the improvement of population health. Students learn the basics of public health from the foundations courses. MD/MPH students can also choose from a wide variety of Transdisciplinary Problem-Solving Courses (two are required), and they will participate in small-group public health discussions in Public Health Seminar. The faculty and staff at the Bursky School of Public Health will help guide students

toward relevant practicum experiences. At the end of the MPH program, MD/MPH students will complete a two-part capstone course. The capstone course culminates in a learning experience that demonstrates synthesis of foundational and specialized competencies.

Requirements

Program Format

Medical students will spend their fourth year in the MPH program. The MD/MPH curriculum comprises three full-time semesters of coursework (summer, fall, and spring) at the Bursky School of Public Health, followed by the MPH practicum and capstone project. Students will meet the 52 required credit units with the 11 credits earned in the MD program, 40 credits earned at the Bursky School of Public Health, and 1 additional credit earned in either program.

Core MPH Courses

- Cross-cutting Themes in Public Health
- Epidemiology
- Biostatistics
- Environmental Health
- Health Policy and Administration
- Health Behavior and Health Promotion
- Public Health Seminar I & II

Doctor of Medicine and Master of Business Administration

The School of Medicine and the Olin Business School offer a combined MD/MBA program. The program augments medical training with the knowledge and skills to both identify the most pressing problems and propose solutions that will make a difference beyond the bedside. Students learn to make a meaningful difference for patients, partners, communities, and the entire system. This program — which takes one year to complete, in addition to the MD curriculum — provides a valuable educational experience in mentorship, leadership, innovation, formal advising, and integrated experiential learning opportunities that connect the skills of business with the mission of health care. A particular focus of the program is the integration of concepts across cultures and geographic boundaries. Financial support is available from several sources. Linda X. Wu, DO, is the advisor for this program and may be contacted at linda.x.wu@wustl.edu for more information.

Doctor of Medicine and Doctor of Philosophy

Washington University offers a combined MD/PhD degree program that draws on the resources of the College of Arts & Sciences, the McKelvey School of Engineering, and the School of Medicine under the auspices of the Medical Scientist Training Program (MSTP). The purpose of the program is to train individuals in medicine and biomedical research to prepare them for careers as physician-scientists. The program was inaugurated in 1969, and it has since trained more physician-scientists than any program in the nation. More than 70% of the individuals who have completed this postgraduate training are now actively involved in research programs at leading institutions.

The program consists of three parts:

1. An enhanced MSTP thread integrated with the Phase 1 medical curriculum;
2. At least three years of original research in a medically relevant field to satisfy the requirements for the PhD degree; and
3. Core clinical clerkships (Phase 2) and advanced clinical electives (Phase 3).

Both the MD and PhD degrees are awarded upon the completion of the program. The MSTP curriculum is integrated to allow for the timely completion of training. Students typically complete their training in seven or eight years.

The program matriculates an average of 25 students per year, which is the equivalent of 20% of the entering School of Medicine class. All MSTP students receive financial support in the form of stipends (currently \$41,000 per year), health coverage, disability and life insurance, subsidization of qualifying daycare costs, and full tuition remission for both the MD and PhD phases of training. Individuals who are awarded an NIH National Research Service Award individual fellowship receive an additional \$5,000 per year for the duration of the award.

Medical Scientist Training Program

Washington University School of Medicine
MSC 8226-0013-04
660 South Euclid Avenue
St. Louis, MO 63110-1093
Phone: 314-362-7190
MSTP Website

Graduate Medical Education

Washington University School of Medicine has a number of opportunities offered through the Graduate Medical Education (GME) Consortium.

GME-Sponsored Programs

In 1997, Washington University School of Medicine, Barnes-Jewish Hospital, and St. Louis Children's Hospital joined together to oversee the quality of graduate medical education training programs at these institutions. In 2024, Missouri Baptist Medical Center joined the Consortium. Each of these institutions has a long history of successfully training outstanding residents and clinical fellows; this collaborative educational effort demonstrates dedication to quality health care and supports thoughtful patient care in the St. Louis area.

The GME Consortium sponsors more than 110 training programs accredited by the Accreditation Council for Graduate Medical Education (ACGME), the organization that accredits sponsoring institutions and training programs across the United States. There are approximately 88 additional subspecialty fellowship programs that are either accredited by other national accrediting bodies or that are in emerging new areas of medicine not yet recognized by the specialty boards. The GME Consortium and all of its sponsored training programs are fully committed to providing a quality educational experience for residents, clinical fellows and other trainees.

Residencies and Fellowships

Advanced medical training is essential for ensuring high-quality patient care in the United States. Residents are doctors who have finished their medical education and are undergoing three to seven years of specialized training in a specific field. Clinical fellows, having completed their residencies and being board-eligible in their primary specialty, pursue further training in an advanced subspecialty area of medicine. Both residents and clinical fellows gain increasing levels of responsibility in patient care while learning from distinguished faculty experts in their areas of specialty.

Endowed Scholarships & Fellowships

Please visit the Medical Advancement website for more information about supporting scholarships and fellowships.

Continuing Medical Education

The study of medicine is a lifelong process, with continuing medical education being an integral component of the continuum. The School of Medicine has supported this learning endeavor through the operation of the Continuing Medical Education (CME) program, which has been fully accredited since 1973. In 2016, the program achieved accreditation by the Joint Accreditation for Interprofessional Continuing Education to provide credit not only for physicians but for pharmacists and nurses as well. Credit for optometrists was added in 2020. In 2022, the program earned Accreditation with Commendation, which is the highest accreditation awarded by the Accreditation Council for Continuing Medical Education to institutions that demonstrate an engagement with their environment in support of interprofessional learning and team change that is part of a system for quality improvement.

The program's mission is to facilitate lifelong learning for health care practitioners and teams to enhance professional growth, patient care, and community health.

Pursuant to this mission, the objectives of the CME program include the following:

- Enable the acquisition of new knowledge and skills for the delivery of quality patient care.
- Translate the results of research into clinical diagnosis and treatment for health-care practitioners.
- Apply educational approaches in support of continuous quality improvement and patient safety in health-care delivery.
- Integrate clinical outcome measures into the educational process.
- Assist with adaptation to changing health-care delivery environments.
- Support faculty development as postgraduate medical educators and leaders.
- Evaluate and refine educational activities.
- Support health-care professionals in meeting state and specialty recertification and relicensure requirements.

Each year, the CME department awards credit for more than 200 symposia and more than 150 recurring academic rounds and conferences as well as self-directed learning activities. About 9,000 registrants participate in these activities annually, and they receive more than 110,000 hours of instruction. CME Online provides educational programs via the internet. Since it began in 2000, the CME Online program has grown to include more than 150 hours of available CME credit.

Medical Physics

Master of Science in Medical Physics

Program Overview

The MSMP program is built on courses accredited by the Commission on Accreditation of Medical Physics Education Programs (CAMPEP), through which students will become familiar with the major texts and literature in the area of medical physics. Students will be exposed to a wide array of radiation treatment techniques and quality control procedures, and they will also perform cutting-edge research with renowned researchers. These experiences will equip students with the knowledge, skills and experiences necessary to further their careers in medical physics.

Program Format

The MSMP program is designed for full-time study over the course of two academic years, starting in the fall semester. A minimum of 30 credit hours are required for degree completion, and this requirement will be met with a combination of core courses, department-approved electives, and either thesis research or focused clinical projects. Courses will run over a traditional 16-week semester schedule during the fall and spring semesters. During the summer, students will be expected to work on their thesis research or clinical project, and they will also have the opportunity to get involved in clinical shadowing opportunities to broaden their clinical experience.

Required Coursework

- MEDPHYS 5000 Clinical Imaging Fundamentals (2 credits)
- MEDPHYS 5001 Structure and Function of the Human Body for Medical Physics (3 credits)
- MEDPHYS 5010 Radiological Physics and Dosimetry (3 credits)
- MEDPHYS 5020 Independent Study (1 credit)
- MEDPHYS 5030 Clinical Project (1-6 credits)
- MEDPHYS 5040 MS Thesis Research (1-6 credits)
- MEDPHYS 5050 Ethics, Professionalism and Current Topics (1 credit)
- MEDPHYS 5060 Radiobiology (2 credits)
- MEDPHYS 5070 Radiation Oncology Physics (3 credits)
- MEDPHYS 5080 Radiation Protection and Safety (2 credits)
- MEDPHYS 5090 Clinical Rotations (1 credit)
- MEDPHYS 5100 Advanced Clinical Medical Physics Laboratory (2 credits)
- ESE 5890 Biological Imaging Technology (3 credits)

PhD in Medical Physics

Degree Requirements

Program Overview

The Doctor of Philosophy (PhD) in Medical Physics program at Washington University in St. Louis provides students with the opportunity to learn fundamental concepts and techniques and to perform academic research in the field of medical physics. The program is geared toward undergraduates with a strong background in physics and mathematics, graduate students with a physics and mathematics background from fields outside of medical physics, and continuing learners with a CAMPEP-accredited master's-level degree in medical physics. Students in the program will be exposed to a wide array of diagnostic medical imaging, radiation therapy, nuclear medicine, and radiation safety approaches and techniques, and they will perform cutting-edge research with renowned investigators. These experiences will equip students with the knowledge, skills and experiences necessary to further their careers in clinical and academic medical physics.

Program Format

The program is designed for full-time study, with a minimum of 70 credit units required for degree completion. The program is comprised of 34 credit units of didactic course work, which is largely completed over the first two years of the program. There are 22 credit units of medical physics core classes and 12 credit units of elective course work, as well as a minimum of 36 credit units of thesis research. The program commences in the fall semester, and didactic courses will run over traditional 16-week schedules during the fall and spring semesters. During the summer, students will be expected to work on their thesis research project. Clinical shadowing opportunities will also be available for those who are interested.

Required Coursework

- MEDPHYS 5000 Clinical Imaging Fundamentals (2 credits)
- MEDPHYS 5001 Structure and Function of the Human Body for Medical Physics (3 credits)
- MEDPHYS 5010 Radiological Physics and Dosimetry (3 credits)
- MEDPHYS 5020 Independent Study (1 credit)
- MEDPHYS 5030 Clinical Project (1-6 credits)
- MEDPHYS 5031 PhD Thesis Research (1-9 credits)
- MEDPHYS 5032 PhD Research Rotation (1-6 credits)
- MEDPHYS 5050 Ethics, Professionalism and Current Topics (1 credit)
- MEDPHYS 5060 Radiobiology (2 credits)
- MEDPHYS 5070 Radiation Oncology Physics (3 credits)

- MEDPHYS 5080 Radiation Protection and Safety (2 credits)
- MEDPHYS 5090 Clinical Rotations (1 credit)
- MEDPHYS 5100 Advanced Clinical Medical Physics Laboratory (2 credits)
- ESE 5890 Biological Imaging Technology (3 credits)

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as the *MER*.

Mentored Experience Requirement (MER)

Philosophy of Teaching

Medical Physics is a field which includes teaching at a number of levels, regardless of the career pathway. Being able to clearly explain and educate others about medical physics topics is an important skill due to the multi-disciplinary nature of the field, and the position of medical physicists at the nexus of communication between a number of different individuals with differing backgrounds and levels of understanding regarding medical physics topics and concepts. Medical physicists in both clinical and academic settings may be involved with educating students, trainees, and other personnel both in classroom-type, one-on-one trainings, and other settings. Even those in industry or regulatory experience must be able to educate others on the use of products and equipment, and/or how to achieve required benchmarks or guidelines. Individuals attaining a PhD are likely to participate in one or more of those pathways throughout their professional life. The mentored educational experience, either in the form of a Mentored Teaching Experience (MTE) or Mentored Professional Experience (MPE), is thus an important element for helping aspiring medical physicists gain comfort with educating individuals in many of the ways in which they may need to in their careers. It can also help individuals identify interest in teaching and training elements which can help guide them on the selection of their chosen pathways.

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Two Preparatory Engagement activities are required:

1. Center for Teaching and Learning (CTL) Teaching Orientation: This is required for all students. Students entering the program without a CAMPEP accredited MS degree will take the orientation at the beginning of their second year in the program. Those entering the program with a CAMPEP-accredited MS degree will take it upon matriculating into the program.
2. A teaching pedagogical orientation provided by the course master or other teaching mentor before commencement of the MTE: This orientation may include (but is not limited to) the following:
 - A review of expectations and/or benchmarks for the student's MTE
 - Discussion of how to address student/trainee queries and/or issues
 - Discussion of student/trainee evaluation philosophy and approaches

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

For all PhD Students: 10 MER units are required in the form of acting as Assistant in Instruction.

Full-time PhD Students: The 10 MER units are achieved by acting as an AI in one of the required core medical physics classroom or laboratory courses listed below. Duties may include the following (depending on the specific course/course master):

- Attendance of class/laboratory sessions
- Preparation of and/or grading of homework
- Preparation of and/or grading of exams
- Leading weekly discussion sections
- Setup and/or aid with performing laboratory or practica sessions
- Other course specific elements as discussed with the course master

Part-time PhD Students: The 10 MER units can be achieved by either acting as an AI as described for full time PhD students or may pursue an alternate AI pathway. The alternate AI pathway is allowed if the part-time PhD student is a full-time WashU employee and their professional duties include teaching and/or training of residents

or training and/or providing continuing education to Washington University in St. Louis or BJC faculty or staff. In these instances, students may propose a 10 MER equivalent (~150 hours total) project spread over one or two academic semesters. These projects must be medical physics education focused and may be classroom-style, small/group individual training style, or other proposed structure. Students who wish to pursue the alternative pathway should identify a faculty mentor, and craft a minimum 500-word proposal submitted no less than 6 weeks before the commencement of the MTE. The proposal must describe the educational need and focus of the AI project, the student's role(s) as AI in the project, and the role of the selected mentor. The proposal should then be approved by both the identified MTE mentor and Program Director before the alternative AI project can commence.

Students in the program typically perform one AI experience for 10 MER units after completion of their PhD qualifying exam. Students should complete the AI experience their second or third year of the program. Students who enter the PhD program directly from the MSMP program at Washington University in St. Louis who have already achieved the equivalence of passing the qualifying exam when entering the program are allowed to complete their MTE within the first two years of joining the PhD program. For all students, a one-year extension may be allowed in exceptional circumstances by student request. This request must be approved at the discretion of the program director.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MER. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement

MGS 8010	Take one time

Optional Activity: Teaching Intensive Pathway (TIP)

The TIP is an optional pathway for those students whose career interests lie in academia or another field that would benefit from extended teaching experiences. This immersive experience allows students to further explore the breadth and depth of teaching best practices and pedagogy related to their respective field. Students who are interested in participating in this elective experience must formally request to participate, which is subject to program approval. Due to this experience being an elective, unpaid experience, students who participate in the TIP will not receive compensation.

Students who successfully complete their AI requirements and have interest in pursuing additional teaching opportunities. The TIP can be completed in any of the courses listed above, however, there must be space for an AI in the course in a given semester, as preference is given to those individuals who have not completed their required MTE. In



addition, students may be allowed to participate as an AI in classroom-based resident training courses. In all instances, students must obtain permission from their Thesis Advisor and the Program Director to undertake additional AI opportunities.

Optional Pathway

MGS 8010	Take two times

Post-PhD Graduate Certificate in Medical Physics

Program Overview

Through the Commission on Accreditation of Medical Physics Education Programs (CAMPEP)–accredited Washington University Post-PhD Graduate Certificate in Medical Physics program, students will become familiar with the major texts and literature in the area of medical physics, and they will be exposed to a wide array of treatment techniques and quality control procedures. These experiences will equip students with the necessary means to further their education. Graduates of the program will have an understanding of the role of patient safety in clinical physics, and they will have the necessary physical and scientific background for a career in medical physics. They will be able to use research and inquiry to acquire knowledge, and they will also have the ability to critically evaluate research and scholarship and to pose new questions and solve problems in medical physics. This program will help students to develop the professional and interpersonal skills necessary for success in a collaborative, multidisciplinary environment.

Program Format

This program requires the completion of 18 credit units and is offered in convenient one- and two-year formats.

Required Coursework

- MEDPHYS 5001 Structure and Function of the Human Body for Medical Physics (3 credits)
- MEDPHYS 5010 Radiological Physics and Dosimetry (3 credits)
- MEDPHYS 5060 Radiobiology (2 credits)
- MEDPHYS 5070 Radiation Oncology Physics (3 credits)
- MEDPHYS 5080 Radiation Protection and Safety (2 credits)
- MEDPHYS 5100 Advanced Clinical Medical Physics Laboratory (2 credits)
- ESE 5890 Biological Imaging Technology (3 credits)

Nursing Science PhD in Nursing Science

Degree Requirements

The PhD in Nursing Science requires 59 graduate units of coursework and research. Students will complete four core areas of study plus a required minor/cognate and a dissertation. The four core areas are Nursing Science, Research Methods, Statistics, and Mentored Research Experience. Students can choose a minor in informatics, clinical investigation, or dissemination and implementation science, or they may propose a customized track that is a match with nursing faculty research areas and that complements the applicant's nursing area of research. Courses in the Nursing Science and Research Methods core areas will be taught by faculty at Goldfarb School of Nursing. Courses in the Statistics core and the minor courses will be taught by faculty at Washington University. The Mentored Research Experience will be taught by scientists at both Goldfarb School of Nursing and Washington University. A Mentored Teaching Experience is also required.

The program is designed for full-time or part-time study. The full-time track is designed to be completed in three years. This generally involves five semesters of coursework (47 credit units) followed by a preliminary examination, a qualifying examination, and three semesters of dissertation work (12 credit units). Students may be eligible for fourth- and fifth-year options if these are necessary for the completion of the proposed dissertation work. The part-time PhD program may be completed in five to seven years, with a maximum of nine years. Part-time students must be enrolled in at least 3 credit units (and no more than 8 credit units) per semester for continuous semesters until credit unit requirements for the program are met. Course credit requirements and milestone accomplishments are the same for full-time and part-time study. A Title, Scope and Procedure form must be submitted to the school registrar or appropriate record custodian at least six months before the degree is expected to be conferred or before beginning the sixth year of enrollment, whichever is earlier. The expectation is that students enrolled in the part-time track will stay in the part-time track and that students enrolled in the full-time track will stay in the full-time track. A decision to change program track requires approval from the program director.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as the *MER*.

Mentored Experience Requirement (MER)

Philosophy of Teaching

Effective communication of information and concepts is a critical skill for nurses with a PhD in Nursing Science. Each nursing science student must be able to demonstrate excellence in teaching and presentation of scientific research topics. The following are essential competencies for PhD in Nursing Science students to achieve in the Mentored Experience Teaching whether they pursue employment in the academic setting, the acute care setting, or a different career path.

1. Communicate a philosophy of teaching that embodies commitment to the improvement of professional practice and research through excellence in teaching and mentoring.
2. Demonstrate sound strategies of planning, delivery, and evaluation of teaching encounters.
3. Continually seek to improve teaching strategies in response to self-reflection, peer input, and student feedback.

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Students are required to conduct three Preparatory Engagement activities:

1. Complete the Washington University Center for Teaching and Learning's Graduate Student Mentored Teaching Orientation within two semesters prior to the Mentored Teaching Assistant in Instruction semester.
2. Attend at least one Washington University Center for Teaching and Learning 90-minute workshop of the student's choice upon completion of the Graduate Student Mentored Teaching Orientation and within two semesters prior to the Mentored Teaching Assistant in Instruction semester.

3. Complete a self-assessment of previous teaching experience and interests to best align the student with courses taught in the desired Mentored Teaching Assistant in Instruction semester. The student will meet with their Student Advisor and the Upper Division or Graduate Program Director to finalize course selection.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

Students are required to complete one AI assignment for 5 MER units.

Required Pathways for Completion

Students work with their faculty mentor to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement

MGS 8005	Take one time

Occupational Therapy



Master of Science in Occupational Therapy

Applicants must hold a bachelor's degree or be a participant in an approved 3-2 program, and they must have completed prerequisite courses from an accredited college or university. The Program in Occupational Therapy is accredited by the Accreditation Council for Occupational Therapy Education of the American Occupational Therapy Association.

The MSOT prepares students to become practitioners in any practice area. A minimum of a master's degree is required for entry into the profession of occupational therapy. The MSOT degree prepares generalist clinicians with the knowledge and skills needed to work as direct care providers, consultants, educators, managers and advocates for clients. The MSOT program also includes the option for students to study with experienced community clinicians, community agency administrators and faculty scientists.

For students interested in pursuing a PhD in the future, the MSOT degree program also includes the option for students to study with faculty scientists. Students have exposure to topics in participation, public health, aging, children and youth, mental health, work and industry, and neurorehabilitation.

An experiential portion of the curriculum — six months of full-time fieldwork supervised by experienced clinicians — follows the two years of academic course work for a total of 80 credit units. The MSOT degree program is a 28-month, full-time program.

With either degree, students will be eligible to sit for the NBCOT examination to become a practicing occupational therapist. The exam is administered by the National Board for Certification in Occupational Therapy (NBCOT), located at One Bank Street, Suite 300, Gaithersburg, MD 20878. NBCOT's phone number is 301-990-7979, and its website address is www.nbcot.org. Please visit the Program in Occupational Therapy website to view our graduation rate.

A felony conviction may affect a graduate's ability to sit for the NBCOT certification exam or to attain state licensure.

Doctorate of Occupational Therapy

Applicants must hold a bachelor's degree or be a participant in an approved 3-2 program, and they must have completed prerequisite courses from an accredited college or university. The Program in Occupational Therapy is accredited by the Accreditation Council for Occupational Therapy Education of the American Occupational Therapy Association.

The OTD is for students who want to assume a leadership position in practice, management, teaching and/or clinical research. In addition to six months of full-time fieldwork supervised by experienced clinicians, OTD students focus on their specialty area and complete the 14-week doctoral capstone for a total of 106 credit units over a three-year period. The OTD degree program is a 36-month, full-time program.

Doctoral students actively engage in leadership experiences to develop capacity as change agents in professional practice and to acquire in-depth knowledge in their practice areas. They learn to analyze the role of occupational therapy across the service delivery continuum for individuals, groups and populations and to design an occupational therapy model for a specific client population. Doctoral students develop an advanced-practice skill set as well as the ability to participate in scholarly work. They may choose from multiple concentrations such as productive aging, social participation and the environment, children and youth, work and industry, neurorehabilitation and rehabilitation science.

Graduates of either degree program will be eligible to sit for the National Board for Certification in Occupational Therapy (NBCOT) examination to become practicing occupational therapists. The exam is administered by NBCOT, which is located at One Bank Street, Suite 300, Gaithersburg, MD 20878. NBCOT's phone number is 301-990-7979. For more information, visit the NBCOT website. Consult our Program in Occupational Therapy website for more information about our graduation rate.

A felony conviction may affect a graduate's ability to sit for the NBCOT exam or to attain state licensure.

Post-Professional Doctorate of Occupational Therapy

The **Online Post-Professional Clinical Doctorate of Occupational Therapy (PP-OTD)** is for experienced occupational therapists who want to impact the profession through innovative leadership and education. The PP-OTD advances the learner's knowledge and skills to meet their career goals in their current practice, in emerging practice and leadership areas, and in higher education. Students must be licensed to practice occupational therapy in the United States and have completed at least two years of occupational therapy practice.

Our PP-OTD courses are delivered through high-quality synchronous and asynchronous virtual learning. The curriculum focuses on developing skills in leadership, program development and evaluation, teaching, and advocacy. It consists of five semesters of course work (6-7 credits per semester) for a total of 34 credits.

The curriculum includes six core courses (3 credits each) that provide advanced training in communication, evidence-based practice, theory and other areas. Four capstone sequence courses (1 credit each) help guide students through the creation, implementation and

evaluation of a student-driven doctoral project and the compilation of a culminating portfolio. For the remaining credits, students select one of two specialty tracks: Educate or Lead. Within each track, four specialty courses (3 credits each) provide additional education to help students meet future goals.

Students can complete the program in five sequential semesters (including the summer semester) on a part-time basis. The curriculum is designed to allow students to continue to work in their current positions, if they choose to do so. There is no full-time study option for this degree. Tuition is charged per credit unit.

Graduates of the PP-OTD program will be prepared for careers as leaders and educators in a wide variety of traditional and nontraditional settings.

PhD in Rehabilitation and Participation Science

Degree Requirements

The Rehabilitation and Participation Science (RAPS) PhD program aims to develop rehabilitation scientists whose research questions are chosen based explicitly on their potential to generate rehabilitation knowledge that will enhance health, reduce illness and disability and optimize participation and quality of life. In our doctoral training model, students devote the majority of their time to mentored research activities beginning in their first semester, and then they become increasingly independent. Students may choose rehabilitation and participation scientists who hold appointments in the occupational therapy program as mentors to help focus their study in the areas of chronic diseases, evidence-based care, interventions, cognitive rehabilitation, neurorehabilitation, health promotion, decreasing secondary conditions, improving physical fitness for people with disabilities, and rehabilitation outcomes and informatics.

This program is designed to be completed in four to five years of full-time study. There is no provision for part-time study. A tuition stipend and fellowship are provided for up to four years, with the possibility of a one-year extension.

Graduates of the RAPS PhD program will be prepared for careers as academic research scientists.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as the *MER*.

Mentored Experience Requirement (MER)

Philosophy of Teaching

Teaching in Rehabilitation and Participation Sciences (RAPS), as viewed along a continuum (from a 1:1 clinician-client therapy session through community health education), is at the heart of occupational therapy and rehabilitation. Academicians in rehabilitation and participation science will need preparation for a wide range of educator roles, including classroom teaching, student mentoring, laboratory staff training, and client/research participant education.

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

All RAPS students take the Teaching Practicum course, a 2-credit seminar covering a variety of topics and skills necessary for success as an academic educator, including learning theories, educational philosophies, instructional design, goal-writing and assessment, course/curriculum design, and mentoring students. Students develop a personal statement of philosophy of teaching and learning and must also complete a mentored teaching experience in the Program in Occupational Therapy either in the concurrent or a subsequent semester.

Students are required to participate in the Teaching Orientation through the Center for Teaching and Learning (CTL) prior to enrolling in the Teaching Practicum course and are encouraged to take advantage of 90-minute workshops offered through the CTL.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

RAPS students ordinarily follow this sequence of engagements: CTL orientation the summer before the year in which they will take OT 7200 Healthcare Education: Theory and Foundations. OT 7200 Healthcare Education: Theory and Foundations is offered every other year, so this will occur in the student's first or second year in the program. Students will complete one AI for either 10 or 15 MER units. The minimum requirements (completing OT 7200 Healthcare Education: Theory and Foundations and one AI experience) should be completed by the end of their third year.

- 10 units = Preparing course materials, giving one or two lectures, leading discussions, managing Canvas, grading and evaluating some assignments, holding office hours
- 15 units = All activities listed above for 10 units, plus developing quizzes and exams, tutoring, supervising projects, administering and grading exams

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MER. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement

Pathway #1

MGS 8010	Take one time

Pathway #2

MGS 8015	Take one time

Physical Therapy

Doctor of Physical Therapy

Overview

The professional curriculum is an intensive two-year, eight-month experience leading to the Doctor of Physical Therapy (DPT) degree. The principle focus of this professional training is to develop scientific and clinical expertise in the diagnosis and treatment of movement-related conditions. By integrating biomedical and physical sciences and clinical education with behavioral and social sciences, the DPT curriculum (PDF) provides students with the scientific expertise, critical thinking skills and interpersonal communication abilities necessary for effective clinical practice, comprehensive treatment design, patient advocacy, patient education and health promotion.

Clinical Education

Over the course of the programs, students are provided with clinical education in class, part-time clinical experiences, and full-time clinical internships. The program exposes students to patient care in various settings and to the treatment of a number of conditions.

We encourage students to travel for at least one clinical experience to obtain the broadest possible exposure. We affiliate with hundreds of sites across the United States; only one third of our clinical sites are within the St. Louis metropolitan area.

Research Opportunities

While students in the DPT degree program are not required to generate original research, they can take advantage of opportunities to participate in ongoing faculty research. Students may participate in a study or apply for an assistantship.

In addition, through an NIH-funded predoctoral research training grant awarded through the School of Medicine, a limited number of opportunities are available to students who wish to participate in a faculty-guided research project. For further details, please visit the Clinical Research Training Center website.

Application and Eligibility

Apply for the DPT degree program online using the Physical Therapist Centralized Application Service (PTCAS).

To be eligible to apply for the DPT degree program, applicants must have the following:



1. A bachelor's degree (or be in the process of completing one) from an institution accredited by a national accreditation agency that is recognized by the Department of Education.
2. Prerequisite courses in biology, chemistry, physics, anatomy, physiology, psychology, and statistics. For a complete list, visit the Program in Physical Therapy website.
3. Science, math/science, and core prerequisites with a grade point average of at least 3.0
4. A demonstrated commitment to a career in physical therapy.

Visit our website for more information regarding application and admissions or eligibility and prerequisites.

DPT Curriculum

Year One, Fall

Code	Title	Units
Early Clinical Experience		
PHYSTHER 8101	Patient and Client Care 1	0.5
PHYSTHER 8102	Knowledge for Practice 1	0.5
PHYSTHER 8103	Practice-Based Learning and Improvement 1	0.5
PHYSTHER 8104	Interpersonal & Communication Skills 1	0.5
PHYSTHER 8105	Professionalism 1	0.5
PHYSTHER 8106	Systems-Based Practice 1	0.5
PHYSTHER 8107	Interprofessional Collaboration 1	0.5
PHYSTHER 8108	Personal & Professional Development 1	0.5
PHYSTHER 8110	Learning, Health and Equity	1
PHYSTHER 8120	Professions and Movement	1
PHYSTHER 8130	Movement and Population Health	2
PHYSTHER 8140	Movement and Precision Health	10-15

Year One, Spring

Code	Title	Units
Early Clinical Experience		
PHYSTHER 8101	Patient and Client Care 1	0.5
PHYSTHER 8102	Knowledge for Practice 1	0.5
PHYSTHER 8103	Practice-Based Learning and Improvement 1	0.5
PHYSTHER 8104	Interpersonal & Communication Skills 1	0.5
PHYSTHER 8105	Professionalism 1	0.5
PHYSTHER 8106	Systems-Based Practice 1	0.5
PHYSTHER 8107	Interprofessional Collaboration 1	0.5
PHYSTHER 8108	Personal & Professional Development 1	0.5
PHYSTHER 8140	Movement and Precision Health	10-15

Year One, Summer

Code	Title	Units
PHYSTHER 8101	Patient and Client Care 1	0.5
PHYSTHER 8102	Knowledge for Practice 1	0.5
PHYSTHER 8103	Practice-Based Learning and Improvement 1	0.5
PHYSTHER 8104	Interpersonal & Communication Skills 1	0.5
PHYSTHER 8105	Professionalism 1	0.5
PHYSTHER 8106	Systems-Based Practice 1	0.5
PHYSTHER 8107	Interprofessional Collaboration 1	0.5
PHYSTHER 8108	Personal & Professional Development 1	0.5
PHYSTHER 8191	Clinical Experience I	4

Year Two, Fall

Code	Title	Units
PHYSTHER 8201	Patient and Client Care 2	0.5
PHYSTHER 8202	Knowledge for Practice 2	0.5
PHYSTHER 8203	Practice-Based Learning and Improvement 2	0.5
PHYSTHER 8204	Interpersonal & Communication Skills 2	0.5
PHYSTHER 8205	Professionalism 2	0.5
PHYSTHER 8206	Systems-Based Practice 2	0.5
PHYSTHER 8207	Interprofessional Collaboration 2	0.5
PHYSTHER 8208	Personal & Professional Development 2	0.5
PHYSTHER 8250	Prevention, Diagnosis and Management of Movement Problems	12

Year Two, Spring

Code	Title	Units
PHYSTHER 8201	Patient and Client Care 2	0.5
PHYSTHER 8202	Knowledge for Practice 2	0.5
PHYSTHER 8203	Practice-Based Learning and Improvement 2	0.5
PHYSTHER 8204	Interpersonal & Communication Skills 2	0.5
PHYSTHER 8205	Professionalism 2	0.5
PHYSTHER 8206	Systems-Based Practice 2	0.5
PHYSTHER 8207	Interprofessional Collaboration 2	0.5
PHYSTHER 8208	Personal & Professional Development 2	0.5
PHYSTHER 8260	Prevention, Diagnosis and Management of Complex Movement Problems	6
PHYSTHER 8292	Clinical Experience II	4



Year Two, Summer

Code	Title	Units
PHYSTHER 8201	Patient and Client Care 2	0.5
PHYSTHER 8202	Knowledge for Practice 2	0.5
PHYSTHER 8203	Practice-Based Learning and Improvement 2	0.5
PHYSTHER 8204	Interpersonal & Communication Skills 2	0.5
PHYSTHER 8205	Professionalism 2	0.5
PHYSTHER 8206	Systems-Based Practice 2	0.5
PHYSTHER 8207	Interprofessional Collaboration 2	0.5
PHYSTHER 8208	Personal & Professional Development 2	0.5
PHYSTHER 8260	Prevention, Diagnosis and Management of Complex Movement Problems	6

Year Three, Fall

Code	Title	Units
PHYSTHER 8301	Patient and Client Care 3	0.5
PHYSTHER 8302	Knowledge for Practice 3	0.5
PHYSTHER 8303	Practice-Based Learning and Improvement 3	0.5
PHYSTHER 8304	Interpersonal & Communication Skills 3	0.5
PHYSTHER 8305	Professionalism 3	0.5
PHYSTHER 8306	Systems-Based Practice 3	0.5
PHYSTHER 8307	Interprofessional Collaboration 3	0.5
PHYSTHER 8308	Personal & Professional Development 3	0.5
PHYSTHER 8393	Clinical Experience III	5
PHYSTHER 8394	Clinical Experience IV	6

Year Three, Spring

Code	Title	Units
PHYSTHER 8301	Patient and Client Care 3	0.5
PHYSTHER 8302	Knowledge for Practice 3	0.5
PHYSTHER 8303	Practice-Based Learning and Improvement 3	0.5
PHYSTHER 8304	Interpersonal & Communication Skills 3	0.5
PHYSTHER 8305	Professionalism 3	0.5
PHYSTHER 8306	Systems-Based Practice 3	0.5
PHYSTHER 8307	Interprofessional Collaboration 3	0.5
PHYSTHER 8308	Personal & Professional Development 3	0.5
PHYSTHER 8370	Practice and Movement	10
PHYSTHER 8380	Practice, Health and Equity	1

PhD in Movement Science

Degree Requirements

The focus of the interdisciplinary doctoral program in movement science is to prepare future researchers and faculty members who can enhance the profession of physical therapy. Admission to this curriculum requires acceptable scores on the Graduate Record Examination, excellence in previous academic work, and demonstrated beginning abilities in posing questions of importance to the study of movement.

The faculty members of the Program in Physical Therapy are committed to being leaders in discovering and transmitting new knowledge related to movement dysfunction, preparing clinicians to assume multiple roles in a complex health care environment, and fulfilling the service mission to society through active participation in humanistic, scientifically based patient care. Students in all curricula are expected to participate actively in an environment that values integrity, initiative, creativity and the strong belief that physical therapy intervention promotes health. In these ways, all individuals associated with the Program in Physical Therapy may achieve their highest professional and personal potential.

Visit our website or more information regarding application and admissions.

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as the *MER*.

Mentored Experience Requirement (MER)

Philosophy of Teaching

The Mentored Experience Requirement for the PhD in Movement Science is a Mentored Teaching Experience. The Mentored Teaching Experience directly aligns with the Movement Science Program Training Objective #2: Each student demonstrates excellence in didactic teaching and presentation of scientific presentations.

- Objective 2.1 Demonstrate sound strategies of planning, delivery, and evaluation of teaching encounters.
- Objective 2.2 Continually seek to improve teaching strategies in response to self-reflection, peer input, and student feedback.

Evaluation strategies: Faculty mentor evaluation, self-assessment and student feedback during the required MSP Teaching Practicum course.

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Students are required to attend a minimum of three of the Graduate Student teaching workshops offered by the Center for Teaching and Learning at Washington University. Students should select the most appropriate/beneficial workshops for their training in consultation with the Course Master for Teaching Practicum, based on their previous teaching exposures/ experiences. Students must complete the three workshops prior to or in conjunction with the Assistant Instruction (AI) experience.

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

MTE is to be completed in academic year two or three of the student's doctoral training. Doctoral students should meet with Teaching Practicum Course Master and begin the duties of the Mentored Teaching Experience two to three months prior to the start of the course. Students are expected to teach two to four class sessions, depending on the scope of the material and length of the class sessions. Duties may include all aspects of course coordination:

- Formal classroom lecture presentation (and lab if appropriate) of a Unit of material within the course. The unit to be taught will be determined and agreed upon by the doctoral student, student's graduate mentor and Course Master of Teaching Practicum. The doctoral student is to prepare all handouts for the unit and must comply with copyright law.

- Review of the course syllabus to include all learning materials, reading assignments, grading policies and so on. It is expected that the doctoral student familiarize themselves with the guidelines for syllabus preparation through information from the Center for Teaching and Learning's website.
- Posting of learning materials on appropriate course management web site in a timely manner.
- Review of course objectives and development of specific learning objectives to accompany unit taught by student. It is expected that the doctoral student familiarize themselves with the principles of developing and writing learning objectives through information on the Center for Teaching and Learning's website or other educational sources.
- Preparation of review sessions as requested.
- Creation of assessment items, assistance with grading (if appropriate), and review of assessment results.
- Review of learner feedback and suggestions for revisions.
- Assistance with all aspects of course management as requested by the Course Master.

Required Pathways for Completion

Students work with their faculty mentor or director to plan how and when they will complete their MERs. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement

MGS 8005

Take one time

Population Health Sciences

Master of Population Health Sciences

The **Master of Population Health Sciences (MPHS)** provides clinicians and health professionals with an opportunity to supplement their clinical training and coursework with a quantitative approach to population health science research. Students develop core skills in epidemiology and biostatistics, and these can be applied to research in any clinical field, from primary to specialty care. The program is intended for clinicians who plan to incorporate clinical or population health research into their clinical careers, including clinical effectiveness and outcomes research.



Requirements

Program Format

The MPHS program is offered in a full-time, 10-month format. The degree requires a minimum of 33 total credits, including seven core courses (17 credits) and 16 credits of elective courses. A minimum of 12 credit units is required for full-time student status, and the maximum course load is 18 credit units per semester. Part-time study options are available.

Core MPHS Courses

Code	Title	Units
PHS 5010	Introductory Clinical Epidemiology	3
PHS 5011	Intermediate Clinical Epidemiology	3
PHS 5012	Ethics in Population and Clinical Health Research	1
PHS 5040	Introductory Biostatistics for Clinical Research	3
PHS 5041	Intermediate Biostatistics for Clinical Research	3
PHS 5070	Introduction to R for Clinical Research	1
PHS 5220	Grant Writing: Applying Clinical and Population Health Methods	3

Elective Courses

Code	Title	Units
PHS 5020	Applied Research Independent Study	2
PHS 5080	Using Administrative Data for Health Services Research	3
PHS 5100	Development, Validation and Application of Risk Prediction Models	3
PHS 5120	Applied Qualitative Methods for Health Research	3
PHS 5130	Decision Analysis for Clinical Investigation and Economic Evaluation	3
PHS 5140	Randomized Controlled Trials	3
PHS 5150	Systematic Reviews and Meta-Analysis	3
PHS 5160	Dissemination and Implementation Science	3
PHS 5210	Communicating Research Findings to the Media and Lay Audiences	1
PHS 5212	Introduction to Health Disparities and the Structural and Social Determinants of Health	3
PHS 5215	Introduction to Propensity Score Methods	1
PHS 5230	Multilevel and Longitudinal Data Analyses for Clinical Research	3

Certificate in Clinical Effectiveness

Students who complete the **Certificate in Clinical Effectiveness** will develop the strong methodological skills needed for clinical outcomes research. Students will achieve competency in designing clinical and observational studies, conducting secondary analysis of existing data, and evaluating clinical epidemiology or clinical research projects of clinical or public health significance.

Requirements

The certificate will require a minimum of 15 total credits, including two core courses (6 credits) and three additional elective courses (9 credits). All electives will be reviewed and approved prior to registration to ensure relevance to the certificate. The certificate can be completed in one year. Exceptions can be made, and all course work must be successfully completed within five years from the start of the first course.

Core Courses

Code	Title	Units
PHS 5010	Introductory Clinical Epidemiology	3
PHS 5040	Introductory Biostatistics for Clinical Research	3

Elective Courses

Code	Title	Units
PHS 5011	Intermediate Clinical Epidemiology	3
PHS 5140	Randomized Controlled Trials	3
PHS 5130	Decision Analysis for Clinical Investigation and Economic Evaluation	3
PHS 5150	Systematic Reviews and Meta-Analysis	3
PHS 5100	Development, Validation and Application of Risk Prediction Models	3
PHS 5080	Using Administrative Data for Health Services Research	3
PHS 5230	Multilevel and Longitudinal Data Analyses for Clinical Research	3
PHS 5212	Introduction to Health Disparities and the Structural and Social Determinants of Health	3
PHS 5215	Introduction to Propensity Score Methods	1

Course Credit

All core courses must be taken for a letter grade. Elective courses may be taken Pass/No Pass.

Who Can Apply

- Medical school students and those in medical residency training
- Students in a master's or doctoral degree program at Washington University
- Career-development awardees
- No international applicants
- No remote learning

Certificate in Health Equity and Disparities

Students who complete the **Certificate in Health Equity and Disparities** will gain knowledge on health disparities and social determinants of health. They will develop the interdisciplinary skills needed to assess health disparities and address the impact of social determinants of health on clinical outcomes and population health.

Requirements

The certificate will require minimum of 15 total credits, including three core courses (7 credits) and three additional elective courses (8 credits). All electives will be reviewed and approved prior to registration to ensure relevance to the Certificate in Health Disparities and Equity. The certificate can be completed in one year. Exceptions can be made, and all course work must be successfully completed within five years from the start of the first course.

Core Courses

Code	Title	Units
PHS 5012	Ethics in Population and Clinical Health Research	1
PHS 5212	Introduction to Health Disparities and the Structural and Social Determinants of Health	3
One of the following:		
PHS 5010	Introductory Clinical Epidemiology	3
PHS 5120	Applied Qualitative Methods for Health Research	3
PHS 5140	Randomized Controlled Trials	3
PHS 5160	Dissemination and Implementation Science	3

Elective Courses

Code	Title	Units
PHS 5010	Introductory Clinical Epidemiology	3
PHS 5011	Intermediate Clinical Epidemiology	3
PHS 5040	Introductory Biostatistics for Clinical Research	3
PHS 5120	Applied Qualitative Methods for Health Research	3
PHS 5140	Randomized Controlled Trials	3
PHS 5160	Dissemination and Implementation Science	3

Course Credit

All core courses must be taken for a letter grade. Elective courses may be taken Pass/No Pass.

Who Can Apply

- Medical school students and those in medical residency training
- Students in a master's or doctoral degree program at Washington University
- Career-development awardees
- No international applicants
- No remote learning

Reproductive Sciences Master of Science in Reproductive Sciences

The Master of Science in Reproductive Sciences (MSRS) is a two-year, full-time degree program. Students choose to matriculate in either a 35-credit Research concentration or a 39-credit Clinical Embryology concentration.

The Reproductive Sciences program includes a core curriculum shared between both concentrations that focuses on basic and advanced topics in human reproductive physiology and pathology; current tools in the reproductive sciences; and concentration-specific courses for students to learn the vast array of field-specific skills and related knowledge. Courses are taught by program-dedicated instructors and faculty expert guest lecturers providing the most up-to-date information.



- **Research Concentration:** Students in this 21-month concentration will perform mentored thesis research in a state-of-the-art lab in the Center for Reproductive Health Sciences or an affiliated lab at Washington University. Broad research topics include fertility, contraception, embryology and development, pregnancy, labor, and gynecologic cancers. Research labs take a variety of approaches to these topics, including cellular and molecular biology, immunology, genetics, physiology and biophysics, and biomedical engineering. Students will gain the research and communication skills needed to confidently perform in a research or consulting environment after completing the program.
- **Clinical Embryology Concentration:** Students in this 24-month concentration will be immersed in the embryology laboratory of the Washington University Fertility & Reproductive Medicine Center from day one of the program. Students will receive extensive hands-on training in embryology laboratory techniques and gain the specialized knowledge required for a career as a clinical embryologist upon graduation.

Required Core Courses for the MSRS

Code	Title	Units
REPRSCI 5000	Human Reproductive Physiology	3
REPRSCI 5005	Current Tools in Reproductive Sciences (CTRS)	3
REPRSCI 5010	Advanced Topics in Reproductive Sciences (ATRS)	3
REPRSCI 5015	Reproductive Sciences Communication I	1
REPRSCI 5095	Introduction to Statistics for Reproductive Sciences	2
Total Units		12

Research concentration students are required to complete an elective course (3-4 credit units, approved by the program).

Visit the MSRS website to view concentration-specific required courses.

Admissions

Applicants to the program must have a bachelor's degree, and most applicants will have majored in life sciences or a related field. Additional admissions criteria can be found on the MSRS Admissions page.

Academic Departments

Washington University School of Medicine has 21 academic departments, all of which provide educational opportunities for the Doctor of Medicine (p. 156) and Graduate Medical Education (p. 195) programs.

- Anesthesiology (p. 209)
- Biochemistry and Molecular Biophysics (p. 223)
- Cell Biology and Physiology (p. 228)
- Developmental Biology (p. 233)
- Emergency Medicine (p. 237)
- Genetics (p. 238)
- Internal Medicine (p. 243)
- Molecular Microbiology (p. 253)
- Neurology (p. 256)
- Neuroscience (p. 272)
- Neurosurgery (p. 277)
- Obstetrics and Gynecology (p. 282)
- Ophthalmology and Visual Sciences (p. 293)
- Orthopaedic Surgery (p. 302)
- Otolaryngology (p. 309)
- Pathology and Immunology (p. 316)
- Pediatrics (p. 326)
- Psychiatry (p. 361)
- Radiation Oncology (p. 373)
- Radiology (p. 378)
- Surgery (p. 393)

Department of Anesthesiology

Anesthesiology is a medical specialty encompassing a broad range of medical and scientific activities. The clinical practice of anesthesiology includes the following:

1. Assessment of, consultation for and preparation of patients for anesthesia and surgery;
2. Provision of insensibility to pain during surgical, obstetric, therapeutic and diagnostic procedures;
3. Monitoring and restoration of physiologic homeostasis during the perioperative period as well as homeostasis in the critically ill or seriously injured patient;
4. Diagnosis and treatment of painful syndromes; and
5. Clinical management and teaching of cardiopulmonary resuscitation.

The realm of scientific investigation in anesthesiology also spans a broad range. Scientific efforts at the cellular and molecular levels are directed toward understanding the molecular mechanisms of anesthesia and analgesia. Clinical research in anesthesia includes broad epidemiological approaches to identifying indicators of outcome as well as prospective clinical studies examining new technologies, anesthetic agents and methods.

The Department of Anesthesiology presents the student with the opportunity to do the following:

1. Acquire and apply pharmacologic knowledge related to anesthetic agents, opioids, paralytic and sedative drugs, and drugs affecting the autonomic nervous system;
2. Understand and apply the basic principles of airway management and mechanical ventilation;
3. Understand and apply the principles of cardiopulmonary resuscitation;
4. Understand and apply the technical skills and anatomic and pharmacologic knowledge used in performing regional nerve blocks;
5. Learn and apply the fundamental principles of acute and chronic pain management; and
6. Learn and apply the basic principles of critical care medicine.

Anesthesiology bridges the gap between basic science and clinical medicine. It provides experience with the clinical evaluation and management of patients as well as with applied physiology and pharmacology. The Department of Anesthesiology offers student experiences in the operating room, the intensive care unit, the pain management clinic and the laboratory.

Contact: Maureen Arends
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Faculty

Michael Avidan, MBBCh, FCA SA
Department Chair

Scott Markowitz, MD
Department Vice Chair for Professional Development & Diversity, Equity and Inclusion

Robert Gereau, PhD
Department Vice Chair for Research

Ivan Kangrga, MD, PhD
Department Vice Chair for Health Systems Liaison

Anne Drewry, MD
Department Vice Chair

Chakrapol Lattanand, MD, MBA
Department Vice Chair for Clinical Operations

Dolores Njoku, MD
Department Vice Chair for Pediatric Anesthesiology

G. Richard Benzinger, MD, PhD
Department Interim Vice Chair for Education

Omokhaye Higo, MD, MBA
Department Vice Chair for Innovation

Visit our website for more information about our faculty and their appointments.

A

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Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Emergency Medicine
Master of Public Health, University of Pittsburgh, 2007
Doctor of Medicine, University of Pittsburgh, 2007

Joanna Abraham, Ph.D.
Professor of Anesthesiology (primary appointment)
Professor of Medicine
Professor of Psychiatry
Bachelor of Science, SRM Easwari Engineering Colleg, 2001
Doctor of Philosophy, Pennsylvania State University-Main Campus, 2010

Hawa Abubakar, MBBS
Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, King's College London, 2010

Oluwafunmilayo Beverly Adebayo-Adonis, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Cornell University, 2007
Doctor of Medicine, Meharry Medical College, 2013

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Professor of Anesthesiology (primary appointment)
Bachelor of Science, Moscow State University, 1991
Doctor of Philosophy, State University of New York at Buffalo, 1997

Ream Al-Hasani McCall, Ph.D.
Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
Doctor of Philosophy, University of Surrey, 2009

Zekeriyya Alanoglu, M.Ed., M.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Ankara University, 1993
Master of Education, Ankara University, 2000

Eric Appelgren, M.B.A., M.D.
Instructor in Anesthesiology (primary appointment)
Stritch School of Medicine, 1997
Master of Business Administration, University of Colorado Denver, 2016

Mark Joseph Arcario, Ph.D., M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Florida, 2009
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2014



Doctor of Medicine, University of Illinois at Urbana-Champaign, 2017

Umeshkumar Athiraman, M.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Neurological Surgery
Doctor of Medicine, The Tamil Nadu Dr. M.G.R. Medical University,
2013

Jacob D AuBuchon, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2005
Doctor of Medicine, University of Missouri Kansas City, 2008

Michael Simon Avidan, MB.BCh.

Professor of Anesthesiology (primary appointment)
Dr. Seymour and Rose T Brown Professor of Anesthesiology
Professor of Surgery (Cardiothoracic Surgery)
Professor of Psychiatry
Foreign MD equivalent, University of the Witwatersrand, 1991

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Assistant Professor of Anesthesiology (Pending Dean Approval)
(primary appointment)
Bachelor of Science, Concordia College, 2009
Doctor of Medicine, University of South Dakota, 2014

B

Sennaraj Balasubramanian, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Tirunelveli Medical College, 1992
Doctor of Medicine, All India Institute of Medical Sciences, 1998

Charles Baysinger, M.D.

Voluntary Clinical Instructor in Anesthesiology
Doctor of Medicine, George Washington University, 2015

Amber Christine Benhardt, M.D.

Assistant Professor of Anesthesiology (Pending Dean Approval)
(primary appointment)
Bachelor of Arts, Texas A&M University, 2009
Doctor of Medicine, Texas A&M University, 2013

George Richard Benzinger, Ph.D., M.D.

Professor of Anesthesiology (primary appointment)
Bachelor of Science, California Institute of Technology, 1993
Doctor of Philosophy, University of Chicago, 1998
Doctor of Medicine, University of Chicago, 2000

Ahmet Onat Bermede, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Ankara University, 2003

Kathleen Gifford Bickel

Instructor in Anesthesiology (Pending Dean Approval) (primary
appointment)

Emre Sertac Bingul, M.D., Doctorate

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Istanbul University, 2012
Doctorate, Istanbul University, 2017

Khairunisa Binte Mohamad Ibrahim, Ph.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, National University of Singapore, 2012
Doctor of Philosophy, National University of Singapore, 2018

Matthew Eugene Boland, M.D.

Associate Professor of Anesthesiology (Pending Executive Faculty
Approval) (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 1996

Anuradha Purushottam Borle, M.D., MBBS

Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, GMC Miraj, 2007
Doctor of Medicine, All India Institute of Medical Sciences, 2012

Walter A Boyle, M.D.

Professor Emeritus of Anesthesiology
Bachelor of Science, University of California San Francisco, 1974
Doctor of Medicine, University of California San Francisco, 1977

Jamie Cao Brown-Shpigel, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Houston, 2009
Doctor of Medicine, University of Texas Health Science Center, 2014

Bernard H Brownstein, Ph.D.

Associate Professor Emeritus of Anesthesiology
Bachelor of Arts, Occidental College, 1961
Doctor of Philosophy, University of California, 1968

Sarah Buday, Ph.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Washington University in St Louis, 2002
Doctor of Philosophy, University of Missouri in St Louis, 2013

Reginald Bulkley, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 1983

C

Yolanda Maria Campos Jurado, M.S., Ph.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Universitat de València, 2014
Master of Science, Universitat de València, 2020
Doctor of Philosophy, Universitat de València, 2020

Yuqing Cao, Ph.D.

Professor of Anesthesiology (primary appointment)
Bachelor of Science, Fudan University (#####), 1989
Doctor of Philosophy, University of California San Francisco, 1999

Brandon Chaffay, M.Eng., MB.BCh.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Queen's University, 2013
Master of Engineering, University of Western Ontario, 2017
Foreign MD equivalent, University College Dublin National University
of Ireland, 2019

Alexander George Chamesian, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Duke University, 2019

Baron Chanda, M.S., Ph.D.

Professor of Anesthesiology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Neuroscience
Bachelor of Science, University of Delhi, 1991
Master of Science, Savitribai Phule Pune University, 1993
Doctor of Philosophy, National Centre for Biological, 2000

Stephanie Kae Charshafian, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Assistant Professor of Emergency Medicine
Bachelor of Science, University of Florida, 2009
Doctor of Medicine, Washington University in St Louis, 2014

Tao Che, M.S., Ph.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
Bachelor of Science, Wuhan University (#####), 2007
Master of Science, Wuhan University (#####), 2010
Doctor of Philosophy, Case Western Reserve University, 2015

Ziwei Chen, M.S., Ph.D., MBBS

Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Dalian Medical University (#####), 1995
Master of Science, Dalian Medical University (#####), 1998
Doctor of Philosophy, Peking University (#####), 2001

Wayland W. Cheng, Ph.D., M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Wheaton College Illinois, 2005
Doctor of Philosophy, Washington University in St Louis, 2012
Doctor of Medicine, Washington University in St Louis, 2012

Kelly Lynne Chilson, M.D.

Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Missouri Columbia, 1999

Salik Choudhary, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2013
Doctor of Medicine, University of Missouri Kansas City, 2013

Derek William Clary, D.O.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Osteopathic Medicine, Kansas City University of Medicine and Biosciences, 2020

James Close, M.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Medicine
Bachelor of Arts, Washington University in St Louis, 1980
Doctor of Medicine, Washington University in St Louis, 1984

Albert Murray Cohen, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Baylor University, 1977

Elizabeth Cohen

Associate Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)

Jill Cooley, M.D.

Assistant Professor of Anesthesiology (Pending Dean Approval)
(primary appointment)
University of Mississippi Medical Center, 2010

Bryan A Copits, Ph.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Philosophy, Northwestern University, 2012

Thomas E Cox

Professor Emeritus of Anesthesiology

Meaghan Claire Creed, Ph.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Neuroscience
Associate Professor of Psychiatry
Bachelor of Science, University of Toronto, 2008
Doctor of Philosophy, University of Toronto, 2012

Lara W. Crock, Ph.D., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Barnard College, 2001
Doctor of Philosophy, Washington University in St Louis, 2013
Doctor of Medicine, Washington University in St Louis, 2013

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Voluntary Clinical Instructor in Anesthesiology
Bachelor of Science, Tufts University, 1988
Doctor of Medicine, University of Massachusetts Amherst, 1994

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Bachelor of Arts, Kansas City University of Medicine and Biosciences, 2018
Doctor of Medicine, Kansas City University of Medicine and Biosciences, 2018

D

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Professor of Anesthesiology (primary appointment)
Professor of Surgery (Cardiothoracic Surgery)
Foreign MD equivalent, University of Pretoria, 1990

John Smith Del Rosario Benjamin, M.S., Ph.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, CUNY City College, 2011
Master of Science, CUNY City College, 2014
New Jersey Medical School, 2021

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Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Science and Technology of China (#####), 2001
Master of Science, University of Colorado Boulder, 2004
Doctor of Medicine, University of Colorado Anschutz Medical Campus, 2019

Avi Benjamin Dobrusin, M.D.



Assistant Professor of Anesthesiology (Pending Dean Approval)
(primary appointment)
Doctor of Medicine, Central Michigan University, 2020

Anne Meredith Drewry, M.D.

Professor of Anesthesiology (primary appointment)
Vice Chair
Division Chief of Critical Care Medicine
Llorin-Roa Professor of Anesthesiology
Doctor of Medicine, Washington University in St Louis, 2006

Julie Kosto Drobish, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Pennsylvania State University-Main Campus, 2006
Doctor of Medicine, Washington University in St Louis, 2009

Leon du Toit, M.S., MB.ChB.

Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Stellenbosch University, 2005
Master of Science, University of Cape Town, 2020

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Bachelor of Science, Saint Xavier University, 1995
Doctor of Osteopathic Medicine, Midwestern University, 2001

E

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Associate Professor of Biochemistry and Molecular Biophysics
Bachelor of Science, Benha University, 1999
Master of Science, Benha University, 2003
Doctor of Philosophy, University of Florida, 2010

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Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Surgery (Cardiothoracic Surgery)
Doctor of Medicine, Saint Louis University, 2005

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Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Vanderbilt University, 2016
Doctor of Medicine, Johns Hopkins University, 2020

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Professor of Anesthesiology (primary appointment)
Henry Elliot Mallinckrodt Professor of Anesthesiology
Professor of Developmental Biology
Professor of Medicine
Bachelor of Science, Yale University, 1974
Doctor of Medicine, New York University, 1978

F

Daniel Patrick Fernandez, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Southern Methodist University, 2012
Doctor of Medicine, Indiana University Indianapolis, 2016

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Division Chief - Division of Regional and Ambulatory Anesthesia/North

Doctor of Medicine, University of Connecticut, 2004

Catherine Foster, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of California Berkeley, 2008
Doctor of Medicine, University of Chicago, 2016

Rosemary Foster, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Saint Louis University, 2013

Bradley Alexander Fritz, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Case Western Reserve University, 2010
Doctor of Medicine, Washington University in St Louis, 2015

Brian M Fuller, M.D.

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Professor of Emergency Medicine
Bachelor of Arts, University of Alabama in Tuscaloosa, 1998
Doctor of Medicine, University of Alabama in Tuscaloosa, 2003

G

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Foreign MD equivalent, The Tamil Nadu Dr. M.G.R. Medical University, 1996
Master of Arts, London South Bank University, 2021

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Associate Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Bangalore University, 1998

Robert W Gereau, Ph.D.

Professor of Anesthesiology (primary appointment)
Dr Seymour and Rose T Brown Professor of Anesthesiology
Division Chief - WU Pain Center
Vice Chair - Department of Anesthesiology
Professor of Neuroscience
Bachelor of Science, Missouri State University (Formerly Southwest Missouri State), 1991
Doctor of Philosophy, Emory University, 1995

Jason R Gillihan, M.D.

Professor of Anesthesiology (primary appointment)
Chief Medical Officer of Barnes West County
Associate Chief Medical Officer of Barnes-Jewish Hospital
Bachelor of Science, University of Southern Indiana, 2002
Doctor of Medicine, Southern Illinois University Carbondale, 2006

Judith P Golden, M.A., Ph.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Hofstra University, 1984
Master of Arts, Hofstra University, 1986
Doctor of Philosophy, Saint Louis University, 1994

Cesar Emmanuel Gonzalez, M.A., Ph.D.

Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)
Bachelor of Science, Jacksonville State University, 2014
Master of Arts, University of Alabama in Huntsville, 2017
Doctor of Philosophy, University of Alabama at Birmingham School of Medicine, 2023

Vivian Maria Gonzalez-Perez, Ph.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Universidad de la Habana, 1997
Doctor of Philosophy, Universidad de Valparaíso, 2009

Burel Goodin, Ph.D.

Professor of Anesthesiology (primary appointment)
Professor of Public Health
Doctor of Philosophy, University of Maryland Baltimore County, 2010

Shreya Goswami

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Thomas J Graetz, M.D.

Professor of Anesthesiology (primary appointment)
Division Chief - Division of Cardiothoracic Anesthesiology
Professor of Surgery (Cardiothoracic Surgery)
Doctor of Medicine, Saint Louis University, 2005

Stephen H Gregory, M.D.

Associate Professor of Anesthesiology (primary appointment)
Division Chief - Division of Perioperative Medicine
Doctor of Medicine, Saint Louis University, 2012

Russell J.I. Groener, MB.ChB.

Associate Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, University of Cape Town, 1983

Ryan C Guffey, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Wayne State University, 2007

Padma Gulur, MBBS

Professor of Anesthesiology (primary appointment)
Head of the Department of Anesthesiology
Bangalore Medical College, 1997

Katharine Nicole Gurba, Ph.D., M.D.

Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)
Doctor of Philosophy, Vanderbilt University, 2013
Doctor of Medicine, Vanderbilt University, 2014

H

Charles B Hantler, M.A., M.D.

Professor Emeritus of Anesthesiology
Bachelor of Arts, University of Michigan Ann Arbor, 1971
Master of Arts, Davenport University, 1973
Doctor of Medicine, Davenport University, 1977

Simon Haroutounian, M.A., Ph.D.

Professor of Anesthesiology (primary appointment)

Division Chief - Division of Clinical and Translational Research
Russell D and Mary B Sheldon Professor of Anesthesiology
Master of Arts, Hebrew University of Jerusalem, 2005
Doctor of Philosophy, Hebrew University of Jerusalem, 2011

Mallory Anne Hawksworth, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Notre Dame, 2016
Doctor of Medicine, University of Illinois at Chicago, 2020

Melissa Erica Hector-Greene, Ph.D., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Mount Holyoke College, 2006
Doctor of Philosophy, Duke University, 2018
Doctor of Medicine, Duke University, 2018

Daniel Luke Helsten, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Kentucky, 1997
Doctor of Medicine, University of Kentucky, 2001

Mohammad Anas Helwani, M.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Surgery (Cardiothoracic Surgery)
Doctor of Medicine, Damascus University, 1998

Bernadette M Henrichs, M.S.N., Ph.D.

Professor of Anesthesiology (primary appointment)
Master of Science in Nursing, Saint Louis University, 1993
Doctor of Philosophy, Saint Louis University, 1999

Erin Leigh Carline Herrera, M.S.N.

Assistant Professor of Anesthesiology (primary appointment)
Master of Science in Nursing, Goldfarb School of Nursing, 2013

Jessica Ann Higginbotham, Ph.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Arts, Saint Louis University, 2012
Doctor of Philosophy, Washington State University, 2019

Omokhaye M Higo, M.B.A., MBBS

Professor of Anesthesiology (primary appointment)
Vice Chair
Bachelor of Science, University of Ibadan, 1984
Foreign MD equivalent, University of Ilorin, 1990
Master of Business Administration, Washington University in St Louis, 2021

Gary E Hirshberg, M.D.

Professor Emeritus of Anesthesiology
Bachelor of Arts, Princeton University, 1968
Doctor of Medicine, Hahnemann University, 1972

Katherine Jeanne Holzer, M.S., Ph.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Illinois Wesleyan University, 2010
Master of Science, Washington University in St Louis, 2012
Doctor of Philosophy, Saint Louis University, 2019

Richard S Hotchkiss, M.D.

Professor of Anesthesiology (primary appointment)
Professor of Medicine



Professor of Surgery (General Surgery)
Professor of Developmental Biology
Doctor of Medicine, University of Virginia, 1976

Felicitas Huber, Ph.D.

Instructor in Anesthesiology (Pending Dean Approval) (primary appointment)
Doctor of Philosophy, University of Tulsa, 2023

Rocco Hueneker, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Martin-Luther-University, 1996

I

Mehmet Emin Ince, M.D.

Assistant Professor of Anesthesiology (Pending Dean Approval)
(primary appointment)
Gulhane Military Medical Academy, 2006

J

Danish Jaffer, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Texas Austin, 2011
Doctor of Medicine, University of Texas San Antonio, 2016

York Jiao, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Washington University in St Louis, 2009
Doctor of Medicine, University of Connecticut, 2013

Jessica Justmann, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of California Davis, 2005
Doctor of Medicine, American University of the Caribbean, 2012

K

Mohammadmehdi Kafashan, M.S., Ph.D.

Assistant Professor of Anesthesiology (primary appointment)
Assistant Professor of Psychiatry
Bachelor of Science, Amirkabir University of Technology, 2008
Master of Science, Sharif University of Technology, 2010
Doctor of Philosophy, Washington University in St Louis, 2016

Muthuraj Kanakaraj, M.D., MBBS

Associate Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Tirunelveli Medical College, 1995
Doctor of Medicine, Madras Medical College, 2005

Suman Subbaraya Kandachar, M.D., MBChB

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Medicine and Bachelor of Surgery, Bangalore University, 1994
Doctor of Medicine, PGIMER, 1998

Ivan M Kangrga, Ph.D., M.D.

Professor of Anesthesiology (primary appointment)
Vice Chair - Clinical Anesthesiology at BJH
Doctor of Medicine, University of Belgrade, 1982

Doctor of Philosophy, Iowa State University, 1991

Thomas George Kannampallil, Ph.D.

Professor of Anesthesiology (primary appointment)
Assistant Dean for Data Science
Professor of Computer Science and Engineering
Professor of Medicine
Bachelor of Science, University of Kerala, 1999
Doctor of Philosophy, University of Illinois at Chicago, 2018

Menelaos Karanikolas, M.D.

Professor of Anesthesiology (primary appointment)
Doctor of Medicine, National and Kapodistrian University of Athens, 1988

Jan Kasal, M.D.

Professor of Anesthesiology (primary appointment)
Professor of Medicine
Doctor of Medicine, Charles University, 1993

Monica Marie Keeline, M.D.

Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)
Bachelor of Arts, Tulane University, 2006
Doctor of Medicine, Saint Louis University, 2010

Paul William Kerby, MBBS

Professor of Anesthesiology (primary appointment)
Bachelor of Science, King's College London, 2001
Foreign MD equivalent, King's College London, 2004

Arthur Kheyfets, D.O.

Instructor in Anesthesiology (primary appointment)
Bachelor of Arts, Saint Louis University, 2012
Doctor of Osteopathic Medicine, Kansas City University of Medicine and Biosciences, 2016

Shahrdad Khodamoradi, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Vanderbilt University, 1985
Doctor of Medicine, Washington University in St Louis, 1990

Bryan James Kidd, M.S., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Illinois at Urbana-Champaign, 2006
Master of Science, University of Alabama in Tuscaloosa, 2010
Doctor of Medicine, Southern Illinois University Carbondale, 2015

Christopher Ryan King, Ph.D., M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Philosophy, University of Chicago, 2012
Doctor of Medicine, University of Chicago, 2014

Tessa Marie King, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Kansas, 1997

Justin Knittel, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Case Western Reserve University, 2009

Ahalya Kodali, M.S., M.D.

Instructor in Anesthesiology (primary appointment)

Bachelor of Science, Boston University, 2010
Master of Science, Boston University, 2012
Doctor of Medicine, Boston University, 2015

Brendan Joseph Kurtz, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2016
Doctor of Medicine, University of Missouri Kansas City, 2018

L**Anand Lakshminarasimhachar, MBBS**

Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Bangalore University, 1994

Demetrios G. Lappas, Ph.D., M.D.

Professor Emeritus of Anesthesiology
Bachelor of Science, Abet School, 1954
Doctor of Medicine, Aristotle University (Duplicate of Aristotle University of Thessaloniki), 1961
Doctor of Philosophy, Aristotle University (Duplicate of Aristotle University of Thessaloniki), 1966

Chakrapol Lattanand, M.D.

Professor of Anesthesiology (primary appointment)
Vice Chair for Clinical Operations
Doctor of Medicine, Hahnemann University, 2000

Chris Cheng-Fu Lee, M.B.A., Ph.D., M.D.

Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Hubei Medical University, 1985
Doctor of Philosophy, Beijing University, 1991
Master of Business Administration, Washington University in St Louis, 2021

Woo Kyung Lee, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Yonsei University, 2009

Ilya Lembrikov, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Yaroslavl State University, 2006

Jun-Nan Li, Ph.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Harbin Medical University, 2010
Doctor of Philosophy, Harbin Medical University, 2015

Christopher J Lingle, Ph.D.

Professor of Anesthesiology (primary appointment)
Professor of Neuroscience
Bachelor of Science, University of Oregon, 1972
Doctor of Philosophy, University of Oregon, 1979

Stephanie Link, D.O.

Assistant Professor of Anesthesiology (primary appointment)
Associate of Science, Southwestern Illinois College (SWIC), 2011
Bachelor of Science, Southern Illinois University Edwardsville, 2013
Doctor of Osteopathic Medicine, Lincoln Memorial University, 2018

Qianjin Liu, Ph.D., M.D.

Professor of Anesthesiology (primary appointment)

Doctor of Medicine, Nanjing Medical University (#####), 1983
Doctor of Philosophy, Saint Louis University, 1997

Qin Liu, Ph.D.

Professor of Anesthesiology (primary appointment)
Professor of Medicine (Dermatology)
Professor of Ophthalmology and Visual Sciences
Professor of Neuroscience
Bachelor of Science, Wuhan University (#####), 1998
Doctor of Philosophy, Chinese Academy of Sciences, 2004

Jenna Lizzo, M.M.Sc., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Illinois at Urbana-Champaign, 2012
Master of Medical Science, Loyola University Chicago, 2014
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2018

John Jacob Long, D.O.

Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)
Bachelor of Science, North Carolina State University, 1995
Doctor of Medicine, A T Still University of Health Sciences, 2003

Sunny Shang Lou, Ph.D., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Massachusetts Institute of Technology, 2009
Doctor of Philosophy, Stanford University, 2017
Doctor of Medicine, Stanford University, 2017

M**Jooyoung Maeng, M.D.**

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Cornell University, 2011
Doctor of Medicine, Indiana University School of Medicine, 2017

Susruta Majumdar, M.S., Ph.D.

Professor of Anesthesiology (primary appointment)
Bachelor of Science, Delhi University, 1998
Master of Science, Delhi University, 2000
Doctor of Philosophy, University of Florida, 2006

Bruno Maranhao, Ph.D., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of California Los Angeles, 2007
Doctor of Philosophy, University of California San Diego, 2015
Doctor of Medicine, University of California San Diego, 2016

Lukas Heinrich Matern, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Columbia University, 2014
Doctor of Medicine, University of Chicago, 2018

John D McAllister, M.D.

Professor of Anesthesiology (primary appointment)
Professor of Pediatrics
Director of Clinical Operations, Pediatric Anesthesiology
Doctor of Medicine, University of Manitoba, 1980
Bachelor of Science, University of Manitoba, 1982



Jordan Gary McCall, Ph.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2015

Molly Ann McCormick, M.D.

Professor of Anesthesiology (primary appointment)
Division Chief - Division of Anesthesiology, General
Doctor of Medicine, University of Missouri Kansas City, 1987

Laura Mckenzie, D.O.

Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)
Doctor of Medicine, University of North Texas Health Science Center, 2014

Brennan Michael McMillan, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Colorado Boulder, 2012
Doctor of Medicine, Albany Medical College, 2017

Carl McMullen, D.O.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Osteopathic Medicine, Midwestern University Illinois, 2011

Bhavi Deepak Mehta, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2010
Doctor of Medicine, University of Missouri Kansas City, 2010

Caitlynn Miller, D.O.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Osteopathic Medicine, Kansas City University of Medicine and Biosciences, 2018

Gregory Charles Miller, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Missouri Kansas City, 2010
Doctor of Medicine, University of Missouri Kansas City, 2016

Allison Denise Mitchell, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Howard University, 2008
Doctor of Medicine, University of Texas Health Sciences at San Antonio, 2012

Kavya Mittimanj, M.D., MBBS

Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Mahadevappa Rampure Medical College, 2006

Doctor of Medicine, K.V.G Medical College, 2018

Nahla Mohamed Farid Mohamed

Assistant Professor of Anesthesiology (primary appointment)

David Thomas Monks, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Birmingham, 2018

John David Moore, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Universidad Autónoma de Centro América, 2020

Rachel Willis Moquin, M.Ed., Ph.D.

Associate Professor of Anesthesiology (primary appointment)

Bachelor of Arts, University of Mississippi, 2011
Master of Education, University of Mississippi, 2013
Doctor of Philosophy, Vanderbilt University, 2017

Jose Moron-Concepcion, Ph.D.

Professor of Anesthesiology (primary appointment)
Henry Elliot Mallinckrodt Professor of Anesthesiology
Division Chief - Division of Anesthesiology, Research Unit
Professor of Psychiatry
Professor of Neuroscience
Doctor of Philosophy, University of Barcelona, 1998

Jimmy Lewis Moss, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Florida State University, 2010
Doctor of Medicine, Florida State University, 2015

Christopher Marlowe Murphy, M.A., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Arkansas Main Campus, 2010
Master of Arts, University of Arkansas Main Campus, 2012
Doctor of Medicine, University of Arkansas Main Campus, 2016

Amjad Issam Musleh, M.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Emergency Medicine
Bachelor of Science, University of New Mexico-Main Campus, 2008
Doctor of Medicine, University of New Mexico-Main Campus, 2013

Vijayasankar Muthu, M.D., MBBS

Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Thanjavur Medical College, 1997
Doctor of Medicine, Madurai Medical College, 2007

N

Hadas Nahman-Averbuch, M.S., Ph.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Haifa University, 2005
Master of Science, Israel Institute of Technology, 2009
Doctor of Philosophy, Israel Institute of Technology, 2015

Jessica Lauren Nelson, M.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Emergency Medicine
Doctor of Medicine, University of Michigan Ann Arbor, 2012
Bachelor of Science, University of Wisconsin, 2018

Daniel C Nieva, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Iowa, 1998
Doctor of Medicine, University of Iowa, 2003

Kyle Niziolek, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Assistant Professor of Emergency Medicine
Doctor of Medicine, Georgetown University, 2012

Dolores Benedicta Njoku, M.D.

Professor of Anesthesiology (primary appointment)

Rudolph L. and Mary Frances Wise Endowed Chair in Pediatric Anesthesiology
Division Chief of Pediatric Anesthesiology
Vice Chair
Doctor of Medicine, University of Mississippi, 1987

Aaron John Norris, Ph.D., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Colorado State University, 2001
Doctor of Philosophy, Washington University in St Louis, 2012
Doctor of Medicine, Washington University in St Louis, 2012

Cody Novack

Assistant Professor of Anesthesiology (primary appointment)

Victoria Novoselova, MBBS

Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Peoples' Friendship University of Russia, 2010

Sydney Marie Nykiel-Bailey, D.O.

Professor of Anesthesiology (primary appointment)
Bachelor of Science, Saint Louis University, 2001
Doctor of Medicine, University of Missouri Kansas City, 2005

O

Uchenna Ofoma, M.S., M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Nigeria, 1998
Master of Science, Pennsylvania State University-Main Campus, 2010

Menekse Ozelik, M.D., MMed

Assistant Professor of Anesthesiology (primary appointment)
Uludag University, 2001
Ankara University, 2006

P

Ben Julian Palanca, M.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Psychiatry
Bachelor of Science, University of Washington, 1997
Doctor of Medicine, Washington University in St Louis, 2005

Arvind Palanisamy, Ph.D., M.D.

Professor of Anesthesiology (primary appointment)
Division Chief - Division of Obstetrical Anesthesia
Professor of Obstetrics and Gynecology
Doctor of Medicine, Tamilnadu Medical University, 2000
Doctor of Philosophy, All India Institute of Medical Sciences, 2003

Chris M Palmer, M.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Emergency Medicine
Bachelor of Science, Virginia Polytechnic Institute and State University, 2004
Doctor of Medicine, SUNY Empire State College, 2008

Hess Amir Panjeton, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Miami, 2003

Doctor of Medicine, University of Miami, 2007

Dahye Park, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Hanyang University, 2014

Kyle Edward Parker, Ph.D.

Instructor in Anesthesiology (primary appointment)
Doctor of Philosophy, University of Missouri Columbia, 2013

Colby Parks, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Rockhurst University, 2006
Doctor of Medicine, Saint Louis University, 2010

Jesus Ceferino Patino, M.D.

Voluntary Clinical Instructor in Anesthesiology
Bachelor of Science, University of the Philippines, 1997
Doctor of Medicine, University of the Philippines, 2002

Bethany Pennington, Pharm.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Pharmacy, Saint Louis College of Pharmacy, 2010

Mitchell R Platin, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Kent State University, 1987

Amynah Pradhan, Ph.D.

Professor of Anesthesiology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Russell D. and Mary B. Shelden Professorship in Anesthesiology
Bachelor of Science, McGill University, 1997
Doctor of Philosophy, McGill University, 2005

Debra D Pulley, M.M.E., M.D.

Professor Emerita of Anesthesiology
Bachelor of Science, Vanderbilt University, 1978
Master of Mechanical Engineering, University of Missouri Columbia, 1982
Doctor of Medicine, Saint Louis University, 1987

Q

Victor Qi, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Pennsylvania, 2014
Doctor of Medicine, University of Pennsylvania, 2019

R

Deepak Rajappa, M.D., MBBS, Doctorate

Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Rajiv Gandhi University of Health Sciences, 2011
Doctor of Medicine, Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh, 2016
Doctorate, Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh, 2019

Britney Ramgopal, M.D.

Assistant Professor of Anesthesiology (primary appointment)



University of Oklahoma, 2008

University of Oklahoma Health Sciences Center, 2012

Lesley Kathryn Rao, M.D.

Professor of Anesthesiology (primary appointment)

Division Chief - Division of Pain Management

Doctor of Medicine, Saint Louis University, 2006

Krunal Raval, MB.ChB.

Assistant Professor of Anesthesiology (primary appointment)

Pramukhswami Medical College, 2008

Bikash Ranjan Ray, M.D., MBChB

Assistant Professor of Anesthesiology (primary appointment)

Bachelor of Medicine and Bachelor of Surgery, Veer Surendra Sai

Institute of Medical Sciences and Research (VIMSAR) (fka VSS Medical College), 2003

Doctor of Medicine, All India Institute of Medical Sciences, 2009

Satish Reddy, M.D.

Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)

Bachelor of Science, University of Georgia, 2006

Doctor of Medicine, Medical College of Georgia, 2011

Andrea Bulkley Reidy, M.D.

Associate Professor of Anesthesiology (primary appointment)

Bachelor of Science, Illinois Wesleyan University, 2005

Doctor of Medicine, Illinois Wesleyan University, 2010

Eduardo Reina, M.D.

Associate Professor of Anesthesiology (primary appointment)

Doctor of Medicine, University of Illinois at Chicago, 2011

Sasha Adrianna Ridgell, M.D.

Instructor in Anesthesiology (primary appointment)

Bachelor of Science, Brown University, 2013

Doctor of Medicine, University of Arkansas for Medical Sciences, 2019

Clare H Ridley, M.D.

Associate Professor of Anesthesiology (primary appointment)

Associate Professor of Surgery (Cardiothoracic Surgery)

Bachelor of Arts, Columbia College of Physicians and Surgeons, 2002

Doctor of Medicine, Washington University in St Louis, 2008

Isabella Rossi Riordan, M.D.

Associate Professor of Anesthesiology (primary appointment)

Division Chief for the Progress West Division

Doctor of Medicine, Loyola University Chicago, 2014

Stephen L. Ristvedt, M.A., Ph.D.

Associate Professor of Anesthesiology (primary appointment)

Associate Professor of Psychiatry

Bachelor of Arts, University of Minnesota, 1981

Master of Arts, University of Pennsylvania, 1983

Doctor of Philosophy, University of Pennsylvania, 1989

Charles M Robertson, M.D.

Instructor in Anesthesiology (primary appointment)

Bachelor of Arts, University of Virginia, 1997

Doctor of Medicine, University of Virginia, 2003

Andrea Rodriguez-Restrepo, M.D.

Assistant Professor of Anesthesiology (primary appointment)

Doctor of Medicine, Pontificia Universidad Javeriana, 2013

Evan Ward Roller, M.D.

Associate Professor of Anesthesiology (primary appointment)

Doctor of Medicine, University of Cincinnati-Main Campus, 2010

John Rouck, M.D.

Assistant Professor of Anesthesiology (primary appointment)

Bachelor of Science, University of Illinois at Urbana-Champaign, 2016

Doctor of Medicine, Saint Louis University, 2020

Brian Christopher Ruyle, Ph.D.

Instructor in Anesthesiology (primary appointment)

Bachelor of Arts, University of Missouri in St Louis, 2012

Doctor of Philosophy, University of Missouri in St Louis, 2019

S

Angela K Saettele, M.D.

Assistant Professor of Anesthesiology (primary appointment)

Bachelor of Science, Simpson College, 2004

Doctor of Medicine, University of Missouri Columbia, 2008

Levent Sahin, M.D.

Assistant Professor of Anesthesiology (primary appointment)

Doctor of Medicine, Eskisehir Osmangazi University, 1999

Emine Aysu Salviz, M.D.

Assistant Professor of Anesthesiology (primary appointment)

Doctor of Medicine, Baskent University, 2004

Vijaya K Samineni, Ph.D.

Assistant Professor of Anesthesiology (primary appointment)

Doctor of Philosophy, Southern Illinois University Carbondale, 2013

Maryam Sammet, D.O.

Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)

Doctor of Osteopathic Medicine, Western University of Health Sciences, 2010

Jessica Lauren Sanford, M.D.

Assistant Professor of Anesthesiology (primary appointment)

Bachelor of Arts, Emory University, 2009

Doctor of Medicine, University of Missouri Columbia, 2014

Benjamin Sanofsky, M.Ed., M.D.

Assistant Professor of Anesthesiology (primary appointment)

Bachelor of Arts, Colgate University, 2008

Master of Education, CUNY Hunter College, 2012

Doctor of Medicine, Stony Brook School of Medicine, 2016

Matthew Stringfellow Sanzalone, M.D.

Assistant Professor of Anesthesiology (primary appointment)

Doctor of Medicine, Louisiana State University, 2015

Richard Austin Sargent

Assistant Professor of Anesthesiology (primary appointment)

Charles R Schrock, M.D.

Associate Professor of Anesthesiology (primary appointment)

Bachelor of Science, University of Notre Dame, 1986



Doctor of Medicine, University of Missouri Columbia, 1991

Rajiv K Shah, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Rochester, 2010

Nicole Jimin Shin, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Washington University in St Louis, 2010
Doctor of Medicine, Washington University in St Louis, 2015

Manjaap Singh Sidhu, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Baccalaureatus, Washington University in St Louis, 2014
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2019

Preet Mohinder Singh, M.D., MBBS

Associate Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Dayanand Medical College, 2007
Doctor of Medicine, All India Institute of Medical Sciences, 2010

Richard Allan Slivicki, Ph.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Winona State University, 2012
Doctor of Philosophy, Indiana University Bloomington, 2018

Jeffrey Barrett Small, M.D.

Assistant Professor of Anesthesiology (Pending Dean Approval)
(primary appointment)
Doctor of Medicine, Saint Louis University, 2001

Sarah Kendall Smith, Ph.D., M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Kansas, 2004
Doctor of Philosophy, University of Kansas Medical Center, 2011
Doctor of Medicine, University of Kansas Medical Center, 2013

Ziyan Song, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Florida State University, 2014
Doctor of Medicine, Florida State University, 2018

John Charles Spitler, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Missouri Columbia, 1998
Doctor of Medicine, University of Missouri Columbia, 2003

Joseph H Steinbach, Ph.D.

Professor Emeritus of Anesthesiology
Bachelor of Arts, Reed College, 1968
Doctor of Philosophy, University of California San Diego, 1973

Tracey Wagner Stevens, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2008

Sanjay Subramanian, M.D.

Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Medicine
Doctor of Medicine, Christian Medical College, 1994

Robert A Swarm, M.D.

Professor Emeritus of Anesthesiology

Bachelor of Arts, Oberlin College, 1978

Doctor of Medicine, Washington University in St Louis, 1983

T

Brandon Kyle Tan, M.S., M.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Duke University, 2010
Master of Science, University of Cincinnati-Main Campus, 2013
Doctor of Medicine, University of Cincinnati-Main Campus, 2018

Rene Tempelhoff

Professor Emeritus of Anesthesiology

Raghu P Terkonda, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Missouri University of Science and Technology
(Formerly University of Missouri at Rolla), 1983
Doctor of Medicine, University of Missouri Columbia, 1987

Leslie Terrell, D.O.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Osteopathic Medicine, Lincoln Memorial University, 2017

Jeremy Michael Thompson, Ph.D., M.D., B.Eng

Instructor in Anesthesiology (primary appointment)
Bachelor of Engineering, Vanderbilt University, 2012
Doctor of Philosophy, Texas Tech University Health Sciences Center, 2017
Doctor of Medicine, Texas Tech University Health Sciences Center, 2019

Vinicius Tieppo Francio, M.S., M.D.

Assistant Professor of Anesthesiology (primary appointment)
Master of Science, National University of Health Sciences, 2012
Doctor of Medicine, University of Science, Art and Technology, 2018

V

Swarup Varaday, MBBS

Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Andhra University, 1989

Anandhalakshmi Varadharajan, M.D., MBBS

Voluntary Clinical Instructor in Anesthesiology
Foreign MD equivalent, Sri Ramachandra Institute of Higher Education and Research, 2000
Doctor of Medicine, St. Lukes, 2007

Nicolette Vassallo, M.D.

Assistant Professor of Anesthesiology (Pending Dean Approval)
(primary appointment)
Bachelor of Science, University of Miami, 2015
Doctor of Medicine, University of Miami, 2020

Richard Florentine Villegas, M.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, University of Nevada Las Vegas, 2003
Doctor of Medicine, University of Santo Tomas, 2008

W

Michael Wadle, D.O.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Osteopathic Medicine, Des Moines University-Osteopathic Medical Center, 2018

Ashley Brooke Weinhold, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Arkansas Main Campus, 2011

Brian T Wessman, M.D.

Professor of Anesthesiology (primary appointment)
Associate Director - Critical Care Medicine Fellowship
Professor of Emergency Medicine
Bachelor of Science, College of William and Mary, 2000
Doctor of Medicine, Commonwealth College, 2005

James Douglas Wirthlin, M.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Brigham Young University, 2006
Doctor of Medicine, Uniformed Services University of the Health Sciences, 2012

Rachel Wolfe

Voluntary Clinical Assistant Professor of Anesthesiology

Brett D Wolff, M.D.

Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)
Bachelor of Arts, Indiana University Bloomington, 1981
Doctor of Medicine, Indiana University School of Medicine, 1985

Maxim Wolfson, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2015

X

Xiaoming Xia, M.S., Ph.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Fudan University (#####), 1984
Master of Science, Shanghai Jiao Tong University (#####), 1987
Doctor of Philosophy, Vollum Institute of Oregon Health and Science University, 1998

Y

Branden Edward Yee, M.P.H., M.D.

Associate Professor of Anesthesiology (primary appointment)
Division Chief of Barnes West County Hospital
Bachelor of Science, Tufts University, 2004
Master of Public Health, Tufts University, 2008
Doctor of Medicine, Tufts University, 2008

Xiaobin Yi, M.D.

Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Hunan Medical University, 1985

Alexander H Young, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Mississippi, 1986
Doctor of Medicine, University of Arkansas Main Campus, 1990

Anna Rebecca Young, M.D.

Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Asbury College, 2004
Doctor of Medicine, University of Kentucky, 2008

Jaclyn Yu, M.D.

Instructor in Anesthesiology (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2019

Kevin Zheng Yuan, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2014

Z

Paul Battista Zanaboni, Ph.D., M.D.

Professor of Anesthesiology (primary appointment)
Doctor of Philosophy, Saint Louis University, 1990
Doctor of Medicine, Saint Louis University, 1992

Jing Zhong, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Duke University, 2009
Doctor of Medicine, University of North Carolina at Chapel Hill, 2017

Yu Zhou, M.S., Ph.D.

Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Wuhan University (#####), 1996
Master of Science, Zhejiang Medical University, 1999
Doctor of Philosophy, State University of New York at Buffalo, 2005

Anita Mathew Zimmerman, M.D.

Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Illinois at Chicago, 2010
Doctor of Medicine, University of Illinois at Chicago, 2014

Jonathan Kramer Zoller, M.D.

Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Tulane University, 2009

Research Electives

Anesthesiology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Special electives in basic science research as it applies to anesthesiology can be arranged with the principal investigators in the Department of Anesthesiology; in the Division of Basic Research under the direction of Jose Moron-Concepcion, PhD; in the Washington University Pain Center under the direction of Rob Gereau, PhD; and in the Division of Clinical and Translational Research under the direction of Simon Haroutounian, PhD.

The basic science laboratories focus on various topics related to ion channel structure and function, molecular mechanisms of anesthetic action, sepsis, cellular and molecular mechanisms of reward and addiction, and the cellular and genetic basis of acute and chronic pain. Arrangements for these special electives are made through the specific investigators: Meaghan Creed, PhD; Alex S. Evers, MD; Robert W. Gereau, PhD; Richard S. Hotchkiss, MD; Christopher J. Lingle, PhD; Qin Liu, PhD; Jose Moron-Concepcion, PhD; or Arvind Palanisamy, MD. In addition, opportunities exist for clinical research under the direction of Joanna Abraham, PhD; Michael Avidan, MBBCh; Anne Drewry, MD; Brian Fuller, MD; Simon Haroutounian, PhD; Thomas Kannamapallil, PhD; or Ben Palanca, MD, PhD.

Courses

ANESTH 8000 General Anesthesiology (Clinical Elective)

This clinical elective is designed to familiarize the student with basic aspects of anesthesiology practice. The primary teaching method is patient care in a clinical setting. The student will learn the basics of preoperative evaluation of surgical patients, the use of intraoperative monitoring inpatient management and postoperative care. In addition to perioperative care, the student will be exposed to other clinical areas which include our pain management clinic, regional anesthesia / acute pain management, cardiothoracic intensive care unit, labor and delivery, pediatric anesthesia, and the Center for Preoperative Assessment and Planning.

During the four-week rotation, the student will learn airway management skills, basic IV skills, practical perioperative fluid and electrolyte therapy, along with general and regional anesthetic techniques. As an integral part of the anesthesia care team, the student will participate actively in the anesthetic management of surgical patients.

The student's specific requests to be assigned to certain types of cases will be honored as time and availability dictate. The rotation will include at least one clinical simulator session using a simulator mannequin for practical management of airway problems. NOTE: Presence and participation in Presentation on the last day of the rotation are required to receive a grade.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8010 Cardiothoracic Anesthesiology (Clinical Elective)

This clinical elective offers practical experience in the perioperative assessment and management of surgical patients undergoing cardiothoracic procedures. The student, as an integral part of the cardiothoracic anesthesia team that is composed of faculty members, fellows and residents, will learn basic principles of airway management and lung ventilation, essential aspects of pharmacologic treatment of hemodynamic abnormalities and cardiac dysrhythmias, and management of intraoperative coagulation disturbances. Emphasis will be placed on the interpretation of intraoperative hemodynamic data, echocardiographic finding (TEE), and laboratory results. During this rotation, the student will also gain practical experience in endotracheal intubation as well as the placement of intravenous lines and invasive monitoring lines, including radial artery and pulmonary artery catheters. Students will learn how to use these parameters in clinical decision making during anesthesia. At the conclusion of the rotation, the student will have a better understanding of invasive monitoring

and data interpretation, as well as a more systematic approach to the management of intra- and post-operative hemodynamic, pulmonary and coagulation abnormalities. The students are expected to attend the didactic sessions of CTA and the Department of Anesthesiology. Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8015 Pediatric Anesthesiology (Clinical Elective)

The primary goal of this rotation is to gain exposure to the field of anesthesiology within the pediatric patient population. This elective provides the opportunity to take part in anesthetics across the range of surgeries and procedures, patient age, and acuity. With the entire elective taking place at St. Louis Children's Hospital, learners are able to observe the differences in physiology, medical/surgical problems, and patient care considerations in pediatric patients.

Credit 2 units.

Typical periods offered: Medicine Year

ANESTH 8020 CTICU: Cardiothoracic Intensive Care Unit (Clinical Elective)

This clinical elective offers practical experience in the postoperative management of cardiothoracic patients. The student will be fully integrated into one of the intensive care teams and have the opportunity to contribute to the management of critically ill patients. Students will have the opportunity to follow specific patients over the course of their stay in the ICU, during which time they will gain insight into holistic management of patients with multi-organ dysfunction.

The CTICU environment is both challenging and exciting. Students will gain unique insight into cardiorespiratory physiology and pharmacology which will be demonstrated at the patients' bedside, an invaluable and unforgettable learning experience. Students will have opportunities to learn and sometimes assist with procedures, such as central lines, chest tubes, bronchoscopy and pulmonary artery catheter insertion as well as bedside ultrasound including TTE and TEE. Principles of management and resuscitation of hemodynamically unstable patients following surgery will be emphasized as well as ventilator management. Students will also see and help manage patients with unique physiology such as those patients on ventricular assist devices, and on ECMO. We also have a very busy and heart and lung transplantation program at the hospital - all of these patients are cared for in the CTICU.

At the conclusion of the rotation, the student will have a better understanding of shock, sepsis, multi-organ failure, organ system support and compassionate withdrawal of life support. In addition to bedside teaching, there will be informal teaching sessions on a wide variety of topics as well as teaching on interpreting hemodynamic data and waveforms, and cardiac echo exams. Students will be encouraged to present on their patient at morning rounds, during which constructive feedback and interactive teaching will occur. Medical students will be asked to present a short discussion on a topic of their choice. This should be a short 20 - 30 minute presentation followed by a discussion on the topic which will be moderated by the attending. Discuss the time and topic of choice with the attending of service.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8030 Pain Management (Clinical Elective)

Acute pain is the most common symptom of medical illness and is ubiquitous after major surgery. Chronic pain is the leading cause of worker disability. Severe pain afflicts most people with advanced cancer. Learning the fundamentals of pharmacologic, interventional, and multidisciplinary pain management is important for all areas of clinical medicine.



Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8040 Anesthesiology for Neurosurgery (Clinical Elective)

This clinical elective is designed to familiarize the student with basic aspects of anesthesiology practice. The primary teaching method is patient care in a clinical setting. The student will learn the basics of preoperative evaluation of surgical patients, the use of intraoperative monitoring inpatient management and postoperative care. In addition to perioperative care, the student will be exposed to other clinical areas which include our pain management clinic, regional anesthesia / acute pain management, cardiothoracic intensive care unit, labor and delivery, pediatric anesthesia, and the Center for Preoperative Assessment and Planning. During the four-week rotation, the student will learn airway management skills, basic IV skills, practical perioperative fluid and electrolyte therapy, along with general and regional anesthetic techniques. As an integral part of the anesthesia care team, the student will participate actively in the anesthetic management of surgical patients. The student's specific requests to be assigned to certain types of cases will be honored as time and availability dictate. The rotation will include at least one clinical simulator session using a simulator mannequin for practical management of airway problems.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 8050 Obstetrical Anesthesiology (Clinical Elective)

The medical students will learn the different analgesia/anesthetic options for the labor patient. They will also learn how the physiological adaptations of pregnancy influence anesthetic management. They will be actively involved in the parturient's management, i.e., starting an IV, placement of spinal, epidural or CSE (combined spinal epidural) anesthetics. They will also attend the OB anesthesia conferences and interview patients in labor (with an OB anesthesia attending).

Credit 2 units.

Typical periods offered: Medicine Year

ANESTH 9100 Anesthesiology Advanced Clinical Rotation (ACR)

This Advanced Clinical Rotation is similar to the General Anesthesiology elective in exposure to anesthesiology, but the level of participation and assessment is enhanced. The expectation is that the students act at the level of a Clinical Anesthesia Year 1 resident. Though a prior elective in anesthesia is not required, it is encouraged, if possible. Students will learn the basics of preoperative evaluation of surgical patients, the use of intraoperative monitoring in patient management, and postoperative care. In addition to perioperative care, they will be exposed to other clinical areas which include labor and delivery, pediatric anesthesia, and the Center for Preoperative Assessment and Planning. The students will interact with patients across all age ranges and demographics. During the four-week rotation, the student will learn airway management skills, practical perioperative fluid and electrolyte therapy, along with general and regional anesthetic techniques. As an integral part of the anesthesia care team, the student will participate actively in the anesthetic management of surgical patients. Grading will be based on competency of anesthesia skills such as preoperative evaluation, bag mask ventilation, intubation, vascular access, handoffs, postoperative pain orders, etc. The student's specific requests to be assigned to certain types of cases will be honored as time and availability dictate. The rotation will include clinical simulator sessions using a simulator mannequin for practical management of airway problems, resuscitation, and trauma emergencies as well as supplemental educational sessions covering relevant topics in anesthesiology.

Credit 4 units.

Typical periods offered: Medicine Year

ANESTH 9150 Surgical Critical Care Advanced Clinical Rotation (ACR)

The 4400 Surgical ICU provides an exciting and challenging opportunity to care for some of the sickest patients in the hospital and offers incredible teaching and education about a variety of medical topics and conditions. The ACR SICU rotation integrates medical students into one of the two SICU teams, and each medical student, in conjunction with a resident or Advanced Practice Provider, will care for 3-5 patients on the service. Working with the resident, medical students will develop a problem list, as well as an organized plan for their patients. They will then need to follow up on the execution of all determined labs/interventions/consults, closely communicating with the rest of the ICU team throughout the shift, as well as presence for sign-outs each morning/evening at shift change. This rotation takes place at the Barnes-Jewish Hospital 4400 ICU Surgical and Burn/Trauma Intensive Care Unit. This ICU takes care of patients from a variety of backgrounds, including general surgery, trauma/acute care surgery, transplant surgery, vascular surgery, urology, as well as medical ICU overflow patients.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Biochemistry and Molecular Biophysics

The faculty of the Department of Biochemistry and Molecular Biophysics perform research in a broad spectrum of biomedically relevant areas, including DNA and RNA structure and enzymology; protein folding, misfolding and aggregation; cellular mechanics; membrane receptor-mediated signaling; and hemostasis, thrombosis and vascular biology. The department offers training opportunities at the crossroads of biochemistry, biophysics, systems biology, proteomics, computational science and pharmacological sciences.

The department's approaches to research focus on understanding the energetics, structure and mechanisms of biological processes. Investigators employ a variety of experimental methods (e.g., X-ray crystallography, nuclear magnetic resonance, mass spectrometry, optical spectroscopy, thermodynamics, rapid kinetics) in combination with computational approaches to unravel the molecular underpinnings of processes of relevance to health and disease. Novel single-molecule methods are providing new insight into the molecular details of enzyme mechanisms and macromolecule dynamics. The high-throughput screening of chemical libraries and the use of synthetic medicinal chemistry to develop small-molecule probes of biological systems provide new avenues for translational research and the development of experimental therapeutics.

The faculty in the department organize and teach basic science courses in the medical school curriculum. In the Arts & Sciences curriculum, the faculty teach courses in Nucleic Acids & Protein Biosynthesis (BBS 5480), Chemistry and Physics of Biomolecules (BBS 5357), and Macromolecular Interactions (BBS 5312). The overarching theme

of these courses is to understand the principles of the molecular interactions that underlie the biological process of health and disease. Students in the School of Medicine and the School of Arts & Sciences are eligible for these courses and may elect to pursue biomedical research under the direction of our faculty. A full listing of advanced course topics can be found on our website.

Website: <http://biochem.wustl.edu>

Faculty

Ben Garcia, PhD

Department Chair

Visit our website for more information about our faculty and their appointments.

A

Hema Adhikari, M.S., Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)

Master of Science, State University of New York at Buffalo, 2015

Doctor of Philosophy, State University of New York at Buffalo, 2015

B

Jacques Ulrich Baenziger, Ph.D., M.D.

Professor Emeritus of Biochemistry and Molecular Biophysics

Bachelor of Arts, New College of Florida, 1969

Doctor of Philosophy, Washington University in St Louis, 1975

Doctor of Medicine, Washington University in St Louis, 1975

Wayne Morris Barnes, Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Arts, University of California Riverside, 1969

Doctor of Philosophy, University of Wisconsin Madison, 1974

Shripad Bhagwat

Professor of Biochemistry and Molecular Biophysics (primary appointment)

Senior Director Needleman Program for Innovation &

Commercialization

Melissa Diane Stuchell Brereton, Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, University of Missouri in St Louis, 2001

Doctor of Philosophy, University of Utah, 2006

Peter M Burgers, M.S., Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)

Marvin A. Brennecke Professor of Biological Chemistry

Bachelor of Science, Leiden University, 1969

Master of Science, Leiden University, 1972

Doctor of Philosophy, Leiden University, 1977

C

Byoungkyu Cho, M.S., Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, Hankuk University of Foreign Studies, 2010

Master of Science, Seoul National University, 2013

Doctor of Philosophy, Seoul National University

John A Cooper, Ph.D., M.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)

Alan A. and Edith L. Wolff Professorship in Biochemistry and Molecular Biophysics

Professor of Cell Biology and Physiology

Bachelor of Science, Brown University, 1977

Doctor of Medicine, Johns Hopkins University, 1982

Doctor of Philosophy, Johns Hopkins University, 1983

D

Gregory DeKoster, Ph.D.

Instructor in Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Arts, Monmouth University, 1990

Doctor of Philosophy, University of Iowa, 1997

Roland Ellwood Dolle, M.S., Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)

Director of the Center for Drug Discovery

Bachelor of Science, Arizona State University, 1978

Master of Science, State University of New York, 1980

Doctor of Philosophy, University of Pennsylvania, 1984

Elizabeth Draganova, Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)

Doctor of Philosophy, Georgia State University, 2016

E

Elliot L Elson, Ph.D.

Professor Emeritus of Biochemistry and Molecular Biophysics

Bachelor of Arts, Harvard University, 1959

Doctor of Philosophy, Stanford University, 1966

Ryan Joseph Emenecker, Ph.D.

Instructor in Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, University of Minnesota Twin Cities, 2016

Doctor of Philosophy, Washington University in St Louis, 2021

F

Doug E. Frantz, Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)



Vice Chancellor for Innovation and Commercialization
Bachelor of Science, Stephen F Austin State University, 1994
Doctor of Philosophy, Texas A&M University, 1998

Carl Frieden, Ph.D.

Professor Emeritus of Biochemistry and Molecular Biophysics
Bachelor of Arts, Carleton College, 1951
Doctor of Philosophy, University of Wisconsin Madison, 1955

G

Eric A Galburt, Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)
Bachelor of Science, Brown University, 1997
Doctor of Philosophy, University of Washington-Seattle Campus, 2002

Roberto Galletto, M.S., Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)
Master of Science, University of Genova, 1996
Doctor of Philosophy, University of Texas Galveston, 2002

Benjamin Aaron Garcia, Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)
Raymond H. Wittcoff Distinguished Professor of Biological Chemistry
Head of the Department of Biochemistry and Molecular Biophysics
Doctor of Philosophy, University of Virginia, 2005

Alireza Ghanbargpour, M.S., Sc.M., Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
Assistant Professor of Molecular Microbiology
Assistant Professor of Cell Biology & Physiology
Bachelor of Science, Shahid Beheshti University, 2012
Master of Science, Sharif University of Technology, 2014
Master of Science, Sharif University of Technology, 2014
Doctor of Philosophy, Michigan State University, 2019

Yehuda Ginosar, M.D.

Voluntary Research Professor of Anesthesiology
Doctor of Medicine, University of London, 1986

Young Ah Goo, M.S., Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)
Professor of Genetics
Bachelor of Science, Chonnam National University, 1990
Master of Science, University of Washington-Seattle Campus, 1994
Doctor of Philosophy, University of Washington, 2002

Lina Greenberg, Ph.D.

Instructor in Biochemistry and Molecular Biophysics (primary appointment)
Bachelor of Science, Brandeis University, 2004
Doctor of Philosophy, Tufts University, 2010

Michael Jonathan Greenberg, Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, Brandeis University, 2004
Doctor of Philosophy, Boston University, 2010

H

Kathleen Hall, Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)
Bachelor of Science, University of Minnesota, 1974
Doctor of Philosophy, University of California Berkeley, 1985

Kristina Harris Petersen, Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics (Pending Executive Faculty Approval) (primary appointment)
Assistant Dean for Student Success and Access
Bachelor of Fine Arts, New York University, 2001
Doctor of Philosophy, Cardiff University, 2007

Alexander Steven Holehouse, Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2017

William F Holmes, Ph.D.

Associate Professor Emeritus of Biological Chemistry
Bachelor of Arts, Princeton University, 1953
Doctor of Philosophy, University of Pennsylvania, 1960

I

Maxenia Garcia Ilagan, Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
Associate Professor of Developmental Biology
Doctor of Philosophy, University of Missouri Columbia, 2000

J

James W Janetka, Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)
Professor of Molecular Microbiology
Carl Frieden Distinguished Professor
Bachelor of Science, University of Illinois at Urbana-Champaign, 1990
Doctor of Philosophy, University of Wisconsin Madison, 1996

K

Yuriy Victorovich Kirichok, M.S., Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)
Master of Science, Moscow Institute of Physics and Technology, 1997
Doctor of Philosophy, Bogomoletz Institute of Physiology of NAS of Ukraine, 2000

Andrzej Modest Krezel, M.S., Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics (Pending Executive Faculty Approval) (primary appointment)
Master of Science, University of Warsaw, 1986



Doctor of Philosophy, University of Wisconsin Madison, 1991

Shivesh Kumar, M.S., Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)

Master of Science, Jiwaji University, 2004

Doctor of Philosophy, Jawaharlal Nehru University, 2010

L

Weikai Li, M.S., Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)

Roy and Diana Vagelos Professor of Biochemistry and Molecular Biophysics

Bachelor of Science, East China University of Science and Technology (#####), 1993

Master of Science, University of Tennessee, 1998

Doctor of Philosophy, Yale University, 2004

Timothy M Lohman, Ph.D.

Professor of Biochemistry and Molecular Biophysics (primary appointment)

Brennecke Professor of Biophysics in Biochemistry and Molecular Biophysics

Bachelor of Arts, Cornell University, 1973

Doctor of Philosophy, University of Wisconsin Madison, 1977

M

Michael Mannino, Ph.D.

Instructor in Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, University of Missouri in St Louis, 2014

Doctor of Philosophy, University of Missouri in St Louis, 2019

Garland R Marshall, Ph.D.

Professor Emeritus of Biochemistry and Molecular Biophysics

Bachelor of Science, California Institute Technology (Duplicate of California Institute of Technology), 1962

Doctor of Philosophy, Rockefeller University, 1966

F. Scott Mathews, Ph.D.

Professor Emeritus of Biochemistry and Molecular Biophysics

Bachelor of Science, University of California, 1955

Doctor of Philosophy, University of Minnesota, 1959

N

Natalie Marie Niemi, Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, University of Michigan Ann Arbor, 2005

Doctor of Philosophy, Van Andel Research Institute, 2012

O

Michael D Onken, Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Arts, Washington University in St Louis, 1990

Doctor of Philosophy, Washington University in St Louis, 2000

Jeramia Ory, Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, University of Nebraska, 1988

Doctor of Philosophy, University of Minnesota, 1998

P

Linda J Pike, Ph.D.

Professor Emeritus of Biochemistry and Molecular Biophysics

Bachelor of Science, University of Delaware, 1975

Doctor of Philosophy, Duke University, 1980

R

Janice Lee Robertson, Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)

Associate Professor of Chemistry (Courtesy Affiliation)

Bachelor of Science, University of Toronto, 2002

Doctor of Philosophy, Cornell University, 2009

Ana Maria Ruiz Manzano, Ph.D.

Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)

Doctor of Philosophy, Universidad Aut6noma de Madrid, 2004

S

Andrea Soranno, M.S., Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)

Master of Science, University of Milan, 2005

Doctor of Philosophy, University of Milan, 2008

Junji Suzuki, Ph.D., M.D.

Instructor in Biochemistry & Molecular Biophysics (primary appointment)

Doctor of Medicine, University of Tokyo, 2012

Doctor of Philosophy, University of Tokyo, 2016

Mito Suzuki, M.S., Ph.D.

Instructor in Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, Kyoto University, 2013

Master of Science, Kyoto University, 2015

Doctor of Philosophy, Kyoto University, 2018

T

Eric J Tomko, Ph.D.

Instructor in Biochemistry and Molecular Biophysics (primary appointment)

Bachelor of Science, University of Missouri Columbia, 2002



Doctor of Philosophy, Washington University in St Louis, 2010

Z

Rui Zhang, Ph.D.

Associate Professor of Biochemistry and Molecular Biophysics
(primary appointment)

Bachelor of Science, Nanjing University, 2005

Doctor of Philosophy, Baylor University, 2010

Mingzhou Zhou, Ph.D.

Instructor in Biochemistry and Molecular Biophysics (primary
appointment)

Bachelor of Science, University of Science and Technology Beijing (###
###), 2004

Doctor of Philosophy, University of South Florida, 2010

Research Electives

Biochemistry and Molecular Biophysics Research Electives

During the fourth year, opportunities exist for many varieties of
advanced clinical or research experiences.

Wayne M. Barnes, PhD

McDonnell Sciences Building, 2nd Floor

Phone: 314-362-3351

Inventing a new way to sequence DNA; PCR at one temp; RT-enabled
Taq pol

Greg Bowman, PhD

South Building, 2nd Floor

Phone: 314-362-7433

The Bowman lab seeks to understand how protein dynamics gives rise
to functional processes like allosteric communication between distant
sites and to exploit our insight into this shape-shifting to design new
drugs and proteins.

Peter M.J. Burgers, PhD

South Building, 1st Floor

Phone: 314-362-3872

Molecular biology of DNA replication and damage response in yeast
and humans

John Cooper, MD, PhD

South Building, 2nd Floor

Phone: 314-362-0287

Molecular mechanisms of cell motility and cytoskeleton assembly

Carl Frieden, PhD

McDonnell Sciences Building, 2nd Floor

Phone: 314-362-3344

Protein folding, aggregation, intrinsically disordered proteins,
fluorescence methods, ApoE lipoproteins and Alzheimer's disease

Eric A. Galburt, PhD

McDonnell Sciences Building, 2nd Floor

Phone: 314-362-5201

Biophysical studies of transcription initiation in eukaryotes and
mycobacterial tuberculosis

Roberto Galletto, PhD

McDonnell Sciences Building, 2nd Floor

Phone: 314-362-4368

Mechanistic studies of DNA motor proteins

Michael Greenberg, PhD

McDonnell Sciences Building, 2nd Floor

Phone: 314-362-8670

Our lab is focused on cytoskeletal molecular motors in health and
disease. We are currently studying the effects of mutations that cause
heart disease.

Kathleen Hall, PhD

South Building, 2nd Floor

Phone: 314-362-4196

We study RNA folding and RNA binding to proteins.

Alex Holehouse, PhD

McDonnell Sciences Building, 2nd Floor

Phone: 314-273-8371

Understand how function is encoded into disordered sequences using
a combination of computational and experimental approaches

Jim Janetka, PhD

Cancer Research Building, 2nd Floor

Phone: 314-362-0509

Rational structure-based drug design and synthesis for cancer and
infectious disease

Andrzej Krezel, PhD

McDonnell Sciences Building, 2nd Floor

Phone: 314-362-8482

Structural biology of transcriptional regulation in the gastric pathogen
Helicobacter pylori

Weikai Li, PhD

McDonnell Sciences Building, 2nd Floor
Phone: 314-362-8687

Structural and biochemical studies of membrane proteins supporting blood coagulation

Timothy M. Lohman, PhD

North Building, 2nd Floor
Phone: 314-362-4393

Mechanisms of DNA-protein interactions; DNA motor proteins (helicases) and SSB proteins

Garland R. Marshall, PhD

Cancer Research Building, 2nd Floor
Phone: 314-935-7911

A major focus is molecular recognition: the basis of intermolecular interactions and specificity seen in drug and hormone receptors and in antigen-antibody and substrate-enzyme systems.

Linda Pike, PhD

McDonnell Sciences Building, 2nd Floor
Phone: 314-362-9502

Our focus is on the mechanisms of action of growth factors and polyphosphoinositide metabolism.

Janice Robertson, PhD

McDonnell Sciences Building, 2nd Floor
Phone: 314-273-7758

Our goal is to understand how and why membrane proteins fold, form stable complexes, and achieve conformational stability inside of the oil-filled cell membrane.

Andrea Soranno, PhD

South Building, 2nd Floor
Phone: 314-273-1632

Our main research interests are the physical principles and molecular mechanisms that determine biomolecular function.

Rui Zhang, PhD

McDonnell Sciences Building, 2nd Floor
Phone: 314-273-1663

We combine single-molecule fluorescence spectroscopy and concepts from polymer physics to investigate intrinsically disordered proteins. We also develop innovative methods to study macromolecular conformations and dynamics within cells and in membraneless organelles.

Department of Cell Biology and Physiology

Cell biology is one of the primary disciplines in medical research, influencing all areas of basic and clinical investigation. The future holds great opportunities in cell biology research due to inventories of the genes and proteins from which cells are built, new experimental techniques and various model organisms. Further discoveries about the cell biology of human genes will continue to translate into therapeutics. Also on the horizon is a better understanding of how proteins and sets of proteins (e.g., macromolecular complexes) are assembled and integrated to produce function.

The Department of Cell Biology and Physiology is ranked among the top 10 cell biology departments in the country, and the research carried out by its faculty covers a broad range of fields within cellular physiology and molecular cell biology. A unifying theme is the study of fundamental processes and their regulation. These cellular processes include genome maintenance, apoptosis, cell cycle control, dynamic cell motility, angiogenesis, signal transduction and membrane trafficking, presynaptic processes, prion protein misfolding, RNA metabolism, and the structure and function of ion channels. The department's research activities provide a foundation for studies in cancer biology, immunobiology, developmental biology, neurobiology and vascular biology. Its faculty use model organisms as well as human stem cells and a variety of techniques such as deep-etch electron and confocal microscopy to carry out their research. Cellular imaging is a particular strength of the department.

The Department of Cell Biology and Physiology oversees the physiology contents within the Washington University School of Medicine's Gateway curriculum, which is designed to provide first-year medical students with a foundation for their further study of clinical and applied physiology. The Molecular Cell Biology course for first-year graduate students conveys an understanding of fundamental cell biology research strategies and principles. In addition, advanced courses open to medical and graduate students provide for more detailed study of specific areas of cell biology, physiology and cellular biophysics.

Website: <http://cellbiology.wustl.edu>

Faculty

David W. Piston, PhD

Department Head

Visit our website for more information about our faculty and their appointments.



A

Ghazaleh Ashrafi, Ph.D.

Associate Professor of Cell Biology and Physiology (primary appointment)
Associate Professor of Genetics
Doctor of Philosophy, Harvard University, 2020

B

Dhaval Paresb Bhatt, M.S., Ph.D., Bachelor

Instructor in Cell Biology and Physiology (primary appointment)
Bachelor's degree, CM College of Pharmacy, 2005
Master of Science, Gujarat University, 2007
Doctor of Philosophy, University of North Dakota, 2013

Kendall Jay Blumer, Ph.D.

Professor of Cell Biology and Physiology (primary appointment)
Bachelor of Arts, Rice University, 1977
Doctor of Philosophy, Duke University, 1986

Michael J. Bridge, Ph.D.

Instructor in Cell Biology and Physiology (primary appointment)
Bachelor of Science, Purdue University-Main Campus, 1995
Doctor of Philosophy, University of Utah, 2006

C

Chun-Kan Chen, M.S., Ph.D.

Assistant Professor of Cell Biology and Physiology (primary appointment)
Bachelor of Science, National Taiwan University, 2010
Master of Science, University of Southern California, 2013
Doctor of Philosophy, California Institute of Technology, 2017

Clair Lorraine Crewe, Ph.D.

Assistant Professor of Cell Biology and Physiology (primary appointment)
Assistant Professor of Medicine
Bachelor of Science, Oklahoma Christian University, 2009
Doctor of Philosophy, University of Oklahoma Health Sciences Center, 2015

D

Panyue Deng, M.S., Ph.D., M.D.

Associate Professor of Cell Biology and Physiology (primary appointment)
Doctor of Medicine, Hunan Medical University, 1995
Master of Science, University of Science, Malaysia, 2001
Doctor of Philosophy, University of Science, Malaysia, 2004

Lai Kuan Dionne, Ph.D.

Associate Professor of Cell Biology & Physiology (primary appointment)
Doctor of Philosophy, University of Colorado Anschutz Medical Campus, 2010

F

Ziao Fu, Ph.D.

Assistant Professor of Cell Biology and Physiology (primary appointment)
Doctor of Philosophy, Columbia University, 2019

G

Denis Goldfarb, Ph.D.

Assistant Professor of Cell Biology and Physiology (primary appointment)
Assistant Professor of Medicine
Bachelor of Science, Rensselaer Polytechnic Institute, 2010
Doctor of Philosophy, University of North Carolina at Chapel Hill, 2019

Subhadra C Gunawardana, M.S., Ph.D.

Associate Professor of Cell Biology and Physiology (primary appointment)
Master of Science, Iowa State University, 1995
Doctor of Philosophy, Cornell University, 2002

H

Phyllis I Hanson, Ph.D., M.D.

Voluntary Research Professor of Cell Biology and Physiology
Bachelor of Arts, Yale University, 1985
Doctor of Philosophy, Stanford University, 1993
Doctor of Medicine, Stanford University, 1993

Xueyan He, Ph.D.

Assistant Professor of Cell Biology and Physiology (primary appointment)
Doctor of Philosophy, Nanjing University, 2015

John E Heuser, M.D.

Professor Emeritus of Cell Biology and Physiology
Bachelor of Science, Harvard University, 1964
Doctor of Medicine, Harvard University, 1969

J

Silvia Jansen, M.S., Ph.D.

Assistant Professor of Cell Biology and Physiology (primary appointment)
Master of Science, Katholieke Universiteit Leuven, 2003
Doctor of Philosophy, Katholieke Universiteit Leuven, 2007

K

David John Edward Kast, M.S., Ph.D.

Assistant Professor of Cell Biology and Physiology (primary appointment)
Bachelor of Science, University of Minnesota, 2000
Master of Science, University of Minnesota, 2004
Doctor of Philosophy, University of Minnesota, 2018

Vitaly A Klyachko, M.S., Ph.D.

Professor of Cell Biology and Physiology (primary appointment)
Professor of Neuroscience
Professor of Biomedical Engineering
Bachelor of Science, Moscow State University, 1997
Master of Science, Moscow State University, 1998
Doctor of Philosophy, University of Wisconsin Madison, 2002

Kwang Woo Ko, M.S., Ph.D.

Instructor in Cell Biology/Physiology (primary appointment)
Bachelor of Science, Yonsei University, 2004
Master of Science, Gwangju Institute of Science & Technology, 2007
Doctor of Philosophy, University of Texas Austin, 2015

L**Sun Joo Lee, M.S., Ph.D.**

Assistant Professor of Cell Biology and Physiology (primary appointment)
Bachelor of Science, Handong Global University, 2000
Master of Science, Gwangju Institute of Science & Technology, 2002
Doctor of Philosophy, Washington University in St Louis, 2010

Polina V. Lishko, M.S., Ph.D.

Professor of Cell Biology and Physiology (primary appointment)
Master of Science, National Taras Shevchenko University of Kyiv, 1996
Doctor of Philosophy, Bogomoletz Institute of Physiology of NAS of Ukraine, 2000

M**Michael Benjamin Major, Ph.D.**

Professor of Cell Biology and Physiology (primary appointment)
Professor of Otolaryngology
Alan A. and Edith L. Wolff Professorship in Cell Biology and Physiology
Bachelor of Science, Michigan State University, 1997
Doctor of Philosophy, University of Utah, 2004

Grigory Maksaev, M.S., Ph.D.

Instructor in Cell Biology and Physiology (primary appointment)
Master of Science, Moscow Inst of Physics & Techn, 1998
Doctor of Philosophy, Moscow Institute of Physics and Technology, 2002

George Edward Marti, Ph.D.

Assistant Professor of Cell Biology/Physiology (primary appointment)
Bachelor of Arts, University of California Berkeley, 2007
Doctor of Philosophy, University of California Berkeley, 2014

Jackie Lee Martin, M.A., M.B.A., M.D.

Voluntary Clinical Professor of Anesthesiology
Bachelor of Arts, Howard University, 1976
Master of Arts, Meharry Medical College, 1980
Doctor of Medicine, Meharry Medical College, 1984
Master of Business Administration, John Hopkins University (Duplicate of Johns Hopkins University), 2010

Robert Paul Mecham, Ph.D.

Professor Emeritus of Cell Biology and Physiology
Bachelor of Science, University of Utah, 1973

Doctor of Philosophy, Boston University, 1977

Robert W Mercer, Ph.D.

Professor Emeritus of Cell Biology and Physiology
Bachelor of Arts, San Jose State University, 1974
Doctor of Philosophy, Syracuse University, 1980

Jongyun Myeong, Ph.D.

Instructor in Cell Biology and Physiology (primary appointment)
Doctor of Philosophy, Seoul National University, 2016

N**Colin G Nichols, Ph.D.**

Professor of Cell Biology and Physiology (primary appointment)
Carl F Cori Professor
Bachelor of Science, University of Leeds, 1982
Doctor of Philosophy, University of Leeds, 1985

P**David James Pagliarini, Ph.D.**

Professor of Cell Biology and Physiology (primary appointment)
Hugo F. and Ina C. Urbauer Professorship
Professor of Biochemistry and Molecular Biophysics
Professor of Genetics
Doctor of Philosophy, University of California San Diego, 2005

Giovanni Pauletti, M.S., Ph.D.

Voluntary Research Professor of Anesthesiology
Master of Science, Swiss Fed Inst Tech (EPFL), 1987
Doctor of Philosophy, Swiss Fed Inst Tech (EPFL), 1994

David William Piston, M.S., Ph.D.

Professor of Cell Biology and Physiology (primary appointment)
Edward Mallinckrodt, Jr. Professorship in Cell Biology and Physiology
Head of the Department of Cell Biology and Physiology
Co-Director for Center for Quantum Leaps (CQL)
Bachelor of Science, Grinnell College, 1984
Master of Science, University of Illinois at Urbana-Champaign, 1985
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 1989

Helen Piwnica-Worms, Ph.D.

Voluntary Research Professor of Cell Biology and Physiology
Bachelor of Arts, Saint Olaf College, 1979
Doctor of Philosophy, Duke University, 1984

Jasmina Profirovic, Ph.D.

Voluntary Research Assistant Professor of Cell Biology and Physiology
Bachelor of Science, University of Belgrade, 1997
Doctor of Philosophy, University of Illinois Chicago (Duplicate of University of Illinois at Chicago), 2005

R**Eduardo Rosa-Molinar, Ph.D.**

Professor of Cell Biology and Physiology (primary appointment)
Professor of Neuroscience
Bachelor of Science, University of Alabama in Tuscaloosa, 1994
Doctor of Philosophy, University of Nebraska Medical Center, 1997

S

Philip Damien Stahl, Ph.D.

Edward Mallinckrodt Jr Professor Emeritus
Bachelor of Science, West Liberty State College, 1964
Doctor of Philosophy, West Virginia University, 1967

Sheila Stewart-Wigglesworth, Ph.D.

Professor of Cell Biology and Physiology (primary appointment)
Gerty Cori Professor of Cell Biology and Physiology
Vice Chair - Cell Biology and Physiology
Professor of Medicine
Bachelor of Science, University of Minnesota, 1990
Doctor of Philosophy, University of California Los Angeles, 1996

Amber Nicole Stratman, Ph.D.

Associate Professor of Cell Biology and Physiology (primary appointment)
Associate Professor of Developmental Biology
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2006
Doctor of Philosophy, University of Missouri Columbia, 2010

T

Heather L. True, M.S., Ph.D.

Professor of Cell Biology and Physiology (primary appointment)
David English Smith Professorship in Medicine
Associate Director of the Division of Biology and Biomedical Sciences
Bachelor of Science, University of Wisconsin Madison, 1992
Master of Science, University of Illinois at Urbana-Champaign, 1995
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 1998

W

Robert S Wilkinson, M.A., Ph.D.

Professor Emeritus of Cell Biology and Physiology
Bachelor of Arts, Rice University, 1968
Master of Arts, University of Texas Austin, 1970
Doctor of Philosophy, University of Texas Austin, 1974

Y

Nathaniel Walter York, Ph.D.

Instructor in Cell Biology and Physiology (primary appointment)
Bachelor of Science, University of Missouri in St Louis, 2013
Doctor of Philosophy, University of Wisconsin Madison, 2018

Zhongsheng You, M.S., Ph.D.

Voluntary Research Professor of Cell Biology and Physiology
Bachelor of Science, Zhejiang University (National Che Kiang University) (#####), 1994
Master of Science, Shanghai Institute of Biochemistry and Cell Biology, 1997
Doctor of Philosophy, University of California San Diego, 2002

Peng Yuan, Ph.D.

Voluntary Research Associate Professor of Cell Biology and Physiology

Bachelor of Science, University of Science and Technology of China (#####), 1997

Doctor of Philosophy, University of Pennsylvania, 2008

David W. Piston, PhD

Department Head

Visit our website for more information about our faculty and their appointments.

Research Electives

Cell Biology and Physiology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Ghazaleh Ashrafi, PhD

510 McDonnell Sciences Building
Phone: 314-273-5518

Uncovering novel regulators of glycolytic and mitochondrial metabolism at the synapse and their role in the pathology of Alzheimer's disease.

Kendall J. Blumer, PhD

506 McDonnell Sciences Building
Phone: 314-362-1668

Signaling mechanisms in cardiovascular and neurological disorders.

Chun-Kan Chen, PhD

4614 Cancer Research Building
Phone: 314-273-2787

The Chen lab utilizes multi-omic and high-throughput screening approaches to systematically investigate the regulation and function of circRNA in cells and to develop novel circRNA technologies for translational applications. Signaling mechanisms in cardiovascular and neurological disorders are also studied.

Clair Crewe, PhD

1127 Couch Biomedical Research Building
Phone: 314-362-3240

Understanding extracellular vesicle (EV)-mediated signaling during homeostatic and pathologic metabolic regulation.

Sergej Djuranovic, PhD

4612 Cancer Research Building
Phone: 314-362-9706

Molecular mechanisms of translational control; cellular processes regulated by changes in RNA metabolism.

Ziao Fu, PhD

9610 BJC Institute of Health
Phone: 314-273-4416

The Fu Lab specializes in understanding protein structures in their native environments using cryo-electron microscopy. Current projects explore their roles in membrane organization, trafficking, and responses to mechanical forces, with a particular emphasis on their involvement in pediatric kidney diseases and neurological disorders.

Denis Goldfarb, PhD

406 McDonnell Sciences Building
Phone: 314-273-3669

Computational mass spectrometry, proteomics, and their applications in biology.

Xue-Yan He, PhD

5516 Cancer Research Building
Phone: 314-362-5296

The He Lab is dedicated to advancing knowledge of the mechanisms responsible for colorectal tumor progression, with a specific focus on stress and its influence on the tumor microenvironment.

Silvia Jansen, PhD

4900 South Building
Phone: 314-273-1853

This lab's focus is on elucidating the molecular mechanisms that regulate the architecture, dimensions and dynamics of actin filament networks and then tuning them to support essential cellular functions that range from cell migration and cytokinesis to neurogenesis.

David J. Kast, PhD

4900 South Building
Phone: 314-273-1852

The long-term goal of this lab's research is to understand the fundamental cellular and molecular mechanisms that drive the biogenesis and dynamics of intracellular membrane compartments, including the endocytic vesicles, the endoplasmic reticulum, the Golgi apparatus and the mitochondria.

Vitaly Klyachko, PhD

501 McDonnell Sciences Building
Phone: 314-362-5517

Mechanisms and regulation of neurotransmitter release at individual synapses; functional roles of presynaptic processes in synaptic plasticity and information processing.

Polina Lishko, PhD

1127 Couch Biomedical Research Building
Phone: 314-362-6672

The role of bioactive lipid signaling and bioelectricity in the physiology of the inverted epithelia of the brain and retina. Physiology and pathophysiology of steroid signaling in reproduction, aging and neurodegeneration.

Michael Benjamin Major, PhD

406 McDonnell Sciences Building
Phone: 314-273-3669

The Major lab studies how perturbation of specific signal transduction pathways contributes to the initiation, progression and dissemination of cancer.

Colin G. Nichols, PhD

9611 BJC Institute of Health
Phone: 314-362-6630

Ion channel biology; multiple levels of analysis from the molecular basis of channel function to in vivo physiology and disease.

David J. Pagliarini, PhD

1127 Couch Building
Phone: 314-273-2330

We are an interdisciplinary team of scientists driven to understand the biochemical underpinnings of mitochondrial dysfunction in human diseases. Together, we integrate large-scale methodologies with traditional biochemistry to investigate the modulation, adaptation, and basic metabolic function of mitochondria.

Slavica Pavlovic Djuranovic, PhD

416 McDonnell Sciences Building
Phone: 314-362-6675

Identifying new targets and possible therapies to treat malaria.

David W. Piston, PhD

4912 South Building
Phone: 314-362-9121

The intracellular and intercellular dynamics of cells within the islets of Langerhans play a key role in the regulation of blood glucose levels. The islets are made up of different cell types, but very little is known about the interplay between the different cell types and how this affects their secretion of various hormones. The islets' α -cells secrete insulin in response to increased blood sugar and also in response to neurotransmitters and hormones. Glucagon also plays a key role in blood glucose homeostasis, and it is secreted by the islets' α -cells. High glucose levels inhibit glucagon secretion from α -cells within the islets but not from dispersed α -cells, and the mechanism underlying this phenomenon has not been defined. We use quantitative live cell microscopy to measure single-cell parameters within intact islets



held within microfluidic devices in order to expose them to spatially heterogeneous levels of various stimuli. The resulting data are fit using mathematical models of islet functional dynamics, which we are continually modifying to better fit the observed islet physiology.

Sheila A. Stewart, PhD

7610 BJC Institute of Health
Phone: 314-362-7437

Delineation of the molecular mechanisms by which aged stromal cells contribute to tumorigenesis and the molecular mechanisms that ensure high-fidelity telomere replication and genomic stability.

Amber N. Stratman, PhD

416 McDonnell Sciences Building
Phone: 314-273-7928

Mechanisms regulating blood vessel formation, stabilization, and blood flow sensing during development and disease.

Heather L. True-Krob, PhD

413 McDonnell Sciences Building
Phone: 314-362-3934

Biological consequences of yeast prions, in both their capacity to function as novel epigenetic elements and their utility to serve as a tractable model for the analysis of protein misfolding and aggregation that occurs in several neurodegenerative disorders.

Zhongsheng You, PhD

514 McDonnell Sciences Building
Phone: 314-362-9893

Studies of the cellular responses to DNA damage and their cancer relevance, focusing on the functional interplays between the DNA damage checkpoint, DNA repair and chromatin structure.

Department of Developmental Biology

The principal research activities of the Department of Developmental Biology are focused on attaining a mechanistic understanding of animal development, encompassing the earliest cell fate specification and movement processes that shape the early embryo, organogenesis, stem cell biology and engineering, tissue homeostasis and repair, and aging. Students and postdoctoral fellows work closely with faculty and staff on research projects and participate in weekly journal clubs and seminars at which recent literature and ongoing research are discussed.

The developmental biology faculty employ a variety of model organisms and cell-based systems to answer key outstanding questions about the fundamental mechanisms of development and to apply this knowledge to pathogenic mechanisms that lead to human birth defects and disease; they also use this knowledge to create improved future therapies. The department takes a broad view of developmental biology, with research groups studying diverse developmental processes (e.g., early embryogenesis, organogenesis, aging) and applying multidisciplinary approaches that include forward and reverse genetics, epigenetics, molecular and chemical methods, and computational methods. Embryogenesis is a fascinating process during which a fertilized egg undergoes divisions to form a mass of pluripotent cells that signal to one another to establish embryonic polarity, diverse cell types, and organs and that also undergo massive cell migrations and rearrangements to sculpt the embryonic body.

Research is also carried out on the processes involved in tissue degeneration, repair and regeneration, the biology of embryonic and adult stem cells, and cellular reprogramming. It is a particularly opportune time for developmental biology research, as recent technological breakthroughs in both animal model systems and genomics afford insights into developmental processes at the epigenetic, genetic and molecular levels and also enable the monitoring of cell behaviors in vivo. We are discovering the genes that are responsible for birth defects and defining connections between many adult human diseases and their origins during embryogenesis. The studies of stem cells, cellular reprogramming and regeneration are bringing us closer to curing human diseases, repairing damaged organs, and extending the boundaries of aging.

Website: <https://developmentalbiology.wustl.edu/>

Faculty

Andrew Kelton Groves, MA, PhD

Stuart A. Kornfeld Distinguished Professor in Medical Sciences
Head of Department of Developmental Biology

Visit our website for more information about our faculty and their appointments.

B

Irving Boime, M.S., Ph.D.

Professor of Developmental Biology (primary appointment)
Professor of Reproductive Biology in Obstetrics and Gynecology
Bachelor of Science, Saint Louis College of Pharmacy, 1964
Master of Science, Purdue University-Main Campus, 1966
Doctor of Philosophy, Washington University in St Louis, 1970

C

Douglas Floyd Covey, M.A., Ph.D.

Professor of Pharmacology in Developmental Biology (primary appointment)
Andrew C and Barbara B Taylor Distinguished Professor of Psychiatry

Professor of Anesthesiology
Professor of Psychiatry
Master of Arts, Johns Hopkins University, 1969
Doctor of Philosophy, Johns Hopkins University, 1973

D

Aaron DiAntonio, M.Phil., Ph.D., M.D.

Professor of Developmental Biology (primary appointment)
Alan A and Edith L Wolff Professor of Developmental Biology
Bachelor of Arts, Harvard University, 1988
Master of Philosophy, University of Cambridge, 1989
Doctor of Philosophy, Stanford University, 1995
Doctor of Medicine, Stanford University, 1995

Sabine Dietmann, M.S., Ph.D.

Assistant Professor of Developmental Biology (primary appointment)
Assistant Professor of Medicine
Master of Science, Goethe University, 1994
Doctor of Philosophy, Freie Universität Berlin, 1999

G

Geoffrey John Goodhill, Ph.D.

Professor of Developmental Biology (primary appointment)
Director of the Center for Theoretical Neuroscience
Professor of Neuroscience
Professor in Computer Science and Engineering
Doctor of Philosophy, University of Sussex, 1992

Andrew Kelton Groves, M.A., Ph.D.

Professor of Developmental Biology (primary appointment)
Head of Department of Developmental Biology
Stuart A. Kornfeld Distinguished Professor of Medical Sciences
Bachelor of Arts, University of Cambridge, 1988
Master of Arts, University of Cambridge, 1991
Doctor of Philosophy, Ludwig Institute for Cancer Research, 1992

H

Tracey O Hermanstyn, Ph.D.

Assistant Professor of Developmental Biology (primary appointment)
Assistant Dean Academic Pathway Programs
Doctor of Philosophy, University of Maryland Baltimore, 2012

I

Shin-Ichiro Imai, Ph.D., M.D.

Professor of Developmental Biology (primary appointment)
Theodore and Bertha Bryan Distinguished Professor of Environmental Medicine
Professor of Medicine
Doctor of Medicine, Keio University, 1989
Doctor of Philosophy, Keio University, 1995

J

Aaron N Johnson, Ph.D.

Associate Professor of Developmental Biology (primary appointment)
Bachelor of Arts, Arizona State University, 1998
Doctor of Philosophy, Arizona State University, 2006

K

Shafqat Ali Khan, Ph.D.

Instructor in Developmental Biology (primary appointment)
Doctor of Philosophy, Homi Bhabha National Institute, 2015

Stephen K Kornfeld, Ph.D., M.D.

Professor of Developmental Biology (primary appointment)
Bachelor of Arts, Yale University, 1984
Doctor of Philosophy, Stanford University, 1991
Doctor of Medicine, Stanford University, 1991

Kristen Louise Kroll, Ph.D.

Professor of Developmental Biology (primary appointment)
Bachelor of Arts, Northwestern University, 1988
Doctor of Philosophy, University of California Berkeley, 1994

L

Yangjian Liu, M.S., Ph.D.

Instructor in Developmental Biology (primary appointment)
Bachelor of Science, Nanjing University (#####), 1998
Master of Science, Chinese Academy of Sciences, 2002
Doctor of Philosophy, Johns Hopkins University, 2006

M

Helen McNeill, Ph.D.

Professor of Developmental Biology (primary appointment)
Larry J Shapiro and Carol-Ann Uetake-Shapiro Professor
Bachelor of Science, Ramapo College of New Jersey, 1985
Doctor of Philosophy, Stanford University, 1993

Craig Anthony Micchelli, Ph.D.

Associate Professor of Developmental Biology (primary appointment)
Bachelor of Science, University of Wisconsin Madison, 1993
Doctor of Philosophy, University of Wisconsin Madison, 1999

Mayssa Mokalled, M.S., Ph.D.

Associate Professor of Developmental Biology (primary appointment)
Bachelor of Science, American University of Beirut, 2003
Master of Science, American University of Beirut, 2005
Doctor of Philosophy, University of Dallas, 2010

N

Jeanne M Nerbonne, Ph.D.

Professor of Developmental Biology (primary appointment)
Alumni Endowed Professor of Molecular Biology and Pharmacology in Developmental Biology
Bachelor of Science, Framingham State College, 1974
Doctor of Philosophy, Georgetown University, 1978



O

David M Ornitz, Ph.D., M.D.

Professor of Developmental Biology (primary appointment)
Alumni Endowed Professor of Developmental Biology
Bachelor of Science, University of California Davis, 1981
Doctor of Philosophy, University of Washington, 1987
Doctor of Medicine, University of Washington, 1988

P

Debabrata Patra, M.S., Ph.D.

Associate Professor of Developmental Biology (primary appointment)
Bachelor of Science, University of Bombay, 1985
Master of Science, University of Bombay, 1987
Doctor of Philosophy, University of Pittsburgh, 1993

Elizabeth Pollina, Ph.D.

Assistant Professor of Developmental Biology (primary appointment)
Bachelor of Arts, Princeton University, 2007
Doctor of Philosophy, Stanford University, 2015

R

John Hall Russell, Ph.D.

Professor Emeritus of Developmental Biology
Bachelor of Science, Juniata College, 1968
Doctor of Philosophy, Washington University in St Louis, 1974

S

Jimann Shin, M.S., Ph.D.

Assistant Professor of Developmental Biology (primary appointment)
Bachelor of Science, Kyung Pook National University, 2002
Master of Science, Kyung Pook National University, 2004
Doctor of Philosophy, Vanderbilt University, 2007

Lilianna Solnica-Krezel, M.S., Ph.D.

Professor of Developmental Biology (primary appointment)
Alan A and Edith L Wolff Professor of Developmental Biology
Master of Science, Medical University of Warsaw, 1985
Doctor of Philosophy, University of Wisconsin Madison, 1991

T

Ankita Thawani, Ph.D., Master, Bachelor

Instructor in Developmental Biology (primary appointment)
Master's degree, Indian Institute of Technology Delhi, 2012
Bachelor's degree, Indian Institute of Technology Delhi, 2012
Doctor of Philosophy, Purdue University-Main Campus, 2019

Thorold W Theunissen, M.A., Ph.D.

Associate Professor of Developmental Biology (primary appointment)
Bachelor of Arts, Harvard University, 2007
Master of Arts, University of Cambridge, 2008
Doctor of Philosophy, University of Cambridge, 2011

Yu-Chen Tony Tsai, Ph.D., M.D.

Assistant Professor of Developmental Biology (primary appointment)
Doctor of Medicine, National Taiwan University, 2005
Doctor of Philosophy, Stanford University, 2013

W

Spencer Gaffney Willet, Ph.D.

Instructor in Developmental Biology (primary appointment)
Bachelor of Science, University of Tennessee, 2007
Doctor of Philosophy, Vanderbilt University, 2014

Y

Yongjun Yin, Ph.D.

Assistant Professor of Developmental Biology (primary appointment)
Doctor of Philosophy, Hebrew University of Jerusalem, 2004

Andrew Seungjo Yoo, M.S., Ph.D.

Professor of Developmental Biology (primary appointment)
Philip and Sima K Needleman Distinguished Professor of Medicine
Bachelor of Science, McGill University, 1995
Master of Science, University of British Columbia, 1997
Doctor of Philosophy, Columbia University, 2005

Z

Bo Aber Zhang, Ph.D.

Associate Professor of Developmental Biology (primary appointment)
Bachelor of Science, Inner Mongolia University (#####), 2004
Doctor of Philosophy, Chinese Academy of Sciences, 2011

Research Electives

Developmental Biology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Research in the Department of Developmental Biology occurs in a highly collegial atmosphere and involves interdisciplinary collaborations between the members of the department as well as among investigators from different departments and centers throughout the School of Medicine, the College of Arts & Sciences, and the McKelvey School of Engineering. Developmental biology faculty have leading roles in several research centers, including the Center of Regenerative Medicine, the Center for the Investigation of Membrane Excitability Diseases, the Center for Cardiovascular Research, and the Hope Center. The department has a rich tradition of mentoring undergraduate, graduate and medical students as well as postdoctoral fellows. We are committed to creating a research environment in which our trainees reach their maximum scientific potential and career goals while addressing key outstanding questions and making important discoveries.

Douglas F. Covey, PhD

355 McDonnell Medical Sciences Building
Phone: 314-362-1726

Medicinal chemistry of steroids.

Aaron DiAntonio, MD, PhD

7150 Jeffrey T. Fort Neuroscience Research Building
Phone: 314-362-9925

Neurodevelopment, neurodegeneration, and axon regeneration in *Drosophila* and mouse.

Geoff Goodhill, PhD

8322 Jeffrey T. Fort Neuroscience Research Building
Phone: 314-273-7691

The Goodhill Lab's overall goal is to understand the computational principles that underlie brain development using a combination of experimental and theoretical approaches. Previously, the lab has studied how growing nerve fibers detect and respond to molecular gradients to find their targets and how visual experience affects the development of maps in the developing brain. Currently, we are using the larval zebrafish as a model to understand the links between the development of patterns of brain activity and complex behaviors and to study how the development of brain and behavior is altered in autism spectrum disorders.

Shin-ichiro Imai, MD, PhD

362A McDonnell Medical Sciences Building
Phone: 314-362-7228

Molecular mechanisms of aging and longevity in mammals, particularly focusing on the tissue-specific functions of the mammalian NAD-dependent deacetylase Sirt1 and the physiological significance of systemic NAD biosynthesis mediated by Nampt (nicotinamide phosphoribosyltransferase) in an intimate connection between metabolism and aging.

Aaron N. Johnson, PhD

3602 Cancer Research Building
Phone: 314-273-1834

Molecular mechanisms of muscle development and regeneration.

Kerry Kornfeld, MD, PhD

3607 Cancer Research Building
Phone: 314-747-1480

Signal transduction during development; zinc metabolism; aging.

Kristen Kroll, PhD

320 McDonnell Medical Sciences Building
Phone: 314-362-7045

Transcriptional networks that regulate the formation of neurons in early embryos and embryonic stem cells; role of chromatin regulatory complexes in controlling pluripotency and differentiation.

Helen McNeill, PhD

305 McDonnell Medical Sciences Building
Phone: 314-273-3050

Our lab interests are focused on the cadherin family of molecules and their regulation of cellular polarity, growth, tissue organization and metabolism. The overall goal of our research is to understand how tissue growth and tissue organization are coordinately regulated. We are focusing on how Fat cadherins function in Hippo pathway-regulated growth control, planar cell polarity tissue organization, and metabolism in flies, mice and hydra. A second, new focus is studying how the nuclear envelope regulates gene expression and fertility.

Craig Micchelli, PhD

328 McDonnell Medical Sciences Building
Phone: 314-362-7036

Our lab studies the regulation of stem cell biology in development, homeostasis and disease.

Mayssa Mokalled, PhD

3601 Cancer Research Building
Phone: 314-273-1835

Spinal cord injury, degeneration and regeneration in zebrafish and mouse.

Jeanne M. Nerbonne, PhD

9900 Clinical Sciences Research Building
Phone: 314-362-2564

Structure, function and regulation of voltage-dependent ion channels in the cardiovascular and nervous systems; regulation of membrane excitability in health and disease.

David M. Ornitz, MD, PhD

3902 South Building
Phone: 314-362-3908

Regulation of cardiovascular, lung, skeletal, and inner ear development, injury response, and regeneration by fibroblast growth factors.

Liz Pollina, PhD

3830 North Medical Building
Phone: 314-362-7054

The Pollina Lab is broadly interested in identifying the molecular mechanisms that preserve longevity across the diverse cell types of the nervous system.



Lila Solnica-Krezel, PhD

3911A South Building
Phone: 314-362-8768

Genetic regulation of vertebrate embryogenesis; genetic mechanisms that regulate cell fates and movements during early vertebrate development using forward and reverse genetics in the zebrafish model and human embryonic stem cells.

Thorold W. Theunissen, PhD

3313 Couch Biomedical Research Building
Phone: 314-362-8768

The Theunissen lab seeks to understand the molecular mechanisms that regulate pluripotent stem cell states and to develop optimal conditions for the derivation, maintenance and differentiation of human ESCs and iPSCs. We also explore whether naive pluripotent stem cells can be used to model early human development and disease.

Tony Tsai, PhD

333 McDonnell Medical Sciences Building
Phone: 314-362-7054

The Tsai lab is interested in control principles of tissue patterning and morphogenesis during embryo development. We seek to understand how cells integrate biochemical and mechanical inputs to make reliable decisions on what cell types they become, where they migrate, and what structure they collectively build.

Andrew Yoo, PhD

361E McDonnell Medical Sciences Building
Phone: 314-362-1811

Cell fate control by microRNAs; neuronal reprogramming to generate human neurons; chromatin controlling factors and genetic pathways that regulate neurogenesis.

Department of Emergency Medicine

Emergency medicine (EM) is the only medical specialty that manages all patients in need of acute care at any time, regardless of their severity of illness/injury, their age, or their ability to pay, 24/7/365. Emergency medical care at Washington University is divided between the Department of Emergency Medicine and the Division of Pediatric Emergency Medicine, which is housed under the Department of Pediatrics. During Phase 1, all students rotate through the emergency departments (EDs) as a part of their Clinical Immersions course, either at Barnes-Jewish Hospital and our community EDs or in the St. Louis Children's Hospital ED. During Phase 2, all students

experience pediatric EM during their rotation in the St. Louis Children's Hospital ED as a part of their pediatric clerkship, managed through the Department of Pediatrics. During Phase 3, students can select a month-long EM elective through the Department of Emergency Medicine to further explore the specialty, and they may also select an advanced clinical rotation in general EM, which primarily focuses on adult EM. They can also select shorter or more flexible electives in the many subspecialties of EM, including emergency medical services (i.e., prehospital medicine), medical toxicology, and ultrasound. Our Toxicology Division also coordinates a keystone integrated science course on addiction medicine.

Website: <https://emergencymedicine.wustl.edu/>

Courses

EMED 8010 Medical Toxicology (Clinical Elective)

This rotation offers practical experience in the evaluation and management of the acutely ill, poisoned, envenomated, or intoxicated patient. Students will gain familiarity and experience evaluating and treating patients who have intentionally and unintentionally overdosed on medications or illicit drugs, have substance use disorders, have been envenomated, or have been exposed to toxic substances. Students will also gain experience in prescribing antidotes and learning to properly decontaminate patients after an ingestion or exposure. There are no overnight or weekend shifts. While not required, students are welcome to participate during off hours to see new consults and enhance their experience and learning. A core content of lectures will be provided. The students will also be assigned small projects during their rotation. Students will be able to rotate in the outpatient toxicology and addiction medicine clinic if desired. Students desiring a letter of recommendation from a toxicology faculty member or those interested in pursuing a career in Emergency Medicine or Medical Toxicology should take this elective. Also, students considering specialties such as Pediatrics, Psychiatry, Neurology, Critical Care Medicine or Internal Medicine should consider this rotation as they will be responsible for evaluating toxicologic conditions as part of their inpatient or outpatient practice.

Credit 4 units.

Typical periods offered: Medicine Year

EMED 8015 Emergency Ultrasound (Clinical Elective)

This elective involves the use of Point Of Care Ultrasound (POCUS) and its integration into clinical care. Students who take this elective will get in person didactics on basic POCUS applications and go scanning with both EM residents and faculty in person. Skills learned and practiced during the elective include POCUS image acquisition, clinical interpretation of POCUS images, and help use POCUS to answer clinical questions for patients and the physicians who care for them. Students will end the elective learning about how POCUS continues to expand its impact into multiple fields of medicine and has wide impacts and implications on patient care and patient centered outcomes.

Credit 2 units.

Typical periods offered: Medicine Year

EMED 8021 Emergency Medicine (Clinical Elective)

This four week elective will encompass all aspects of Emergency Medicine, with clinical time spent in the main urban trauma center as well as in a community setting. In addition, to seeing a wide range of pathology at the two sites, students will be given the opportunity for a 1:1 teaching shift, toxicology shift, and nursing shift, as well as a shift with ancillary departments such as social work and respiratory

therapy. Students will be expected to attend grand rounds and teaching lectures as well as team-based learning and simulation sessions. Students will work in the trauma/critical care area and general medicine areas of the ED, and are expected to see patients independently, present to the team, perform basic procedures with guidance, call consults, and sign out patients to the oncoming team. Credit 4 units.

Typical periods offered: Medicine Year

EMED 8301 EMS: Emergency Medical Services (Clinical Elective)

The Emergency Medical Services (EMS) elective is hosted by the Division of EMS within the Department of Emergency Medicine. EMS is a growing subspecialty of medicine that focuses on the care of patients in the prehospital setting. EMS physicians provide direct and indirect medical direction, build systems of care, and treat patients in the prehospital setting. EMS cares for patients of all ages and all acute medical problems. This elective offers students an immersive EMS experience through observational ride along shifts with local EMS agencies, time with EMS physician medical directors, and self-directed learning assignments. EMS conference is held Friday mornings and includes didactics, workshops, and simulations with EMS faculty, EMS fellows, and emergency medicine residents. Many elective activities are off site and a vehicle is recommended.

Credit 2 units.

Typical periods offered: Medicine Year

EMED 9100 Emergency Medicine Advanced Clinical Rotation (ACR)

This rotation offers practical experience in the evaluation and management of acutely sick and injured patients. Students will function as subinterns, initially evaluating their assigned patients, and developing a plan for further diagnostic studies and therapy. They will report to a senior level resident or an attending physician.

The student can expect the opportunity to perform or assist with a wide variety of procedural skills such as suturing, splinting, peripheral and central venous access, ultrasound, and cardiopulmonary resuscitation. Shifts will be eight hours and students will rotate between day, evening, and night shifts (including weekend shifts) to gain maximum exposure to all types of emergencies. The majority of shifts will occur at Barnes-Jewish Hospital; however, additional shifts may be scheduled at Barnes-Jewish West County Hospital and Missouri Baptist hospital, community teaching hospitals approximately 8 miles away.

Students will also be expected to attend weekly grand rounds and student lectures covering aspects of the core content of Emergency Medicine as well as attend a departmental journal club and student simulation sessions.

Students will gain an understanding of other disciplines closely associated with Emergency Medicine by doing rotations with either social work, nursing, or respiratory therapy. Students will also gain knowledge of the triage system during their time in the department.

Students desiring a Standard Letter of Evaluation (SLOE) should take the Emergency Medicine ACR. Students will be scheduled for required weekend and overnight shifts and changes will not be allowed to the schedule unless approved prior to the start of the rotation by the course coordinator.

Please be advised that there is a limit of days off while on this rotation during interview season; otherwise, students should arrange to take the elective

Credit 4 units.

Typical periods offered: Medicine Year

James S. McDonnell Department of Genetics

The Department of Genetics is at the forefront of the rapidly developing field known as genomic (or personalized) medicine, in which genetic and epigenetic analysis coupled with clinical information enables treatments to be tailored specifically to the individual patient. The rapid evolution of sequencing technologies, genome engineering, automated cellular imaging and mass spectrometry methods to rapidly perform proteomic and metabolomics studies, coupled with powerful computational tools, is revolutionizing the biological sciences. Investigators in the department are developing new methods of genomic analysis — including technology and software, epigenomics and copy number variation as well as studies of disease pathways using model organisms — to identify and study the genes responsible for human disease and treatment responses.

The department supports a broad program of preclinical and graduate instruction in genetics, with research opportunities that include studies of transcriptional networks, population genetics, protein evolution, neurological disorders, developmental genetics, models of human disease, genome architecture, statistical genetics and computational biology, genome technologies and infertility.

A significant portion of the first-year course in basic medical sciences is devoted to human and clinical genetics, with emphasis on how genomic information will transform the practice of medicine. This includes specialized selective courses in addition to the core genetic curriculum. Advanced training in clinical genetics and in genetic research is available from the faculty in the Department of Genetics and from geneticists with principal appointments in many other departments within the School of Medicine.

Advanced courses and seminars are offered that focus on the genetics of complex disease, gene expression, genome engineering, induced pluripotent stem cells, single-cell genomics, molecular genetics, genetic epidemiology, computational biology, developmental genetics, microbial genetics, cancer genetics, and population and evolutionary genetics. Extraordinary opportunities for research training and experience are available in all of these areas and at all levels. The programs are tailored to meet the needs of medical students, graduate students, and both MD and PhD postdoctoral fellows pursuing advanced training in biomedical research.

Website: <http://genetics.wustl.edu>

Faculty

Jeffrey Milbrandt, MD, PhD

James S. McDonnell Professor and Head of Genetics
Executive Director, McDonnell Genome Institute
Co-Director Needleman Center for Neurometabolism and Axonal Therapeutics

Michael Province, PhD

Director, Division of Statistical Genomics

Rich Head, MS

Director, Genome Technology Access Center at McDonnell Genome Institute (GTAC@MGI)

Xiaoxia Cui, PhD

Director, Genome Engineering and iPSC Center

Visit our website for more information about our faculty and their appointments.

A

Lucinda L. Antonacci-Fulton, M.B.A., M.S.

Assistant Professor of Genetics (primary appointment)
Bachelor of Science, Southern Illinois University Edwardsville, 1991
Master of Science, Southern Illinois University Edwardsville, 1992
Master of Business Administration, Washington University in St Louis, 2022

Frederick Arnold, Ph.D.

Assistant Professor of Genetics (primary appointment)
Bachelor of Science, Haverford College, 2012
Doctor of Philosophy, Thomas Jefferson University, 2019

B

Ruteja A. Barve, M.S., Ph.D.

Assistant Professor of Genetics (primary appointment)
Bachelor of Science, Savitribai Phule Pune University, 1995
Master of Science, Washington University in St Louis, 2008
Doctor of Philosophy, Washington University in St Louis, 2014

John Rutledge Bermingham, Ph.D.

Associate Professor of Genetics (primary appointment)
Bachelor of Science, Yale University, 1979
Doctor of Philosophy, University of Colorado Boulder, 1989

Adam J. Bloom, Ph.D.

Associate Professor of Genetics (primary appointment)
Bachelor of Science, University of California Berkeley, 1997
Doctor of Philosophy, Washington University in St Louis, 2006

William James Buchser, Ph.D.

Associate Professor of Genetics (primary appointment)
Bachelor of Music, University of Miami, 2002
Doctor of Philosophy, University of Miami, 2009

C

Paul F Cliften, M.S., Ph.D.

Associate Professor of Genetics (primary appointment)
Bachelor of Science, Utah State University, 1992
Master of Science, Utah State University, 1995
Doctor of Philosophy, University of Colorado Health Science Center, 1999

Barak Alon Cohen, Ph.D.

Professor of Genetics (primary appointment)
Alvin Goldfarb Distinguished Professor of Computational Biology
Bachelor of Science, Cornell University, 1992
Doctor of Philosophy, Harvard University, 1998

Jennifer Cremins, Ph.D.

Professor of Genetics (primary appointment)
James S. McDonnell Professor of Molecular Genetics
Professor of Neurosciences
Doctor of Philosophy, Georgia Institute of Technology-Main Campus, 2007

Xiaoxia Cui, M.S., Ph.D.

Associate Professor of Genetics (primary appointment)
Bachelor of Science, Nanjing University (#####), 1993
Master of Science, University of Alabama in Birmingham, 1997
Doctor of Philosophy, University of Texas Austin, 2005

D

Joseph D Dougherty, Ph.D.

Professor of Genetics (primary appointment)
Professor of Psychiatry
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 1999
Doctor of Philosophy, University of California, 2005

Susan K. Dutcher, Ph.D.

Professor of Genetics (primary appointment)
Professor of Cell Biology and Physiology
Bachelor of Arts, Colorado College, 1974
Doctor of Philosophy, University of Washington, 1980

E

Gabor Egervari, Ph.D., M.D.

Assistant Professor of Genetics (primary appointment)
Assistant Professor of Biochemistry and Molecular Biophysics
Doctor of Medicine, Semmelweis University, 2011
Doctor of Philosophy, Icahn School of Medicine at Mo, 2017

F

Robert S. Fulton, M.S.

Assistant Professor of Genetics (primary appointment)
Bachelor of Arts, Southern Illinois University Edwardsville, 1990
Master of Science, Southern Illinois University Edwardsville, 1997

H

Richard D Head, M.S.

Professor of Genetics (primary appointment)
Professor of Pathology and Immunology
Master of Science, Southern Illinois University Carbondale, 1992

Paul Hime, Ph.D.

Instructor in Genetics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2004
Doctor of Philosophy, University of Kentucky, 2017

J

Sheng Chih Jin, M.S., Ph.D.

Assistant Professor of Genetics (primary appointment)
Assistant Professor of Pediatrics
Bachelor of Science, National Chiao Tung University, 2004
Master of Science, Johns Hopkins University, 2008
Doctor of Philosophy, Washington University in St Louis, 2014

L

Heather A Lawson, M.A., Ph.D.

Assistant Professor of Genetics (primary appointment)
Bachelor of Arts, University of Wisconsin Milwaukee, 2002
Master of Arts, Pennsylvania State University-Main Campus, 2004
Doctor of Philosophy, Pennsylvania State University-Main Campus, 2008

Daofeng Li, Ph.D.

Assistant Professor of Genetics (primary appointment)
Bachelor of Science, China Agricultural University, 2005
Doctor of Philosophy, China Agricultural University, 2011

Tina Ann Lindsay, M.A.

Instructor in Genetics (primary appointment)
Bachelor of Science, Missouri State University (Formerly Southwest Missouri State), 1993
Master of Arts, Southern Illinois University Carbondale, 1996

M

Brett Burkard Maricque, Ph.D.

Assistant Professor of Genetics (primary appointment)
Director - Center for Community Health Partnership and Research
Bachelor of Science, University of Wisconsin Madison, 2010
Doctor of Philosophy, Washington University in St Louis, 2016

James P Mc Carter, Ph.D., M.D.

Voluntary Research Professor of Genetics
Bachelor of Arts, Princeton University, 1989
Doctor of Philosophy, Washington University in St Louis, 1998
Doctor of Medicine, Washington University in St Louis, 1998

Michael Meers, Ph.D.

Assistant Professor of Genetics (primary appointment)
Bachelor of Science, Duke University, 2010

Doctor of Philosophy, University of North Carolina at Chapel Hill, 2017

Benpeng Miao, Ph.D.

Instructor in Genetics (primary appointment)
Bachelor of Science, Ocean University of China (#####), 2013
Doctor of Philosophy, Chinese Academy of Sciences, 2018

Jeffrey D Milbrandt, Ph.D., M.D.

Professor of Genetics (primary appointment)
James S McDonnell Professor of Genetics
Executive Director of the McDonnell Genome Institute
Professor of Medicine
Professor of Pathology and Immunology
Professor of Neurology
Bachelor of Science, University of Nebraska, 1974
Doctor of Medicine, Washington University in St Louis, 1978
Doctor of Philosophy, University of Virginia, 1983

Robi D. Mitra, Ph.D.

Professor of Genetics (primary appointment)
Alvin Goldfarb Distinguished Professor of Computational Biology
Doctor of Philosophy, Massachusetts Institute of Technology, 2000

Elizabeth Mueller, Ph.D.

Assistant Professor of Genetics (primary appointment)
Bachelor of Science, University of Iowa, 2015
Doctor of Philosophy, Washington University in St Louis, 2020

P

Michael A Province, M.A., Ph.D.

Professor of Genetics (primary appointment)
Professor of Biostatistics
Bachelor of Arts, University of Dallas, 1973
Master of Arts, Washington University in St Louis, 1979
Doctor of Philosophy, Washington University in St Louis, 1987

R

Keerthivasan Raanin Chandradoss, M.S., Ph.D.

Instructor in Genetics (primary appointment)
Master of Science, University of Mysore, 2015
Doctor of Philosophy, Indian Institute Of Technology, 2021

S

Nancy L. Saccone, M.S., Ph.D.

Associate Professor of Genetics (primary appointment)
Associate Professor of Biostatistics
Bachelor of Arts, University of California, 1988
Master of Science, Brown University, 1990
Doctor of Philosophy, Brown University, 1993

Yo Sasaki, M.S., Ph.D.

Professor of Genetics (primary appointment)
Bachelor of Science, Tokyo University of Agriculture and Technology, 1991
Master of Science, Tokyo University of Agriculture and Technology, 1994



Doctor of Philosophy, Gunma University, Med School, 1997

Tim B Schedl, Ph.D.

Professor of Genetics (primary appointment)

Bachelor of Arts, Lawrence University, 1977

Doctor of Philosophy, University of Wisconsin Madison, 1984

Shawn Shafer

Associate Professor of Genetics (Pending Executive Faculty Approval)
(primary appointment)

Alan Shiels

Professor of Genetics

Giwon Shin, Ph.D.

Assistant Professor of Genetics (primary appointment)

Bachelor of Science, Pohang University of Science & Technology, 2007

Doctor of Philosophy, Pohang University of Science & Technology,
2012

James B Skeath, Ph.D.

Professor of Genetics (primary appointment)

Assistant Dean Academic Pathway Programs

Bachelor of Arts, Haverford College, 1988

Doctor of Philosophy, University of Wisconsin Madison, 1993

Gary D Stormo, M.A., Ph.D.

Professor Emeritus of Genetics

Bachelor of Science, California Institute of Technology, 1972

Master of Arts, University of Colorado Boulder, 1975

Doctor of Philosophy, University of Colorado Boulder, 1981

Yidan Sun, Ph.D.

Assistant Professor of Genetics (primary appointment)

Doctor of Philosophy, Chinese Academy of Sciences, 2017

T

Tychele Naomi Turner, Ph.D.

Assistant Professor of Genetics (primary appointment)

Bachelor of Science, Michigan State University, 2008

Doctor of Philosophy, Johns Hopkins University, 2014

U

Aki Ushiki, M.S., Ph.D.

Assistant Professor of Genetics (primary appointment)

Bachelor of Science, University of Tsukuba, 2012

Master of Science, University of Tsukuba, 2014

Doctor of Philosophy, University of Tsukuba, 2017

V

Michael J. Vasek, Ph.D.

Instructor in Genetics (primary appointment)

Bachelor of Science, Duke University, 2006

Doctor of Philosophy, Washington University in St Louis, 2015

W

Ting Wang, M.S., Ph.D.

Professor of Genetics (primary appointment)

Sanford and Karen Loewentheil Distinguished Professor of Medicine

Head of the Department of Genetics

Professor of Computer Science and Engineering

Professor of Biostatistics

Master of Science, Washington University in St Louis, 2001

Doctor of Philosophy, Washington University in St Louis, 2006

Michael Aaron White, M.S., Ph.D.

Associate Professor of Genetics (primary appointment)

Bachelor of Arts, Brigham Young University, 2000

Master of Science, University of Rochester, 2004

Doctor of Philosophy, University of Rochester, 2006

Mary Kaye Wojczynski, M.P.H., Ph.D.

Associate Professor of Genetics (primary appointment)

Bachelor of Science, University of Wisconsin Stevens Point, 1995

Master of Public Health, Emory University, 1999

Doctor of Philosophy, University North Carolina, 2006

X

Mingchao Xie

Associate Professor of Genetics (Pending Executive Faculty Approval)
(primary appointment)

Y

Jinsheng Yu, M.S., Ph.D., M.D.

Assistant Professor of Genetics (primary appointment)

Bachelor of Science, Hubei University of Medicine, 1984

Doctor of Medicine, Hubei University of Medicine, 1984

Master of Science, Tongji Medical College of Huazhong University of
Science and Technology, 1995

Doctor of Philosophy, Tongji Medical College of Huazhong University
of Science and Technology, 1998

Z

Xiaoyu Zhuo, Ph.D.

Instructor in Genetics (primary appointment)

Doctor of Philosophy, University of Utah, 2016

Research Electives

Genetics Research Electives

During the fourth year, opportunities exist for many varieties of
advanced clinical or research experiences.

Barak Cohen, PhD

Couch Biomedical Research Building, Room 4308

Phone: 314-362-3674

cohen@wustl.edu

Functional genomics in yeast; gene regulatory networks, complex trait
genetics, and synthetic biology studies of cis-regulation.

Joseph Dougherty, PhD

Couch Biomedical Research Building, Room 6316
Phone: 314-286-0752
jdougherty@wustl.edu

Our laboratory utilizes a variety of techniques spanning from human molecular genetics and informatics to mouse behavioral neuroscience and neuroanatomy. We develop and employ mouse models of psychiatric disorders, particularly those that mimic genetic variations that we have identified in human patient populations, with the goal of trying to understand the cellular and molecular underpinnings of these disorders.

Susan K. Dutcher, PhD

Couch Biomedical Research Building, Room 5301
Phone: 314-362-2765
dutcher@wustl.edu

Studies of the role of centrioles and basal bodies in ciliary signaling, assembly, and motility using molecular genetics and computational and biochemical approaches.

Gabor Egervari, MD, PhD

Couch Biomedical Research Building, Room 6313
Phone: 314-362-6741
gabor@wustl.edu

Our lab combines genomic, proteomic and metabolomic approaches with animal behavioral models to understand how metabolic fluctuations influence gene expression in the brain, particularly in the context of substance use disorders and neurodegeneration.

Sheng Chih (Peter) Jin, PhD

Couch Biomedical Research Building, Room 5206
jin810@wustl.edu
Phone: 314-273-2710

We use human genetic, genomic, and bioinformatic approaches to identify mutations underlying human diseases and their molecular mechanisms.

Tristan (Qingyun) Li, PhD

McDonnell Medical Sciences Building, 8th Floor
Phone: 314-273-1422
qingyunli@wustl.edu

Our lab is broadly interested in neuroimmunology, with a focus on microglial biology. We combine cutting-edge, single-cell genomic technologies with in vitro and in vivo genetic, molecular, and cellular tools to investigate microglial functions in the establishment of the nervous system as well as how changes in these functions contribute to neurological diseases.

Michael Meers, PhD

Couch Biomedical Research Building, Room 5308
Phone: 314-747-4061
meers@wustl.edu

The Meers Lab studies how transcription factors interact with and overcome barriers presented by chromatin landscapes to specify developmental and disease outcomes. To do so, we develop cutting-edge epigenomics techniques to map transcription factor binding and chromatin structure in the same context at high resolution.

Jeffrey Milbrandt, MD, PhD

Couch Biomedical Research Building, Room 6306
Phone: 314-362-4651
jmilbrandt@wustl.edu

We are performing Cas9/CRISPR activation and repression screens in iPSC-derived neurons together with single-cell transcriptomics analysis to evaluate the causal effects of genetic variants associated with neuropsychiatric diseases. We are also studying how metabolism influences the axonal/glia interactions important for proper nerve function. We use genetic and metabolomic analysis to identify molecular mechanisms of axonal degeneration, a self-destructive process that plays an important role in many neurodegenerative conditions, particularly motor neuron diseases like ALS and peripheral neuropathy.

Rob Mitra, PhD

Couch Biomedical Research Building, Room 4301
Phone: 314-362-2751
rmitra@wustl.edu

Our focus is on systems biology, gene regulation and technology development. Projects in the lab fall into three general categories: 1) understanding the molecular logic of transcription factor cooperativity; 2) mapping the gene regulatory networks that control developmental processes and using this knowledge to reprogram fibroblasts into useful cell types; and 3) developing novel technologies to more efficiently achieve the first two aims.

Samantha Morris, PhD

Couch Biomedical Research Building, Room 3316
Phone: 314-747-8618
s.morris@wustl.edu

This lab strives to engineer cell fate to generate clinically valuable cell populations via stem cell and developmental biology. Our research focuses on dissecting the gene regulatory networks that define cell identity, using the developing embryo and tissue regeneration as a guide to engineer fate in vitro. We apply insight from these analyses to generate clinically relevant populations by differentiating cells from a pluripotent state or by directly converting cells between mature fates. We employ a combination of computational, single-cell transcriptomics with cell and developmental biology approaches.



Michael A. Province, PhD

Farrell Learning and Teaching Center (FLTC), 6th floor, Suite 605
Phone: 314-362-3616
mprovince@wustl.edu

Development and evaluation of novel statistical genetics methodology, especially as applied to genomic identification and validation of variants for human complex quantitative traits, such as heart disease, cancer, pulmonary function, diabetes, and human longevity.

Nancy L. Saccone, PhD

Farrell Learning and Teaching Center (FLTC), 6th floor, Suite 606
Phone: 314-747-3263
nlism@wustl.edu (nlisms@wustl.edu)

Statistical genetics and psychiatric genetics; development and application of analysis methods for studying the genetics of human disease and complex traits.

Tim Schedl, PhD

Couch Biomedical Research Building, Room 5305
Phone: 314-362-6162
ts@wustl.edu

Our lab studies germ cell development in the model organism *Caenorhabditis elegans*. The major focuses are control of the decision to proliferate or enter the meiotic pathway, control and coordination of meiotic prophase progression and gametogenesis, and control of meiotic maturation and ovulation.

James Skeath, PhD

Couch Biomedical Research Building, Room 6315
Phone: 314-362-0535
jskeath@wustl.edu

Identification of the genes and the elucidation of the molecular mechanisms that regulate the early events of *Drosophila* central neurogenesis; illumination of the mechanisms that form, pattern and specify the individual identities of the progenitor cells of the *Drosophila* embryonic central nervous system.

Gary D. Stormo, PhD

Couch Biomedical Research Building, Room 4208
Phone: 314-747-5534
stormo@wustl.edu

Computational biology of protein-DNA interactions, RNA folding, gene and promoter finding; biochemical analysis of DNA-protein interactions and gene regulation.

Tychele Turner, PhD

Couch Biomedical Research Building, Room 5302
Phone: 314-273-8517
tychele@wustl.edu

The focus of the Turner laboratory is the discovery and characterization of genetic etiological factors involved in neurodevelopmental disorders. We utilize both computational and experimental approaches to explore this genetic architecture.

Ting Wang, PhD

Couch Biomedical Research Building, Room 5211
Phone: 314-286-0865
twang@wustl.edu

Our lab uses genomics and epigenomics approaches to investigate how epigenetic factors determine cell fate. We study cell fate in normal development, differentiation, and regeneration; cell fate in tumorigenesis and epigenetic therapy; and cell fate in evolution.

John T. Milliken Department of Medicine

Instruction in medicine is provided during all three phases of the new Gateway Curriculum. This begins with immersive experiences and clinical skills that are introduced in Phase 1, bringing immediate clinical context to the foundational sciences. It continues during the Phase 2 Internal Medicine clerkship, where students directly apply knowledge and care to patients in a supervised setting, and it extends into the required Internal Medicine advanced clinical rotation and elective courses in Phase 3.

Website: <https://internalmedicine.wustl.edu>

Faculty

The Department of Medicine's general medicine teaching services at Barnes-Jewish Hospital and the Veterans Administration Medical Center (St. Louis) are under the following directors:

Victoria J. Fraser, MD

Adolphus Busch Professor of Medicine and Chair

Jeffrey S. Crippin, MD

Marilyn E. Bornefeld Chair in Gastrointestinal Research and Treatment
Professor of Medicine
Vice Chair of Clinical Programs

Nancy K. Sweitzer, MD, PhD

Professor of Medicine
Vice Chair of Clinical Research

Abby L. Spencer, MD

Professor of Medicine
Vice Chair of Education

Angela L. Brown, MD

Professor of Medicine
Vice Chair of Health Equity

Thomas Ciesielski, MD

Associate Professor of Medicine
Vice Chair of Patient Safety

Peggy L. Kendall, MD

Virginia Minnich Distinguished Professor of Medicine
Chief, Division of Allergy and Immunology

Richard W. Gross, MD, PhD

Professor of Medicine
Chief, Division of Bioorganic Chemistry and Pharmacology

Roberto Civitelli, MD

Sydney M. & Stella H. Schoenberg Professor of Medicine
Chief, Division of Bone and Mineral Diseases

Sumanth Prabhu, MD

Lewin Distinguished Professor of Cardiovascular Diseases
Chief, Division of Cardiology/Cardiology Diseases

Lynn A. Cornelius, MD

Winfred A. and Emma R. Showman Professor of Dermatology in Medicine
Chief, Division of Dermatology

Clay F. Semenkovich, MD

Irene E. and Michael M. Karl Professor of Endocrinology and Metabolism in Medicine
Chief, Division of Endocrinology, Metabolism and Lipid Research

Nicholas O. Davidson, MD

John E. and Adaline Simon Professor of Medicine
Chief, Division of Gastroenterology

Margaret L. (Molly) McNairy

Professor of Medicine
Chief, Division of General Medicine, Geriatrics, and Hospital Medicine

Samuel Klein, MD

William H. Danforth Professor of Medicine and Nutritional Science
Chief, Division of Geriatrics and Nutritional Sciences

Elaine M. Majerus, MD, PhD

Professor of Medicine
Co-Chief, Division of Hematology

Stephen Oh, MD, PhD

Associate Professor of Medicine
Co-Chief, Division of Hematology

Jennifer A. Philips, MD, PhD

Theodore and Bertha Bryan Professorship in Environmental Medicine #1
Professor of Molecular Microbiology
Co-Chief, Division of Infectious Diseases

William G. Powderly, MD

Dr. J. William Campbell Professor of Medicine
Co-Chief, Division of Infectious Diseases

Benjamin D. Humphreys, MD, PhD

Joseph P. Friedman Professor of Renal Diseases in Medicine
Chief, Division of Nephrology

John F. DiPersio, MD, PhD

Virginia E. and Sam J. Golman Professor of Medicine
Chief, Division of Oncology

Patrick H. White, MD

The Stokes Family Endowed Chair in Palliative Medicine and Supportive Care Chair and Associate Professor of Medicine
Chief, Division of Palliative Care Medicine

Janet Lee, MD

Selma and Herman Seldin Distinguished Professor in Medicine
Professor of Pathology and Immunology
Chief, Division of Pulmonary and Critical Care Medicine

Christine Pham, MD

Guy and Ella Mae Magness Professor of Medicine
Chief, Division of Rheumatology

Carlos Bernal-Mizrachi, MD

Philip E. & Carolyn E. Cryer Professor of Medicine
Chief, Veteran's Administration

Visit our website for more information about our faculty and their appointments.

A**Christopher Abraham, M.D.**

Associate Professor of Medicine
Bachelor of Science, Medical College of Georgia, 2005
Doctor of Medicine, Saint Louis University, 2006

Gail G Ahumada, M.A., M.D.

Associate Professor Emerita of Clinical Medicine
Bachelor of Arts, Stanford University, 1961
Master of Arts, Stanford University, 1962
Doctor of Medicine, University of California, 1972

B**Stanley J Birge, M.D.**

Emeritus Associate Professor of Medicine
Bachelor of Arts, Amherst College, 1959
Doctor of Medicine, Washington University in St Louis, 1963

C**Lewis Robert Chase**

Professor Emeritus of Medicine

D**James Albert Delmez, M.D.**

Emeritus Professor of Medicine
Bachelor of Arts, Washington University in St Louis, 1969
Doctor of Medicine, University of Rochester, 1973



F

Shangnon Chen Fei

Voluntary Teaching Instructor in Medicine

Victoria J Fraser, M.D.

Professor of Medicine (primary appointment)

Adolphus Busch Professor of Medicine

Head of the Department of Medicine

Bachelor of Science, William Woods University, 1978

Doctor of Medicine, University of Missouri Columbia, 1983

G

Jitendra K Gupta, M.S.

Instructor Emeritus in Clinical Medicine

Master of Science, School Not Found, 1963

H

Tariq Hassan, MBBS

Voluntary Clinical Assistant Professor of Medicine

Aga Khan University, 1989

Jennifer B Hillman, M.S., M.D.

Voluntary Clinical Assistant Professor of Medicine

Bachelor of Science, University of Missouri Columbia, 1996

Doctor of Medicine, University of Missouri Columbia, 2001

Master of Science, University of Cincinnati-Main Campus, 2008

L

Stephen S Lefrak, M.D.

Professor Emeritus of Medicine

Bachelor of Arts, Colgate University, 1960

Doctor of Medicine, State University of New York, 1965

Bruce Levy, M.D.

Professor of Medicine (primary appointment)

Dean of the School of Medicine

Executive Vice Chancellor for Medical Affairs

George and Carol Bauer Dean of WashU Medicine

Joseph Erlanger Distinguished Professor

University of Pennsylvania, 1984

University of Pennsylvania, 1988

Morton A Levy, M.D.

Associate Professor Emeritus of Clinical Medicine

Bachelor of Arts, University of California, 1957

Doctor of Medicine, Washington University in St Louis, 1961

Alex Li

Voluntary Teaching Assistant Professor of Medicine

N

J. Roger Nelson, M.D.

Assistant Professor Emeritus of Clinical Medicine

Bachelor of Arts, Washington University in St Louis, 1949

Doctor of Medicine, Washington University in St Louis, 1953

P

Mabel Louise Purkerson, M.D.

Professor Emerita of Medicine

Bachelor of Arts, Erskine College and Seminary, 1951

Doctor of Medicine, University of South Carolina (Duplicate of

University of South Carolina Columbia), 1956

R

Willie Ray Ross, M.P.H., M.D.

Professor of Medicine (primary appointment)

Alumni Endowed Professorship In Medicine

Associate Dean for Diversity

Bachelor of Science, Yale University, 1980

Doctor of Medicine, Washington University in St Louis, 1984

Master of Public Health, Saint Louis University, 2007

S

Paul Joseph Scheel, M.A., M.D.

Professor of Medicine (primary appointment)

Chief Executive Officer-Faculty Practice Plan

Vice Chancellor for Clinical Affairs

Bachelor of Science, Lynchburg College, 1983

Doctor of Medicine, Georgetown University, 1987

Master of Arts, Johns Hopkins University, 2001

Gabe E Soto

Voluntary Teaching Assistant Professor of Medicine

T

Peter G Tuteur, M.D.

Associate Professor Emeritus of Medicine

Bachelor of Arts, Johns Hopkins University Medical (Duplicate of Johns Hopkins University), 1962

Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1966

Z

John F. Zalewski, M.D.

Voluntary Teaching Assistant Professor of Medicine

Bachelor of Science, Clarkson University, 1973

Doctor of Medicine, State University of New York at Buffalo, 1980

Research Electives

Medicine Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

For information about Primary Care Summer Preceptorships (p. 248), please refer to the information at the bottom of this section.

John P. Atkinson, MD

Clinical Sciences Research Building, 10th Floor

Phone: 314-362-8391

A clinical research elective is offered in the evaluation of patients with complement deficiency or overactivity states and with undiagnosed rheumatic disease syndromes.

Roberto Civitelli, MD

BJC Institute of Health, 11th Floor, Musculoskeletal Research Center

Phone: 314-454-8408

Biology of cell-cell interactions and communication in bone via gap junctions and cell adhesion molecules; function of connexins and cadherins in transcriptional control of osteoblast differentiation, osteoclastogenesis, and mechanotransduction; modulation of mesenchymal lineage allocation and osteogenic differentiation by cadherins and beta-catenin signaling.

Nicholas O. Davidson, MD

910 Clinical Sciences Research Building, North Tower

Phone: 314-362-2027

Our focus is on the genetic pathways of nonalcoholic fatty liver disease (NAFLD) and colorectal cancer development. We have two major areas of research interest. Our laboratory is interested, first, in the molecular mechanisms of hepatic steatosis and the pathogenesis of NAFLD. This is the most prevalent liver disease in the United States, likely affecting a quarter of the population. We have generated genetically manipulated mouse strains that offer insights into the mechanisms of hepatic steatosis. The student would work as part of a team, designing and conducting experiments that will test hypotheses concerning the mechanisms and consequences of hepatic steatosis. These studies will primarily involve mouse genetics, examining the expression of candidate genes under a variety of nutritional and pharmacologic settings that modulate hepatic lipid metabolism. In addition, we are using microarrays to study the spectrum of genetic changes that may predict the extent of hepatic lipid accumulation in patients with steatohepatitis. Our goal is to test hypotheses using mouse genetics and to extend these studies to examine the same pathways in humans with NAFLD. Our second area of interest concerns the genetic pathways involved in colorectal cancer, the second leading cause of cancer-related deaths. We have developed a novel strain of mice in which the dominant effects of mutations in the APC tumor suppressor gene have been abrogated through deletion of an RNA binding protein, apobec-1. This deletion has a major effect on the expression of cox-2, abrogating the increase in expression seen in human colonic adenomas and wild-type mouse intestinal adenomas. These findings suggest that apobec-1 is a genetic modifier of colon

cancer development. We will study the importance of apobec-1 expression in human colon cancer specimens and continue our murine genetic studies of this novel pathway for modulating colon cancer development and progression.

Bradley Evanoff, MD, MPH

Phone: 314-454-8638

Our primary interest is on occupational medicine epidemiology and intervention research. Our research involves the use of epidemiology methods to characterize associations between diseases and work-related exposures. We are also doing workplace intervention studies to prevent injuries and illnesses and to improve healthy diet and physical activity among working populations. During an elective in occupational medicine epidemiology research, students will learn how to use epidemiologic methods to investigate disease processes by working on a mutually agreed-on topic of interest related to occupational diseases. Other activities can include worksite visits and intervention projects as well as involvement with worksite health promotion and policy making. Elective length is variable, depending on individual circumstances. Please contact Dr. Evanoff to discuss this research.

Gregory I. Goldberg, PhD

Wohl Clinic, 4th Floor

Phone: 314-362-8172

Role of secreted extracellular matrix metalloproteases in tissue remodeling; structure and function of the metalloproteases.

Richard W. Gross, MD, PhD

4525 Scott Avenue, East Building

Phone: 314-362-2690

Lipid mediators of signal transduction in the cardiovascular system; characterization of regulatory mechanisms responsible for the liberation of lipid second messengers during cellular activation; roles of phospholipases in mediating the metabolic syndrome and end-organ tissue damage.

Stacey House, MD, PhD

Phone: 314-362-8070

houses@wustl.edu

Lisa Hayes

Phone: 314-362-4362

hayesl@wustl.edu

Emergency medicine clinical research is the primary focus of this lab. This type of research involves the gamut of research designs, from retrospective cohort studies ("The Use of B Hydroxy Butyrate Point-of-Care Testing in Diabetic Ketoacidosis") to prospective clinical trials ("Biomarkers in Traumatic Brain Injury") to the evaluation of health care systems and emergency department processes ("Effects of a Triage Process Conversion on the Triage of High Risk Presentations") to the analysis of health policy issues ("Rate of Follow-up to a Primary Care Clinic and Subsequent Emergency Department Utilization among an Urban ED Population"). Students will learn the basic clinical



research designs and will be able to articulate the benefits and drawbacks of each. They will be involved in hypothesis generation and study design for projects that are at that stage. For ongoing projects, they will learn about the informed consent process and be involved in screening for study subjects and subject selection and enrollment. They will be allowed to consent for studies judged to be of minimal risk. Students will be taught important rules regarding data acquisition and entry, particularly as these relate to standards that have been set forth in the medical literature. They will learn about bias and inter-rater reliability. Students will participate in data entry, data analysis, and subsequent abstract/manuscript preparation based on their level of interest and time commitment. Students will meet weekly with one of the course directors to discuss study progress and to identify any roadblocks to study completion. These meetings will also serve as a forum for one-on-one education of the student regarding study methodology, ethical issues in research, and various resources available to the clinical researcher at Washington University.

Sandor J. Kovacs, MD, PhD

9965 Clinical Sciences Research Building
Phone: 314-362-8901

This experience is geared toward students with math, physics and engineering backgrounds. The cardiovascular biophysics research elective concentrates on physiologic modeling and the comparison of model predictions to in vivo human data. The minimum elective time is eight weeks.

Marc S. Levin, MD, and Deborah C. Rubin, MD

922/924 Clinical Sciences Research Building
Phone: 314-362-8933 or 314-362-8935

Students will be members of a collaborative research team headed by Drs. Levin and Rubin (Department of Medicine) investigating the mechanisms underlying the intestinal adaptive response that occurs to compensate for the loss of functional small intestine. A second project focuses on epithelial-mesenchymal interactions and their role in regulating gut epithelial proliferation carcinogenesis and the normal and cancer stem cell niche. Specific mechanisms under investigation include the function of an immediate early gene *Tis7* on gut adaptation after resection or injury. The role of myofibroblast protein epimorphin in regulating cell proliferation and colon carcinogenesis is being explored. The student will have the opportunity to learn basic molecular biology and physiology as they relate to small intestinal growth and function. Examples of techniques that are used in these studies include small animal surgery and colitis and cancer models (mice and rats), molecular biological techniques including PCR, Northern blotting, vector construction for the production of transgenic and knockout mouse models, in situ hybridization and immunohistochemistry.

Jason C. Mills, MD, PhD

Clinical Sciences Research Building, North Tower, Room 1030
Phone: 314-362-4213

We investigate the differentiation of epithelial stem cells in the upper gastrointestinal tract. We study how genes regulate differentiation in mouse models and in vitro in tissue culture, and we correlate our findings with human tissue specimens. Specific projects include the following: (1) understanding how inflammation leads to aberrant differentiation (metaplasia), which is a precursor for cancer; (2) elucidating how master regulatory transcription factors like *Xbp1* and *Mist1* coordinate the massive cytoskeletal and organellar expansion of specialized secretory cells as they differentiate from stem cells; and (3) understanding the mechanisms that regulate how differentiated cells can be reprogrammed into stem cells in gastrointestinal organs like the stomach and the pancreas.

Richard E. Ostlund, MD

8804 Wohl Hospital
Phone: 314-362-8286

Our laboratory focuses on the prevention and treatment of coronary heart disease by studying cholesterol absorption, detoxification and elimination from the body. Direct patient studies that use new stable isotopic cholesterol tracers and mass spectrometry techniques complement in vitro work on the biochemistry of cholesterol transport in cultured cells.

Russell Pachynski, MD

BJC Institute of Health, 7th Floor
Phone: 314-286-2341

Our lab focuses on several aspects of tumor immunology and translational immunotherapy. We utilize mouse tumor models, human tissues and samples, and advanced molecular and immunologic techniques to study leukocyte trafficking in the setting of tumor development and progression. We also have projects focusing on developing novel immunotherapeutics aimed at augmenting the recruitment of beneficial leukocyte subsets into the tumor microenvironment in order to suppress tumor growth. We are utilizing several approaches, such as nanoparticles, fusion proteins and viruses.

Katherine Ponder, MD

8818 Cancer Science Research Building
Phone: 314-362-5188
kponder@wustl.edu

The focus of this lab is on gene therapy for lysosomal storage diseases such as mucopolysaccharidosis (MPS). We have developed a retroviral vector that can be efficiently delivered to the liver of mice and dogs and that results in expression sufficient to reduce many of the clinical manifestations of these genetic diseases. Current studies focus on assessing the therapeutic effect of gene therapy on sites that are affected in MPS (e.g., heart, aorta, bones, joints) and on developing vectors that might be translated into human patients. In addition, we are evaluating the pathogenesis of disease in MPS, which appears to involve the upregulation of destructive proteases in the aorta and possibly other sites. A better understanding of the pathogenesis of disease might result in additional therapies for MPS.

Clay F. Semenkovich, MD

Southwest Tower, 8th Floor
Phone: 314-362-4454

Fatty acid metabolism and its role in atherosclerosis, diabetes, hypertension and obesity; modulation of respiratory uncoupling for the treatment of aging, obesity and vascular disease.

Phyllis K. Stein, PhD

Northwest Tower, Room 13116
Phone: 314-286-1350
pstein@wustl.edu

This lab's main focus is on the clinical significance of heart rate variability and ECG-derived waveform parameters obtained from continuous ambulatory monitoring. This elective affords the student the opportunity to perform research in heart rate variability or in other measurements, like QT variability or T-wave alternans that can be derived from continuous ECG monitoring from Holter recordings or polysomnography recordings in the sleep lab. One area of active research is the identification of heart rate patterns associated with obstructive and central sleep apneas and hypopneas and the relationship of previously unappreciated cycling heart rate patterns and outcomes. Data are also available from mice. Many possible projects are available using our many large existing datasets, using the thousands of stored studies in the sleep lab, or using de novo data collection in a clinical or animal population and in infants. Also, many possible directions for this research are available, from applying traditional and nonlinear HRV to different populations to developing methods to quantify ultradian heart rate variability patterns to developing novel ECG analysis techniques, among others. Also, we are involved with the Cardiovascular Health Study (CHS), a large population-based longitudinal study of risk factors for heart disease and stroke among community-dwelling people more than 65 years old. There is a subset of this population who had Holter recordings (~1400 at baseline, ~800 of the same people five years later, and ~370 minority subjects recorded at the same time as the second CHS recording). These recordings have already been analyzed by us, so there is a large amount of heart rate variability and heart rate pattern data available. There are also subsets of patients from the CHS and from another study (EPHESUS) who are known to have died suddenly, and we have developed a matched control group in order to examine ECG-based differences in those who died suddenly. We also have electronic sleep studies at two time points for about 300 of the CHS Holter participants who also participated in the Sleep Heart Health Study. We have analyzed an additional ~1500 sleep studies from CHS participants who did not have Holter recordings. Thus, there is also an opportunity in the CHS dataset for studies of the relationship of heart rate variability with changes in heart rate variability over time and with a huge number of clinical and demographic factors among the elderly. We also have data on the relationship of Holter-based HRV and sleep apnea patterns to the development of atrial fibrillation after cardiac surgery as well as data from a study of the treatment of depression in treatment-resistant depressed post-MI patients, a study of sickle cell patients, and a study of heart rate variability and echo parameters

in elderly African Americans. Currently, we are also analyzing HRV in premature infants as they mature and HRV as a predictor of response to treatment in babies in the NICU and PICU, using stored 24-hour bedside ECGs.

Heart rate variability and clinical outcomes: The student will be learning about HRV methods and will investigate the relationship of HRV and outcomes in one of our datasets. Because we have clinical and demographic data for about 20,000 subjects for whom continuous ECGs from Holter recordings, sleep studies, and ICU studies are available, as well as some mouse data, the student will be able to choose a project that may lead to a publishable result in an area of interest. The HRV Lab has enough computers and software to accommodate the needs of any interested students.

John Turk, MD, PhD

Southwest Tower, 8th Floor
Phone: 314-362-8190

Phospholipid signaling mechanisms in pancreatic islets is the main focus of this lab. Experience with the mass spectrometric analysis of complex lipids is available.

H.J. Wedner, MD

5002 Steinberg Pavilion, Barnes-Jewish Hospital, North Campus
Phone: 314-454-7937 or 314-454-7377

Asthma care in the inner city: Students will participate in ongoing studies of the delivery of asthma care to inner-city children and adults. The emphasis will be on direct contact between the asthmatic patients and the student, along with an asthma counselor.

Biology of pollen and fungal allergens: Our laboratory has been characterizing the important allergenic proteins from molds and pollen. The allergens are identified using skin-test-sensitive individuals, and the proteins are isolated and characterized by a combination of physiochemical and molecular biological techniques. These studies should lead to better forms of allergy immunotherapy. Students will participate in the isolation, characterization and modification of major allergens from a number of molds, including *Stachybotrys atra* and *Epicoccum nigrum*, and from several pollens, including those from white oak and *Parthenium hysterophorus*, a newly recognized allergen.

Primary Care Summer Preceptorships

Since 1996, the School of Medicine has sponsored a primary care preceptorship program for medical students during the summer between their first and second years of classes. Students select a preceptor in internal medicine, pediatrics or family practice and spend up to eight weeks observing that physician's clinical practice. A stipend is provided to the student. Although many of the preceptors are in St. Louis, others — particularly alumni — are located in cities throughout the country.



Courses

MEDICINE 8010 Rheumatology (Clinical Elective)

Students will participate in the diagnostic work-up and management of patients with conditions such as: systemic lupus erythematosus, rheumatoid arthritis, scleroderma, vasculitis, spondyloarthropathies, and gout. There is less exposure to osteoarthritis and regional musculoskeletal problems. By working closely with faculty members, fellows, and medical residents, students actively contribute to the care of rheumatology patients through inpatient consultations and outpatient clinics at Barnes-Jewish Hospital. An emphasis is placed on the physical examination of joints and the musculoskeletal system, synovial fluid analysis, and interpretation of diagnostic tests and radiographs. Students attend rheumatology conferences. This elective enrolls students in the inpatient rheumatology consult service. Please contact the elective Course Director if you prefer a predominantly outpatient rotation, a mixed (inpatient and outpatient) learning experience, or exposure to a specific interest (i.e. adult-pediatric rheumatology, autoimmune eye disease, dermatology-rheumatology, etc).

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8020 Geriatric Medicine (Clinical Elective)

This rotation is designed to familiarize students with the principals of comprehensive geriatric evaluation and management, including pertinent medical, psychological, social, and functional assessments of older adults. Students participate in clinical evaluations at the Geriatric Assessment Clinic, Geriatric Medicine Primary Care clinics, Parc Provence Nursing Home, outpatient clinics at the VA Medical Center-Jefferson Barracks (optional), and participate in a home hospice visit. Students attend weekly Geriatric Medicine conferences and are expected to give an oral presentation on a topic or journal article of their choice.

Many clinical activities are off-site from the medical campus; students will be required to coordinate their own transportation to and from such sites.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8030 Inpatient Cardiology (Clinical Elective)

Students will participate as members of the General Cardiology Consult Service at Barnes Jewish Hospital/Washington University School of Medicine. They will be part of a team composed of cardiologists, fellows, and residents that sees a large population of patients with cardiovascular issues and follows them through all aspects of their in-hospital care. Emphasis will be placed on physical examination and the interpretation of cardiac diagnostic tests including electrocardiograms, echocardiograms and coronary angiograms and their role in clinical decision making.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8045 Cardiac Arrhythmias and Electrophysiology (Clinical Elective)

Students will be members of the Cardiac Electrophysiology Consultation Team, which includes faculty members, fellows, residents, and nurse practitioners. The student will serve as the primary assessor for consultations and will, in concert with the rest of the team, complete the patient's assessment and initiation of recommendations and plan, as well as follow up. There is an emphasis

on ECG evaluation and gaining familiarity with indications and details of arrhythmia therapeutics, including catheter ablation procedures, implantable device procedures, assessment, and programming, as well as antiarrhythmic drug therapy.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8050 Heart Failure and Transplant Cardiology (Clinical Elective)

This rotation is intended to provide trainees with a comprehensive experience managing patients with advanced heart failure. In addition to daily inpatient rounds, trainees are invited to attend both heart failure and transplant clinics. Further, the curriculum is supplemented by a syllabus that contains the critical literature pertinent to this patient population. The trainees will also have experience with the evaluation of patients for operative heart failure therapies and will have the opportunity to observe these surgical procedures.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8055 Dermatology (Clinical Elective)

The aim of this elective is to provide a guide for students so they are able to appreciate dermatology within the broader perspectives of medicine and biology. Emphasis will be placed on the dermatologic variations encountered in a normal physical examination of the skin, the identification of common skin diseases, dermatologic clues to systemic disease, as well as those dermatologic conditions that are life-threatening. The student will participate in outpatient care in the Barnes-Jewish Hospital, VA, and affiliated clinics. Students will attend all clinical teaching rounds and conferences in addition to the basic science and cutaneous histopathology conferences.

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 8075 Clinical Gastroenterology and Hepatology (Clinical Elective)

The GI Hepatology elective is integrated into a very active inpatient and endoscopy service at Barnes-Jewish Hospital. Students will participate in the evaluation of inpatients with a spectrum of gut and liver disorders, make patient rounds with the faculty and fellows, and have responsibility for patients on whom consultations have been requested. In addition, they will observe general endoscopic techniques and participate in GI conferences.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8080 Management of Inflammatory Bowel Disease (Clinical Elective)

This immersive elective provides a comprehensive exploration of inflammatory bowel disease, focusing on the diagnosis and management of patients with Crohn's disease and ulcerative colitis. Students will actively participate in outpatient clinics where patients are referred for specialized care, gaining firsthand experience in the use of biologics and advanced immunomodulatory therapies. The elective also covers the inpatient management of patients with active IBD, including the integration of multidisciplinary care and the nuances of therapeutic decision-making in acute and complex cases. Additionally, students will observe the endoscopic evaluation of IBD, including advanced therapeutic endoscopy procedures, to better understand disease assessment and procedural interventions in this specialized field.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8090 Hematology and Hemostasis (Clinical Elective)

Activities include work-up of patients at Barnes-Jewish Hospital under the supervision of the hematology fellow and faculty; attendance at daily clinical rounds for 1 - 1.5 hours per day. These are staffed by a senior faculty in the Division of Hematology.

In addition to evaluation of patients with hematologic disorders, the student will gain additional analytic skills including:

1. Interpret and integrate laboratory data in the diagnosis of anemia and other cytopenias
2. Review peripheral blood and bone marrow morphology,
3. Analyze laboratory data for the diagnosis of thrombophilia and bleeding
4. Discern the principles of blood banking and pheresis

The students will have the opportunity to follow patients with sickle cell disease and understand the treatment of this disorder. The student is expected to attend and participate in the weekly hematology conference.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8095 Bone and Mineral Diseases (Clinical Elective)

This course is designed to acquaint the student with the clinical, radiological and pathological manifestations and treatment of disorders of bone and mineral metabolism, including osteoporosis, Paget's disease of bone, hyperparathyroidism, osteomalacia, chronic kidney disease bone and mineral disease and more rare disorders of bone development and mineral homeostasis. During the pediatric rotations will have exposure to pediatric metabolic bone diseases (heritable or acquired), heritable disorders of connective tissue, skeletal dysplasias and clinical dysmorphology.

The student will rotate through the clinics of the Bone Health Program and see patients at the Center for Advanced Medicine, Barnes-Jewish West County Hospital, Center for Advanced Medicine South, and St. Louis Children's Hospital, under the guidance of Division faculty. The student will also learn the principles and best use of bone densitometry in clinical practice, and participate in the histological assessment of bone biopsies, based on case availability. Medical students will present interesting cases or a pertinent topic related to bone metabolism at the Metabolic Bone Disease Case Conference.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8100 Inpatient Infectious Diseases Consult Service (Clinical Elective)

This elective offers medical students an immersive experience in the evaluation and management of infectious diseases in hospitalized patients across Barnes-Jewish Hospital. Students are typically assigned to one of the general inpatient Infectious Diseases (ID) consult teams, where they will learn the fundamentals of diagnosing and treating a broad spectrum of infections, from common community-acquired illnesses to complex hospital-acquired and opportunistic infections. Under daily supervision by an ID faculty attending, students will follow their own patients, participate actively in clinical decision-making, and engage closely with ID fellows, residents, advanced practice providers, and multidisciplinary teams. They are expected to read relevant literature about their patients' conditions, attend teaching rounds, and participate in ID conferences and educational sessions. Core learning topics include antimicrobial selection and stewardship; appropriate use of antibiotics, antifungal, and antiviral agents; infection control principles; and the role of surgical versus medical management. Students with a strong interest in Transplant Infectious Diseases or Orthopedic/Bone and Joint Infectious Diseases may request assignment to one of these subspecialty consult services. Because these teams have limited capacity, students must contact the course director as early as possible and at least one month in advance to request a subspecialty placement. Subspecialty rotations

provide focused exposure to infections in immunocompromised hosts (including solid organ and stem cell transplant recipients and patients with hematologic malignancies) or to the evaluation and management of native and prosthetic joint infections. Students rotating on these services will gain additional experience with immunosuppressive drug interactions, neutropenic fever, invasive fungal infections, surgical management of bone and joint infections, and collaboration with transplant and orthopedic surgical teams, respectively. Across all rotations, students will develop skills in clinical reasoning, evidence-based management, and multidisciplinary communication while caring for patients with diverse and challenging infectious diseases.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8115 Ambulatory Infectious Disease (Clinical Elective)

The elective is designed to teach students the fundamentals of evaluating clinical infections in the outpatient setting. Students see patients under the supervision of a faculty member and interact with Infectious Disease Fellows and Internal Medicine Residents. Students will participate in the care of patients living with HIV or otherwise immunosuppressed patients as well as general infectious disease patients. The clinic is the primary provider for many patients living with HIV, and students will learn the pathogenesis of HIV, become familiar with most antiretroviral medications, and have the opportunity to learn about opportunistic infections and their prophylaxis. They will also have the opportunity to see patients with bone and joint infections, endovascular infections, endemic and opportunistic mycoses, mycobacterial infections, sexually transmitted diseases, and many other infections. Patients seen will have a wide range of acute and chronic infections, and will include indigent and insured patients across a wide range of ages. The students will play an important role in the management of these patients and will present their assessments and plans to the supervising attending. They are expected to write clinic notes, read the literature about their patients, and participate in clinical conferences.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8125 Inpatient Oncology Consult Service (Clinical Elective)

Medical Oncology is a complex subspecialty that is undergoing a rapid evolution as a result of new systemic treatment approaches that stem from biological insights into the nature of cancer. During the course of the elective, medical students will be able to interact with attending physicians and patients for bedside teaching and attend tumor boards and lectures focused on the care of patients with solid tumors. The student will function as a member of the consult service team. Duties will include performing initial consultations and follow-up care under the supervision of an Oncology attending and an Oncology fellow. At the end of the rotation, the students will appreciate the principles of our approach to cancer patients and should have gained insights into the evaluation and management of patients with newly diagnosed malignancies. The role of surgery, radiation, and systemic treatment will also be an important theme, as well as the conduct of clinical research in this patient population. Students will also learn to care for hospitalized patients suffering from complications from their cancer or from toxicities due to treatments. Oncologic emergencies will be covered. Issues such as palliative care treatment options and end-of-life decision making will be explored as well.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8135 Hospice and Palliative Medicine (Clinical Elective)

The Palliative Medicine elective will focus on the care of patients with life-threatening or debilitating illness throughout the course of their care. Skills in symptom management, communication, and interdisciplinary team-based care will be the focus. Students will spend



the majority of their time on the BJH Palliative Care Service. Based on the individual student's interest, there may also be opportunities to work with the BJC Hospice Team and the St. Louis Children's Hospital Pediatric Advance Care Team (PACT). Students wishing to work with either team should contact the Course Director and Administrative Contact, as well as the instructors of the appropriate team, with as much advance notice as possible as trainee spots are very limited for both. While in the hospital, students will be responsible for seeing patients upon initial assessment as well as delivering follow-up care with the team. Patients will be seen for both end-of-life care as well as symptom management. Students will learn to assess and treat refractory symptoms and participate in complicated advanced care planning. Students will attend interdisciplinary team meetings and may participate in conversations about goals of care and coping with bad news. They may also get hospice experiences at our hospice house (Evelyn's House) and shadow those care providers, if desired. Emphasis will be placed on observing and understanding the psychosocial and spiritual needs of the patients, as well as the impact of the burden on caregivers. Students will be required to give a 10–15-minute presentation to the BJH Palliative Care team at the end of their rotation.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8140 Endocrinology, Diabetes, and Metabolism (Clinical Elective)

The rotation will be divided across general endocrinology and diabetes inpatient consultative services, as well as outpatient faculty clinics as desired. Students will perform evaluations of patients with endocrine and metabolic diseases under supervision of fellows and faculty at Barnes-Jewish Hospital and/or in WashU clinics. They will present cases daily on teaching rounds and participate in case conferences and seminars on a weekly basis. Caring for patients with diabetes and gaining experience with the latest glycemic control technologies (e.g., continuous glucose monitoring, insulin pump therapy) are important parts of the rotation, as is interacting with patients presenting for transgender care and patients with thyroid, pituitary, adrenal, gonadal, bone, and lipid disorders. A variety of outpatient clinics are offered in the division and students will be given the opportunity to customize the learning experience to match their career goals. At the end of the rotation, it is expected that students will have the ability to evaluate and treat a variety of endocrine disorders, as well as initiate inpatient and outpatient management of diabetes including insulin dosing and glucose monitoring.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8145 Outpatient Oncology (Clinical Elective)

Students will gain experience in the initial treatment of newly-diagnosed malignancies and the outpatient management of oncology patients. Participation in multidisciplinary tumor conferences will stress a combined-modality approach to management, incorporating systemic therapy, radiotherapy and surgery. Students will see patients with a variety of malignancies, including lymphoma, myeloma, and tumors of the lung, breast, and colon. Management of hypercalcemia and other paraneoplastic syndromes, as well as cancer pain management, will be covered.

Students will have the opportunity to see how most oncologists spend 90% of their workday. They will observe different styles that oncologists use when presenting news about prognosis, treatment options, and other information to patients while they also learn about the molecular basis for cancer, the mechanisms of action for our therapies (particularly the newer agents which target specific molecular abnormalities), and the key studies that justify the use of therapies (e.g. randomized studies showing that after surgery, chemotherapy will reduce the risk of recurrence from a particular

cancer with a particular regimen). By spending time with clinicians, students will learn how to identify hereditary syndromes, use drugs for symptom relief, and also learn how radiographic and laboratory tests allow oncologists to care for patients.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8160 Pulmonary Medicine (Clinical Elective)

Students will acquire skills in the evaluation and management of patients with pulmonary diseases and in the interpretation of pulmonary function tests. They will gain experience on the inpatient pulmonary consult service, and in the outpatient clinic if desired. They will attend regular pulmonary and critical care medicine conferences.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8165 Bone Marrow Transplantation and Stem Cell Biology (Clinical Elective)

This elective is designed to introduce students to the general inpatient, intensive care, and outpatient management of patients with multiple hematologic malignancies including leukemia, lymphoma, marrow failure states and myeloma. These patients will be treated with chemotherapy, targeted therapies and cellular immunotherapies including chimeric receptor T cells (CART), natural killer cells, bispecific antibody treatments and stem cell transplant (both autologous and allogeneic). As the primary team, the BMT service is responsible for diagnosing and treating all medical problems including many critical care issues that may occur in these patients. These complex patients are often severely immunocompromised, coagulopathic, and at high-risk of multi-organ complications from both their disease and their therapy. Students work closely with residents, fellows, and faculty to develop treatment plans for patients. Students participate in daily rounds discussing general inpatient and intensive care BMT patients and attend outpatient clinic 1 day/wk to see how BMT physicians approach patients faced with difficult decisions to make regarding their care. In addition to multiple weekly conferences, students also attend daily teaching rounds led by faculty to learn the basic science of hematopoiesis, the genomics of leukemia, stem cell biology, gene therapy and cell therapy, transplantation immunology, graft vs host disease and infectious diseases seen in these immunocompromised patients. The average medical student will contribute to the care of inpatients (30-40 patients/day) and will be directly involved in the assessment and care of selected outpatients as well.

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 8175 Clinical Nephrology (Clinical Elective)

Students rotate through inpatient and outpatient experiences to gain exposure to all facets of nephrology. They will spend the majority of their time on an inpatient consult service, gaining exposure to acute and chronic renal failure, glomerulonephritis, and electrolyte disorders. During this time, they will serve as a fully integrated member of the consult team, evaluating underlying causes of kidney disease, performing diagnostic procedures, formulating management plans, and engaging in decision-making discussions with primary services and families. In addition, students will have the opportunity to experience ICU nephrology, transplant nephrology, the various CKD clinics, and all modalities of dialysis, including in-center, home, and peritoneal dialysis.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8180 Kidney Transplantation (Clinical Elective)

This elective course offers medical students an introduction to the field of kidney transplantation. Through a blend of didactic sessions, case discussions, and clinical exposure, students will gain foundational knowledge and practical insight into the multidisciplinary care of kidney transplant patients.

Course Topics Include: Overview of kidney transplantation: indications, evaluation, and surgical principles, basic immunology relevant to transplant rejection and tolerance, principles and protocols of immunosuppressive therapy, post-transplant care and long-term management of kidney transplant recipients, and common complications and their clinical management

By the end of the elective, students will be able to describe the transplant process from evaluation of the potential kidney transplant recipient to post-operative care, understand the rationale behind immunosuppressive regimens, and recognize the critical aspects of caring for kidney transplant recipients.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8185 Adult Allergy and Clinical Immunology (Clinical Elective)

Students will participate in the outpatient Allergy Clinics located in Highlands Medical Building, Barnes-Jewish West County, and the Center for Advanced Medicine South County. Students will participate in allergy skin testing, pulmonary function testing, and drug challenges. They will have the opportunity to see patients with allergic rhinitis, asthma, hives, food allergy, immunodeficiency, eosinophilic esophagitis, hereditary angioedema, mastocytosis, contact allergic dermatitis, eczema, and more. They can attend allergy conferences on Thursday morning. Students have the option to follow a fellow and see inpatient consults at Barnes-Jewish Hospital.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8190 Interventional and Structural Cardiology (Clinical Elective)

This rotation provides medical students with immersive exposure to contemporary interventional and structural cardiology within the high-volume, quaternary-care environment of Barnes-Jewish Hospital and the Washington University School of Medicine. Students observe the full spectrum of diagnostic and therapeutic procedures performed in the cardiac catheterization laboratories, including coronary angiography, percutaneous coronary intervention, intracoronary imaging, coronary physiology assessment, and structural heart interventions. In addition to cath lab exposure, students participate in outpatient interventional and structural cardiology clinics, gaining insight into pre-procedural evaluation, shared decision-making, longitudinal management of coronary and valvular disease, and post-procedural follow-up. During the outpatient phase of the rotation, students will be expected to see patients independently, obtain focused histories, perform targeted examinations, and draft clinical notes that contribute to the visit documentation and care plan. Students engage with interventional cardiology faculty, fellows, advanced practice providers, and the multidisciplinary structural heart team. Emphasis is placed on understanding indications, procedural steps, imaging interpretation, hemodynamic assessment, complication recognition, and the integration of interventional findings into both inpatient and outpatient care pathways.

Credit 2 units.

Typical periods offered: Medicine Year

MEDICINE 8300 Internal Medicine at Missouri Baptist for Visiting Students (Clinical Elective)

This elective is designed to provide final-year medical students with an immersive clinical experience in internal medicine, focusing on the diagnosis and management of adult medical conditions in both inpatient and outpatient settings. Students will function as active members of a multidisciplinary medical team, working under the supervision of internal medicine faculty and residents. Emphasis is placed on critical thinking, clinical decision-making, professionalism, and preparation for internship/residency. By the end of this elective, students are expected to: Develop advanced clinical skills in patient assessment, including comprehensive history-taking and focused physical examination tailored to presenting complaints. Formulate problem lists, differential diagnoses, and evidence-based diagnostic and management plans for common and complex internal medicine conditions. Interpret diagnostic tests, including laboratory studies and imaging, in the context of patient care. Integrate pharmacologic and non-pharmacologic treatment strategies appropriate for adult medical patients. Communicate effectively and professionally with patients, families, and healthcare team members. Demonstrate accountability and ethical comportment in clinical decision-making, patient safety, and professional responsibilities. Participate in teaching conferences: A. On inpatient ward medicine, present cases whom they have cared for in resident report and lead the discussion B. On specialty electives, develop case discussions and literature reviews as requested by the elective director C. Select papers for discussion at intern journal club, analyze, and lead the discussion D. Attend grand rounds weekly E. Attend CPC weekly Meet bi-weekly with Dr. Goodenberger or designee for bilateral feedback

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 8330 Comprehensive Clinical Exam

Comprehensive Clinical Exam

Credit 0 units.

Typical periods offered: Medicine Year

MEDICINE 8880 Outpatient Hematology (Clinical Elective)

Students will gain experience in the diagnostic workup of hematological conditions like low or high blood counts, thrombosis, bleeding, and paraproteinemia. They will get familiar with treatment strategies for a wide variety of benign hematological conditions (e.g. thrombotic microangiopathies, sickle cell disease, thrombosis, and hemophilias) and malignant hematological disorders (e.g. myeloproliferative neoplasms and myelodysplastic syndromes). Students will also learn about the role of procedures like blood/blood fraction exchange (apheresis) and bone marrow biopsy. Participation in hematology case conference will provide insight into approaching a case with evidence-based management strategies and hematology grand rounds will offer formal learning experience in hematology from experts in the area. Students will observe hematologists going through a typical workday and managing difficult conversations (e.g. breaking bad news). They will learn about gaps in the field of hematology, which generate rationale for future research. Students will rotate through outpatient hematology clinics at Siteman Cancer Center and attend the Hematology Case Conference, and Hematology Grand Rounds.

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 9100 Internal Medicine Advanced Clinical Rotation (ACR)

This rotation is designed to imitate intern year in caring for adult hospitalized patients. It is a four-week rotation, which includes night shifts. You will be expected to put in discharge and admission orders, write daily notes, communicate with ancillary staff and consultants, and communicate updates to patients and their families. During the day, you will be expected to take care of 4-6 patients. At night, you will



be expected to provide cross-cover for existing patients and complete new admissions. This rotation will take place at the John Cochran VA Hospital and at Barnes-Jewish Hospital on the medicine firm, cardiology firm or hospitalist services.

Hospitalist and medicine firm see patients admitted for a medical reason. Cardiology firm takes care of patients admitted primarily for a cardiac reason, but these patients often have many medical comorbidities reflective of a general medicine population. The team structure of cardiology and medicine firm services include one attending, one resident and two interns. The team structure of hospitalist will include working directly with a hospitalist attending. The John Cochran VA Hospital sees common medical illnesses but is still a referral center. The VA teams consist of one attending, one resident, and one intern.

Credit 4 units.

Typical periods offered: Medicine Year

MEDICINE 9150 Medicine Intensive Care Advanced Clinical Rotation (ACR)

The Medical Intensive Care Unit ACR is designed to introduce medical students to critical care medicine. The rotation will provide the opportunity to care for critically ill medicine patients presenting with a wide variety of diagnoses including shock, respiratory failure, metabolic derangements, and acute gastrointestinal hemorrhage, amongst others. Students will be expected to learn the basic pathophysiology and treatment approaches of these common MICU disease processes. The MICU ACR will take place in the 8300 and 8400 Medical Intensive Care Units, and the medical students will work on a team comprised of internal medicine residents, pulmonary and critical care fellows, and attending physicians. The rotation will consist of three weeks of days and one week of nights. While on days, the students on the MICU ACR will be expected to follow 3-4 ICU patients, present these patients on rounds, and develop management plans. While on nights, the students will join the residents and fellows in cross covering established patients and admitting new patients to present on rounds the next morning. The management of critically ill patients is an essential skill for an intern in a variety of medical specialties, and the pathology seen in the Medical ICU will allow for students to gain experience in this environment prior to starting their residency.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Molecular Microbiology

The Department of Molecular Microbiology teaches introductory courses in microbiology and pathogenic microorganisms for first-year medical students and graduate students. In conjunction with the Division of Biology & Biomedical Sciences (DBBS) program in Molecular Microbiology and Microbial Pathogenesis, the department also offers a number of advanced courses that are primarily designed for graduate students but also open to medical students. Advanced elective research activities are offered by faculty in the department.

Website: <http://www.microbiology.wustl.edu>

Faculty

Sean P. J. Whelan, PhD

Department Chair

Visit our website for more information about our faculty and their appointments.

B

Wandy L. Beatty, Ph.D.

Associate Professor of Molecular Microbiology (primary appointment)
Bachelor of Science, Montana State University Bozeman, 1989
Doctor of Philosophy, University of Wisconsin Madison, 1994

Douglas E Berg, Ph.D.

Alumni Professor Emeritus of Molecular Microbiology
Bachelor of Science, Cornell University, 1964
Doctor of Philosophy, University of Washington, 1969

Stephen M Beverley, Ph.D.

Professor of Molecular Microbiology (primary appointment)
Ernest St. John Simms Distinguished Professor of Molecular Microbiology
Bachelor of Science, California Institute of Technology, 1973
Doctor of Philosophy, University of California, 1979

Tamara L. Brent, Ph.D., M.D.

Professor of Molecular Microbiology (primary appointment)
Alumni Endowed Professor of Molecular Microbiology
Bachelor of Arts, Johns Hopkins University, 1983
Doctor of Philosophy, Johns Hopkins University, 1991
Doctor of Medicine, Johns Hopkins University, 1991

C

Michael G Caparon, Ph.D.

Professor Emeritus of Molecular Microbiology
Bachelor of Science, Michigan State University, 1981
Doctor of Philosophy, University of Iowa, 1985

D

Gisela Andrea Di Venzio, Ph.D.

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Doctor of Philosophy, Rosario National University, 2014

Siyuan Ding, Ph.D.

Associate Professor of Molecular Microbiology (primary appointment)
Bachelor of Science, Fudan University (#####), 2009
Doctor of Philosophy, Yale University, 2014

Karen W Dodson, Ph.D.

Instructor in Molecular Microbiology (primary appointment)
Bachelor of Arts, University of Missouri Columbia, 1983
Doctor of Philosophy, Washington University in St Louis, 1990

Lisa Drewry, Ph.D.



Instructor in Molecular Microbiology (primary appointment)
Bachelor of Arts, Saint Olaf College, 2012
Doctor of Philosophy, Washington University in St Louis, 2019

F

Mario Federico Feldman, Ph.D.

Professor of Molecular Microbiology (primary appointment)
Doctor of Philosophy, Universidad de Buenos Aires, 2004

H

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Helen L Stoeber Professor of Molecular Microbiology
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Doctor of Philosophy, Northwestern University, 1987

K

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Doctor of Philosophy, University of Toronto, 2012

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Associate Professor of Molecular Microbiology (primary appointment)
Doctor of Philosophy, Michigan State University, 2009

L

Michele LeRoux, Ph.D.

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Doctor of Philosophy, University of Washington, 2015

Yuhao Li, M.S., Ph.D.

Instructor in Molecular Microbiology (primary appointment)
Master of Science, South China Agricultural University (#####), 2014
Doctor of Philosophy, South China Agricultural University (#####), 2014

Zhuoming Liu, Ph.D.

Assistant Professor of Molecular Microbiology (primary appointment)
Doctor of Philosophy, University of Tokyo, 2015

Jennifer K Lodge, Ph.D.

Professor of Molecular Microbiology (primary appointment)
Bachelor of Science, Oberlin College, 1979
Doctor of Philosophy, Washington University in St Louis, 1988

Carolina Beatriz Lopez, M.S., Ph.D.

Professor of Molecular Microbiology (primary appointment)
Theodore and Bertha Bryan Professorship In Environmental Medicine
Bachelor of Science, Pontificia Universidad Catolica, 1992
Master of Science, Pontificia Universidad Catolica, 1995
Doctor of Philosophy, Mount Sinai School of Medicine, 2002

O

Paul D Olivo, Ph.D., M.D.

Voluntary Research Assistant Professor of Molecular Microbiology
Bachelor of Arts, George Washington University, 1972
Doctor of Medicine, University of Florida, 1981
Doctor of Philosophy, University of Florida, 1982

R

Charles M Rice, Ph.D.

Voluntary Research Professor of Molecular Microbiology
Bachelor of Science, University of California, 1974
Doctor of Philosophy, California Institute Technology (Duplicate of California Institute of Technology), 1981

S

Sondra Schlesinger, Ph.D.

Professor Emerita of Molecular Microbiology
Bachelor of Science, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1956
Doctor of Philosophy, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1960

Henry L Schreiber, M.S., Ph.D.

Instructor in Molecular Microbiology (primary appointment)
Associate of Arts, Tyler Junior College, 2004
Bachelor of Science, Tulane University, 2008
Master of Science, University of Texas Tyler, 2011
Doctor of Philosophy, Washington University in St Louis, 2017

Laurence David Sibley, Ph.D.

Professor of Molecular Microbiology (primary appointment)
Alan A and Edith L Wolff Distinguished Professor
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Doctor of Philosophy, Louisiana State University, 1985

Asya Smirnov, D.V.M., Ph.D.

Instructor in Molecular Microbiology (primary appointment)
Doctor of Veterinary Medicine, Moscow Veterinary Academy, 1993
Doctor of Philosophy, Hebrew University of Jerusalem, 2005

Christina Leigh Stallings, M.A., M.S., Ph.D.

Professor of Molecular Microbiology (primary appointment)
Theodore and Bertha Bryan Professor of Environmental Medicine
Professor of Public Health
Bachelor of Science, University of Mary Washington, 1999
Master of Arts, Columbia University, 2001
Master of Science, Columbia University, 2002
Doctor of Philosophy, Columbia University, 2005

T

Niraj Harish Tolia, Ph.D.

Voluntary Research Associate Professor of Molecular Microbiology
Bachelor of Science, Imperial College, 1999
Doctor of Philosophy, Watson School of Biological Sciences, 2004



W

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Professor of Molecular Microbiology (primary appointment)
Robert C. Packman Professorship
Professor of Pathology and Immunology
Bachelor of Science, Stanford University, 1992
Doctor of Philosophy, Massachusetts Institute of Technology, 1998

Sean P. J. Whelan, Ph.D.

Professor of Molecular Microbiology (primary appointment)
Marvin A Brenneke Distinguished Professor of Molecular Microbiology
Head of the Department of Molecular Microbiology
Doctor of Philosophy, University of Reading, 1993

Meng Wu, Ph.D.

Assistant Professor of Molecular Microbiology (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2014

Z

Ting Zhang, Ph.D.

Assistant Professor of Molecular Microbiology (primary appointment)
Doctor of Philosophy, Mississippi State University, 2013

Research Electives

Molecular Microbiology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Stephen M. Beverley, PhD

McDonnell Pediatric Research Building, 10th Floor
Phone: 314-747-2630

Molecular genetics of protozoan parasites and their viruses, including neglected tropical diseases; biosynthesis of the parasite surface, molecular genetics and genomics, glycobiology, virulence and drug action or resistance.

Michael Caparon, PhD

McDonnell Pediatric Research Building, 10th Floor
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Molecular genetics and pathogenicity of the streptococci and other pathogenic gram-positive bacteria.

Siyuan Ding, PhD

McDonnell Pediatric Research Building, 9th Floor
Phone: 314-273-3963

Our lab studies the molecular mechanisms of rotavirus replication, immunity, and pathogenesis; enteric virus-host interactions; and antiviral signaling in the gastrointestinal tract using viral reverse genetics, high-throughput screens, mouse models, and human intestinal organoids.

Tamara L. Doering, MD, PhD

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We study the opportunistic fungal pathogen *Cryptococcus neoformans*, with the dual motivations of elucidating basic biology and identifying potential drug targets. Topic areas include the synthesis of the polysaccharide capsule that is the main cryptococcal virulence factor, host-fungal interactions, transcriptional regulation, fungal cell biology, and genomic determinants of cryptococcal virulence. Current approaches include those of biochemistry, cell and molecular biology, and genetics; studies also include image-based analysis of host-pathogen interactions and computational analyses.

Daniel Goldberg, MD, PhD

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Biochemistry of malaria.

Scott J. Hultgren, PhD

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Our focus is on the pathogenic mechanisms and disease outcomes in the urinary tract. Work in the Hultgren lab blends multiple scientific disciplines to elucidate bacterial and host mechanisms that determine the onset, course and outcome of interactions between a host mucosal surface and bacterial pathogens. Using genetics, genomics, biochemistry, structural biology, high-resolution imaging, animal models, clinical studies and combinatorial chemistry, we have illuminated new ways in which intracellular lifestyles and community behavior play critical roles in the pathogenesis of urinary tract infection. We have uncovered new principles of adhesive pili biogenesis in gram-negative bacteria by the chaperone/usher pathway, delineating the fine molecular details of a donor strand complementation and exchange mechanism by which the energy of final subunit folding is used to complete the assembly and extrusion of pili across the outer membrane. We revealed how uropathogenic *Escherichia coli* use type 1 pili to invade and establish biofilm-like intracellular bacterial communities within bladder cells as part of a mechanism that subverts host defenses and how quiescent intracellular reservoirs can seed recurrent infections. We have uncovered complex networks that govern mucosal epithelial response to infection, which we have shown determines disease outcome. Further, we have made seminal contributions to our understanding of the pathogenesis and response to other uropathogens, polymicrobial infections and catheter-associated UTIs and to the mechanisms by which bacteria form a directed amyloid fiber, curli, which is important in biofilm formation. Together, this work is changing the

way UTIs are evaluated, reshaping models of bacterial infections in general and spawning new technologies to design novel vaccines and antimicrobial therapeutics to diagnose, treat and/or prevent UTIs and their sequelae.

Christina L. Stallings, PhD

BJC Institute of Health, 10th Floor
Phone: 314-286-0276

Our main focus is the molecular pathogenesis of mycobacteria. Our laboratory integrates in vivo disease modeling, molecular biology and biochemistry to provide answers to the fundamental biological questions regarding molecular pathogenesis and to yield therapeutic strategies for the treatment of mycobacterial infections.

Joseph P. Vogel, PhD

McDonnell Pediatric Research Building, 10th Floor
Phone: 314-747-1029

Legionella pneumophila, the causative agent of Legionnaires' pneumonia, replicates inside alveolar macrophages by preventing phagosome-lysosome fusion.

David Wang, PhD

McDonnell Pediatric Research Building, 8th Floor
Phone: 314-286-1123

Our work focuses on the discovery and characterization of novel viruses. We use functional genomic technologies to identify novel viruses from a variety of clinical samples from diseases of unexplained etiology. We then use epidemiologic, molecular and cellular strategies to define the relevance of newly identified viruses to human disease. A range of new viruses — including polyomaviruses, astroviruses and picornaviruses — are currently under investigation.

Sean P. J. Whelan, PhD

McDonnell Pediatric Research Building, 9th Floor
Phone: 314-286-1585

The Whelan Lab research focus is on the molecular mechanisms that underpin gene expression in nonsegmented negative-strand (NNS) RNA viruses — a group of viruses that includes some of the most significant human pathogens in existence (e.g., rabies, ebola, respiratory syncytial virus, measles, mumps, Nipah viruses). Vesicular stomatitis virus (VSV) has served as an important prototype of the NNS RNA viruses for more than 50 years, and Dr. Whelan has played a leading role in this field that can be traced back to the recovery of infectious virus from cDNA. As independent investigators, Dr. Whelan and his colleagues have led the way to understanding the structure and function of the viral replication machinery. The goals of such studies have been to ultimately inform the development of inhibitors against this group of important pathogens and to advance the use of VSV as a vaccine vector, an oncolytic agent, and a neuronal tracer.

Department of Neurology

Neurology covers the diseases of the brain, spinal cord, nerves, and muscles. The Department of Neurology has an extensive presence in each phase of the medical school curriculum. In Phase 1, students are introduced to the basic anatomy and function of the nervous system as well as the major diseases encountered by neurologists in Modules 6 and 7. Students can also rotate on neurology services during their clinical immersions in Phase 1. During Phase 2, students rotate through neurology as one the required core clinical clerkships. During this course, students have extensive exposure to both the inpatient and outpatient practice of neurology. In Phase 3 of the curriculum, students can select a month-long advanced clinical rotation (ACR) in either adult or pediatric neurology. They can also select shorter or more flexible electives in neurology or certain subspecialties of neurology. Various neurology-related keystone integrated science courses (KISCs) are also offered.

For more information about the Department of Neurology, please visit the department website.

Website: <https://neuro.wustl.edu/education>

Faculty

Jin-Moo Lee, MD, PhD

Department Chair

Visit our website for more information about our faculty and their appointments.

A

Nazik Abuelgasim, MB.ChB.

Assistant Professor of Neurology (primary appointment)
Foreign MD equivalent, University of Khartoum, 2010

Aninda Bhat Acharya, M.D.

Voluntary Clinical Instructor in Neurology
Bachelor of Science, University of Kansas, 1992
Doctor of Medicine, University of Kansas, 1996

Dusit Adstamongkonkul

Voluntary Clinical Assistant Professor of Neurology

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Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, Dartmouth College, 2002
Master of Science, University of Medicine and Dentistry of New Jersey, 2004
Doctor of Philosophy, Rutgers University-New Brunswick, 2011
Doctor of Medicine, Rutgers University-New Brunswick, 2013

Saumel Bashir Ahmadi, Ph.D., M.D.

Instructor in Neurology (primary appointment)



Doctor of Medicine, Saurashtra University, 2010
Doctor of Philosophy, University of Toronto, 2018

Muhammad Taher Al-Lozi, M.S., M.D.

Professor of Neurology (primary appointment)
Director, Electrodiagnostic Laboratory
Bachelor of Arts, University of Panjab, 1976
Doctor of Medicine, University of Panjab, 1980
Master of Science, University of Jordan, 1985

Asher Jefferson Albertson, M.S., Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Wyoming, 2005
Master of Science, University of Wyoming, 2007
Doctor of Philosophy, University of Alabama in Birmingham, 2011
Doctor of Medicine, University of Alabama in Birmingham, 2013

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Assistant Professor of Neurology (primary appointment)
Doctor of Medicine, Universidade Federal Fluminense (UFF), 2008

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Doctor of Medicine, School Not Found, 1991

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Master of Science, University of Edinburgh, 2007
Doctor of Philosophy, University of Edinburgh, 2011

Beau Mark Ances, M.S., Ph.D., M.D.

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Vice Chair-Faculty Affairs
Professor of Radiology
Professor of Biomedical Engineering
Melba and Forest Seay Professor of Clinical Neuropharmacology in Neurology
Bachelor of Science, University of Pennsylvania, 1993
Master of Science, London School of Economics and Political Science, 1994
Doctor of Philosophy, University of Pennsylvania, 2000
Doctor of Medicine, University of Pennsylvania, 2001

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Voluntary Clinical Instructor in Neurology
Bachelor of Arts, California State University, 2004
Master of Science, Washington University in St Louis, 2007
Doctor of Philosophy, Washington University in St Louis, 2011

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Section Chief for Cerebral Palsy and Pediatric Movement Disorders
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Doctor of Philosophy, University of Oxford, 2008
Doctor of Medicine, Washington University in St Louis, 2012

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Associate Professor of Neurology (primary appointment)

Bachelor of Arts, University of Southern California, 2004
Master of Arts, Georgetown University, 2006
Doctor of Medicine, Saint Louis University, 2010

Sylvia Awadalla, M.D.

Professor Emeritus of Neurology
Doctor of Medicine, Ohio State University (Duplicate of Ohio State University-Main Campus), 1985

B

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Voluntary Clinical Assistant Professor of Neurology
Peking University Health Science Center (#####), 1996

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Bachelor of Science, Xavier University of Louisiana, 1996
Master of Science, Washington University in St Louis, 2001
Doctor of Philosophy, University of Toledo, 2009

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Bachelor of Science, Brown University, 1995
Doctor of Medicine, Washington University in St Louis, 2001
Doctor of Philosophy, Washington University in St Louis, 2005

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Bachelor of Science, Paris Sud University, 2005
Master of Science, Paris Sud University, 2007
Doctor of Philosophy, Strasbourg University, 2011

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Professor of Neurology (primary appointment)
Charles F and Joanne Knight Distinguished Professor of Neurology
Bachelor of Science, Washington University in St Louis, 1995
Doctor of Medicine, Case Western Reserve University, 2000

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Associate Professor of Neurology (primary appointment)
Associate Professor of Pediatrics
Section Chief of Neonatal Neurology
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Doctor of Philosophy, University of California San Francisco, 2006
Doctor of Medicine, Stanford University, 2012

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Master of Science, University of Antwerp, 2013
Doctor of Science, University of Antwerp, 2016

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Doctor of Medicine, Southern Illinois University Carbondale, 1993

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Doctor of Philosophy, Brandeis University, 2014

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Doctor of Philosophy, Indiana University Bloomington, 1972

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Doctor of Medicine, University of Missouri Columbia, 1980

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Doctor of Philosophy, University of Texas Southwest, 2014

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Bachelor of Science, University of Rochester, 2018
Doctor of Philosophy, Washington University in St Louis, 2024

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Assistant Professor of Radiology
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Doctor of Philosophy, Washington University in St Louis, 2017
Doctor of Medicine, Washington University in St Louis, 2017

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Doctor of Philosophy, State University of New York at Buffalo, 2007
Doctor of Medicine, State University of New York at Buffalo, 2007

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Master of Science, California State Polytechnic University-Pomona, 1977
Doctor of Philosophy, University of Wisconsin Madison, 1981

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Doctor of Philosophy, University of Virginia, 2000

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Voluntary Clinical Associate Professor of Pediatrics
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Doctor of Medicine, Saint Louis University, 1968

C

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Professor of Pediatrics
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Doctor of Medicine, Washington University in St Louis, 1986

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Professor of Radiology
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Doctor of Philosophy, Indiana University Bloomington, 2004

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Doctor of Medicine, University of Tennessee, 1989

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Doctor of Medicine, Washington University in St Louis, 1983

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Doctor of Medicine, Damascus University, 2004
Master of Science, University of Pennsylvania, 2014

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Bachelor of Arts, Fisher More College, 1993
Master of Arts, Washington University in St Louis, 2002
Doctor of Philosophy, Washington University in St Louis, 2002

Luqi Chi, M.S., M.D.

Professor of Neurology (primary appointment)
Doctor of Medicine, Huabei Medical College for Coa, 1984
Master of Science, University of Pennsylvania, 2009

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Professor of Neurology (primary appointment)
Bachelor of Arts, Boston College, 1998
Doctor of Philosophy, Washington University in St Louis, 2004

David B Clifford, M.D.

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Bachelor of Arts, Southwestern University, 1971
Doctor of Medicine, Washington University in St Louis, 1975

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Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2010
Doctor of Philosophy, University of Missouri in St Louis, 2016

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Professor Emeritus of Neurology
Doctor of Medicine, University of Pavia, 1985

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Instructor in Neurology (primary appointment)
Bachelor of Science, Eastern Illinois University, 2016
Doctor of Philosophy, Saint Louis University, 2021

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Professor of Neurology (primary appointment)
Manny and Rosalyn Rosenthal and Dr. John L. Trotter MS Center Chair in Neuroimmunology at Barnes-Jewish Hospital
Chief, Section of Multiple Sclerosis and Neuroimmunology
Bachelor of Science, University of South Alabama, 1976
Doctor of Medicine, University of Alabama in Birmingham, 1980

Nicole Cruz

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Bachelor of Science, University of Florida, 2014
Doctor of Medicine, University of Florida, 2018

D

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Bachelor of Science, Universidade Federal do Rio Grande do Sul (UFRGS), 2011
Master of Science, Universidade Federal do Rio Grande do Sul (UFRGS), 2014
Doctor of Philosophy, University of Michigan Ann Arbor, 2020

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Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, University of California Berkeley, 2013
Doctor of Medicine, Saint Louis University, 2018

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Assistant Professor of Pediatrics
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2006

Doctor of Medicine, University of Illinois at Chicago, 2009

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Assistant Professor of Neurology (primary appointment)
Bachelor of Science, Cardinal Stritch University, 2007
Master of Health Administration, Walden University, 2016
Doctor of Medicine, American International College, 2016

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Section Chief - Section of General Neurology and Headache Medicine
Bachelor of Arts, University of Texas Austin, 1996

Doctor of Philosophy, Cornell University, 2003
Doctor of Medicine, Cornell University, 2004

Saurav Das, M.D.

Associate Professor of Neurology (primary appointment)
Doctor of Medicine, Stanley Medical College, 2013

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Assistant Professor of Neurology (primary appointment)
Bachelor of Science, Emory University, 2002
Doctor of Philosophy, Emory University, 2009
Doctor of Medicine, Vanderbilt University, 2011

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Baccalaureatus, Harvard University, 1997
Doctor of Philosophy, University of Kentucky, 2005
Doctor of Medicine, University of Kentucky, 2007

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Executive Vice Chair- Department of Neurology
Doctor of Medicine, Federal University of Ceara, 2005

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Bachelor of Science, Central Michigan University, 2010
Doctor of Philosophy, University of Nebraska Medical Center, 2017
Doctor of Medicine, University of Nebraska Medical Center, 2019

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Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, University of Virginia, 1990
Master of Science in Social Work, University of Texas Austin, 1993
Juris Doctor, University of Texas Austin, 1998

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Bachelor of Science, Dartmouth College, 2001
Doctor of Philosophy, Oxford University (Duplicate of University of Oxford), 2006
Doctor of Medicine, Harvard University, 2008

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Professor of Neurology (primary appointment)
Doctor of Medicine, McMaster University, 2000

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Bachelor of Science, Savitribai Phule Pune University, 2006
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Doctor of Philosophy, Louisiana State University, 2012

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Bachelor of Science, Princeton University, 1987
Doctor of Medicine, University of San Francisco, 1993

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Professor of Neurology (primary appointment)
Professor of Neurological Surgery

Professor of Anesthesiology
Professor of Occupational Therapy
Bachelor of Arts, State University of New York at Stonybrook, 1974
Master of Arts, University of Louisville, 1978
Doctor of Medicine, University of Kentucky, 1982

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Professor Emeritus of Neurology
Professor Emeritus of Pediatrics
Bachelor of Arts, Duke University, 1963
Doctor of Medicine, Duke University, 1967

Joseph M Dooley, M.D.

Voluntary Clinical Associate Professor of Neurology
Bachelor of Science, Saint Louis University, 1954
Doctor of Medicine, Saint Louis University, 1958

Nico U. Dosenbach, Ph.D., M.D.

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Professor of Psychological & Brain Sciences (Courtesy Affiliation)
Professor of Radiology
Professor of Biomedical Engineering
Professor of Pediatrics
Professor of Occupational Therapy
David M. and Tracy S. Holtzman Professor of Neurology
Bachelor of Arts, Columbia University, 2000
Doctor of Philosophy, Washington University in St Louis, 2008
Doctor of Medicine, Washington University in St Louis, 2008

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Associate Professor of Neurology (primary appointment)
Bachelor of Science, University of Notre Dame, 2005
Doctor of Medicine, Tulane University, 2009

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Assistant Professor of Neurology (primary appointment)
Assistant Professor of Radiology
Doctor of Medicine, University of Alabama in Birmingham, 2014

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Doctor of Medicine, Cairo University, 2015

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Doctor of Philosophy, Northwestern University, 1997
Doctor of Medicine, Northwestern University, 1997

Juan Escandon, M.D.

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Doctor of Medicine, School Not Found, 1989

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Voluntary Clinical Instructor in Neurology

Doctor of Medicine, Smolensk State Medical Academy, 1996

F**Slim Fellah, M.S., Ph.D.**

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Bachelor of Science, Higher Institute of Biotechnol, 2005
Master of Science, Higher Institute of Biotechnol, 2007
Doctor of Philosophy, AIX-MARSEILLE UNIVERSITY, 2012

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Professor of Neurology (primary appointment)
Professor of Orthopedic Surgery
Professor of Anesthesiology
Professor of Neurological Surgery
Vice Chair of Clinical Affairs
Bachelor of Arts, Johns Hopkins University, 1991
Doctor of Medicine, Vanderbilt University, 1995

Andrew Ross Findlay, M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of California Santa Barbara, 2007
Doctor of Medicine, University of California Irvine, 2013

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Professor of Neurology (primary appointment)
Professor of Radiology
Section Chief of Cerebrovascular Disease
Bachelor of Science, Duke University, 1998
Doctor of Medicine, University of Oklahoma, 2002

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Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, Johns Hopkins University, 2003
Doctor of Philosophy, Case Western Reserve University, 2011
Doctor of Medicine, Case Western Reserve University, 2013

Bennett David Frank, Ph.D., M.D.

Voluntary Clinical Instructor in Neurology
Bachelor of Arts, Washington University in St Louis, 1982
Doctor of Philosophy, Beaufort Technical College (Duplicate of Technical College of the Lowcountry), 1987
Doctor of Medicine, Beaufort Technical College (Duplicate of Technical College of the Lowcountry), 1988

Robert P. Fucetola, M.A., Ph.D.

Professor of Neurology (primary appointment)
Section Chief Rehab Department of Neurology
Bachelor of Arts, Washington University in St Louis, 1991
Master of Arts, Washington University in St Louis, 1993
Doctor of Philosophy, Washington University in St Louis, 1997

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Associate Professor of Neurology (primary appointment)
Bachelor of Science, University of New Mexico-Main Campus, 1996
Doctor of Philosophy, University of New Mexico-Main Campus, 2005
Doctor of Medicine, University of New Mexico-Main Campus, 2007



Gilbert Gallardo, M.S., Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Texas El Paso, 1999
Master of Science, University of Texas San Antonio, 2002
Doctor of Philosophy, University of Texas Southwest, 2008

Claudia Gambrah-lyles, M.D.

Instructor in Neurology (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2013
Doctor of Medicine, University of Pennsylvania, 2019

Daniel Garbin Di Luca, M.S., M.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Medicine, Universidade Federal Fluminense (UFF), 2015
Master of Science, University of Toronto, 2023

Stefanie Geisler, M.D.

Associate Professor of Neurology (primary appointment)
Doctor of Medicine, Humboldt University, 2001

Nupur Ghoshal, Ph.D., M.D.

Professor of Neurology (primary appointment)
Adjunct Lecturer - Biology
Professor of Psychiatry
Bachelor of Science, Iowa State University, 1995
Doctor of Philosophy, Northwestern University, 2001
Doctor of Medicine, Northwestern University, 2003

James Anthony Giles, Ph.D.

Voluntary Research Assistant Professor of Neurology
Doctor of Philosophy, University of Manchester, 2012
Bachelor of Science, University of Manchester, 2013

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Voluntary Clinical Instructor in Neurology
Bachelor of Arts, Washington University in St Louis, 1971
Doctor of Philosophy, Washington University in St Louis, 1977
Doctor of Medicine, Washington University in St Louis, 1986

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Bachelor of Science, Brandeis University, 2010
Doctor of Medicine, Technion Israel Institute of Technology, 2016

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Associate Professor of Neurology (primary appointment)
Associate Professor of Pediatrics
Bachelor of Arts, Indiana University Bloomington, 2004
Bachelor of Science, Indiana University Bloomington, 2004
Doctor of Philosophy, Washington University in St Louis, 2012
Doctor of Medicine, Washington University in St Louis, 2012

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Doctor of Philosophy, University of Minnesota, 1979

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Vice Chair - Division of Pediatric Neurology
Section Chief of Pediatric Epilepsy
Bachelor of Science, Bates College, 2001

Doctor of Osteopathic Medicine, University of New England, 2009

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Associate Professor of Neurology (primary appointment)
Section Chief - Pediatric Neurocritical Care Medicine
Associate Professor of Pediatrics
Associate Professor of Radiology
Associate Director of the Division of Pediatric and Developmental Neurology
Bachelor of Science, Furman University, 2002
Doctor of Medicine, University of Virginia, 2006
Master of Science, Washington University in St Louis, 2016

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Director - Neurofibromatosis Center
Professor of Pediatrics
Professor of Genetics
Professor of Neurological Surgery
Bachelor of Science, University of Michigan Ann Arbor, 1979
Master of Science, University of Michigan Ann Arbor, 1980
Doctor of Philosophy, University of Michigan Ann Arbor, 1984
Doctor of Medicine, University of Michigan Ann Arbor, 1986

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Doctor of Medicine, Seoul National University, 2010
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Bachelor of Arts, McGill University, 1956
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Assistant Professor Emeritus of Clinical Neurology
Bachelor of Arts, Rice University, 1953
Doctor of Medicine, University of Texas Austin, 1957

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Voluntary Clinical Instructor in Neurology

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Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, Tougaloo College, 2010
Master of Science, Mississippi College, 2012
Doctor of Medicine, University of Mississippi, 2017

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Professor of Psychological & Brain Sciences
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Bachelor of Music, New York University, 2002
Master of Science, Fordham University, 2005
Doctor of Philosophy, Fordham University, 2009

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Bachelor of Arts, Saint Johns University, 1970
Doctor of Medicine, Washington University in St Louis, 1977

Robert John Heuermann, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2008
Doctor of Philosophy, Northwestern University, 2015
Doctor of Medicine, Northwestern University, 2017

Kristin Hannah Hinrichs, Ph.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Philosophy, Saint Louis University, 2014

Robert Edward Hogan, M.D.

Professor of Neurology (primary appointment)
Bachelor of Arts, Augustana College South Dakota, 1985
Doctor of Medicine, University of Missouri Columbia, 1989

Derek Lance Holder, M.S., M.D.

Associate Professor of Neurology (primary appointment)
Bachelor of Science, Washington University in St Louis, 2007
Master of Science, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2008
Doctor of Medicine, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2012

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Professor of Neurology (primary appointment)
Barbara Burton and Reuben M Morriss III Distinguished Professorship
Director - Hope Center for Neurological Disorders
Director- Knight Alzheimer's Disease Research Center
Professor of Developmental Biology
Bachelor of Science, Northwestern University, 1983
Doctor of Medicine, Northwestern University, 1985

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Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of California San Diego, 2009
Doctor of Medicine, Semmelweis University, 2016

Chung Hsu, Ph.D., M.D.

Voluntary Research Professor of Neurology
Doctor of Medicine, National Taiwan University, 1970
Doctor of Philosophy, University of Virginia, 1975

Helen Hwang, Ph.D., M.D.

Instructor in Neurology (primary appointment)
Bachelor of Science, University of California San Diego, 2005
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2013

Doctor of Medicine, University of Illinois at Chicago, 2016

I**Jill Christine Isenberg, M.S., Ph.D.**

Voluntary Clinical Instructor in Neurology
Bachelor of Arts, Wake Forest University, 1998
Master of Science, Wake Forest University, 2003
Doctor of Philosophy, Wake Forest University, 2005

J**Rachel Jensen**

Voluntary Clinical Assistant Professor of Neurology

Eugene Malcolm Johnson, Ph.D.

Professor Emeritus of Neurology
Bachelor of Science, University of Maryland (Duplicate of University of Maryland-College Park), 1966
Doctor of Philosophy, University of Maryland (Duplicate of University of Maryland-College Park), 1970

Ronald Lee Jones

Voluntary Clinical Assistant Professor of Neurology

Yo-El S Ju, M.D.

Professor of Neurology (primary appointment)
Barbara Burton and Reuben M Morriss III Professorship
Bachelor of Science, Harvard University, 2001
Doctor of Medicine, Columbia University, 2005

K**Peter Kang, M.D.**

Associate Professor of Neurology (primary appointment)
Bachelor of Science, SUNY Geneseo, 2008
Doctor of Medicine, University of Pittsburgh, 2012

Richard T. Katz, M.A., M.D.

Voluntary Clinical Professor of Neurology
Bachelor of Arts, University of Rochester, 1977
Master of Arts, Cleveland Institute of Music, 1979
Doctor of Medicine, Case Western Reserve University, 1981

Benjamin Kay, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Assistant Professor of Pediatrics
Assistant Professor of Radiology
Doctor of Philosophy, University of Cincinnati-Main Campus, 2013
Doctor of Medicine, University of Cincinnati-Main Campus, 2015

Salah G. Keyrouz, M.D.

Professor of Neurology (primary appointment)
Section Chief - Section of Neurological Critical Care
Professor of Neurological Surgery
Doctor of Medicine, Université Libanaise (Lebanese University), 2000

Syed Ahmed Khader, M.D.

Voluntary Clinical Instructor in Neurology
Bachelor of Science, School Not Found, 1989
Doctor of Medicine, University of Madras, 1993

Eva Sari Klinman, Ph.D., M.D.

Instructor in Neurology (primary appointment)
Doctor of Philosophy, University of Pennsylvania, 2016
Doctor of Medicine, University of Pennsylvania, 2018
Bachelor of Science, Massachusetts Institute of Technology

Ksenija Kos, M.D.

Voluntary Clinical Associate Professor of Neurology



University of Zagreb, 1990

Paul Thomas Kotzbauer, Ph.D., M.D.

Professor of Neurology (primary appointment)
Professor of Developmental Biology
Bachelor of Science, Northwestern University, 1989
Doctor of Philosophy, Washington University in St Louis, 1997
Doctor of Medicine, Washington University in St Louis, 1997

Walter A Kukull, M.S., Ph.D.

Professor of Neurology (primary appointment)
Professor of Public Health
Bachelor of Arts, University of Washington, 1971
Master of Science, Western Washington University, 1974
Doctor of Philosophy, University of Washington, 1983

Ashok Kumar, M.D.

Voluntary Clinical Assistant Professor of Neurology
Doctor of Medicine, Dow Medical College Karachi, 1985

Terrance T. Kummer, Ph.D., M.D.

Associate Professor of Neurology (primary appointment)
Assistant Dean for Medical Student Research and Scholarship
Bachelor of Science, University of Minnesota, 1999
Doctor of Philosophy, Washington University in St Louis, 2006
Doctor of Medicine, Washington University in St Louis, 2006

L

Eric Carl Landsness, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Philosophy, University of Wisconsin Madison, 2011
Doctor of Medicine, University of Wisconsin Madison, 2013

Erin Lee Langton, M.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Medicine, Eastern Virginia Medical School, 2017

Douglas P. Larsen, M.D.

Professor of Neurology (primary appointment)
Vice Chair- Educational Affairs
Professor of Pediatrics
Bachelor of Arts, Brigham Young University, 1999
Doctor of Medicine, University of Utah, 2003

Osvaldo Jose Laurido-Soto, M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Puerto Rico Rio Piedras, 2010
Doctor of Medicine, Washington University in St Louis, 2014

Jin-Moo Lee, Ph.D., M.D.

Professor of Neurology (primary appointment)
Andrew B. and Gretchen P. Jones Professor of Neurology
Head of the Department of Neurology
Professor of Radiology
Bachelor of Arts, Yale University, 1985
Doctor of Philosophy, Cornell University, 1992
Doctor of Medicine, Weill Cornell Medical College, 1993

Kyeong Philip Lee, M.D.

Voluntary Clinical Associate Professor of Neurology

Tufts University, 1990

Walter Lemann, M.D.

Voluntary Clinical Associate Professor of Neurology
Bachelor of Science, Yale University, 1975
Doctor of Medicine, Tulane University, 1979

Alison M Leston, Ph.D., M.D.

Voluntary Clinical Assistant Professor of Neurology
Bachelor of Science, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1990
Doctor of Philosophy, University of Chicago, 2000
Doctor of Medicine, Washington University in St Louis, 2001

Ashley Levan

Voluntary Clinical Assistant Professor of Neurology

Mingjie Li, M.S., Ph.D., M.D.

Associate Professor of Neurology (primary appointment)
Doctor of Medicine, Jiamusi University (#####), 1983
Master of Science, Harbin Medical University, 1987
Doctor of Philosophy, Kochi Medical School, 1989

Yan Li, Ph.D.

Associate Professor of Neurology (primary appointment)
Doctor of Philosophy, University of Alabama in Birmingham, 2017
Bachelor of Science, Central China Agricultural University (#####, Huazhong Agricultural University), 2007

Amy K Liscis, M.D.

Professor of Neurology (primary appointment)
Bachelor of Science, Rice University, 2000
Doctor of Medicine, Washington University in St Louis, 2004

Jorge Jesus Llibre-Guerra, M.S., M.D.

Assistant Professor of Neurology (primary appointment)
Assistant Professor of Public Health
Doctor of Medicine, Havana University, 2012
Master of Science, Havana University, 2014

Jane Loitman, M.S., M.D.

Voluntary Clinical Assistant Professor of Neurology
Bachelor of Arts, Tufts University, 1982
Master of Science, Georgetown University, 1988
Doctor of Medicine, University of Minnesota, 1992

Justin Matthew Long, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, Indiana University Bloomington, 2004
Doctor of Philosophy, Indiana University Indianapolis, 2014
Doctor of Medicine, Indiana University School of Medicine, 2014

Cindy Ly, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Program Director, Neuromuscular Medicine Fellowship
Bachelor of Science, University of Texas Austin, 2000
Doctor of Philosophy, Baylor College of Medicine, 2008
Doctor of Medicine, Baylor College of Medicine, 2010

Eileen Marie Lynch, Ph.D.

Instructor in Neurology (primary appointment)
Bachelor of Science, Rensselaer Polytechnic Institute, 2013

Doctor of Philosophy, University of Wisconsin Madison, 2020

M

Luigi Maccotta, Ph.D., M.D.

Associate Professor of Neurology (primary appointment)
Associate Professor of Radiology
Bachelor of Science, Saint Peters College, 1994
Doctor of Philosophy, Washington University in St Louis, 2005
Doctor of Medicine, Washington University in St Louis, 2005

Baijayanta Maiti, Ph.D., M.D.

Associate Professor of Neurology (primary appointment)
Associate Professor of Radiology
Doctor of Medicine, Calcutta University, 2003
Doctor of Philosophy, University of Utah, 2010

Raman Kant Malhotra, M.D.

Professor of Neurology (primary appointment)
Section Chief - Section of Sleep Medicine
Doctor of Medicine, University of Missouri Kansas City, 2000

John F Mantovani, M.D.

Voluntary Clinical Associate Professor of Neurology
Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, University of Evansville, 1971
Doctor of Medicine, University of Missouri Columbia, 1974

Soe S Mar, M.D.

Professor of Neurology (primary appointment)
Professor of Pediatrics
Doctor of Medicine, Institute of Medicine, 1987

Robert P Margolis, M.D.

Voluntary Clinical Assistant Professor of Neurology
Bachelor of Arts, Kent State University, 1971
Doctor of Medicine, Saint Louis University, 1975

Talora Louise Martin, M.D.

Assistant Professor of Neurology (primary appointment)
Case Western Reserve University, 2021

Eric Martin McDade, D.O.

Professor of Neurology (primary appointment)
Barbara Burton and Reuben M. Morriss III Professor
Bachelor of Arts, Canisius College, 1998
Doctor of Osteopathic Medicine, Midwestern University Illinois, 2004

Peter R Millar, M.A., Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, Tufts University, 2010
Master of Arts, Washington University in St Louis, 2016
Doctor of Philosophy, Washington University in St Louis, 2020

Timothy M Miller, Ph.D., M.D.

Professor of Neurology (primary appointment)
Clayson Professor of Neurology
Vice Chair-Research
Doctor of Philosophy, Washington University in St Louis, 1998
Doctor of Medicine, Washington University in St Louis, 1998

John Carl Morris, M.D.

Professor of Neurology (primary appointment)
Harvey A and Dorismae Hacker Friedman Distinguished Professor of Neurology
Associate Director- Knight Alzheimer's Disease Research Center
Professor of Occupational Therapy
Professor of Pathology and Immunology
Professor of Physical Therapy
Bachelor of Arts, Ohio Wesleyan University, 1970
Doctor of Medicine, University of Rochester, 1974

Michael Justin Morrissey, Ph.D.

Voluntary Clinical Instructor in Neurology
Doctor of Philosophy, Saint Louis University, 2005

Krista L Moulder, Ph.D.

Professor of Neurology (primary appointment)
Bachelor of Arts, Northwestern University, 1993
Doctor of Philosophy, Washington University in St Louis, 2001

Soumya Mukherjee, M.S., Ph.D.

Assistant Professor of Neurology (primary appointment)
Kharagpur, 2011
Doctor of Philosophy, Calcutta University, 2018

Erik S Musiek, Ph.D., M.D.

Professor of Neurology (primary appointment)
Charlotte and Paul Hagemann Professorship in Neurology
Section Chief - Section of Aging and Dementia
Bachelor of Science, College of William and Mary, 1999
Doctor of Philosophy, Vanderbilt University, 2005
Doctor of Medicine, Vanderbilt University, 2007

Evangelos Pavlos Myserlis, M.D.

Assistant Professor of Neurology (primary appointment)
Aristotle University of Thessaloniki, 2016

N

Robert T Naismith, M.D.

Professor of Neurology (primary appointment)
Bachelor of Science, Case Western Reserve University, 1994
Doctor of Medicine, Case Western Reserve University, 1998

Fabio Augusto Nascimento E Silva, M.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Medicine, Universidade Federal do Paraná (UFPR), 2014

Sarah Naylor, Ph.D.

Assistant Professor of Neurology (primary appointment)
Executive Director of the Tracy Family SILQ Center
Doctor of Philosophy, Washington University in St Louis, 2012

Jeffrey J Neil, Ph.D., M.D.

Professor of Neurology (primary appointment)
Professor of Pediatrics
Doctor of Philosophy, Washington University in St Louis, 1984
Doctor of Medicine, Washington University in St Louis, 1984

Joshua David Newman, M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Virginia, 2014



Doctor of Medicine, Georgetown University, 2018

Susan Searles Nielsen, M.S., Ph.D.

Associate Professor of Neurology (primary appointment)

Associate Professor of Public Health

Bachelor of Arts, The Evergreen State College, 1992

Master of Science, University of Washington, 2000

Doctor of Philosophy, University of Washington, 2004

Anne Fagan Niven, Ph.D.

Professor of Neurology (primary appointment)

Bachelor of Arts, Wellesley College, 1984

Doctor of Philosophy, University of California San Diego, 1992

Scott Norris, M.D.

Professor of Neurology (primary appointment)

Section Chief- Section of Movement Disorders

Professor of Radiology

Bachelor of Arts, Washington University in St Louis, 2000

Doctor of Medicine, University of Missouri Columbia, 2008

O

John Lawrence O'Donnell, M.S., Ph.D.

Assistant Professor of Neurology (primary appointment)

Bachelor of Science, Johns Hopkins University, 2009

Master of Science, University of Rochester, 2013

Doctor of Philosophy, University of Rochester, 2017

Miranda Ethel Orr, Ph.D.

Associate Professor of Neurology (primary appointment)

Doctor of Philosophy, Montana State University Bozeman, 2012

P

Samira Parhizkar, Ph.D.

Instructor in Neurology (primary appointment)

Doctor of Philosophy, Ludwig Maximilians Universität München, 2019

Sheel Jitendra Pathak, M.D.

Associate Professor of Neurology (primary appointment)

Associate Professor of Pediatrics

Bachelor of Science, University of Texas Austin, 2004

Doctor of Medicine, University of Texas Galveston, 2008

Robert Harris Paul, M.S., Ph.D.

Voluntary Research Assistant Professor of Neurology

Bachelor of Science, California State Long Beach (Duplicate of

California State University-Long Beach), 1993

Master of Science, Oklahoma State University (Duplicate of Oklahoma

State University-Main Campus), 1995

Doctor of Philosophy, Oklahoma State University (Duplicate of

Oklahoma State University-Main Campus), 1998

Alan L Pearlman, M.D.

Professor Emeritus of Neurology

Bachelor of Arts, University of Iowa, 1958

Doctor of Medicine, Washington University in St Louis, 1961

David M Peebles, M.D.

Voluntary Clinical Instructor in Neurology

Bachelor of Arts, Vanderbilt University, 1982

Doctor of Medicine, University of Chicago, 1986

Lindsay M Peglar Marsala, M.S., M.D.

Assistant Professor of Neurology (primary appointment)

Assistant Professor of Pediatrics

Bachelor of Science, Tulane University, 2008

Master of Science, Tulane University, 2009

Doctor of Medicine, University of Missouri Columbia, 2013

Karen J Pentella, M.D.

Voluntary Clinical Assistant Professor of Neurology

Bachelor of Science, Ohio State University (Duplicate of Ohio State University-Main Campus), 1975

Doctor of Medicine, Ohio State University (Duplicate of Ohio State University-Main Campus), 1979

Enmanuel Perez, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)

Bachelor of Science, University of Puerto Rico Rio Piedras, 2010

Doctor of Philosophy, University of Miami, 2016

Doctor of Medicine, University of Miami, 2018

Joel S Perlmutter, M.D.

Professor of Neurology (primary appointment)

Elliot H. Stein Family Chair in Neurology at Barnes-Jewish Hospital

Professor of Neuroscience

Professor of Occupational Therapy

Professor of Radiology

Professor of Physical Therapy

Bachelor of Arts, Princeton University, 1975

Doctor of Medicine, University of Missouri Columbia, 1979

Alan Pestronk, M.D.

Professor of Neurology (primary appointment)

Professor of Pathology and Immunology

Bachelor of Arts, Princeton University, 1966

Doctor of Medicine, Johns Hopkins University, 1970

Kalen Petersen, Ph.D.

Assistant Professor of Neurology (primary appointment)

Bachelor of Science, University of Tulsa, 2014

Doctor of Philosophy, Vanderbilt University, 2019

Kellen Kay Petersen, M.S., Ph.D.

Instructor in Neurology (primary appointment)

Bachelor of Science, University of Utah, 2007

Master of Science, New York University, 2009

Doctor of Philosophy, New York University, 2020

Steven E Petersen, Ph.D.

Professor Emeritus of Neurology

Bachelor of Arts, University of Montana Missoula, 1974

Doctor of Philosophy, California Institute Technology (Duplicate of California Institute of Technology), 1982

Daniel Phillips, M.D.

Voluntary Clinical Assistant Professor of Neurology

Bachelor of Science, Northwestern University, 1976

Doctor of Medicine, Washington University in St Louis, 1980

Katherin Elizabeth Portwood, M.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Medicine, Ross University School of Medicine, 2019

Cyril P Pottier, M.S., Ph.D.

Assistant Professor of Neurology (primary appointment)
Assistant Professor of Psychiatry
Bachelor of Science, Paris Descartes University, 2007
Master of Science, Paris Descartes University, 2009
Doctor of Philosophy, University of Rouen, 2013

Stephanie K Powell, M.S., Ph.D.

Voluntary Clinical Instructor in Neurology
Bachelor of Science, University of Notre Dame, 1994
Master of Science, University of Wisconsin Milwaukee, 2000
Doctor of Philosophy, University of Wisconsin Milwaukee, 2004

William John Powers, M.D.

Voluntary Research Professor of Neurology
Bachelor of Arts, Dartmouth College, 1971
Doctor of Medicine, Cornell University, 1975

Ashley Nicole Nielsen Preisser, Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Pittsburgh, 2013
Doctor of Philosophy, Washington University in St Louis, 2019

R

Brad Alan Racette, M.D.

Professor Emeritus of Neurology
Bachelor of Arts, Princeton University, 1988
Doctor of Medicine, Northwestern University, 1992

Christopher Austin Ray, M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, Vanderbilt University, 2011
Doctor of Medicine, University of Alabama at Birmingham School of Medicine, 2018

David Martin Reisler, M.P.H., M.D.

Voluntary Clinical Assistant Professor of Neurology
Bachelor of Arts, Harvard University, 1957
Doctor of Medicine, Washington University in St Louis, 1961
Master of Public Health, Johns Hopkins University Medical (Duplicate of Johns Hopkins University), 1971

Dave A Rengachary, M.D.

Voluntary Clinical Instructor in Neurology
Bachelor of Arts, Northwestern University, 1996
Doctor of Medicine, Northwestern University, 2000

Charles Andrew Roach, M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, Kansas State University, 2013
Doctor of Medicine, University of Kansas, 2018

James R Rohrbaugh, M.D.

Voluntary Clinical Associate Professor of Neurology
Bachelor of Arts, Yale University, 1971
Doctor of Medicine, Ohio State University (Duplicate of Ohio State University-Main Campus), 1974

Monica Rosado Bruno, M.S., Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, University of Puerto Rico, 2015
Master of Science, Albizu University, 2018
Doctor of Philosophy, Albizu University, 2021

Steven Mark Rothman

Voluntary Teaching Assistant Professor of Neurology

Michelle Diane Rudman, M.D.

Instructor in Neurology (primary appointment)
Doctor of Medicine, University of Miami, 2019

Robin C Ryther, Ph.D., M.D.

Associate Professor of Neurology (primary appointment)
Bachelor of Science, University of Missouri Columbia, 1998
Doctor of Philosophy, Vanderbilt University, 2004
Doctor of Medicine, Vanderbilt University, 2006

S

Naresha Saligrama, M.S., Ph.D.

Assistant Professor of Neurology (primary appointment)
Assistant Professor of Pathology and Immunology
Master of Science, Indian Veterinary Research Institute, 2006
Doctor of Philosophy, University of Vermont, 2013

Chihiro Sato, M.S., Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Tokyo, 2003
Master of Science, University of Tokyo, 2005
Doctor of Philosophy, University of Tokyo, 2008

Andrew David Sauerbeck, Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Kentucky, 2005
Doctor of Philosophy, University of Kentucky, 2011

Anneliese M Schaefer, J.D., Ph.D.

Professor of Neurology (primary appointment)
Juris Doctor, Washington University in St Louis, 1988
Doctor of Philosophy, Washington University in St Louis, 2001

Suzanne E. Schindler, Ph.D., M.D.

Professor of Neurology (primary appointment)
Bachelor of Science, Millsaps College, 1999
Doctor of Philosophy, Washington University in St Louis, 2008
Doctor of Medicine, Washington University in St Louis, 2008

Bradley L Schlaggar, Ph.D., M.D.

Voluntary Research Professor of Neurology
Bachelor of Science, Brown University, 1986
Doctor of Philosophy, Washington University in St Louis, 1994
Doctor of Medicine, Washington University in St Louis, 1994

Kathleen Marie Schoch, Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, Bradley University, 2007
Doctor of Philosophy, University of Kentucky, 2013

Earl R Schultz, M.D.

Voluntary Clinical Professor of Neurology



Bachelor of Arts, Southeast Missouri State University, 1952
Bachelor of Science, University of Missouri Columbia, 1953
Doctor of Medicine, Washington University in St Louis, 1955

Wade Self, Ph.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2018

Ashish Sharma, M.S., Ph.D.

Instructor in Neurology (primary appointment)
Bachelor of Science, G.H.G. Khalsa College of Pharmacy, 2011
Master of Science, Shoolini University of Biotechnology and Management Sciences, 2014
Doctor of Philosophy, Shoolini University of Biotechnology and Management Sciences, 2020

Christian T Sheline, Ph.D.

Voluntary Research Associate Professor of Neurology
Bachelor of Arts, Dartmouth College, 1983
Doctor of Philosophy, University of California, 1989

Renee Shellhaas, M.S., M.D.

Professor of Neurology (primary appointment)
David T. Blasingame Professor
Senior Associate Dean for Faculty Promotions and Career Development
Doctor of Medicine, University of Michigan Ann Arbor, 2001
Master of Science, University of Michigan Ann Arbor, 2008

Georgia Shelton, M.P.H., M.D.

Assistant Professor of Neurology (primary appointment)
Baccalaureatus, Harvard University, 2014
Master of Public Health, University of Texas Health Science Center, 2020
Doctor of Medicine, University of Texas Southwestern Medical Center at Dallas, 2020

Todd B Silverman

Voluntary Clinical Instructor in Neurology

Barry A. Singer

Voluntary Clinical Associate Professor of Neurology

Alyssa Erin Smith, M.D.

Assistant Professor of Neurology (primary appointment)
Assistant Professor of Pediatrics
Bachelor of Science, Loyola University Chicago, 2010
Doctor of Medicine, Rush University, 2014

Sean E Smith, M.S., M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Delaware, 2003
Master of Science, State University of New York at Buffalo, 2009
Doctor of Medicine, Saint Louis University, 2015

Christopher D Smyser, M.S., M.D.

Professor of Neurology (primary appointment)
Professor of Pediatrics
Professor of Radiology
Professor of Psychiatry
Professor of Neurological Surgery
Division Chief - Division of Pediatric and Developmental Neurology

A. Ernest and Jane G. Stein Professor of Developmental Neurology
Bachelor of Science, University of Iowa, 1998
Doctor of Medicine, University of Iowa, 2004
Master of Science, Washington University in St Louis, 2016

Barbara Joy Snider, Ph.D., M.D.

Professor of Neurology (primary appointment)
Bachelor of Arts, Northwestern University, 1979
Doctor of Philosophy, University of Texas Southwest, 1989
Doctor of Medicine, University of Texas Southwest, 1989

Michael Snyder, M.D.

Voluntary Clinical Assistant Professor of Neurology
Bachelor of Science, Iowa State University, 1997
Doctor of Medicine, University of Iowa, 2002

Richard S Sohn, M.D.

Associate Professor Emeritus of Neurology
Bachelor of Science, Brooklyn College (Duplicate of CUNY Brooklyn College), 1964
Doctor of Medicine, University of Chicago, 1968

Tara V. Spevack, M.S., Ph.D.

Voluntary Clinical Instructor in Neurology
Bachelor of Science, McGill University, 1987
Master of Science, University of Florida, 1994
Doctor of Philosophy, University of Florida, 1997

Jeremy Fuller Strain, Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Texas Dallas, 2009
Doctor of Philosophy, University of Texas Dallas, 2015

Aaron F Struck, M.D.

Associate Professor of Neurology (primary appointment)
Section Chief of Adult Epilepsy
Doctor of Medicine, University of Wisconsin Madison, 2009

In Sook Sunwoo, M.D.

Instructor Emerita in Neurology
Doctor of Medicine, School Not Found, 1959

Charlene Belle Supnet-Bell, Ph.D.

Associate Professor of Neurology (primary appointment)
Bachelor of Science, University of Manitoba, 1999
Doctor of Philosophy, University of Prince Edward Island, 2010

T

Yunshuo Tang, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Assistant Professor of Ophthalmology and Visual Sciences
Bachelor of Science, University of California Berkeley, 2007
Doctor of Philosophy, University of California San Francisco, 2015
Doctor of Medicine, University of California San Francisco, 2017

Tina Tarnawsky, M.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Medicine, University of Central Florida, 2020

Sandra L Tate, M.D.

Voluntary Clinical Instructor in Neurology

Bachelor of Arts, School Not Found, 1900
Doctor of Medicine, Southern Illinois University (Duplicate of Southern Illinois University Carbondale), 1987

Mengesha A Teshome, M.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Medicine, Addis Ababa University, 1989

Kwee L Thio, Ph.D., M.D.

Professor of Neurology (primary appointment)
Professor of Neuroscience
Professor of Pediatrics
Bachelor of Science, Brown University, 1984
Doctor of Philosophy, Washington University in St Louis, 1992
Doctor of Medicine, Washington University in St Louis, 1992

Jeffrey B. Titus, M.A., Ph.D.

Voluntary Clinical Assistant Professor of Neurology
Bachelor of Science, Evangel College (Duplicate of Evangel University), 1997
Master of Arts, University of Northern Colorado, 1999
Doctor of Philosophy, Ball State University, 2002

Stuart Ramm Tomko, M.D.

Associate Professor of Neurology (primary appointment)
Bachelor of Science, Davidson College, 2005
Doctor of Medicine, Baylor College of Medicine, 2010

Norman Edwin Trevathan, M.S., M.D.

Voluntary Research Professor of Neurology
Bachelor of Science, David Lipscomb University (Duplicate of Lipscomb University), 1977
Master of Science, Emory University, 1982
Doctor of Medicine, Emory University, 1982

Regina Lindsay Triplett, M.S., M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, William Smith College, 2010
Master of Science, University of Pittsburgh, 2014
Doctor of Medicine, University of Pittsburgh, 2015

Angela M Tripp

Voluntary Clinical Assistant Professor of Neurology

U

Jason Daniel Ulrich, Ph.D.

Professor of Neurology (primary appointment)
Bachelor of Science, Quincy College, 2004
Doctor of Philosophy, University of Iowa, 2011

Mwiza Ushe, M.S., M.D.

Professor of Neurology (primary appointment)
Vice Chair-Cultural and Wellness
Bachelor of Science, University of Pittsburgh, 2000
Master of Science, Washington University in St Louis, 2007
Doctor of Medicine, Washington University in St Louis, 2007

V

Manouela Vesselinova Valtcheva, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Science, University of Georgia, 2010
Doctor of Philosophy, Washington University in St Louis, 2018
Doctor of Medicine, Washington University in St Louis, 2018

Renee Bailey Van Stavern, M.D.

Professor of Neurology (primary appointment)
Bachelor of Arts, Texas A&M University, 1991
Doctor of Medicine, University of Texas Health Science Center, 1997

Arun S. Varadhachary, Ph.D., M.D.

Professor of Neurology (primary appointment)
Section Chief - Neurohospitalist Section
Doctor of Philosophy, Temple University, 2001
Doctor of Medicine, Temple University, 2004

Michele Renee Verda

Voluntary Clinical Instructor in Neurology

Amy Robichaux Viehoever, Ph.D., M.D.

Associate Professor of Neurology (primary appointment)
Associate Professor of Pediatrics
Doctor of Philosophy, Vanderbilt University, 2004
Doctor of Medicine, Vanderbilt University, 2006

Clara Vila Castelar, M.A., M.Phil., Ph.D., Bachelor

Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, University of Missouri in St Louis, 2011
Master of Arts, Queens College, 2016
Master of Philosophy, CUNY Graduate School and University Center, 2017
Doctor of Philosophy, CUNY Graduate School and University Center, 2018
Bachelor's degree, Universitat de Barcelona

Oksana Volshteyn, M.D.

Professor of Neurology
Doctor of Medicine, Minsk State Medical Institute, 1976

W

Guoqiao Wang, M.A., M.S., Ph.D.

Associate Professor of Neurology (primary appointment)
Associate Professor of Biostatistics
Master of Science, Yunnan University (#####), 2007
Master of Arts, University of Alabama in Tuscaloosa, 2010
Doctor of Philosophy, University of Alabama in Birmingham, 2014

Yan Wang, M.D.

Assistant Professor of Neurology (primary appointment)
Doctor of Medicine, University of Chicago, 2016

Andrew M. Wayne, M.D.

Voluntary Clinical Instructor in Neurology
Bachelor of Science, University of California Riverside, 1989
Doctor of Medicine, University of Missouri Columbia, 1993

Ling Wei, M.D.

Voluntary Research Assistant Professor of Neurology
Doctor of Medicine, Beijing Medical University (Duplicate of Capital University of Medical Sciences (#####)), 1977



Conrad Christian Weihl, Ph.D., M.D.

Professor of Neurology (primary appointment)
Section Chief - Section of Neuromuscular Medicine
Gabe Weil Professorship
Bachelor of Science, University of Illinois at Urbana-Champaign, 1993
Doctor of Philosophy, University of Chicago, 1998
Doctor of Medicine, University of Chicago, 2001

Judith L. Weisenberg, M.D.

Professor of Neurology (primary appointment)
Bachelor of Science, Barnard College, 1998
Doctor of Medicine, University of Minnesota, 2002

Howard I Weiss, M.D.

Voluntary Clinical Assistant Professor of Neurology
Doctor of Medicine, Tulane University, 1972

Emily Katherine White, M.A., Ph.D.

Assistant Professor of Neurology (primary appointment)
Assistant Professor in Psychological & Brain Sciences
Bachelor of Arts, Washington University in St Louis, 2008
Master of Arts, University of Nevada Las Vegas, 2013
Doctor of Philosophy, University of Nevada Las Vegas, 2016

Robert L. White, Ph.D., M.D.

Assistant Professor of Neurology (primary appointment)
Assistant Professor of Radiology
Bachelor of Science, Washington University in St Louis, 1999
Doctor of Philosophy, Washington University in St Louis, 2007
Doctor of Medicine, Washington University in St Louis, 2007

Laura Katherine Wiley, M.S., Ph.D.

Associate Professor of Neurology (primary appointment)
Associate Professor of Medicine
Bachelor of Science, University of Denver, 2009
Master of Science, Vanderbilt University, 2014
Doctor of Philosophy, Vanderbilt University, 2016

Jonathan Paul Williams, M.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, University of Florida, 2011
Doctor of Medicine, Howard University, 2017

Julie Wisch, Ph.D.

Instructor in Neurology (primary appointment)
Bachelor of Science, University of Iowa, 2011
Doctor of Philosophy, University of Missouri Columbia, 2016

Kyle Byron Womack, M.S., M.D.

Professor of Neurology (primary appointment)
Bachelor of Arts, Southern Methodist University, 1983
Doctor of Medicine, University of Texas Southwest, 1987
Master of Science, University of Texas Southwest, 2020

Michael Wong, Ph.D., M.D.

Professor of Neurology (primary appointment)
Allen P and Josephine B Green Professor of Pediatric Neurology
Professor of Neuroscience
Professor of Pediatrics
Bachelor of Arts, Princeton University, 1987
Doctor of Philosophy, University of Texas Southwest, 1995

Doctor of Medicine, University of Texas Southwest, 1995

Gregory Frederick Wu, Ph.D., M.D.

Professor of Neurology (primary appointment)
Professor of Pathology and Immunology
Bachelor of Science, Washington University in St Louis, 1993
Doctor of Philosophy, University of Iowa, 2001
Doctor of Medicine, University of Iowa, 2001

Z

Craig Mitchell Zaidman, M.D.

Professor of Neurology (primary appointment)
Professor of Pediatrics
Doctor of Medicine, University of Virginia, 2001

Allyson R Zazulia, M.D.

Professor of Neurology (primary appointment)
Associate Dean for Continuing Medical Education
Professor of Radiology
Bachelor of Science, University of Maryland-College Park, 1990
Doctor of Medicine, Georgetown University, 1994

John M Zempel, Ph.D., M.D.

Professor of Neurology (primary appointment)
Professor of Pediatrics
Bachelor of Science, University of Wisconsin Madison, 1985
Doctor of Philosophy, Washington University in St Louis, 1995
Doctor of Medicine, Washington University in St Louis, 1995

Lirong Zhu, Ph.D., M.D.

Voluntary Clinical Assistant Professor of Neurology
Doctor of Medicine, Fudan University (Duplicate of Fudan University (#####)), 2000
Doctor of Philosophy, Baylor College of Medicine, 2006

Yiqi Zhu, M.S.W., Ph.D.

Assistant Professor of Neurology (primary appointment)
Bachelor of Arts, East China Normal University (#####), 2010
Master of Social Work, Washington University in St Louis, 2012
Doctor of Philosophy, Washington University in St Louis, 2021

Research Electives

Neurology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Beau Ances, MD

Taylor Avenue Building Extension, 2nd Floor
Phone: 314-747-8423

Neuroimaging of neurodegenerative disorders. Students can work in a neuroimaging laboratory that is focused on the translational discovery of neuroimaging biomarkers for neurodegenerative diseases. The laboratory focuses on the pathogenesis of Alzheimer's disease and HIV-associated neurocognitive disorders. We are investigating the effects of neurodegenerative diseases on the brain network level

using functional (blood oxygen level dependent imaging, arterial spin labeling), structural (volumetrics, diffusion tensor imaging), and metabolic (PET amyloid and tau) methods. Multiple projects that involve bioengineering, neuroimaging and infectious disease are available, depending on the interest of the student.

Randall Bateman, MD

BJCIH 9603

Phone: 314-273-9057

Diagnostic tests, biomarkers, and pathophysiology of Alzheimer's disease and other neurologic diseases. This research elective will expose the student to translational research in the study of Alzheimer's disease and other neurodegenerative diseases. The student will participate in multiple areas of the research, including participant recruitment, consent, enrollment and the performance of clinical research studies to discover and develop diagnostic tests and biomarkers and to understand the pathophysiology of Alzheimer's disease. Lumbar puncture for cerebrospinal fluid sample collection, blood collection and intravenous labeling methods will be demonstrated and taught. The student will participate in sample analysis, including processing for mass spectrometry quantitation, proteomic analyses, clinical analyses including determining sensitivity and specificity of tests, and application to real-world populations including diverse clinical cohorts led by the PI (SEABIRD) and the SILQ Center. Quantitation, analysis and modeling of the data will be taught in the context of data interpretation and clinical study design. The student will learn about how clinical tests and treatments are developed in medicine, advancing the leading edge of advanced medical diagnosis and treatment.

Anne H. Cross, MD

McMillan, 3rd Floor

Phone: 314-747-4591 or 314-747-0405

Understanding interactions of the immune system with the central nervous system as it relates to multiple sclerosis and other neuroimmunological disorders. Our goal is to understand how immune cells cross the blood-brain barrier and initiate the cascade of events that leads to the lesions of multiple sclerosis. We are also funded to study the effects of diet and adipokines on neuroinflammation. Depending on the time commitment of the student and their individual interests and goals, they will either assist with ongoing projects or be given a laboratory project on which to work. Projects may involve animal models of multiple sclerosis, cell culture or studies of human samples (cerebrospinal fluid, blood or autopsied specimens). Interested students should contact Dr. Cross (crossa@neuro.wustl.edu) several weeks in advance before signing up for this research to allow for sufficient planning.

Joel S. Perlmutter, MD

East Building, 2nd Floor

Phone: 314-362-6026

Pathophysiology of movement disorders. The lab is primarily interested in the etiology, pathophysiology and treatment of basal ganglia disorders. We have several studies of Parkinson disease (PD). We are testing new drugs that might rescue injured nigrostriatal neurons (a model of PD) with the potential to slow the progression of PD. For these, we use PET to measure dopamine and related pathways and to quantify motor behavior. We also have an active program developing and validating neuroimaging biomarkers for PD and for determining the integrity of the nigrostriatal pathway that includes studies in human and animal models of PD. In addition, we have an active program that combines a variety of approaches to develop biomarkers and investigate the pathophysiology of dementia associated with PD. We use PET to measure radioligand binding in PD and dystonia. We use PET to investigate drug-mediated pathways and inflammatory responses in the brain and to parse out the effects of potential therapeutic interventions. We also develop and implement MR-based methods including diffusion tensor imaging and resting-state functional connectivity to investigate the brain mechanisms underlying PD and dystonia.

Marcus E. Raichle, MD

East Building, 2nd Floor

Phone: 314-362-6907

This lab investigates in vivo brain hemodynamic, metabolic and functional studies of human cognition and emotion using cyclotron-produced isotopes and PET as well as fMRI in humans.

Gregory Wu, MD, PhD

McMillan, 3rd Floor

Phone: 314-362-3293

Understanding how immune responses are generated that target the central nervous system. Specifically, this lab studies antigen-presenting cell contributions to autoimmune animal models of multiple sclerosis. Our goal is to understand what cellular interactions are critical to the development of immune-mediated demyelination.

Courses

NEUROL 8020 Neuro-Oncology (Clinical Elective)

The Phase III elective experience in adult neurology is designed to adapt to the individual goals and objectives of students. The elective takes place in one or two 2-week blocks that can occur among four possible venues as chosen by the student after discussion with the course director:

1. Adult Inpatient General Service
2. Adult Inpatient Stroke Service
3. Adult Inpatient Consult Service
4. Outpatient Clinics (with 8-10 clinics/week)

The combination of services and experiences will be arranged directly between the student and the Course Director prior to beginning the rotation. Students rotating on the inpatient services will work closely with neurology residents to develop neurology-specific care plans for general neurology or stroke patients and will function above a clerkship level. No call or weekend duties will be expected on this rotation. On the general consult team, students will see patients in the



ER and on other services who have neurologic issues or complications. In the outpatient clinics, students will rotate between a variety of subspecialty clinics and work with a variety of attendings in order to experience the breadth of outpatient neurology.

Credit 4 units.

Typical periods offered: Medicine Year

NEUROL 8030 Neonatal Neurology (Clinical Elective)

The Neonatal Neurology elective will consist of a combination of inpatient and outpatient experiences designed to provide medical students with comprehensive exposure to the field. Through the rotation, students will actively participate in all aspects of patient care, acquiring the knowledge and skills necessary to effectively evaluate infants with a wide range of neurological disorders including encephalopathy, stroke, seizures, hypotonia, intraventricular hemorrhage, periventricular leukomalacia, and genetic disorders, among others.

Clinical activities will be tailored to fit the interests and goals of the individual student and include a combination of inpatient and outpatient exposures. Inpatient activities will occur in the St. Louis Children's Hospital Neonatal Intensive Unit as part of the Neonatal Neurology Consultation service. Outpatient activities will occur in the St. Louis Children's Hospital Outpatient Clinics. Students will also attend educational conferences specific to the field during the rotation, including Neonatal Neurology Clinical Conference and Neonatal Neuroradiology Conference.

Credit 2 units.

Typical periods offered: Medicine Year

NEUROL 8035 Pediatric Neurology (Clinical Elective)

The Phase III elective experience in child neurology is designed to adapt to the individual goals and objectives of students. The elective takes place among five possible venues as chosen by the student after discussion with the course director: 1. Inpatient ward service 2. FL/ED consult service 3. PICU consult service 4. Outpatient Clinics (with 8-10 clinics per week) 5. Video EEG (VEEG) monitoring service.

The combination of services and experiences will be arranged directly between the student and the Course Director prior to beginning the rotation. In outpatient clinics, students will rotate between a variety of subspecialty clinics and work with a variety of attendings in order to experience the breadth of outpatient pediatric neurology. Students rotating on the inpatient ward service will work closely with the pediatric neurology resident to develop neurology-specific care plans and will function above a clerkship level. On the FL/ED consult services, students will work with the consult attending and pediatric neurology residents on that team to see consults in the ER and other hospital floors.

Credit 4 units.

Typical periods offered: Medicine Year

NEUROL 8040 Neurointensive Care Unit (Clinical Elective)

The student will be integrated into the Critical Care Team that provides care in the Neurology/Neurosurgery ICU. Diseases frequently encountered include intracerebral hemorrhage, head trauma, subarachnoid hemorrhage, stroke, spinal cord disease, and neuromuscular disease. The student will follow patients, participate in rounds and may participate in some procedures under supervision. Didactic sessions will be provided as conferences or lectures from the ICU attending and fellow.

Credit 4 units.

Typical periods offered: Medicine Year

NEUROL 8045 Adult Epilepsy (Clinical Elective)

Students will learn how epileptologists diagnose and manage epilepsy in adults. They will learn how to use the history and physical exam and ancillary studies such as EEG, MRI, PET, and SPECT to diagnose and manage patients with new onset epilepsy, established epilepsy, and medically intractable epilepsy. They will become familiar with the medical management of epilepsy as well as the treatment options for medically intractable epilepsy including epilepsy surgery. They will also learn how to manage the co-morbid conditions that accompany epilepsy such as depression, behavioral problems, cognitive impairment, sleep disturbance, and non-epileptic events. Students will accomplish these goals by rounding on the inpatient epilepsy service (Epilepsy Monitoring Unit and Critical Care EEG Monitoring) with the epilepsy team at Barnes-Jewish Hospital. Students will attend outpatient epilepsy clinic one half-day per week. They will attend the Adult Epilepsy Conference, EEG Review Conference, EEG/Epilepsy Didactics, and Neurology Grand Rounds.

Credit 2 units.

Typical periods offered: Medicine Year

NEUROL 8201 Neurology (Clinical Elective)

The Phase III elective experience in adult neurology is designed to adapt to the individual goals and objectives of students. The elective can occur at four possible venues chosen by the student after discussion with the course director: 1. Adult Inpatient General Service 2. Adult Inpatient Stroke Service 3. Adult Inpatient Consult Service 4. Outpatient Clinics (with 8-10 clinics per week) The combination of services and experiences will be arranged directly between the student and the Course Director prior to beginning the rotation. Students rotating on the inpatient services will work closely with neurology residents to develop neurology-specific care plans for general neurology or stroke patients and will function above a clerkship level. On the consult team, students will see patients in the ER and on other services who have neurologic issues or complications. In the outpatient clinics, students will rotate among a variety of subspecialty clinics and work with a range of attendings to experience the breadth of outpatient neurology.

Credit 4 units.

Typical periods offered: Medicine Year

NEUROL 9100 Neurology Advanced Clinical Rotation (ACR)

The Neurology Advanced Clinical Rotation (ACR) offers graduated, supervised patient care responsibility in adult or pediatric neurology, where students are expected to act and perform at the intern level. Students typically spend the rotation on one of three services:

- Inpatient General Adult Neurology at Barnes-Jewish Hospital
- Adult Stroke Neurology at Barnes-Jewish Hospital or
- Inpatient General Pediatric Neurology at St. Louis Children's Hospital

(Split rotations are considered on a case-by-case basis by the ACR Director)

Under the supervision of senior residents and attending physicians, students gain increased autonomy evaluating and treating acute and chronic neurological disorders. Key responsibilities include performing complete histories and neurological examinations, independently establishing differential diagnoses and care plans, and, when possible, writing orders, admission notes, progress notes, and discharge summaries. Students manage a tailored patient load determined by case complexity and their individual clinical skills to ensure adequate experience. Additionally, ACR students are required to attend departmental rounds and clinical conferences to further advance their neurological knowledge.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Neuroscience

The Department of Neuroscience plays a key role in the development and teaching of basic sciences in the Medical School Gateway curriculum, including human anatomy, histology, and neuroscience. In conjunction with the Division of Biology & Biomedical Sciences (DBBS) program in neuroscience, the department also offers introductory graduate courses in cellular, molecular, and systems neuroscience. In addition, the department also offers a number of advanced courses that are primarily designed for graduate students but that are also open to students in the medical curriculum. Finally, advanced elective research activities are offered by faculty in the department.

Website: <http://neuroscience.wustl.edu>

Faculty

Linda J. Richards, AO, FAA, FAHMS, PhD

Department Chair

Visit our website for more information about our faculty and their appointments.

A

Joonas Autio, Ph.D.

Assistant Professor of Neuroscience (primary appointment)

Assistant Professor of Radiology

Doctor of Philosophy, University of Eastern Finland, 2013

B

Amy Lynn Bauernfeind, M.Phil., Ph.D.

Professor of Anatomy (primary appointment)

Vice Chair Education Department of Neuroscience

Professor of Anthropology (Courtesy Affiliation)

Bachelor of Science, Vanderbilt University, 2004

Master of Philosophy, George Washington University, 2011

Doctor of Philosophy, George Washington University, 2014

Peter O Bayguinov, Ph.D.

Assistant Professor of Neuroscience (primary appointment)

Assistant Professor of Cell Biology and Physiology

Bachelor of Science, University of Washington, 2003

Doctor of Philosophy, University of Nevada Reno, 2010

Azad Bonni

Voluntary Research Professor of Neuroscience

Paul C Bridgman, M.S., Ph.D.

Professor Emeritus of Neuroscience

Bachelor of Arts, University of San Diego, 1974

Master of Science, University of California San Diego, 1976

Doctor of Philosophy, Purdue University-Main Campus, 1980

Andreas H Burkhalter, M.S., Ph.D.

Professor of Neuroscience (primary appointment)

Professor of Biomedical Engineering

Master of Science, University of Zurich, 1973

Doctor of Philosophy, University of Zurich, 1977

Harold Burton, Ph.D.

Professor Emeritus of Neuroscience

Bachelor of Arts, University of Michigan Ann Arbor, 1964

Doctor of Philosophy, University of Wisconsin Madison, 1968

C

Valeria Cavalli, M.S., Ph.D.

Professor of Neuroscience (primary appointment)

Robert E. and Louise F. Dunn Professorship in Biomedical Research

Bachelor of Science, University of Geneva, 1991

Master of Science, University of Geneva, 1992

Doctor of Philosophy, University of Geneva, 2000

Fujun Chen, Ph.D.

Instructor in Neuroscience (primary appointment)

Doctor of Philosophy, East China Normal University (#####), 2007

Yao Chen, M.S., Ph.D.

Assistant Professor of Neuroscience (primary appointment)

Assistant Professor of Cell Biology and Physiology

Assistant Professor of Electrical & System Engineering

Bachelor of Science, University of Cambridge, 2002

Master of Science, University of Cambridge, 2006

Doctor of Philosophy, Harvard University, 2009

James M Cheverud, M.S., Ph.D.

Professor Emeritus of Anatomy

Bachelor of Arts, Northwestern University, 1975

Master of Science, University of Wisconsin Madison, 1977

Doctor of Philosophy, University of Wisconsin Madison, 1979

Glenn C Conroy, M.Phil., Ph.D.

Professor Emeritus of Anatomy

Bachelor of Arts, University of California Berkeley, 1970

Master of Philosophy, Yale University, 1972

Doctor of Philosophy, Yale University, 1974

D

Krikor T Dikranian, Ph.D., M.D.

Professor of Anatomy (primary appointment)

Professor of Physical Therapy

Doctor of Medicine, Medical University of Varna, 1978

Doctor of Philosophy, Medical University of Sofia, 1992

F**Susan M Fitzpatrick, Ph.D.**

Voluntary Research Associate Professor of Neuroscience
Voluntary Research Associate Professor of Occupational Therapy
Bachelor of Science, Saint Johns University, 1978
Doctor of Philosophy, Cornell University, 1984

Tom P Franken, M.S., Ph.D., M.D.

Assistant Professor of Neuroscience (primary appointment)
Doctor of Medicine, Katholieke Universiteit Leuven, 2009
Doctor of Philosophy, Katholieke Universiteit Leuven, 2015
Master of Science, Katholieke Universiteit Leuven, 2016

G**Harrison W. Gabel, Ph.D.**

Associate Professor of Neuroscience (primary appointment)
Baccalaureatus, Princeton University, 2001
Doctor of Philosophy, Harvard University, 2008

Matthew Gaidica, Ph.D.

Assistant Professor of Neuroscience (primary appointment)
Bachelor of Science, Kettering University, 2010
Doctor of Philosophy, University of Michigan Ann Arbor, 2019

H**Edward B. Han, Ph.D.**

Assistant Professor of Neuroscience (primary appointment)
Assistant Professor of Anesthesiology
Bachelor of Science, Cornell University, 1995
Doctor of Philosophy, University of California San Diego, 2004

Martha B. Han, Ph.D.

Associate Professor of Neuroscience (primary appointment)
Bachelor of Science, Yale University, 2000
Doctor of Philosophy, University of California San Diego, 2008

Naoki Hiratani, Ph.D.

Assistant Professor of Neuroscience (primary appointment)
Bachelor of Science, The University of Tokyo, 2011
Doctor of Philosophy, The University of Tokyo, 2016

Timothy E. Holy, M.A., Ph.D.

Professor of Neuroscience (primary appointment)
Alan A and Edith L Wolff Professor of Neuroscience
Vice Chair Research of Neuroscience
Bachelor of Arts, Rice University, 1991
Master of Arts, Princeton University, 1992
Doctor of Philosophy, Princeton University, 1997

Cheng Huang, M.S., Ph.D.

Assistant Professor of Neuroscience (primary appointment)
Bachelor of Science, Beijing Institute of Technology (#####), 2005
Master of Science, Beijing Institute of Technology (#####), 2007
Doctor of Philosophy, Tsinghua University (#####), 2013

J**Joanna Louisa Jankowsky, Ph.D.**

Professor of Neuroscience (primary appointment)
Theodore and Bertha Bryan Professor of Environmental Medicine
Bachelor of Arts, Amherst College, 1991
Doctor of Philosophy, California Institute of Technology, 1999

K**Adam Kepecs, Ph.D.**

Professor of Neuroscience (primary appointment)
Professor of Psychiatry
Rita Levi-Montalcini Professor of Biomedical Sciences
Bachelor of Science, Eotvos Lorand University (University of Budapest), 1997
Doctor of Philosophy, Brandeis University, 2002

L**Qingyun Li, Ph.D.**

Assistant Professor of Neuroscience (primary appointment)
Assistant Professor of Genetics
Bachelor of Science, China Agricultural University, 2006
Doctor of Philosophy, Duke University, 2015

Alessandro Livi, Ph.D.

Instructor in Neuroscience (primary appointment)
Doctor of Philosophy, University of Parma, 2019

M**Ashley C. Morhardt, M.S., Ph.D.**

Associate Professor of Anatomy (primary appointment)
Bachelor of Science, Illinois College, 2006
Master of Science, Western Illinois University, 2009
Doctor of Philosophy, Ohio University-Main Campus, 2016

N**Michael L Nonet, Ph.D.**

Associate Professor of Neuroscience (primary appointment)
Bachelor of Science, University of California Davis, 1984
Doctor of Philosophy, Massachusetts Institute of Technology, 1989

O**Karen Laurel O'Malley, M.S., Ph.D.**

Professor of Neuroscience (primary appointment)
Bachelor of Arts, Sonoma State University, 1971
Master of Science, Portland State University, 1973
Doctor of Philosophy, University of Texas Austin, 1980

Hysell Oviedo, Ph.D.

Assistant Professor of Neuroscience (primary appointment)
Roger M Perlmutter Career Development Assistant Professorship
Doctor of Philosophy, New York University, 2004

P**Camillo Padoa-Schioppa, M.S., Ph.D.**

Professor of Neuroscience (primary appointment)
Professor of Biomedical Engineering
Professor of Economics (Courtesy)
Robert E. and Louise F. Dunn Professorship in Medical Sciences
Master of Science, La Sapienza University, 1996
Doctor of Philosophy, Massachusetts Institute of Technology, 2002

Thomas J Papouin, M.S., Ph.D.

Assistant Professor of Neuroscience (primary appointment)
Bachelor of Science, École Normale Supérieure Paris, 2005
Master of Science, École Normale Supérieure Paris, 2007
Doctor of Philosophy, University of Bordeaux 2, 2011

Anthony Pappas, Ph.D.

Assistant Professor of Anatomy (Pending Dean Approval) (primary appointment)
Doctor of Philosophy, University of Vermont, 2016

Jane Phillips Conroy, M.A., Ph.D.

Professor Emeritus of Anatomy
Bachelor of Arts, Brandeis University, 1969
Master of Arts, New York University, 1973
Doctor of Philosophy, New York University, 1978

Joseph L Price, Ph.D.

Professor Emeritus of Anatomy and Neurobiology
Bachelor of Arts, Oxford University (Duplicate of University of Oxford), 1966
Doctor of Philosophy, Oxford University (Duplicate of University of Oxford), 1969

Kristen Alexandra Prufrock, M.S., Ph.D.

Assistant Professor of Anatomy (primary appointment)
Bachelor of Science, University of Toronto, 2012
Master of Science, University of Toronto, 2014
Doctor of Philosophy, Johns Hopkins University, 2020

R**Linda J Richards, Ph.D.**

Professor of Neuroscience (primary appointment)
Edison Professor of Neuroscience
Director of McDonnell Center for Cellular and Molecular Neurobiology

Head of the Department of Neuroscience
Bachelor of Science, Walter & Eliza Hall Institute, 1990
Doctor of Philosophy, Walter & Eliza Hall Institute, 1994

S**Lawrence B Salkoff, Ph.D.**

Professor of Neuroscience (primary appointment)
Professor of Genetics
Bachelor of Arts, University of California Los Angeles, 1967
Doctor of Philosophy, University of California Berkeley, 1979

Paul Joseph Shaw, M.A., Ph.D.

Professor of Neuroscience (primary appointment)
Bachelor of Arts, Niagara University, 1985
Master of Arts, San Jose State University, 1990
Doctor of Philosophy, University of Chicago, 1996

Lawrence H Snyder, M.S., Ph.D., M.D.

Professor of Neuroscience (primary appointment)
Professor of Psychological & Brain Sciences
Baccalaureatus, Princeton University, 1982
Master of Science, University of Rochester, 1992
Doctor of Philosophy, University of Rochester, 1992
Doctor of Medicine, University of Rochester, 1992

T**Paul H Taghert, Ph.D.**

Professor of Neuroscience (primary appointment)
Bachelor of Arts, Reed College, 1975
Doctor of Philosophy, University of Washington, 1981

Gaia Tavoni, M.S., Ph.D.

Assistant Professor of Neuroscience (primary appointment)
Assistant Professor of Medicine
Assistant Professor of Electrical & Systems Engineering
Assistant Professor of Computer Science and Engineering
Assistant Professor of Physics
Bachelor of Science, Politecnico di Torino, 2010
Master of Science, Politecnico di Torino, 2012
Doctor of Philosophy, École Normale Supérieure Paris, 2015

Alex Michael Taylor, Ph.D.

Assistant Professor of Anatomy (primary appointment)
Doctor of Philosophy, Saint Louis University, 2021

V**David C Van Essen, Ph.D.**

Professor of Neuroscience (primary appointment)
Alumni Endowed Professor of Neurobiology
Professor of Biomedical Engineering
Bachelor of Science, California Institute of Technology, 1967
Doctor of Philosophy, Harvard University, 1971

Y**Jason Yi, Ph.D.**

Assistant Professor of Neuroscience (primary appointment)
Bachelor of Science, Dickinson College, 2001
Doctor of Philosophy, Duke University, 2009



Research Electives

Neuroscience Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Kari Allen, PhD

North Building, 3rd Floor
Phone: 314-747-6572

Paleoanthropology and phylogenetic statistics; comparative analyses of primate craniodental morphology and the evolution of brain size

Martha Bagnall, PhD

McDonnell Medical Sciences Building, 4th Floor
Phone: 314-362-9695

Molecular, electrophysiological, and behavioral analyses of neural circuits for vestibular control of spinal function

Paul Bridgman, PhD

McDonnell Medical Sciences Building, 8th Floor
Phone: 314-362-3449

Cell biology of the developing nervous system

Andreas Burkhalter, PhD

North Building, 4th Floor
Phone: 314-362-4068

Organization and function of neuronal circuits in mouse visual cortex

Harold Burton, PhD

East McDonnell Building, 3rd Floor
Phone: 314-362-3556

Cortical functional reorganization in response to sensory loss

Valeria Cavalli, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-362-3540

Cellular, molecular and epigenetic mechanisms controlling axon regeneration

Yao Chen, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-273-7739

We aim to understand how the dynamics of neuromodulators and intracellular signals contribute to the function of neuromodulators, to learning, and to the function of sleep.

Krikor Dikranian, MD, PhD

North Building, 3rd Floor
Phone: 314-362-3548

Cell death during the development of the mammalian central nervous system; traumatic brain injury in the infant

James Fitzpatrick, PhD

McKinley Research Building, Basement
Phone: 314-747-0838

Optical and charged particle multiscale microscopy application method development

Tom Franken, MD, PhD

East McDonnell Building, 3rd Floor
Phone: 314-362-3590

Neuronal mechanisms of perception

Harrison Gabel, PhD

McDonnell Medical Sciences Building, 8th Floor
Phone: 314-362-9814

Gene regulation in the developing nervous system; molecular mechanisms of neurodevelopmental disorders

Geoffrey Goodhill, PhD

McDonnell Medical Sciences Building, 9th Floor

Computational neuroscience; large-scale neural recording; development of behavior and neural coding in zebrafish; autism models

Edward Han, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-747-2505

Learning-related hippocampal network activation

Timothy E. Holy, PhD

North Building, 4th Floor
Phone: 314-362-0086

Neural mechanisms of action of mammalian pheromones

Adam Kepecs, PhD

McDonnell Medical Sciences Building, 4th Floor
Phone: 314-273-8523

Our long-term goal is to reverse engineer the computational and neurobiological processes underlying cognition and decision-making and apply these insights to biological psychiatry.

Tristan (Qingyun) Li, PhD

McDonnell Medical Sciences Building, 8th Floor
Phone: 314-273-1422

My lab is broadly interested in neuroimmunology, with a focus on microglial biology. We combine cutting-edge, single-cell genomic technologies with in vitro and in vivo genetic, molecular, and cellular tools to investigate microglial functions in the establishment of the nervous system, and we study how changes in these functions contribute to neurological diseases.

Ilya Monosov, MS, PhD

East McDonnell Building, 2nd Floor
Phone: 314-362-3740

Neuronal mechanisms of voluntary behavior

Ashley Morhardt, PhD

North Building, 3rd Floor
Phone: 314-273-1859

Evolution of neural diversity within and across non-mammalian vertebrate clades, especially dinosaurs

Michael L. Nonet, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-747-1176

Molecular genetic analysis of synaptic development and function

Karen L. O'Malley, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-362-7087

Molecular mechanisms underlying neurodegenerative processes; signaling mechanisms associated with intracellular receptors

Camillo Padoa Schioppa, PhD

East McDonnell Building, 3rd Floor
Phone: 314-747-2253

Neuronal bases of economic choice and decision making

Thomas Papouin, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-273-7738

Role played by the 80% to 90% of non-neuronal cells (glial cells) in brain function

Linda J. Richards AO, FAA, FAHMS, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-362-3033

The Brain Development and Disorders Laboratory investigates how long-range neural circuits are established in the brain and how neural circuit plasticity affects the function of the cerebral cortex.

Lawrence B. Salkoff, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-362-3644

Roles of ion channels in neuronal long-term excitability changes

Paul J. Shaw, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-362-2703

Molecular genetics of sleep and circadian rhythms

Lawrence H. Snyder, MD, PhD

East McDonnell Building, 3rd Floor
Phone: 314-747-3530

Computational and cognitive issues in cortical control of eye and arm movement investigated via electrophysiology and imaging

Paul H. Taghert, PhD

McDonnell Medical Sciences Building, 9th Floor
Phone: 314-362-3641

Neurobiology of circadian rhythms; neurobiology of peptidergic neurotransmission

Gaia Tavoni, PhD

East McDonnell Building, 3rd Floor
Phone: 314-362-3590

Applying concepts and methods from statistical mechanics, Bayesian theory, mathematics and biophysics to the study of the brain

David C. Van Essen, PhD

East McDonnell Building, 2nd Floor
Phone: 314-362-7043

Organization, function, and development of primate cerebral cortex, especially in humans; generation and utilization of neuroinformatics tools for data mining

Jason Yi, PhD

McDonnell Medical Sciences Building, 8th Floor
Phone: 314-273-1664

Molecular pathways shaping nervous system development and function

Guoyan Zhao, PhD

McDonnell Medical Sciences Building, 8th Floor
Phone: 314-273-9045



My laboratory is interested in understanding the regulatory networks that control the development and proper function of mammalian brains in the context of human health and disease.

Courses

NEUROSCI 8005 Advanced Dissection (Non-Clinical Elective)

Students will perform detailed dissections on a discrete region of the body of their choosing - i.e. head/neck, thorax, abdomen, pelvic cavity, or limbs. Students will compile a list of personal learning objectives with the approval of the course director(s). A minimum of 30 hours of self-paced individual dissection is required and may include the practice of surgical approaches, and/or the study of cross-sectional anatomy and medical imaging. At the end of the course, each student will demonstrate their dissection results to the faculty and submit a final project. The final project allows students to synthesize their laboratory experience with primary literature on the clinically-relevant anatomy in their region of interest.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Neurosurgery

Instruction in neurological surgery begins with an introduction to the anatomy and physiology of the nervous system presented in the first-year course in neural sciences directed by the Department of Neuroscience, with the participation of the neurosurgery faculty. During the second year, the Department of Neurosurgery presents the course in diseases of the nervous system in conjunction with the departments of Neurology, Pathology & Immunology, Molecular Microbiology, Medicine and Pediatrics. The course emphasizes how knowledge derived from basic or clinical investigations leads to improvements in clinical care. During the third year, students may elect to participate in a two- or four-week neurosurgery clerkship that introduces them to the clinical care of patients with diseases of the nervous system. Neurosurgical faculty members work with the neurologists to provide lectures, demonstrations and teaching exercises involving patients with neurological diagnoses as part of the clinical medicine course. Students may elect to fulfill their neurology requirement by rotating on the neurosurgery service. Students may also choose neurosurgery as part of the surgical specialty rotations. Neurosurgical diagnosis, critical care, operative treatment and ethical issues in patient management are emphasized. During the fourth year, students may choose from several advanced electives, including clinical externships in neurosurgery and experiences in basic or clinical/translational research.

Neurosurgical Specialties

As members of one of the most comprehensive neurosurgical programs in both the region and the nation, Washington University neurosurgeons offer exceptional care in a variety of specialties.

Tumors

The Department of Neurosurgery at Washington University School of Medicine offers a comprehensive, multidisciplinary approach for the treatment of all types of neurological tumors, including brain tumors, inoperable tumors, pituitary tumors, skull-base tumors and spine tumors. Depending on the type of tumor, our multidisciplinary team comprises ophthalmologists, otolaryngologists, radiation oncologists, neuroradiologists, neuroanesthesiologists, medical oncologists and other specialists.

Aneurysms and Cerebrovascular Disorders and Diseases

The multidisciplinary medical team focuses on the treatment of aneurysms, arteriovenous fistulas, arteriovenous malformations, carotid stenosis, cavernous malformations, moyamoya and stroke. It includes cerebrovascular surgeons, who perform microsurgical procedures, and interventional radiologists, who offer minimally invasive endovascular treatment options. We also have a team of critical care neurologists, who coordinate postprocedure care in a dedicated neurointensive care unit, as well as neurologists, who coordinate neurorehabilitation care at The Rehabilitation Institute of St. Louis.

Spine Injuries and Disorders

Washington University spinal neurosurgeons are recognized as national leaders in the treatment of disorders of the spine, spinal cord and peripheral nervous system. We use a multidisciplinary approach to treating spinal diseases and disorders. The personalized care of each patient is emphasized. Where appropriate, spine patients receive comprehensive, collaborative care from both neurosurgeons and specialists in thoracic surgery; vascular surgery; ear, nose and throat surgery; medical oncology; radiation oncology; anesthesia; pain management; and physiatry.

Peripheral Nerves

Washington University neurosurgeons work with a multidisciplinary group of surgeons, neurologists and therapists to customize patient treatments to maximize functional outcomes. Washington University neurosurgeons have extensive expertise in advanced microsurgical reconstructive techniques and are on the forefront of new and innovative ways to improve patient outcomes.

Pediatric Neurosurgery

The entire spectrum of neurosurgical disorders in children is treated by pediatric neurosurgeons and physicians in related disciplines. Our pediatric neurosurgeons are also part of multidisciplinary teams that provide care in several specialized pediatric centers, including the brachial plexus center, the center for cerebral palsy spasticity, the neurofibromatosis clinic, the pediatric epilepsy center, the pediatric gamma knife program, the pediatric neuro-oncology program, and the spina bifida clinic.

Epilepsy

Our neurosurgeons are nationally recognized for their care of patients with epilepsy as well as research in this field. They are part of a multidisciplinary team that works together to develop the optimal plan to help patients control or minimize their seizures. The Department of Neurosurgery offers care for both adults and children with medically intractable seizures; it provides a full range of surgical options for intractable epilepsy, including implantable seizure-control devices, resection of seizure foci, and vagal nerve stimulation.

Movement Disorders

The multidisciplinary team specializes in the treatment of movement disorders such as ataxia, catatonia, dystonia, essential tremor, Huntington's disease, myoclonus, Parkinson's disease, and Tourette's syndrome. For some patients with Parkinson's disease or essential tremor, medications are often inadequate to control disabling symptoms. These patients may benefit from stereotactic neurosurgical procedures to improve their function.

Website: <http://www.neurosurgery.wustl.edu>

Faculty

Ralph G. Dacey, MD

Department Head

Visit our website for more information about our faculty and their appointments.

A

Benjamin Thomas Acland, Ph.D.

Instructor in Neurological Surgery (Pending Dean Approval) (primary appointment)

Bachelor of Arts, Pomona College, 2007

Doctor of Philosophy, Washington University in St Louis, 2022

B

Peter Brunner, M.S., Ph.D.

Associate Professor of Neurological Surgery (primary appointment)

Associate Professor of Neurology

Associate Professor of Computer Science and Engineering

Bachelor of Science, University of Graz, 2004

Master of Science, University of Graz, 2005

Doctor of Philosophy, University of Graz, 2013

Bradley Budde, M.D.

Assistant Professor of Neurological Surgery (primary appointment)

Bachelor of Science, Illinois State University, 2012

Doctor of Medicine, University of Illinois College, 2016

David Thomas Bundy, M.S., Ph.D.

Assistant Professor of Neurological Surgery (primary appointment)

Bachelor of Science, Texas A&M University, 2008

Master of Science, Washington University in St Louis, 2015

Doctor of Philosophy, Washington University in St Louis, 2015

C

Magalie Cadieux, M.D.

Assistant Professor of Neurological Surgery (primary appointment)

Assistant Professor of Orthopedic Surgery

Doctor of Medicine, Université Laval, 2015

Michael R Chicoine, M.D.

Professor Emeritus of Neurological Surgery

Bachelor of Science, University of Illinois at Urbana-Champaign, 1985

Doctor of Medicine, University of California, 1990

D

Ralph G Dacey, M.D.

Professor of Neurological Surgery (primary appointment)

Bachelor of Arts, Harvard University, 1970

Doctor of Medicine, University of Virginia, 1974

Deepti Diwan, M.S., Ph.D.

Instructor in Neurological Surgery (primary appointment)

Bachelor of Science, Chaudhary Charan Singh Haryana Agricultural University, 2008

Master of Science, Mody University, 2010

Doctor of Philosophy, Saitama University, 2015

Joshua L Dowling, M.D.

Professor of Neurological Surgery (primary appointment)

Bachelor of Arts, Yale University, 1985

Doctor of Medicine, Tulane University, 1989

F

Gabriel Nathan Friedman, M.D.

Assistant Professor of Neurological Surgery (primary appointment)

Assistant Professor of Neurology

Harvard University, 2018

G

Jacob K. Greenberg, M.S., M.D.

Assistant Professor of Neurological Surgery (primary appointment)

Assistant Professor of Orthopedic Surgery

Bachelor of Science, Washington University in St Louis, 2009



Master of Science, Washington University in St Louis, 2015
Doctor of Medicine, Washington University in St Louis, 2015

H

Daniel Michael Hafez, Ph.D., M.D.

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Orthopedic Surgery
Bachelor of Science, University of Illinois at Urbana-Champaign, 2007
Doctor of Philosophy, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2012
Doctor of Medicine, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2014

Gabriel E. Haller, Ph.D.

Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Genetics
Associate Professor of Neurology
Bachelor of Arts, University of Chicago, 2008
Doctor of Philosophy, Washington University in St Louis, 2013

Rowland Hua Han, M.S., M.D.

Instructor in Neurological Surgery (Pending Dean Approval) (primary appointment)
Bachelor of Science, University of Pennsylvania, 2013
Master of Science, University of Pennsylvania, 2013
Doctor of Medicine, Washington University in St Louis, 2018

Anna Huguenard, M.D.

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Biomedical Engineering
Assistant Professor of Neurology
Assistant Professor of Radiology
Bachelor of Arts, Indiana University Bloomington, 2011
Bachelor of Science, Indiana University Bloomington, 2011
Doctor of Medicine, Emory University, 2016

K

Albert H Kim, M.A., Ph.D., M.D.

Professor of Neurological Surgery (primary appointment)
August A. Busch, Jr. Professor of Neurological Surgery
Professor of Neurology
Professor of Developmental Biology
Professor of Genetics
Bachelor of Arts, Harvard University, 1994
Master of Arts, Washington University in St Louis, 1999
Doctor of Philosophy, New York University School of Medicine, 2002
Doctor of Medicine, New York University School of Medicine, 2003

Caroline Ko, M.A., Ph.D.

Associate Professor of Neurological Surgery (primary appointment)
Bachelor of Science, University of Toronto, 1999
Master of Arts, University of Toronto, 2001
Doctor of Philosophy, University of Toronto, 2009

L

Tyler Timothy Lazaro, M.D.

Assistant Professor of Neurological Surgery (Pending Dean Approval)
(primary appointment)
Boston University, 2013
Boston University, 2017

Eric Claude Leuthardt, M.D.

Professor of Neurological Surgery (primary appointment)
Shi Hui Huang Professor of Neurological Surgery
Professor of Neuroscience
Professor of Mechanical Engineering and Applied Science.
Bachelor of Science, Saint Louis University, 1995
Doctor of Medicine, University of Pennsylvania, 1999

Yang Li, Ph.D.

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Genetics
Assistant Professor of Computer Science and Engineering
Bachelor of Science, Sichuan University (#####), 2013
Doctor of Philosophy, Tsinghua University (#####), 2018

Yuping Derek Li, M.S., M.D.

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Medicine
Johns Hopkins University, 2013
Johns Hopkins University, 2014
Northwestern University, 2019

Patrick Henry Lockett, Ph.D.

Instructor in Neurological Surgery (primary appointment)
Doctor of Philosophy, University of South Alabama, 2017

M

Dimitrios Mathios, M.D.

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Genetics
Doctor of Medicine, Athens University, Medical School, 2011

Sean David McEvoy, M.H.S., M.D.

Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Pediatrics
Bachelor of Science, University of Iowa, 2005
Master of Health Science, Yale University, 2010
Doctor of Medicine, Yale University, 2010

Jogender Mehla, M.S., Ph.D.

Assistant Professor of Neurological Surgery (primary appointment)
Master of Science, All India Institute of Medical Sciences, 2007
Doctor of Philosophy, All India Institute of Medical Sciences, 2013

Alex Patrick Michael, M.D.

Assistant Professor of Neurological Surgery (primary appointment)
Saint Louis University, 2009
Southern Illinois University School of Medicine (SIU-SOM), 2014

Camilo Alejandro Molina, M.D.

Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Orthopedic Surgery
Bachelor of Arts, Miami University-Oxford, 2008
Doctor of Medicine, Johns Hopkins University, 2013

O**John Ogunlade, D.O.**

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Orthopedic Surgery
Doctor of Osteopathic Medicine, Nova Southeastern University, 2014

Joshua William Osburn, M.D.

Professor of Neurological Surgery (primary appointment)
Professor of Neurology
Professor of Radiology
Bachelor of Arts, Texas A&M University, 2002
Doctor of Medicine, University of Texas Southwest, 2007

P**Bhuvic Patel, M.D.**

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Genetics
Assistant Professor of Otolaryngology
Bachelor of Science, Brown University, 2011
Doctor of Medicine, Washington University in St Louis, 2015

Brenton Henry Pennicooke, M.S., M.D.

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Orthopedic Surgery
Bachelor of Science, Johns Hopkins University, 2008
Master of Science, Johns Hopkins University, 2008
Doctor of Medicine, Harvard University, 2012

R**Wilson Z Ray, M.D.**

Professor of Neurological Surgery (primary appointment)
Henry G and Edith R Schwartz Professor of Neurological Surgery
Professor of Orthopedic Surgery
Professor of Biomedical Engineering
Doctor of Medicine, University of Iowa, 2004

Jarod Roland, M.D.

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Pediatrics
Doctor of Medicine, Texas Tech University Health Sciences Center, 2009

S**Alexander Stegh, M.A., Ph.D.**

Professor of Neurological Surgery (primary appointment)
Professor of Chemistry
Professor of Biomedical Engineering
Master of Arts, Medizinische Hochschule Hannover, 1998
Doctor of Philosophy, Medizinische Hochschule Hannover, 2000

Jennifer Mae Strahle, M.D.

Professor of Neurological Surgery (primary appointment)
Professor of Orthopedic Surgery
Professor of Pediatrics

Apolline Blair Endowed Chair Professor of Neurological Surgery
Bachelor of Science, Bates College, 2002
Doctor of Medicine, University of Minnesota, 2008

T**Rui Tang, Ph.D.**

Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Genetics
Bachelor of Science, Nanjing University (#####), 2008
Doctor of Philosophy, University of Georgia, 2016

Eric Michael Thompson, M.D.

Professor of Neurological Surgery (primary appointment)
Division Chief of Pediatric Neurosurgery
T. S. Park, M.D., Chair in Pediatric Neurological Surgery
Professor of Cell Biology and Physiology
Professor of Pediatrics
Bachelor of Science, Duke University, 2002
Doctor of Medicine, University of Nebraska Medical Center, 2006

V**Kumar Vasudevan, M.D.**

Assistant Professor of Neurological Surgery (primary appointment)
Bachelor of Arts, Brown University, 2008
Bachelor of Science, Brown University, 2008
Doctor of Medicine, Brown University, 2012

W**Jing Wang, Ph.D.**

Professor of Neurological Surgery (primary appointment)
Professor of Informatics, Data Sciences, and Biostatistics
Doctor of Philosophy, North Carolina State University at Raleigh, 2004

Jon T. Willie, Ph.D., M.D.

Associate Professor of Neurological Surgery (primary appointment)
Bachelor of Arts, University of Texas Austin, 1996
Doctor of Philosophy, University of Texas Southwest, 2005
Doctor of Medicine, University of Texas Southwest, 2005

Y**Hiroko Yano, M.S., Ph.D.**

Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Genetics
Associate Professor of Neurology
Bachelor of Science, Science University of Tokyo, 1991
Master of Science, University of Tokyo, 1993
Doctor of Philosophy, University of Tokyo, 1996

Z**Gregory Joseph Zipfel, M.D.**

Professor of Neurological Surgery (primary appointment)
Ralph G Dacey Distinguished Professorship of Neurological Surgery
Head of the Department of Neurological Surgery



Professor of Neurology
Bachelor of Science, University of Illinois at Urbana-Champaign, 1991
Doctor of Medicine, Northwestern University, 1995

Research Electives

Neurosurgery Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Michael R. Chicoine, MD

Phone: 314-747-6143

Our focus is on outcomes analysis for adult patients with brain tumors. Current clinical studies focus on the outcomes of patients with benign and malignant brain tumors utilizing a prospective brain tumor database. Particular emphasis includes the impact of intraoperative MRI (iMRI) on outcomes for patients with brain tumors and other diseases. We are establishing a multicenter database pooling data from multiple iMRI centers in North America.

Ian G. Dorward, MD

Phone: 314-747-6142

Our research interests include outcomes analysis in spinal reconstruction surgery, including the impact of age, obesity, and other clinical variables on costs, complications, and patient satisfaction. Another area of interest is the evaluation of novel techniques in spinal deformity correction and minimally invasive spinal surgery. Additional work focuses on etiologic factors of spinal deformity in both adolescents and adults.

Gavin P. Dunn, MD, PhD

Phone: 314-747-6141

Our studies focus on the examination of molecular mechanisms in the endothelial cells and smooth muscle cells in the intracerebral microcirculation and the contribution of glial cells to their impairment after hypoxia/reoxygenation. In vitro techniques for studying isolated perfused microvessels are used to examine questions centered on endothelial smooth muscle and glial cell integration of cerebral blood flow responses.

Ammar H. Hawasli, MD, PhD

Phone: 314-747-6144

Our functional spinal neurosurgery research laboratory aims to understand the physiological and pathophysiological relationships between the spine and the brain. We study brain physiology and connectivity in spinal disorder patients, leveraging expertise in both spinal neurosurgery and brain physiology and a network of high-level collaborators at Washington University School of Medicine.

Albert H. Kim, MD, PhD

Phone: 314-747-6141

I have laboratory and clinical research interests in the cancer stem cell state and the genetics of glioblastoma using human tumor specimens. I additionally have clinical projects examining patient outcomes for two common types of brain tumors: meningiomas and pituitary tumors.

Eric C. Leuthardt, MD

Phone: 314-747-6146

Our lab is pursuing research in the areas of neuroprosthetics, brain-computer interfaces (BCIs), and advanced imaging modalities. These include opportunities in basic neurophysiology, engineering for BCIs, and functional MRI imaging research for applications toward brain tumors.

David D. Limbrick, MD, PhD

Phone: 314-454-4630

Our lab investigates clinical and translational research into newborn brain injuries, including posthemorrhagic hydrocephalus. Our main research areas include cerebrospinal fluid protein markers of disease, MRI diffusion tensor imaging, and prospective clinical trials. In addition, multi-institutional clinical research opportunities exist for syringomyelia associated with Chiari I malformation.

T.S. Park, MD

Phone: 314-454-2810

Our ongoing projects include outcome studies of selective dorsal rhizotomies for the treatment of spastic cerebral palsy in children and brachial plexus repair after birth injury. We are also involved in a multicenter outcome study of syringomyelia associated with Chiari I malformation in children.

Wilson Z. Ray, MD

Phone: 314-362-3114

Clinical and translational research on peripheral nerve and spinal cord injuries; lab-based opportunities for longer research electives investigating peripheral nerve regeneration and peripheral neuroprosthetics incorporating transient electronics.

Keith M. Rich, MD

Phone: 314-747-6142

Research on neuronal and glioma cellular apoptosis after treatment with DNA-damaging agents; techniques include growing human brain tumor cells in culture, bioassay for apoptosis with fluorescent staining, protein immunoblotting, and PCR.

Matthew Smyth, MD

Phone: 314-454-4454

Clinical outcomes studies for pediatric epilepsy surgery and craniostomy surgery, basic and translational research in advanced clinical imaging, and translational research in the development of focal brain cooling devices for the treatment of epilepsy.

Gregory J. Zipfel, MD

Phone: 314-747-6141

My NIH-funded research program involves both basic and clinical research efforts focused on two main conditions: (1) cerebral amyloid angiopathy and its contribution to ischemic stroke, vascular dementia, and Alzheimer's disease; and (2) vasospasm-induced delayed cerebral ischemia and long-term cognitive deficits after aneurysmal subarachnoid hemorrhage. My work includes the following: basic experimental methods, including cell culture and ex vivo vascular techniques; in vivo studies utilizing animal models of ischemic stroke and subarachnoid hemorrhage and live animal epifluorescent and confocal imaging; and phase I clinical trials in patients.

Courses

Clerkship Opportunities

Students may elect to obtain their neurology clerkship experience on the neurosurgery service, or they can choose neurosurgery as part of the surgical specialty rotations. Third-year students participate with the residents and attendings on hospital rounds, evaluate patients in the neurosurgery outpatient department and participate in the neurosurgical operating room. The main objectives of the rotation include: 1) the evaluation of comatose or head-injured patients; 2) clinical presentation, diagnostic work-up and treatment of cervical and lumbar disc disease; and 3) evaluation and treatment of patients with hemorrhagic and ischemic stroke.

NEUROSUR 8101 Neurosurgery (Clinical Elective)

The Neurosurgery elective is a 4-week rotation where you will spend 1-2 weeks at a time on a specific neurosurgical service between vascular, tumor, or spine neurosurgery. There is also a possibility to go in pediatric neurosurgery. You will learn how to do basic neurosurgical procedures, rounding on complex patients in the ICU or the ward, be on-call with the neurosurgery mid-level residents, participate in the residents' clinic and in the operating room. Note that this course is a pre-requisite for the ACR course in neurosurgery. Credit 4 units.

Typical periods offered: Medicine Year

NEUROSUR 9100 Neurosurgery Advanced Clinical Rotation (ACR)

The goal of our four-week Advanced Clinical Rotation is to provide an overview of neurological surgery for medical students planning to apply for neurosurgery residency in the next year. The ACR takes place on the campus of Washington University School of Medicine, and at nationally ranked Barnes-Jewish Hospital and St. Louis Children's Hospital. Enrolled students must first complete the neurosurgery elective and will then be assigned to one of our neurosurgical services to spend four weeks on for the ACR. The medical student will act like an intern. During the ACR, the medical student will participate in patient work-ups, pre-, intra- and postoperative care, and diagnostic

procedures, learn how to perform basic neurosurgical procedures such as lumbar punctures, ICP monitor placement, and ventricular drain placement, spend some days in clinic, take overnight call. They are also encouraged to participate in Grand Rounds, Neurosurgery Resident Curriculum conference, and Journal Club with the neurosurgery residents.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Obstetrics and Gynecology

The Department of Obstetrics and Gynecology is actively engaged in undergraduate medical education. A summary of our course involvement includes the following:

- **Phase 1 Immersions:** Labor & Delivery (L&D) and Gynecologic Oncology (GynOnc) are two different Procedural Immersion sites that allow two students on rotation at a time. The L&D site involves the ability to experience clinical encounters with patients in the Women's Assessment Center, antepartum unit, L&D, and postpartum floor. Services will include time with the Ob/Gyn resident teams, laborists, and nurse practitioners; the OB Anesthesia team; lactation consultants; and other practitioners. The GynOnc immersion will include the inpatient floor, the outpatient offices at two different sites, the Gyn operating rooms, and the chemo center. Services will include time with the Gyn resident team and nurse practitioners; the chemo nurses; and pharmacists, social workers, case managers, and others.
- **Phase 2 Ob/Gyn Clerkship:** This core clerkship includes a full week of dedicated didactic time, three clinical rotations of two weeks in length, and a final week of assessments. Students will have the opportunity to experience the labor and delivery unit, inpatient Gyn specialties, and Ob/Gyn ambulatory settings. Based on the lottery outcome, these experiences will dive into any combination of the inpatient, office, or operating room setting.
- **Phase 3 Ob/Gyn ACR, Electives, & Capstone:** In this segment of training, students will have greater autonomy in patient care under the supervision of residents, fellows, or attendings. The OB Inpatient ACR includes two weeks of L&D and two weeks of the antepartum unit. The GynOnc ACR includes four weeks of inpatient care, outpatient care, and operating room experiences. In addition, there are a variety of elective options, including Outpatient MFM, Outpatient Generalist, REI, Complex Family Planning, and Ob/Gyn Ultrasound. Finally, the Capstone course provides a very active hands-on curriculum for those who are Ob/Gyn-bound.

No matter what stage our students find themselves in, our department is dedicated to the educational training of our medical students. We want our students to respect and understand the scope of female health care to ensure they will bring this knowledge base to their future clinical practice, regardless of the specialty area.



Website: <http://www.obgyn.wustl.edu>

Faculty

Dineo Khabele, MD, FACOG, FACS

Department Head

Tammy Sonn, MD

Vice Chair for Education

Katherine Massa, MD

Ob/Gyn Student Clerkship Director

Visit our website for the most updated information about our faculty and their appointments.

A

Ali Ahmady, M.S., Ph.D.

Associate Professor of Obstetrics and Gynecology (primary appointment)

Bachelor of Science, Tehran University, 1988

Master of Science, National University of Singapore, 1995

Doctor of Philosophy, National University of Singapore, 1998

Vinita M Alexander

Voluntary Clinical Instructor in Obstetrics and Gynecology

Farners Amargant i Riera, M.S., Ph.D.

Assistant Professor of Obstetrics and Gynecology (primary appointment)

Bachelor of Science, Universitat Autònoma de Barcelona, 2012

Master of Science, Universidad Complutense de Madrid, 2013

Doctor of Philosophy, Universitat Pompeu Fabra, 2018

John K Appelbaum, M.D.

Voluntary Clinical Assistant Professor of Obstetrics and Gynecology

Bachelor of Arts, Saint Louis University, 1980

Doctor of Medicine, Washington University in St Louis, 1984

Tomas Ismael Aquino

Voluntary Research Assistant Professor of Obstetrics and Gynecology

Jillian Mary Ashley-Martin, M.S., M.S.N., Ph.D.

Voluntary Research Assistant Professor of Obstetrics and Gynecology

Bachelor of Science, Cornell University, 1996

Master of Science in Nursing, Massachusetts General Hospital

Institute of Health Professions, 2001

Master of Science, Dalhousie University, 2006

Doctor of Philosophy, Dalhousie University, 2015

Lamia Atasi

Voluntary Clinical Instructor in Obstetrics and Gynecology

B

Laura Alane Baalman, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology

Bachelor of Arts, University of Missouri Kansas City, 1991

Doctor of Medicine, University of Missouri Kansas City, 1992

Elise Cosette Bardawil, M.D.

Associate Professor of Obstetrics and Gynecology (primary appointment)

Bachelor of Arts, University of Pennsylvania, 2007

Doctor of Medicine, Drexel University, 2013

Emily Sara Barker

Voluntary Clinical Instructor in Obstetrics and Gynecology

James Allen Bartelsmeyer

Voluntary Clinical Instructor in Obstetrics and Gynecology

Margaret Elizabeth Baum, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology

Voluntary Teaching Associate Professor

Bachelor of Arts, Saint Louis University, 1997

Doctor of Medicine, John Hopkins University (Duplicate of Johns Hopkins University), 2001

Adriana Beatty

Voluntary Clinical Instructor in Obstetrics and Gynecology

Robert L Becker, M.D.

Voluntary Clinical Assistant Professor of Obstetrics and Gynecology

Bachelor of Arts, Cornell University, 1965

Doctor of Medicine, Washington University in St Louis, 1969

James E Belcher, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology

Bachelor of Science, University of Texas Austin, 1972

Doctor of Medicine, Washington University in St Louis, 1976

Joe E Belew, M.D.

Voluntary Clinical Associate Professor of Obstetrics and Gynecology

Bachelor of Arts, Central Methodist College (Duplicate of Central Methodist University), 1953

Doctor of Medicine, Saint Louis University, 1957

Scott W Biest, M.D.

Professor Emeritus of Obstetrics and Gynecology

Bachelor of Science, University of Missouri Kansas City, 1985

Doctor of Medicine, University of Missouri Kansas City, 1989

Barbara Blachut, M.D.

Assistant Professor of Obstetrics and Gynecology (primary appointment)

Bachelor of Science, Duke University, 2015

Doctor of Medicine, Washington University in St Louis, 2020

Katherine H Bligard, M.A., M.D.

Assistant Professor of Obstetrics and Gynecology (primary appointment)

Bachelor of Science, Louisiana State University, 2010

Master of Arts, Washington University in St Louis, 2015

Doctor of Medicine, Washington University in St Louis, 2015

Richard Gerald Bolanos

Voluntary Clinical Instructor in Obstetrics and Gynecology

Voluntary Clinical Instructor in Obstetrics and Gynecology

Lawrence V Boveri, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology

Doctor of Medicine, University of Missouri Columbia, 1988

Craig William Boyd

Voluntary Clinical Instructor in Obstetrics and Gynecology

Robert J Brown, M.D.

Voluntary Clinical Assistant Professor of Obstetrics and Gynecology

Bachelor of Science, Saint Peters College, 1977

Doctor of Medicine, Washington University in St Louis, 1983

Madeline Louise Bruck

Voluntary Clinical Instructor in Obstetrics & Gynecology

Bruce L Bryan, M.D.

Voluntary Clinical Assistant Professor of Obstetrics and Gynecology

Doctor of Medicine, School Not Found, 1900

Robert Burstein, M.D.

Professor Emeritus of Clinical Obstetrics and Gynecology

Doctor of Medicine, Washington University in St Louis, 1948

C

Heather Campbell, M.D.

Associate Professor of Obstetrics and Gynecology (primary appointment)

Vice Chair of Faculty Development

Bachelor of Science, Texas A&M University, 1992

Doctor of Medicine, University of Utah, 1996

Ebony Boyce Carter, M.P.H., M.D.

Voluntary Research Associate Professor of Obstetrics and Gynecology

Bachelor of Science, Stanford University, 2000

Master of Public Health, University of Michigan Ann Arbor, 2002

Doctor of Medicine, Duke University, 2006

Emma Elizabeth Cermak, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology

Bachelor of Arts, University of Pennsylvania, 2005

Doctor of Medicine, Case Western Reserve University, 2010

Aneesh Surya Chawla, M.S., M.D.

Assistant Professor of Obstetrics and Gynecology (primary appointment)

urban, 2013

Master of Science, Midwestern University, 2015

Doctor of Medicine, Wake Forest University, 2019

Michael B Chen

Voluntary Clinical Assistant Professor of Obstetrics and Gynecology

Octavio Robert Chirino

Voluntary Clinical Instructor in Obstetrics and Gynecology

Ronald J Chod, M.D.

Voluntary Clinical Associate Professor of Obstetrics and Gynecology

Bachelor of Arts, University of Texas Austin, 1978

Doctor of Medicine, Southwestern University, 1983

Vicente M Colon-Alcaraz, M.D.

Voluntary Clinical Assistant Professor of Obstetrics and Gynecology

Bachelor of Arts, University of Puerto Rico (Duplicate of University of Puerto Rico), 1978

Doctor of Medicine, School Not Found, 1982

Kimberly Ann Coombs

No Rank

Meramec

Bachelor of Science, Sanford-Brown College Missouri

Sarah Elizabeth Cusworth, M.D.

Voluntary Clinical Instructor of Obstetrics and Gynecology

Bachelor of Arts, Saint Louis University, 2010

Doctor of Medicine, Saint Louis University, 2014

D

Tara Nicole Banaszek Daming

Voluntary Clinical Instructor in Obstetrics and Gynecology

Molina Dayal

Voluntary Clinical Instructor in Obstetrics and Gynecology

Katherine Mary de Souza, M.D.

Associate Professor of Obstetrics and Gynecology (primary appointment)

Bachelor of Science, University of Maryland-College Park, 2006

Doctor of Medicine, Virginia Commonwealth University, 2013

Jessica Despotovic

Voluntary Clinical Instructor in Obstetrics and Gynecology

Voluntary Clinical Instructor in Obstetrics and Gynecology

Michelle R Devera, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology

Bachelor of Arts, Washington University in St Louis, 1985

Doctor of Medicine, Washington University in St Louis, 1993

Jeffrey M Dicke, M.D.

Professor of Obstetrics and Gynecology (primary appointment)

Vice Chair - Imaging

Bachelor of Arts, University of Toledo, 1975

Doctor of Medicine, Ohio State University-Main Campus, 1978

Shelby Marie Dickison, M.D.

Associate Professor of Obstetrics and Gynecology (primary appointment)

Bachelor of Science, University of Missouri in St Louis, 2004

Doctor of Medicine, University of Missouri Columbia, 2011

Justin T Diedrich, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology

Bachelor of Arts, Case Western Reserve University, 2004

Doctor of Medicine, Case Western Reserve University, 2008

Russell B Dieterich, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology

Bachelor of Arts, Knox College, 1965

Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1970

Kinsey Dinnel

Voluntary Clinical Instructor in Obstetrics and Gynecology

Michael Mckinley Dombrowski, M.D.



Associate Professor of Obstetrics and Gynecology (primary appointment)
Associate Professor of Anesthesiology
Bachelor of Science, University of Michigan Ann Arbor, 2006
Doctor of Medicine, Wayne State University, 2011

Maggie Dwiggins, Sc.M., M.D.

Assistant Professor of Obstetrics and Gynecology (primary appointment)
Bachelor of Science, Augustana College Illinois, 2007
Master of Science, University of Illinois at Urbana-Champaign, 2009
Doctor of Medicine, University of Illinois College, 2013

E

David Louis Eisenberg, M.P.H., M.D.

Professor of Obstetrics and Gynecology (primary appointment)
Division Chief of Complex Family Planning
Bachelor of Science, University of Pittsburgh, 1999
Doctor of Medicine, University of Alabama at Birmingham School of Medicine, 2003
Master of Public Health, Northwestern University, 2009

Josiah O. Ekunno, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology
Bachelor of Science, School Not Found, 1965
Doctor of Medicine, School Not Found, 1974

Mechelle Elsiebo

Voluntary Clinical Instructor in Obstetrics and Gynecology

Julie Emmerich

No Rank
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Bachelor of Science, University of Utah, 2014
Doctor of Medicine, Rush University, 2018

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Doctor of Medicine, Meharry Medical College, 1963

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Doctor of Philosophy, Washington University in St Louis, 1977



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Doctor of Medicine, Boston University, 2015

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Voluntary Clinical Instructor in Obstetrics and Gynecology

Taryn Marie White

Voluntary Clinical Instructor in Obstetrics & Gynecology

Denise Michelle Willers, M.D.

Professor of Obstetrics and Gynecology (primary appointment)
Division Director of the Academic Specialists (ASOG)
Division Director of the Pediatric and Adolescent Gynecology (PAG)
Bachelor of Science, Drake University, 1996
Doctor of Medicine, Southern Illinois University Carbondale, 2000

Sara Wood, M.S., M.D.

Associate Professor of Obstetrics and Gynecology (primary appointment)
Division Chief of Female Pelvic Medicine and Reconstructive Surgery
Bachelor of Arts, University of Northern Iowa, 2002
Doctor of Medicine, Carver College of Medicine at University of Iowa, 2006
Master of Science, University of Illinois at Chicago, 2016

Candice Woolfolk, M.P.H., Ph.D.

Assistant Professor of Obstetrics and Gynecology (primary appointment)
Assistant Professor of Public Health
Bachelor of Science, University of Missouri Columbia, 2008
Master of Public Health, Saint Louis University, 2012
Doctor of Philosophy, Saint Louis University, 2019

Heather E. Wuebker, M.D.

Voluntary Clinical Instructor in Obstetrics and Gynecology
Bachelor of Arts, University of Missouri Kansas City, 1996
Doctor of Medicine, University of Missouri Kansas City, 1998

Z

Brooke Zaiz, M.D.

Assistant Professor of Obstetrics and Gynecology (Pending Dean Approval) (primary appointment)
Vanderbilt University, 2015
Tulane University, 2020

Sandra G.H. Zakroff

Voluntary Clinical Instructor in Obstetrics and Gynecology

Peinan Zhao, M.S., Ph.D.

Assistant Professor of Obstetrics and Gynecology (primary appointment)
Doctor of Philosophy, Wuhan University (#####), 2011
Master of Science, University of Missouri Columbia, 2016

Darryl Thomas Zinck

Voluntary Clinical Instructor in Obstetrics and Gynecology

Amanda Zofkie, M.D.

Assistant Professor of Obstetrics and Gynecology (primary appointment)
Doctor of Medicine, University of Cincinnati-Main Campus, 2014

Research Electives

Obstetrics and Gynecology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Basic Research

During this four-week elective, students will have the opportunity to immerse themselves in bench research in one of our labs. The main criteria for this rotation is that the student must have prior experience as an undergraduate or postgraduate in a laboratory, not including coursework. This rotation is designed for the student who is planning a career in academic medicine as a physician-scientist and who is interested in considering reproductive science as a field.

Eligible students interested in a basic research experience should call our office at 314-286-1775 (prior to signing up for a course) to discuss the schedule and expectations of this rotation.

Clinical Research

Eligible students interested in a clinical research experience are encouraged to apply for the T12, Meharry, or Institute for Public Health programs through Washington University.

Courses

OBGYN 8010 OBGYN Reproductive Endocrinology & Infertility (Clinical Elective)

The student will participate (in the office and hospital) in the study and treatment of women with reproductive endocrine disorders and infertility. The student will attend and present in conferences, attend surgery, observe assisted reproductive technology procedures, have assigned reading and be an integral part of the reproductive endocrine service. Opportunities for clinical research projects in reproductive endocrinology are also available. In addition, the student may spend one week of the rotation on night shift in labor & delivery which will help acquaint the student with the residents and hospital. Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 8035 OBGYN Ultrasound - Genetics (Clinical Elective)

Working with the attending physicians in the Ultrasound Units at the Center for Outpatient Health and the Center for Women's Wellness at Missouri Baptist Medical Center, the student will learn the principles and techniques of non-invasive screening for fetal disorders and observe the performance of invasive prenatal diagnostic procedures. The student will also learn the standards and guidelines for performance of the antepartum obstetrical ultrasound examination and female pelvic examination. Normal and abnormal fetal and gynecologic anatomy will be reviewed. Experience will be gained in pedigree analysis and familial risk factor assessment by working with genetic counselors. One day is spent in the Cytogenetics Laboratory observing the preparation of prenatal specimens for karyotype analysis. Opportunities for participation in clinical research are also available.



Credit 2 units.

Typical periods offered: Medicine Year

OBGYN 8040 Complex Family Planning (Clinical Elective)

Students will attend a variety of outpatient and inpatient clinics to interact with patients seeking different reproductive health services including contraception, abortion care, pregnancy loss, and gender-affirming health care. These clinics include family planning and abortion care services at the Hope Clinic and BJH; Pediatric and Adolescent Gynecology, The SPOT, the Contraceptive Choice Center (C3 Clinic); gynecology clinic at the Faculty Practice Gyn clinic located in COH 7 and the Complex Family Planning clinic (COH 3); and the Transgender Care Clinic (CAM 5C).

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 8051 Outpatient OBGYN Generalist Care (Clinical Elective)

This experience is designed to primarily acquaint the student with the diagnosis and care of outpatients. Students will work one-on-one with attending staff, to focus on an overview of evaluation, diagnosis, and treatment of common obstetric and gynecologic concerns. The student will spend the majority of time attending half day clinics and private offices. In addition, the student will spend one week of the rotation on night shift in labor & delivery which will help acquaint the student with the residents and hospital. If desired, additional time can be arranged to participate in/observe outpatient surgical procedures. A 30-45 minute presentation to attendings and house staff will culminate the rotation on a selected OB/GYN topic.

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 8450 Outpatient Maternal-Fetal Medicine (Clinical Elective)

Students will see a variety of high risk obstetrical patients in the outpatient setting in the Center for Outpatient Health. The student will evaluate various types of reproductive-age patients with medical or obstetrical complications, including preconception consultations, prenatal care consultations and initial prenatal visits. The student will also see return patients to experience the continuity of prenatal care. Students will participate in antenatal testing and learn basic ultrasonography skills. In addition, the student will spend one week of the rotation on night shift in labor & delivery which will help acquaint the student with the residents and hospital. The student will be responsible for one presentation to be given to the OB teams at the end of the rotation. Students are provided independent study time to put together the presentation which should be in power point and on a topic of their choice, inspired by a patient-related clinical condition that piqued their interest during the block.

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 9100 Inpatient Maternal-Fetal Medicine Advanced Clinical Rotation (ACR)

This experience is designed to prepare you for a career in obstetrics and gynecology. The rotation is divided into 2-week blocks alternating with Labor & Delivery and Antepartum. Depending on the number of 4th year students during the rotation you may start on Labor & Delivery or Antepartum. You will be treated as an acting intern and will be expected to become a functioning member of the team. The purpose of the Labor & Delivery segment is to allow you to participate in monitoring and delivery of patients in labor including spontaneous vaginal deliveries and cesarean sections. The team will be comprised of PGY1,2, 4, fellow, and attendings. You will participate in team rounds and board signout, perform histories & physical exams, and write admit orders/progress notes for co-signature. You will be taught how to perform cervical exams and to interpret

fetal monitoring during labor. During your antepartum block your primary team includes a PGY2, 4, fellow, and attending. You will learn how to diagnose, evaluate, and manage obstetric conditions including preterm labor, preterm pre-labor rupture of membrane, hypertensive disorders of pregnancy, diabetes, and fetal growth restriction. You will also be exposed to uncommon conditions and expected to generate appropriate differential diagnoses. You will round with the team, perform detailed histories & physical exams, write admit orders/ progress notes for co-signature, and assist with the interpretations of antepartum fetal testing. You will be introduced to basic ultrasonography skills. The student will be responsible for one topical presentation to be given to the OB teams at the end of the rotation. On your first day:

Antepartum: Students should report to board sign out at 8 am to listen to the night team's handoff. At the conclusion of board sign out you will meet the team on the antepartum floor to start rounds. Labor & Delivery: Students should report to board sign out at 8 am to listen ...

Credit 4 units.

Typical periods offered: Medicine Year

OBGYN 9150 Gynecologic Oncology Advanced Clinical Rotation (ACR)

This course is designed to prepare students for a career in Obstetrics and Gynecology. By the end of the ACR, students are expected to be functioning near the level of a matriculating intern and should be fully integrated with the team, which includes an attending and a fellow (who rotate weekly), a resident team (R4, 2 R3's, R2, R1, rotating every 6w), and often Phase 2 and Phase 1 students. The student will take part in the work-up of patients on the gynecology service prior to surgery and/or radiotherapy, assist in surgery, participate in rounds with residents/fellows/faculty, assist in managing the inpatient unit including writing notes and entering orders for MD co-signature, accompany chief residents/fellows/faculty on consultations, and attend gynecologic oncology clinics and conferences. Opportunities for clinical or basic research projects in gynecologic malignancy are also available. A 30-minute presentation to the division reviewing a topic in gynecologic oncology is required.

Credit 4 units.

Typical periods offered: Medicine Year

John F. Hardesty, MD, Department of Ophthalmology and Visual Sciences

The John F. Hardesty, MD Department of Ophthalmology and Visual Sciences has a longstanding tradition of excellence in patient care, research, and education and is consistently recognized among the nation's leading ophthalmology programs by *U.S. News & World Report*. With one of the largest ophthalmology research faculties in the country, the department continues to advance the field through groundbreaking discoveries, innovative therapies, and exceptional training programs. Its national research leadership was further affirmed in the 2025 Blue Ridge Institute for Medical Research rankings, in which WashU Medicine Ophthalmology was ranked No.

3 in the nation in National Institutes of Health (NIH) funding among ophthalmology departments. The department secured \$22,793,703 in NIH funding across 28 awards led by 19 principal investigators, reflecting the strength of its collaborative research enterprise and its ongoing commitment to improving vision and eye health through scientific innovation.

Our mission is clear: *As world leaders in patient care, teaching, and research, we strive to touch lives and preserve and restore vision through innovation and compassionate service.*

We invite students to be part of our collaborative and dynamic environment, where they will gain invaluable experience and contribute to groundbreaking discoveries that shape the future of ophthalmology.

While only a small percentage of physicians in the United States specialize in ophthalmology, a fundamental understanding of the eye is essential for all physicians. The eye can provide critical insights into a patient's overall health, aiding in the diagnosis and management of various medical conditions.

A recent *Ophthalmology* journal article highlighted the widespread relevance of ophthalmology in multiple specialties, stating that "ophthalmology-related issues arise in the diagnosis and treatment of inpatients and outpatients in internal medicine, pediatrics, trauma surgery, neurology, endocrinology, neurosurgery, otolaryngology, dermatology, oncology, and rheumatology services."¹

Despite this, many primary care program directors believe that fewer than half of incoming residents possess adequate ophthalmology skills upon entering their internships. Ophthalmoscopy, in particular, remains a significant gap in medical training. Studies have shown that emergency medicine physicians frequently omit ophthalmoscopic examinations even when indicated; when the test is performed, abnormal findings are often missed. This gap in training is especially concerning given the high rate of eye-related emergency department visits: there were 12 million nationwide between 2006 and 2011.

To provide quality care, physicians must either develop proficiency in assessing ocular health or recognize when a referral to an ophthalmologist is necessary. Regardless of specialty, enhancing ophthalmology knowledge strengthens clinical skills and ensures better patient outcomes across all fields of medicine.

¹ Graubart EB, Waxman EL, Forster SH, Giaconi JA, Rosenberg JB, Sankar PS, Goyal A, Mirza RG. Ophthalmology objectives for medical students: revisiting what every graduating medical student should know. *Ophthalmology*, December 2018; 125(12):1842-1843.

Website: <http://ophthalmology.wustl.edu>

Faculty

Our staff includes full-time university attending physicians for all subspecialties in ophthalmology, including adult strabismus, comprehensive ophthalmology, corneal and external diseases, neuro-ophthalmology, ocular oncology, oculofacial plastic and reconstructive surgery, optometry, pediatric ophthalmology, retinal disease, uveitis, and glaucoma. We have a very healthy mix of senior established faculty and junior members.

Our Leadership

Aaron Y Lee, MD, MSCI

Arthur W. Stickle Distinguished Professor and Chairman,
Ophthalmology and Visual Sciences

Kevin Ko, MBA

Executive Director of Business Affairs

P. Kumar Rao, MD, MBA

Professor and Vice Chair for Clinical Affairs

Daniel Kerschensteiner, MD

Bernard Becker Professor of Ophthalmology and Visual Sciences
Vice Chair for Research; Co-Director of the Neuroscience PhD Program

Rajendra S. Apte, MD, PhD

Paul A. Cibis Distinguished Professor of Ophthalmology and Visual Sciences; Vice Chair of Innovation and International Affairs

Carla Siegfried, MD

Jacquelyn E. and Allan E. Kolker, MD, Distinguished Professor of Ophthalmology and Visual Sciences; Vice Chair of Strategic Initiatives

Andrew R Lee, MD

Associate Professor, Ophthalmology and Visual Sciences; Chief, Pediatric Ophthalmology; Director, Medical Student Education for Ophthalmology

Arsham Sheybani, MD

Professor, Ophthalmology and Visual Sciences; Glaucoma and Anterior Segment Surgery, Residency Program Director

Kisha Piggott, MD, PhD

Associate Professor, Ophthalmology and Visual Sciences; Co-Director of the Residency Program

James Liu, MD

Assistant Professor, Ophthalmology and Visual Sciences; Director of Surgical Training and Skills Lab

Erin Sieck, MD

Associate Professor, Ophthalmology and Visual Sciences; Fellowship Director Advanced Anterior Segment and Glaucoma Surgery; Director of Ophthalmology Continuing Medical Education

Cynthia Montana, MD, PhD

Associate Professor, Ophthalmology and Visual Sciences; Director of the University Eye Service



Joseph Steska, OD

Instructor, Ophthalmology and Visual Sciences; Director of Optometry and Associate Director of University Eye Service

Mark Rallo, OD

Instructor, Ophthalmology and Visual Sciences; Director of Pediatric Optometry

Steven Couch, MD, FACS

Professor, Ophthalmology and Visual Sciences; Director of Quality and Safety

Visit the Ophthalmology & Visual Sciences website for more information about our faculty and their appointments.

A

Rajendra Apte, Ph.D., M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Paul A. Cibis Distinguished Professor of Ophthalmology and Visual Sciences
Vice Chair - Translation and Innovation
Professor of Developmental Biology
Professor of Medicine
Doctor of Medicine, University of Mumbai, 1993
Doctor of Philosophy, University of Texas Southwest, 1997

Neva P Arribas, M.D.

Associate Professor Emerita of Clinical Ophthalmology and Visual Sciences
Associate of Arts, School Not Found, 1949
Doctor of Medicine, School Not Found, 1954

B

Steven Bassnett, Ph.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Grace Nelson Lacy Distinguished Professorship in Ophthalmology
Professor of Cell Biology and Physiology
Bachelor of Science, University of Wales, 1982
Doctor of Philosophy, University of East Anglia, 1987

William L Becker, M.A., M.D.

Voluntary Clinical Assistant Professor of Ophthalmology and Visual Sciences
Voluntary Teaching Assistant Professor of Ophthalmology and Visual Sciences
Bachelor of Arts, Earlham College, 1982
Master of Arts, Washington University in St Louis, 1987
Doctor of Medicine, Washington University in St Louis, 1987

Gregg Jonathan Berdy, M.D.

Voluntary Clinical Associate Professor of Ophthalmology and Visual Sciences
Voluntary Teaching Associate Professor of Ophthalmology and Visual Sciences

Bachelor of Arts, Duke University, 1979

Doctor of Medicine, Saint Louis University, 1983

Kevin Jay Blinder, M.D.

Voluntary Clinical Professor of Ophthalmology and Visual Sciences
Voluntary Teaching Professor of Ophthalmology and Visual Sciences
Doctor of Medicine, University of Missouri Kansas City, 1985

James C Bobrow, M.D.

Voluntary Clinical Professor of Ophthalmology and Visual Sciences
Bachelor of Arts, Yale University, 1966
Doctor of Medicine, Johns Hopkins University Medical (Duplicate of Johns Hopkins University), 1970

Sean Michael Breit, M.D.

Voluntary Clinical Instructor of Ophthalmology & Visual Sciences
Voluntary Teaching Instructor in Ophthalmology and Visual Sciences
Doctor of Medicine, Ohio State University (Duplicate of Ohio State University-Main Campus), 2002

Nancy M Buchser, M.D.

Voluntary Clinical Instructor of Ophthalmology & Visual Sciences
Doctor of Medicine, University of Miami, 2007

Dean B Burgess, M.D.

Professor Emeritus of Clinical Ophthalmology and Visual Sciences
Bachelor of Arts, Occidental College, 1963
Doctor of Medicine, University of California, 1967

C

Shiming Chen, M.S., Ph.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Bernard Becker and Janet R Becker Distinguished Professorship in Ophthalmology
Professor of Developmental Biology
Bachelor of Science, Capital Normal University (#####), 1981
Master of Science, Capital University of Medical Sciences (#####), 1984
Doctor of Philosophy, State University of New York, 1992

Brian Stewart Clark, Ph.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
Assistant Professor of Developmental Biology
Bachelor of Science, University of Wisconsin Madison, 2004
Doctor of Philosophy, Medical College of Wisconsin, 2013

Bruce H Cohen, M.D.

Voluntary Clinical Assistant Professor of Ophthalmology and Visual Sciences
Bachelor of Arts, Harvard University, 1976
Doctor of Medicine, Johns Hopkins University, 1980

Steven Michael Couch, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Patient Safety Officer (Adult) - Clinical Adult Division
Doctor of Medicine, University of Missouri Kansas City, 2006

Philip L Custer, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, Vanderbilt University, 1974

Doctor of Medicine, Vanderbilt University, 1978

D**Kyle Dohrman, O.D.**

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, University of Illinois at Urbana-Champaign, 2007

Doctor of Optometry, Southern College of Optometry, 2011

E**Jennifer M. Enright, Ph.D., M.D.**

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, University of Notre Dame, 2008

Doctor of Philosophy, Washington University in St Louis, 2017

Doctor of Medicine, Washington University in St Louis, 2017

F**Adam Ross Fedyk**

Voluntary Teaching Instructor in Ophthalmology and Visual Sciences

Voluntary Clinical Instructor in Ophthalmology and Visual Sciences

Robert M Feibel, M.D.

Voluntary Clinical Professor of Ophthalmology and Visual Sciences

Bachelor of Arts, Johns Hopkins University, 1965

Doctor of Medicine, Harvard University, 1969

Thomas A Ferguson, M.S., Ph.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)

Professor of Pathology and Immunology

Bachelor of Arts, Kent State University, 1974

Master of Science, Kent State University, 1976

Doctor of Philosophy, University of Cincinnati-Main Campus, 1982

G**Mae Etsuko Gordon, M.S., Ph.D.**

Professor of Ophthalmology and Visual Sciences (primary appointment)

Professor of Biostatistics

Bachelor of Arts, Portland State University, 1967

Master of Science, University of Wisconsin Madison, 1970

Doctor of Philosophy, University of Wisconsin Madison, 1979

Wesley C Green, M.S., M.D.

Instructor in Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, University of Wisconsin La Crosse, 2007

Master of Science, State University of New York, 2009

Doctor of Medicine, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2013

Kevin William Greulich, M.D.

Instructor in Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, University of Notre Dame, 1995

Doctor of Medicine, University of Michigan Ann Arbor, 1999

H**George J Harocopos, M.D.**

Professor of Ophthalmology and Visual Sciences (primary appointment)

Professor of Pathology and Immunology

Bachelor of Arts, Harvard University, 1995

Doctor of Medicine, Medical College of Virginia, 2000

James R Hoekel, O.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, University of Missouri Columbia, 1990

Doctor of Optometry, University of Missouri in St Louis, 1994

Jing-Wei Huang, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)

Doctor of Medicine, National Taiwan University, 1981

J**Sharon Leslie Jick**

Voluntary Teaching Instructor in Ophthalmology and Visual Sciences

Voluntary Clinical Instructor in Ophthalmology and Visual Sciences

William Steven Joffe, M.D.

Assistant Professor Emeritus of Clinical Ophthalmology and Visual Sciences

Bachelor of Arts, Washington University in St Louis, 1959

Doctor of Medicine, Washington University in St Louis, 1963

Jordan Kelley Jones, O.D.

Instructor in Ophthalmology and Visual Sciences (primary appointment)

Doctor of Optometry, University of Missouri in St Louis, 2011

K**Michael A Kass, M.S., M.D.**

Professor of Ophthalmology and Visual Sciences (primary appointment)

Senior Associate Dean for Human Research Protection

Bernard Becker Professorship in Ophthalmology and Visual Sciences

Bachelor of Science, Northwestern University, 1963

Master of Science, Northwestern University, 1966

Doctor of Medicine, Northwestern University, 1966

Daniel Kerschensteiner, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)



Vice Chair - Research Division
Professor of Biomedical Engineering (Courtesy)
Professor of Neuroscience
Bernard Becker Professor of Ophthalmology and Visual Sciences_Research Chairholder
Doctor of Medicine, Georg August University, 2004

L

Aaron Yuntai Lee, M.D., MSCI

Professor of Ophthalmology & Visual Sciences (primary appointment)
Head of the Department of Ophthalmology & Visual Sciences
Arthur W Stickle Distinguished Professor
Bachelor of Arts, Harvard University, 2004
Doctor of Medicine, Washington University in St Louis, 2009
Master of Science Clinical Investigation, Washington University in St Louis, 2009

Andrew R. Lee, M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
Director - Medical Student Education
Director - Clinical Pediatric Division
Bachelor of Science, Duke University, 2009
Doctor of Medicine, Washington University in St Louis, 2013

Cecilia Sungmin Lee, M.S., M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Jane Hardesty Poole Distinguished Professor
Bachelor of Science, Emory University, 2004
Doctor of Medicine, Emory University, 2008
Master of Science, University of Washington School of Public Health, 2016

James Liu, M.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2015

Anthony J Lubniewski, M.D.

Professor Emeritus of Ophthalmology and Visual Sciences
Bachelor of Science, University of Florida, 1980
Doctor of Medicine, University of Florida, 1985

Gregg T Lueder, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Professor of Pediatrics
Bachelor of Science, Iowa State University, 1981
Doctor of Medicine, University of Iowa, 1985

Peter David Lukasiewicz, Ph.D.

Professor Emeritus of Ophthalmology and Visual Sciences
Bachelor of Science, Brown University, 1977
Doctor of Philosophy, University of Michigan Ann Arbor, 1984

M

Robi N Maamari, M.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
Doctor of Medicine, University of California Irvine, 2014
Bachelor of Science, University of California Berkeley

Todd P Margolis, Ph.D., M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Alan A and Edith L Wolff Distinguished Professor
Bachelor of Science, Stanford University, 1977
Doctor of Philosophy, University of California San Francisco, 1983
Doctor of Medicine, University of California San Francisco, 1984

Glory Ezinne Mgboji, M.D.

Instructor in Ophthalmology and Visual Sciences (Pending Dean Approval) (primary appointment)
University of Maryland-College Park, 2017
Johns Hopkins University, 2022

Cynthia L. Montana, Ph.D., M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
Bachelor of Science, University of Virginia, 2005
Doctor of Philosophy, Washington University in St Louis, 2014
Doctor of Medicine, Washington University in St Louis, 2014

O

F. Thomas Ott, M.D.

Assistant Professor Emeritus of Clinical Ophthalmology and Visual Sciences
Bachelor of Arts, Southern Methodist University, 1963
Doctor of Medicine, Washington University in St Louis, 1965

P

Anjali K Pathak, M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
Bachelor of Arts, West Virginia University, 1993
Bachelor of Science, West Virginia University, 1993
Doctor of Medicine, West Virginia University, 1997

Kisha Deslee Piggott, Ph.D., M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
Co-Director - Residency Program
Bachelor of Science, Spelman College, 2003
Doctor of Philosophy, Emory University, 2009
Doctor of Medicine, Emory University, 2011

Eric Ernest Polk, O.D.

Instructor in Ophthalmology and Visual Sciences (primary appointment)
Bachelor of Science, Missouri State University (Formerly Southwest Missouri State), 1989
Doctor of Optometry, University of Missouri in St Louis, 1994

Julia Pulliam, O.D.



Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
Bachelor of Science, Illinois College, 2007
Doctor of Optometry, Indiana University Bloomington, 2011

R

Rithwick Rajagopal, Ph.D., M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Doctor of Philosophy, New York University, 2006
Doctor of Medicine, New York University, 2007

Mark S Rallo, O.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
Director of Pediatric Optometry PD
Bachelor of Science, Saint Louis University, 1986
Doctor of Optometry, University of Missouri Columbia, 1990

Prabakar Kumar Rao, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Vice Chair - Clinical Operations
Bachelor of Arts, University of California San Diego, 1991
Doctor of Medicine, University of Southern California, 1995

Margaret Mary McGlynn Reynolds, M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
Associate Professor of Psychiatry
Bachelor of Science, Creighton University, 2010
Doctor of Medicine, Cornell University, 2014

Juan Gomez Rodriguez

Voluntary Research Assistant Professor of Ophthalmology and Visual Sciences

Mark A Rothstein, M.D.

Voluntary Clinical Assistant Professor of Ophthalmology and Visual Sciences
Bachelor of Arts, Williams College, 1986
Doctor of Medicine, University of Utah, 1991

Michael B Rumelt, M.D.

Assistant Professor Emeritus of Clinical Ophthalmology and Visual Sciences
Bachelor of Science, Lamar University, 1962
Doctor of Medicine, Washington University in St Louis, 1966

Philip A Ruzycki, Ph.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
Assistant Professor of Genetics
Bachelor of Science, Davidson College, 2008
Doctor of Philosophy, Washington University in St Louis, 2018

S

Mickey L Salmon, M.D.

Instructor Emeritus in Clinical Ophthalmology and Visual Sciences
Bachelor of Science, Centenary College, 1955
Doctor of Medicine, Louisiana State University, 1959

James Banks Shepherd, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Bachelor of Arts, Amherst College, 1992
Doctor of Medicine, Columbia University, 1997

Priya Saigal Shetty, M.D.

Voluntary Teaching Instructor in Ophthalmology and Visual Sciences
Voluntary Clinical Instructor in Ophthalmology and Visual Sciences
Doctor of Medicine, University of Michigan (Duplicate of University of Michigan Ann Arbor), 2007

Arsham Sheybani, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Director - Residency Program
Doctor of Medicine, Washington University in St Louis, 2008

Steven M Shields, M.D.

Voluntary Teaching Assistant Professor of Ophthalmology and Visual Sciences
Voluntary Clinical Assistant Professor of Ophthalmology and Visual Sciences
Bachelor of Science, Washington University in St Louis, 1981
Doctor of Medicine, Washington University in St Louis, 1986

Erin Gwen Sieck, M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2013
Doctor of Medicine, University of Missouri Kansas City, 2015

Carla J Siegfried, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Jacquelyn E and Allan E Kolker M.D. Distinguished Professor of Ophthalmology
Vice Chair - Diversity, Equity and Professionalism
Bachelor of Arts, University of Missouri Kansas City, 1989
Doctor of Medicine, University of Missouri Kansas City, 1989

Morton Edward Smith, M.D.

Professor Emeritus of Ophthalmology and Visual Sciences
Associate Dean Emeritus for Post-Graduate Education
Bachelor of Science, University of Maryland (Duplicate of University of Maryland-College Park), 1956
Doctor of Medicine, University of Maryland (Duplicate of University of Maryland-College Park), 1960

Florentina Soto Lucas, Ph.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)
Doctor of Philosophy, University of Alicante, 1992

Joseph Steska, O.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)



Doctor of Optometry, Illinois College of Optometry, 2009

Michael Vincent Stock, M.D.

Instructor in Ophthalmology and Visual Sciences (primary appointment)

Doctor of Medicine, Washington University in St Louis, 2012

Leanne Denise Stunkel, M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)

Associate Professor of Neurology

Bachelor of Arts, Johns Hopkins University, 2008

Doctor of Medicine, Cornell University, 2014

T

Paul M Tesser, Ph.D., M.D.

Voluntary Teaching Associate Professor of Ophthalmology and Visual Sciences

Voluntary Clinical Associate Professor of Ophthalmology and Visual Sciences

Bachelor of Science, Massachusetts Institute of Technology, 1981

Doctor of Philosophy, State University of New York at Stonybrook, 1990

Doctor of Medicine, State University of New York at Stonybrook, 1991

Praneetha Thulasi, M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Arts, Saint Louis University, 2008

Doctor of Medicine, Emory University, 2016

Linda Mei-Lin Tsai, M.D.

Professor Emerita of Ophthalmology

Bachelor of Arts, Northwestern University, 1990

Doctor of Medicine, Northwestern University, 1995

Nathan Tuttle, O.D.

Instructor in Ophthalmology and Visual Sciences (primary appointment)

Doctor of Optometry, Southern College of Optometry, 2009

Robert Lawrence Tychsen, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)

John F Hardesty MD Distinguished Professor of Ophthalmology and Visual Sciences

Professor of Ophthalmology and Visual Sciences in Pediatrics

Professor of Neuroscience

Bachelor of Science, Georgetown University, 1975

Doctor of Medicine, Georgetown University, 1979

V

Gregory Paul Van Stavern, M.D.

Professor of Ophthalmology and Visual Sciences (primary appointment)

Robert C. Drews Professor in Ophthalmology

Professor of Neurology

Bachelor of Science, La Salle University, 1989

Doctor of Medicine, Pennsylvania State University-Main Campus, 1993

W

Jessica Yang Walia, M.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Arts, Northwestern University, 2013

Doctor of Medicine, University of Illinois at Chicago, 2018

James Walsh, Ph.D., M.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, University of North Carolina at Chapel Hill, 2005

Doctor of Philosophy, University of Virginia, 2014

Doctor of Medicine, University of Virginia, 2016

Qian Wang, Ph.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Doctor of Philosophy, University of Alberta, 2016

Daniel Joseph Watson, M.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, Saint Louis University, 2010

Doctor of Medicine, Loyola University Chicago, 2014

Stephen Alan Wexler, M.D.

Professor of Ophthalmology and Visual Sciences (Pending Executive Faculty Approval) (primary appointment)

Bachelor of Science, University of Michigan Ann Arbor, 1977

Doctor of Medicine, University of Michigan Ann Arbor, 1982

Richard Harris Wieder, M.D.

Associate Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, University of Illinois at Urbana-Champaign, 1982

Doctor of Medicine, University of Illinois at Chicago, 1986

Philip Raymond Williams, Ph.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Assistant Professor of Neuroscience

Doctor of Philosophy, Washington University in St Louis, 2009

Y

Takeshi Yoshimatsu, M.S., Ph.D.

Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)

Bachelor of Science, University of Tokyo, 2001

Master of Science, University of Tokyo, 2003

Doctor of Philosophy, University of Tokyo, 2006

Research Electives

Ophthalmology and Visual Sciences Research Electives

Fourth-year medical students have a variety of opportunities to engage in advanced clinical or research experiences. Below is a list of faculty members with ongoing research projects that actively involve medical students. Students interested in working with a faculty member not listed are encouraged to reach out directly to inquire about potential research opportunities within their lab.

Residents are also encouraged to participate in laboratory or clinical investigations, as research plays a critical role in developing essential skills such as the following:

- Understanding the limitations of laboratory methodologies
- Evaluating scientific literature
- Strengthening critical thinking
- Refining career goals through hands-on research experience

Residents have the flexibility to choose their research focus, with a broad range of opportunities available. The department supports both basic science and clinical research, with active investigations in the following areas:

- Neurobiology
- Immunology
- Molecular Biology
- Pharmacology & Physiology
- Clinical Studies & Outcomes Research

To recognize outstanding contributions, the Rosenbaum Research Award (\$1,000) is presented annually to the resident with the most innovative research project.

For a list of available research projects or more information, please contact ophthostudentresearch@wustl.edu.
(ophthostudentresearch@wustl.edu)

Interdisciplinary Training in Vision Science (ITVS) Pathway

Graduate students in the Department of Ophthalmology and Visual Sciences (DOVS) come from at least seven different graduate programs, each with distinct course requirements that may not fully cover vision science. To bridge this gap, we developed the Interdisciplinary Training in Vision Science (ITVS) Pathway, a structured curriculum designed to supplement traditional graduate training.

Supported in part by the renewed DOVS T32 grant, the ITVS Pathway offers four specialized courses that introduce students to core aspects of vision science. These courses attract a diverse group of students, postdoctoral fellows, and faculty, fostering a collaborative learning environment where trainees receive mentorship and constructive feedback. Importantly, ITVS students play a key role in refining the program by providing feedback, ensuring that the curriculum continues to evolve to meet the needs of the vision science research community.

Courses

BIOL 5508: ITVS Advanced Techniques

3 course units

The Advanced Methods in Vision Science course provides ITVS students the opportunity to learn about advanced methods utilized in studies of the visual systems from the experts who perform the studies. These methods emerged from different disciplines (molecular biology, imaging, electrophysiology, machine learning), but provide critical details for understanding how the visual systems focuses and processes light stimuli. The course has two components. 1) A series of 90-minute structured discussions of advanced methods via foundational papers and recent applications of these methods. 2) A choice of two hands-on experiences with these methods in the instructor laboratories. We open the discussion section of the course to all students, postdocs, and faculty members (in this order) but cap the class size at 12 participants to facilitate interactions. Hands-on experiences are restricted to ITVS students. For hands-on experiences, each ITVS student chooses two techniques and spends a day in the laboratory of the respective instructor to gain practical experience with the experiments and analysis pipelines and discuss pitfalls and applications of the methods in detail. Through these components, the Advanced Methods in Vision Science course tries to accomplish three goals: 1) enable students to critically assess the literature through an understanding of strengths and limitations of advanced methods, 2) help students plan experiments involving these methods, and 3) facilitate collaborations with experts in the field that could enhance the science of the ITVS students.

BIOL 5509: ITVS Project Building

1 course unit

The overall goal is to have intense guidance to construct a grant/fellowship application. Students should expect to have a near completed F30/F31 application by the end of this course. Students will study previous F30/F31 applications and sit on a mock panel to review real world grants from their peers. They will use this experience to understand the reviewers perspective when writing fellowships and grants in the future. Students will draft all portions of a research proposal with feedback from their peers, the course instructor and faculty mentors.



BIOL 5501: The Biology and Pathology of the Visual System

3 course units

The purpose of the course is to provide a fascinating view of vertebrate eye development, anatomy, physiology and pathology. Topics to be covered include the molecules that control eye formation, ocular stem cells, the physiology of transparency, hereditary ocular diseases, phototransduction, the neurobiology of the retina and central visual pathways, age-related eye diseases, and many others. The course is open to all second year graduates students and above. Ophthalmology residents and postdocs with an interest in vision are strongly encouraged to attend.

BIOL 5623: ITVS Translation in Vision Science

1 course unit

This course introduces students to the translation of basic science and pre-clinical research to the biopharma industry and/or clinics to benefit patients. The class will introduce how patient genetics can guide disease research in animal models and how patient tissue can be used to model disease progression/outcomes. Students will learn how results from these types of studies impact patient lives through the development of drug/treatment candidates and/or clinical trials. Students will be connected to clinicians to witness the profound impact of blinding diseases on patient lives and how scientific advances in disease research can motivate philanthropic funding of subsequent research.

Courses

Curriculum courses (p. 301) for Ophthalmology and Visual Sciences are listed below.

Gateway Curriculum

WashU's Gateway Curriculum is designed to provide medical students with a progressive, hands-on learning experience throughout their four-year education. The curriculum is structured into three phases, integrating early clinical exposure with advanced training opportunities to develop well-rounded, patient-centered physicians.

Early Clinical Immersion

The first 16 months of medical school introduce students to foundational medical knowledge and clinical practice. A key component of this phase is the Procedural Immersions, three-week-long experiences that expose students to various clinical and surgical settings. These immersions help students:

- Familiarize themselves with different healthcare environments.
- Develop essential clinical skills.
- Understand the broader impact of society and healthcare systems on individual patient outcomes.

This immersive, 360-degree approach allows students to view patient care from multiple perspectives—physician, patient, and healthcare system. During the Ophthalmology Procedural Immersion, students gain hands-on experience in the University Eye Clinic, pediatric and adult subspecialty clinics, and operating rooms, as well as participate in inpatient consult rounds. This early exposure helps contextualize classroom learning and lays the foundation for future clinical training.

Ophthalmology in the Brain and Behavior Module

Ophthalmology education is integrated into Phase 1 through Module 7: Brain and Behavior, where students explore:

- Eye anatomy and physiology.
- Visual pathways in the brain.
- Extraocular movement mechanisms.

Interactive case-based sessions reinforce these concepts, encouraging critical thinking and the development of fundamental eye examination skills.

Advanced Clinical Training in Ophthalmology

In the final phase of the curriculum, students have the opportunity to further their ophthalmology training through electives and advanced clinical rotations. These experiences provide the following:

- Deeper exposure to clinical ophthalmology.
- Hands-on training in diagnosing and managing ocular conditions.
- Close collaboration with ophthalmology residents.

During these rotations, students refine their diagnostic skills by reviewing differential diagnoses for red eye, interpreting ophthalmologic consult notes, and managing ocular emergencies. Additionally, they gain proficiency in essential examination techniques, including ophthalmoscopy, slit-lamp biomicroscopy, and indirect ophthalmoscopy.

By integrating ophthalmology education throughout the medical school journey, the Gateway Curriculum ensures that students develop the knowledge, skills, and clinical confidence needed to excel in eye care and beyond.

Curriculum Courses

- OPTH 8015 Neuro-Ophthalmology (Clinical Elective) (contact Gregory Van Stavern, MD for additional information)
- OPTH 8030 Orbital and Oculofacial Plastic Surgery (Clinical Elective) (contact John Holds, MD, FACS for additional information)

OPHTH 8010 Ophthalmology (Clinical Elective)

The Ophthalmology elective is designed to provide a foundational experience in clinical and surgical ophthalmology for medical students, whether they are interested in ophthalmology or other fields of medicine for their future career. Time will be divided among the University Eye Service clinic, adult inpatient consults, and ophthalmology subspecialties (e.g. Pediatric Ophthalmology, Glaucoma, Cornea, Oculoplastics, and Retina).

The amount of time at each location will depend on length of the rotation and the student's specific interests. There are weekly case conferences with Dr. Andrew Lee, Dr. Cynthia Montana, and other faculty members. Students will attend departmental grand rounds weekly, when applicable. At the end of the experience, the student is expected to be familiar with the routine eye exam, common eye conditions and their treatment, and the use of the slit lamp and ophthalmoscope.

Credit 2 units.

Typical periods offered: Medicine Year

OPHTH 8015 Neuro-Ophthalmology (Clinical Elective)

This elective will be offered by invitation only to select fourth-year medical students with a career interest in Neuro-Ophthalmology. During the four-week rotation, students will be busy in the Neuro-Ophthalmology clinic. Students will be expected to work-up new patients and present them to the Neuro-Ophthalmology attending. After clinic students should read about diagnoses encountered in clinic. In addition, there will be required reading. Comprehension of the reading will be assessed by scheduled quizzes which will then be reviewed with the student by one of three faculty members. There may be opportunities to join the operating room for strabismus surgery. Interested students will be encouraged to engage in a research project with one of the faculty members, although this is not required for the rotation. This will be a busy clinical elective; students can expect to spend ten half-days working in clinic or the OR per week. By the end of the rotation, students will feel comfortable recording a chief complaint, focused Neuro-Ophthalmic history, and performing a Neuro-Ophthalmic examination. Students should achieve resident level knowledge of common Neuro-Ophthalmic pathology.

Credit 2 units.

Typical periods offered: Medicine Year

OPHTH 8030 Orbital and Oculofacial Plastic Surgery (Clinical Elective)

Hands-on experience with clinical and surgical aspect of Orbital and Oculofacial Plastic Surgeons. Students will work with Dr. Couch and Dr. Maamari in the clinic and the operating room in the care of diverse patients both on the pediatric and adult sides.

Credit 2 units.

Typical periods offered: Medicine Year

OPHTH 9100 Ophthalmology Advanced Clinical Rotation (ACR)

On the Ophthalmology Advanced Clinical Rotation, medical students will rotate on the ophthalmology adult consult service, the University Eye Service clinic, and the subspecialty clinics of the full time faculty of the Department of Ophthalmology and Visual Sciences (cornea, glaucoma, oculoplastics, neuro-ophthalmology, pediatric ophthalmology). Students will care for patients of all ages and backgrounds, and ophthalmic diseases seen will range from common eye conditions to complex diseases requiring subspecialty care.

In clinic and on consults, students will perform the ophthalmic history and physical examination and also develop their ability to diagnose, manage, and treat common ophthalmic conditions. In the operating room, students will participate in all phases of perioperative patient care and learn basic ophthalmic surgical principles and techniques.

Academic curriculum for the rotation will include weekly case presentations with ophthalmology faculty, resident lectures and conferences, and weekly departmental grand rounds. Each student will also present a case at grand rounds during the final week of the rotation with the assistance of a resident mentor.

Students will participate in ophthalmology call approximately one evening per week. During that time, the medical student is expected to be present to work with the primary call ophthalmology resident.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Orthopaedic Surgery

Orthopaedic surgery is concerned with the injuries, diseases and conditions of the musculoskeletal system. The WUSM III rotation in Musculoskeletal Surgery & Medicine exposes the student to multiple aspects of orthopaedic surgery, including caring for patients in the emergency department and the operating room as well as clinical practice in the emergency department and the outpatient and inpatient wards.

Website: <http://www.ortho.wustl.edu>

Faculty

Regis O'Keefe, MD, PhD

Department Chair

Visit our website for more information about our faculty and their appointments.

A

Yousef Abu-Amer, M.S., Ph.D.

Professor of Orthopedic Surgery (primary appointment)

Dr J Albert Key Professor of Orthopedic Surgery

Professor of Cell Biology and Physiology

Bachelor of Science, Hebrew University of Jerusalem, 1985

Master of Science, Hebrew University of Jerusalem, 1987

Doctor of Philosophy, Hebrew University of Jerusalem, 1993

Alexander William Aleem, M.S., M.D.

Associate Professor of Orthopedic Surgery (primary appointment)

Bachelor of Science, Johns Hopkins University, 2006

Doctor of Medicine, Washington University in St Louis, 2010

Master of Science, Washington University in St Louis, 2019

B

Robert L Barrack, M.D.



Professor of Orthopedic Surgery (primary appointment)
Charles F and Joanne Knight Distinguished Professor of Orthopedic Surgery
Doctor of Medicine, Vanderbilt University, 1980

Kimberly Ann Bartosiak, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Loyola University Chicago, 2015

Ilya Bendich, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Dartmouth College, 2015

Marschall Brantling Berkes, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Division Chief – Division of Orthopedic Trauma
Doctor of Medicine, Vanderbilt University, 2008

Terra Rupert Blatnik, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, Allegheny College, 2003
Doctor of Medicine, Case Western Reserve University, 2007

Michael Anthony Boeving, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, University of Oklahoma, 2018

Martin I Boyer, M.S., M.D.

Professor of Orthopedic Surgery (primary appointment)
Carol B and Jerome T Loeb Professor of Orthopedic Surgery
Doctor of Medicine, University of Toronto, 1988
Master of Science, University of Toronto, 1993

Keith Happ Bridwell, M.D.

Professor of Orthopedic Surgery (primary appointment)
Professor of Neurological Surgery
Bachelor of Arts, Washington University in St Louis, 1973
Doctor of Medicine, Washington University in St Louis, 1977

David Micah Brogan, M.S., M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Associate Professor of Neurological Surgery
Master of Science, University of London, 2005
Doctor of Medicine, Washington University in St Louis, 2009

Robert Henry Brophy, M.S., M.D.

Professor of Orthopedic Surgery (primary appointment)
Division Chief – Division of Orthopedic Sports
Jerome J. Gilden, MD Endowed Distinguished Professor of Orthopedic Surgery
Bachelor of Arts, Stanford University, 1994
Bachelor of Science, Stanford University, 1994
Master of Science, Stanford University, 1995
Doctor of Medicine, Washington University in St Louis, 2001

Jacob M Buchowski, M.S., M.D.

Professor of Orthopedic Surgery (primary appointment)
Division Chief - Division of Spine
Vice Chair - Department of Orthopedic Surgery
Professor of Neurological Surgery
J Albert Key Distinguished Professor of Orthopedic Surgery
Bachelor of Science, Yale University, 1996

Master of Science, Yale University, 1996
Doctor of Medicine, Johns Hopkins University, 2000

C

Katherine M. Caldwell, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, Texas A&M University, 2014
Doctor of Medicine, University of Missouri Columbia, 2019

Ryan Patrick Calfee, M.D.

Professor of Orthopedic Surgery (primary appointment)
Division Chief - Division of Hand and Wrist
Bachelor of Science, University of Virginia, 1997
Doctor of Medicine, Washington University in St Louis, 2001

Tyler Calkins, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, West Virginia University, 2014
Doctor of Medicine, West Virginia University, 2019

Alexandre Carter, Ph.D., M.D.

Professor of Orthopedic Surgery (primary appointment)
Professor of Neurology
Professor of Radiology
Professor of Occupational Therapy
Bachelor of Science, Brandeis University, 1991
Doctor of Philosophy, Harvard University, 2003
Doctor of Medicine, Harvard University, 2003

Abby Ling Lee Cheng, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Associate Professor of Surgery
Associate Professor of Medicine
Doctor of Medicine, Washington University in St Louis, 2013

David Cameron Clever, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Ohio State University College of Medicine, 2018

John C Clohisy, M.D.

Professor of Orthopedic Surgery (primary appointment)
Daniel C. and Betty B. Viehmann Distinguished Professor of Orthopedic Surgery
Vice Chair - Department of Orthopedic Surgery
Bachelor of Arts, Northwestern University, 1985
Doctor of Medicine, Northwestern University, 1989

John Clayton Fournier Clohisy, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Assistant Professor of Neurological Surgery
Bachelor of Science, University of Notre Dame, 2013
Doctor of Medicine, University of Missouri Columbia, 2017

Suzanne Marie Cornbleet, M.A., D.P.T.

Associate Professor of Orthopedic Surgery
Bachelor of Science, University of Colorado Boulder, 1975
Master of Arts, Washington University in St Louis, 1987
Doctor of Physical Therapy, Washington University in St Louis, 2003

Carol Y. Crooks, M.D.



Assistant Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 2001

D

Kayla E Daniel, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2011
Doctor of Medicine, Rush University, 2016

Gregory M Decker, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Assistant Professor of Neurology
Doctor of Medicine, American University of the Caribbean, 2014

Naomi Dirckx, M.S., Ph.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, Katholieke Universiteit Leuven, 2011
Master of Science, Katholieke Universiteit Leuven, 2013
Doctor of Philosophy, Katholieke Universiteit Leuven, 2018

Ryan Everett Doyel, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, Marquette University, 2011
Doctor of Medicine, Creighton University, 2015

Christopher J. Dy, M.P.H., M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Associate Professor of Surgery (Public Health Sciences)
Bachelor of Science, University of Miami, 2004
Master of Public Health, University of Miami, 2008
Doctor of Medicine, University of Miami, 2008

E

Dennis Ian English, M.A., M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Division Chief of Musculoskeletal Oncology
Bachelor of Arts, Washington University in St Louis, 2008
Doctor of Medicine, Loyola University Chicago, 2014
Master of Arts, Loyola University Chicago

Lawrence Glennon Evans

Voluntary Clinical Instructor in Orthopedic Surgery

F

Roberta Faccio, Ph.D.

Professor of Orthopedic Surgery (primary appointment)
Professor of Cell Biology and Physiology
Jerome J. Gilden, M.D. Endowed Distinguished Professorship in Orthopedic Surgery
Doctor of Philosophy, University of Bari, 2000

G

Richard H Gelberman, M.D.

Professor Emeritus of Orthopedic Surgery
Bachelor of Arts, University of North Carolina at Chapel Hill, 1965

Doctor of Medicine, University of Tennessee, 1969

Charles A Goldfarb, M.D.

Professor of Orthopedic Surgery (primary appointment)
Richard H. Gelberman, MD Distinguished Professorship in Orthopaedic Surgery
Executive Vice Chair - Department of Orthopedic Surgery
Bachelor of Arts, Williams College, 1992
Doctor of Medicine, University of Alabama at Birmingham School of Medicine, 1996

Matthew Lawrence Goodwin, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Assistant Professor of Neurological Surgery
Doctor of Medicine, Cornell University, 2013

J. Eric Gordon, M.D.

Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, University of California, 1983
Doctor of Medicine, University of California Davis, 1988

Farshid Guilak, M.P.H., M.S., Ph.D.

Professor of Orthopedic Surgery (primary appointment)
Mildred B. Simon Research Professorship in Orthopaedic Surgery
Professor of Biomedical Engineering
Professor of Mechanical Engineering and Materials Science
Professor of Developmental Biology
Bachelor of Science, Rensselaer Polytechnic Institute, 1985
Master of Science, Rensselaer Polytechnic Institute, 1987
Master of Public Health, Columbia University, 1990
Doctor of Philosophy, Columbia University, 1992

H

Mark E. Halstead, M.D.

Professor of Orthopedic Surgery (primary appointment)
Professor of Pediatrics
Bachelor of Science, University of Wisconsin Madison, 1994
Doctor of Medicine, University of Wisconsin Madison, 1998

Jeremy A Hartman, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Saint Louis University, 2013

Damon Joseph Louis Hays, M.D.

Voluntary Clinical Instructor in Orthopedic Surgery
Bachelor of Science, Truman State University (Duplicate of Truman State University (Formerly Northeast Missouri State University)), 1998
Doctor of Medicine, Ohio University (Duplicate of Ohio University-Main Campus), 2003

William Louis Hollabaugh, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, Marquette University, 2014
Doctor of Medicine, Medical College of Wisconsin, 2018

Pooya Hosseinzadeh, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Isfahan University of Medical Sciences, 2004

Devyani M. Hunt, M.D.



Professor of Orthopedic Surgery (primary appointment)
Division Chief - Division of Physical Medicine & Rehabilitation
Professor of Neurology
Bachelor of Science, University of Texas Austin, 1995
Doctor of Medicine, University of Texas Houston, 2000

Kelly Hynes, M.S., M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Chief of the Division of Foot and Ankle
Bachelor of Science, Dalhousie University, 2006
Doctor of Medicine, Memorial University of Newfoundland, 2010
Master of Science, University of Chicago, 2023

J

Sindhu Saji Jacob, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Kottayam Medical College, 1994

Jeffrey E Johnson, M.D.

Professor Emeritus of Orthopedic Surgery
Bachelor of Arts, Duke University, 1976
Doctor of Medicine, Georgetown University, 1980

Richard Johnston, M.D.

Instructor in Orthopedic Surgery (primary appointment)
Bachelor of Science, University of Georgia, 1981
Doctor of Medicine, Vanderbilt University, 1985

K

Jay Donovan Keener, M.D.

Professor of Orthopedic Surgery (primary appointment)
Division Chief - Division of Shoulder and Elbow
Vice Chair - Department of Orthopedic Surgery
Sam and Marilyn Fox Distinguished Professor in Orthopedic Surgery
Bachelor of Science, West Virginia University, 1991
Doctor of Medicine, West Virginia University, 1998

Brian Adams Kelly, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Associate Professor of Neurological Surgery
Bachelor of Arts, Williams College, 2002
Doctor of Medicine, Columbia University, 2009

Kunjan Khanna, M.S., Ph.D.

Instructor in Orthopedic Surgery (primary appointment)
Bachelor of Science, University of Delhi, 2012
Master of Science, University of Delhi, 2014
Doctor of Philosophy, Tamilnadu Medical University, 2020

Derrick Michael Knapik, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Ohio State University-Main Campus, 2014

Alexander Knights, Ph.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Arts, University of New South Wales, 2013
Bachelor of Science, University of New South Wales, 2013
Doctor of Philosophy, University of New South Wales, 2018

Christine Krull, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Assistant Professor of Neurology
Doctor of Medicine, University of Missouri Columbia, 2013

L

Adam J. LaBore, M.D.

Professor of Orthopedic Surgery (primary appointment)
Professor of Neurology
Division Chief – Division of Neuro Rehabilitation
Bachelor of Science, Louisiana College, 1994
Doctor of Medicine, Loyola University Chicago, 1998

Mark J. Lambrechts, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Assistant Professor of Neurological Surgery
Bachelor of Arts, Miami University-Oxford, 2010
Doctor of Medicine, Tulane University, 2016

Xiaofei Li, Ph.D.

Instructor in Orthopedic Surgery (primary appointment)
Doctor of Philosophy, Stony Brook University, 2019

Scott J Luhmann, M.D.

Professor of Orthopedic Surgery (primary appointment)
Professor of Neurological Surgery
Bachelor of Arts, Gustavus Adolphus College, 1986
Doctor of Medicine, University of Minnesota, 1991

M

Matthew J Matava, M.D.

Professor of Orthopedic Surgery (primary appointment)
Division Chief - Division of Sports Medicine
Professor of Physical Therapy
Bachelor of Arts, University of Missouri Kansas City, 1986
Doctor of Medicine, University of Missouri Kansas City, 1987

Audrey McAlinden, Ph.D.

Professor of Orthopedic Surgery (primary appointment)
Professor of Cell Biology and Physiology
Doctor of Philosophy, University of London, 1998

Christopher M McAndrew, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, University of Tennessee, 2004

Jeremy James McCormick, M.D.

Professor of Orthopedic Surgery (primary appointment)
Baccalaureatus, Dartmouth College, 1999
Doctor of Medicine, Loyola University Chicago, 2003

Douglas J. McDonald, M.D.

Professor Emeritus Orthopaedic Surgery
Bachelor of Science, Saint Johns University, 1978
Doctor of Medicine, University of Minnesota, 1982

Maria Isabel Menendez Montes, D.V.M., Ph.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Doctor of Veterinary Medicine, University of Leon, 2002

Doctor of Philosophy, Ohio State University-Main Campus, 2015

John P Metzler, M.D.

Professor of Orthopedic Surgery (primary appointment)

Professor of Neurology

Bachelor of Science, Texas A&M University, 1991

Doctor of Medicine, University of Texas Galveston, 1995

Zachary Isaac Meyer, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Doctor of Medicine, Washington University in St Louis, 2015

Laura L Meyers, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)

Bachelor of Science, Washington University in St Louis, 1988

Doctor of Medicine, Vanderbilt University, 1993

Marie Theresa Morris, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Bachelor of Science, University of Arkansas Main Campus, 2012

Doctor of Medicine, Washington University in St Louis, 2016

N

Adam Nasreddine, M.A., M.D., Vocational.Diploma

Assistant Professor of Orthopedic Surgery (primary appointment)

Bachelor of Science, American University of Beirut, 2006

Master of Arts, Boston University, 2011

Doctor of Medicine, Pennsylvania State University-College of Medicine, 2018

specific trade or career, Yale University, 2023

Jeffrey Jerome Nepple, M.D.

Professor of Orthopedic Surgery (primary appointment)

Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2003

Doctor of Medicine, Washington University in St Louis, 2007

Brian J. Neuman, M.D.

Professor of Orthopedic Surgery (primary appointment)

Professor of Neurological Surgery

Division Chief – Division of Orthopedic Spine

Lawrence G and Elizabeth A Lenke Distinguished Professor of Orthopedic Surgery

Doctor of Medicine, Thomas Jefferson University, 2007

Ryan M. Nunley, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)

Bachelor of Arts, Vanderbilt University, 1998

Doctor of Medicine, University of North Carolina at Chapel Hill, 2002

O

Regis James O'Keefe, Ph.D., M.D.

Professor of Orthopedic Surgery (primary appointment)

Fred C Reynolds Professor of Orthopedic Surgery

Head of the Department of Orthopedic Surgery

Bachelor of Arts, Yale University, 1981

Doctor of Medicine, Harvard University, 1985

Doctor of Philosophy, University of Rochester, 2000

Mitchel Robert Obey, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Bachelor of Arts, Luther College Iowa, 2012

Doctor of Medicine, Mayo Medical School, 2017

Arin D Oestreich, Ph.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Doctor of Philosophy, University of Missouri Columbia, 2015

Nathan P Olafsen, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)

Associate Professor of Neurology

Doctor of Medicine, University of Missouri Columbia, 2012

P

Nicholas Pallotta, M.S., M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Assistant Professor of Neurological Surgery

Bachelor of Science, Rensselaer Polytechnic Institute, 2007

Master of Science, Rensselaer Polytechnic Institute, 2009

Doctor of Medicine, Stony Brook School of Medicine, 2013

Tulsi Pandat, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Doctor of Medicine, University of Arkansas for Medical Sciences, 2018

Joseph Pangelinan, M.A., Ph.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Master of Arts, Southeast Missouri State University, 1995

Doctor of Philosophy, University of Missouri in St Louis, 2015

Cecilia Pascual Garrido, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)

Doctor of Medicine, Universidad de Buenos Aires, 2000

R

Elena C. Randazzo, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Doctor of Medicine, University of Missouri Columbia, 2020

Elizabeth Yanik Rowlands, Sc.M., Ph.D.

Associate Professor of Orthopedic Surgery (primary appointment)

Associate Professor of Surgery

Associate Professor of Public Health

Bachelor of Science, University of Maryland-College Park, 2007

Master of Science, Johns Hopkins University, 2009

Doctor of Philosophy, University of North Carolina at Chapel Hill, 2013

Rimma Ruvinskaya, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)

Doctor of Medicine, Saint Petersburg State Pediatric Medical

Academy, 1985

S

Linda J Sandell, M.S., Ph.D.

Professor Emeritus of Orthopedic Surgery

Bachelor of Arts, University of Denver, 1969

Master of Science, University of Denver, 1971



Doctor of Philosophy, Northwestern University, 1980

Andrew M. Schneider, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Arts, University of California Berkeley, 2011
Stritch School of Medicine, 2017

Perry Lee Schoenecker, M.D.

Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, University of Wisconsin Madison, 1964
Doctor of Medicine, University of Wisconsin Madison, 1968

Jason Shellhaas, M.D.

Voluntary Clinical Assistant Professor of Orthopedic Surgery
Bachelor of Arts, Middlebury College, 1997
Doctor of Medicine, University of North Carolina at Chapel Hill

Jie Shen, M.S., Ph.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, Nanjing University (#####), 2005
Master of Science, University of Rochester, 2011
Doctor of Philosophy, University of Rochester, 2012

Matthew J Silva, M.Eng., Ph.D.

Professor of Orthopedic Surgery (primary appointment)
Julia and Walter R Peterson Professor of Orthopedic Research
Vice Chair - Research, Department of Orthopedic Surgery
Professor of Mechanical Engineering and Materials Science
Professor of Biomedical Engineering
Bachelor of Science, Cornell University, 1982
Master of Engineering, Cornell University, 1984
Doctor of Philosophy, Massachusetts Institute of Technology, 1996

Scott A. Simpson, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Associate Professor of Neurology
Division Chief – Division of Orthopedic Injury Clinic
Bachelor of Arts, Columbia University, 2005
Doctor of Medicine, University of Rochester, 2010

Matthew Vernon Smith, M.D.

Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Virginia Commonwealth University, 2002

Katherine Caroline White Stenson, M.D.

Professor of Orthopedic Surgery (primary appointment)
Professor of Neurology
Bachelor of Arts, Washington University in St Louis, 1994
Doctor of Medicine, Northwestern University Medical, 2018

Jason Strelzow, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, University of British Columbia, 2010

Gaurav Swarnkar, Ph.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Doctor of Philosophy, Jawaharlal Nehru University, 2012

T

Katharine Tam, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)

Assistant Professor of Neurology

Bachelor of Science, Cornell University, 2010
Doctor of Medicine, Albert Einstein College of Medicine, 2014

Chi-Tsai Tang, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Associate Professor of Neurology
Doctor of Medicine, University of North Carolina at Chapel Hill, 2004

Ruhang Tang, M.S., Ph.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, Nanjing University (#####), 1986
Master of Science, Nanjing University (#####), 1990
Doctor of Philosophy, Chinese Academy of Sciences, 1996

Simon Tang, M.S., Ph.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Associate Professor of Mechanical Engineering and Materials Science
Bachelor of Science, University of California Berkeley, 2003
Master of Science, Rensselaer Polytechnic Institute, 2005
Doctor of Philosophy, Rensselaer Polytechnic Institute, 2007

W

Lindley Bevelle Wall, M.D.

Professor of Orthopedic Surgery (primary appointment)
Jacqueline N Baker and W. Randolph Baker Professor
Division Chief - Division of Pediatrics
Bachelor of Science, Duke University, 2002
Doctor of Medicine, Washington University in St Louis, 2006

Cuicui Wang, M.S., Ph.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, Soochow University (#####), 2005
Master of Science, Nanjing University, 2008
Doctor of Philosophy, University of Rochester, 2014
Bachelor of Science in Nursing, Goldfarb School of Nursing, 2020

Jenna Leigh Wilson, M.D.

Assistant Professor of Orthopedic Surgery (primary appointment)
Bachelor of Science, University of North Texas, 2013
Doctor of Medicine, Texas A&M Health Science Center, 2018

David J. Wright, M.D.

Assistant Professor of Orthopedic Surgery (Pending Dean Approval)
(primary appointment)
Bachelor of Arts, University of California Berkeley, 2010
Doctor of Medicine, University of California Irvine, 2016

Rick Wayne Wright, M.D.

Voluntary Clinical Professor of Orthopedic Surgery
Bachelor of Science, University of Missouri Columbia, 1984
Doctor of Medicine, University of Missouri Columbia, 1988

Z

Benjamin Matthew Zmistowski, M.D.

Associate Professor of Orthopedic Surgery (primary appointment)
Doctor of Medicine, Jefferson Medical College, 2014

Research Electives

Orthopaedic Surgery Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Various orthopaedic surgery research opportunities are available with the following faculty attendings. If interested, please contact the Education Office at 314-747-2543, email the orthopaedic surgery department (orthosurg@wudosis.wustl.edu), or contact the faculty member directly.

- Yousef Abu-Amer, PhD
- Alexander Aleem, MD
- Robert L. Barrack, MD
- Robert Brophy, MD
- Jacob M. Buchowski, MD, MS
- Ryan Calfee, MD
- Aaron Chamberlain, MD
- Cara A. Cipriano, MD
- John Clohisy, MD
- Matthew Dobbs, MD
- Charles A. Goldfarb, MD
- Farshid Guilak, PhD
- Munish Gupta, MD
- Pooya Hosseinzadeh, MD
- Deeptee Jain, MD
- Michael Kelly, MD
- Sandra Klein, MD
- Charles Lawrie, MD
- Scott J. Luhmann, MD
- Matthew J. Matava, MD
- Audrey McAlinden, PhD
- Chris McAndrew, MD
- Mark Miller, MD
- Jeff Nepple, MD
- Regis O'Keefe, MD
- Nathan Olafsen, MD
- Linda Sandell, PhD
- Perry Schoenecker, MD
- Matt Silva, PhD
- Matthew Smith, MD
- Lindley B. Wall, MD

Courses

ORTHO 8071 Physical Medicine and Rehabilitation (Clinical Elective)

The elective is designed to provide the student with a broad introduction to the field of Physical Medicine and Rehabilitation (PMR). Major objective of this clinical elective is to achieve greater knowledge of the neurological and musculoskeletal diseases and their treatment, and gain understanding of basic principles of rehabilitation. The student will learn the clinical and rehabilitative care of patients with strokes, traumatic brain injury, spinal cord trauma and diseases, and limb amputations. Student will gain clinical skills in evaluating in management of functional impairments. Students will be expected to participate in daily rounds on inpatient rehabilitation units with the clinical care team, follow 3-4 patients, attend multidisciplinary team conferences and family meetings, attend outpatient rehabilitation clinics in spinal cord, stroke, traumatic brain injury, and amputee. Teaching and supervision is provided by the Division of Neuro-Rehabilitation faculty. PMR residents are involved in student teaching as well. Students are required to participate in didactic teaching conferences within the PM&R residency. Participation in Musculoskeletal PMR clinic in the Orthopedic surgery department can be arraigned on individual basis. This rotation is particularly useful for students considering careers in Rehabilitation, Neurology, Geriatrics, Primary care, Neurosurgery, Orthopedic surgery, Polytrauma, or any other field that will require experience in the evaluation and management of patients with physical impairment and disabilities. Credit 2 units.

Typical periods offered: Medicine Year

ORTHO 8150 Orthopedic Surgery (Clinical Elective)

This elective will allow for immersion within one of the orthopedic surgery subspecialties. The student will be assigned to a mentor/preceptor and work primarily with a single attending within the available subspecialties including orthopedic oncology, hand surgery, orthopedic trauma, sports medicine, arthroplasty and adult reconstruction, pediatric orthopedics, spine, foot and ankle or shoulder and elbow. The student will have the opportunity to care for patients in the inpatient and outpatient setting, and working within a team to include residents, fellows, and attendings. Emphasis will be on the evaluation and treatment of degenerative and acute orthopaedic conditions. Surgical education on anatomy, surgical approaches and operative rationale will also be central to the rotation. Participation in department and service specific lectures and conferences will be expected. Overnight call responsibilities will allow for further exposure to the management of acute orthopedic problems in the emergency room.

Credit 2 units.

Typical periods offered: Medicine Year

ORTHO 8160 PM&R Musculoskeletal and Sports Medicine (Clinical Elective)

In this outpatient Physical Medicine and Rehabilitation rotation, students will assess patients with musculoskeletal and sport medicine concerns, develop a diagnostic approach, and design treatment plans. Common presenting concerns include acute or chronic pains, strains, and sprains. Students will be exposed to a variety of outpatient procedures including diagnostic ultrasound, electrodiagnostic testing, as well as anatomic, ultrasound, and fluoroscopic-guided injections. This rotation is useful for any student, especially those interested in PM&R, primary care, emergency medicine, radiology, and orthopedic surgery.

Credit 2 units.

Typical periods offered: Medicine Year



ORTHO 8170 PM&R and Orthopedic Injury Clinic (Clinical Elective)

In this outpatient Physical Medicine and Rehabilitation rotation, students will assess patients presenting to the Orthopedic Injury Clinic, our orthopedic urgent care clinic. Common presenting concerns include acute or chronic pains, fractures, strains, and sprains. Students will help develop a diagnostic approach and design treatment plans. Students will be exposed to a variety of outpatient procedures including diagnostic ultrasound, anatomic, ultrasound, and fluoroscopic-guided injections. This rotation is useful for any student, especially those interested in PM&R, primary care, emergency medicine, pediatrics, radiology, and orthopedic surgery.

Credit 2 units.

Typical periods offered: Medicine Year

ORTHO 9100 Orthopedic Surgery Advanced Clinical Rotation (ACR)

This will be a 4-week inpatient and outpatient clinical experience involving the evaluation, diagnosis and treatment of orthopedic conditions, with exposure to a variety of degenerative and acute orthopedic conditions. Students will be expected to function at the level of a PGY1 with regard to clinical responsibilities. Participation will involve floor management, ER evaluation, OR participation and outpatient clinic experience. Emphasis will be on correlating anatomy to function in normal and pathologic states.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Otolaryngology

The Department of Otolaryngology–Head & Neck Surgery at WashU Medicine has a rich, 130-year history of leadership in the field that is built on the foundations of academic medicine: patient care, research, training, and service. Our past leaders include luminaries in the field of otolaryngology, such as John Blasdel Shapleigh, MD; Greenfield Sluder, MD; Lee Wallace Dean, MD; Theodore Walsh, MD; Joseph Ogura, MD; John Fredrickson, MD; Richard A. Chole, MD, PhD; Craig A. Buchman, MD; and, presently, Sidharth Puram, MD, PhD. Even from our earliest days — prior to the inception of the McMillan Eye, Ear, Nose and Throat Hospital (circa 1943) — excellence has been an integral part of the department's fabric. A look at former faculty and program graduates reveals many of the true innovators in our field. While we remain humbled by our beginnings and past achievements, we choose not to rest on our laurels. Rather, we aspire to further our commitment to improving patients' lives by leading our field and its clinical application.

Today, more than ever, we are driven to provide highest-quality, cutting-edge patient care that is both safe and effective. Our WashU physicians and team, together with our Honor Roll Award-winning hospital, Barnes-Jewish Hospital (*U.S. News*, 2024-25), are second to none when it comes to tackling the full spectrum of conditions involving the ear, nose, throat, head, and neck. Our basic, translational, and clinical research programs are remarkable, providing answers to a variety of relevant questions that build on our foundations of knowledge, lay the groundwork for future clinical trials, and provide state-of-the-art patient solutions. Our educational programs for medical and graduate students, physicians in training, and established

practitioners are committed to creating a culture of lifelong learning that firmly establishes our next generation of leaders in the field. Our residency program is highly rated by all metrics, providing balanced training across the clinical subspecialties and unique opportunities for growth and development as clinician-scientists (R25 training grant) and educators. We are most proud that these activities are ongoing in a work culture that values collegiality, inclusiveness, diversity, and mutual respect. The Department of Otolaryngology–Head & Neck Surgery at WashU Medicine is a truly outstanding place!

The CID at WashU Medicine (Department of Otolaryngology–Head & Neck Surgery) is a consortium of graduate education, research, and clinical programs born out of the pioneering efforts of St. Louis physician Max Goldstein, MD. In 1914, he founded the Central Institute for the Deaf (CID), where doctors and teachers worked together to help deaf people. When the CID's school building opened two years later, its auditory/oral methods for instructing deaf children were groundbreaking.

WashU and the CID first joined forces in 1931, when the CID's established teacher training program became the first deaf education undergraduate program to affiliate with a university. Graduate programs in deaf education, audiology, and speech and hearing sciences soon followed.

Beginning in the 1930s, the CID's research efforts involved the study of the anatomy and science of hearing. During World War II, the CID's research on hearing loss in military personnel laid the foundation for the field of audiology. The CID also pioneered hearing testing and hearing aids, and it opened the country's first hearing aid clinic in 1941. In September 2003, a new affiliation transferred the CID's graduate degree programs, research programs, and adult audiology clinic — along with its building — to WashU Medicine. The CID school continues to operate on the WashU Medicine campus as CID: Central Institute for the Deaf.

Today, these programs continue to work together to fulfill a shared mission to serve people with hearing loss.

Website: <http://oto.wustl.edu>

Faculty

Sidharth V. Puram, MD, PhD, FACS

Department Head

Visit our website for more information about our faculty and their appointments.

A

Azadeh Afshari, M.S., D.Dent.

Voluntary Clinical Instructor in Otolaryngology

Bachelor of Science, West Virginia University, 2004

Master of Science, University of Texas Medical School Houston, 2013

Doctor of Dentistry, University of Texas Medical School Houston, 2014

B**Sean B Bailey, M.S., M.D.**

Voluntary Clinical Instructor in Otolaryngology
Bachelor of Science, Tulane University, 1981
Doctor of Medicine, Tulane University, 1987
Master of Science, Tulane University, 1988

Eric Barbarite, M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, University of Miami, 2013
Doctor of Medicine, University of Miami, 2017

Katelyn Berg, Au.D., Ph.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Arts, Saint Olaf College, 2015
Doctor of Audiology, Vanderbilt University, 2019
Doctor of Philosophy, Vanderbilt University, 2024

Paul Bigg, D.M.D.

Voluntary Clinical Instructor in Otolaryngology
Baccalaureatus, Washington University in St Louis, 2014
Doctor of Medical Dentistry, Case Western Reserve University, 2019

Gregory Harris Branham, M.D.

Professor Emeritus of Otolaryngology
Bachelor of Science, University of South Carolina Columbia, 1979
Doctor of Medicine, University of South Carolina Columbia, 1983

Nicholas Branham

Voluntary Clinical Instructor in Otolaryngology

Jennifer Brinkmeier, M.D.

Associate Professor of Otolaryngology (primary appointment)
Bachelor of Arts, Williams College, 2002
Doctor of Medicine, Ohio State University College of Medicine, 2007

C**Jamie H Cadieux, Au.D.**

Assistant Professor of Otolaryngology (primary appointment)
Doctor of Audiology, Washington University in St Louis, 2006

Rebecca D Chernock, M.D.

Professor of Otolaryngology
Bachelor of Science, Brown University, 1999
Doctor of Medicine, University of Pennsylvania, 2004

John Jeonhwan Chi, M.A., M.D.

Professor of Otolaryngology (primary appointment)
Division Chief - Facial Plastic & Reconstructive Surgery
Bachelor of Science, Columbia University, 2001
Master of Arts, City College, 2003
Doctor of Medicine, SUNY Downstate Medical Center University
Hospital in Brooklyn, 2007

Richard A Chole, Ph.D., M.D.

Professor Emeritus of Otolaryngology
Doctor of Medicine, University of Southern California, 1969
Doctor of Philosophy, University of Minnesota, 1977

William W. Clark, M.S., Ph.D.

Professor Emeritus of Otolaryngology
Bachelor of Arts, University of Michigan Ann Arbor, 1969
Master of Science, University of Michigan Ann Arbor, 1973
Doctor of Philosophy, University of Michigan Ann Arbor, 1975

Sheldon C Cohen, D.Dent.

Voluntary Clinical Instructor in Otolaryngology
Bachelor of Science, Washington University in St Louis, 1973
Doctor of Dentistry, Southern Illinois University (Duplicate of Southern Illinois University Carbondale), 1976

Zachariah W Cole

Voluntary Clinical Instructor in Otolaryngology

D**Neha Datta, M.D.**

Assistant Professor of Otolaryngology
Bachelor of Science, Rice University, 2006
Doctor of Medicine, Harvard University, 2012

Lisa S. Davidson, M.S., Ph.D.

Associate Professor of Otolaryngology (primary appointment)
Associate Director of Applied and Clinical Hearing Research
Bachelor of Science, East Tennessee State University, 1985
Master of Science, Washington University in St Louis, 1987
Doctor of Philosophy, Washington University in St Louis, 2003

Sheldon L Davis

Voluntary Clinical Assistant Professor of Otolaryngology

Andrew J. Drescher, M.D.

Associate Professor of Otolaryngology (primary appointment)
Bachelor of Science, Yale University, 1998
Doctor of Medicine, University of Michigan Ann Arbor, 2002

Norman Steven Druck, M.D.

Voluntary Clinical Assistant Professor of Otolaryngology
Bachelor of Arts, Washington University in St Louis, 1967
Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1970

Katherine Dunskey, M.D.

Associate Professor of Otolaryngology (primary appointment)
Doctor of Medicine, Saint Louis University, 2010

Nedim Durakovic, M.D.

Associate Professor of Otolaryngology (primary appointment)
Bachelor of Arts, Brown University, 2007
Doctor of Medicine, Brown University, 2012

E**Julia Edgar**

Voluntary Research Instructor in Otolaryngology

F**Nyssa F Farrell, M.D.**

Associate Professor of Otolaryngology (primary appointment)



Bachelor of Science, University of South Carolina Columbia, 2010
Doctor of Medicine, University of South Carolina Columbia, 2014

Jill B Firszt, M.S., Ph.D.

Professor of Otolaryngology (primary appointment)
Bachelor of Science, University of Illinois at Urbana-Champaign, 1978
Master of Science, University of Illinois at Urbana-Champaign, 1982
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 1998

G

William D Gay, D.Dent.

Associate Professor Emeritus of Otolaryngology
Doctor of Dentistry, University of Tennessee, 1966

Joel Goebel, M.D.

Professor Emeritus of Otolaryngology
Bachelor of Science, University of Notre Dame, 1976
Doctor of Medicine, Washington University in St Louis, 1980

Rebecca Lindsay Grammer

Voluntary Clinical Instructor in Otolaryngology

Heather Jean Grantham, M.Ed., Ph.D.

Voluntary Clinical Associate Professor of Otolaryngology
Bachelor of Arts, Emory University, 1995
Master of Education, Smith College, 2005
Doctor of Philosophy, Washington University in St Louis, 2009

H

Richard Alexander Harbison, M.S., M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, University of Denver, 2009
Doctor of Medicine, University of Colorado Anschutz Medical Campus, 2013
Master of Science, University of Washington-Seattle Campus, 2017

Eugenio Guidote Herbosa

Voluntary Clinical Instructor in Otolaryngology

Jacques A Herzog, M.D.

Professor of Otolaryngology (primary appointment)
Division Chief
Assistant Dean for Community Based Medical Education
Bachelor of Arts, University of Missouri Columbia, 1980
Doctor of Medicine, University of Missouri Kansas City, 1980

Keiko Hirose, M.D.

Professor of Otolaryngology (primary appointment)
Professor of Pediatrics
Doctor of Medicine, Harvard University, 1993

Lawrence M Hoffman, D.Dent.

Voluntary Clinical Instructor in Otolaryngology
Bachelor of Arts, Indiana University Bloomington, 1972
Doctor of Dentistry, Washington University in St Louis, 1976

James E Huettner, Ph.D.

Instructor in Otolaryngology (Pending Dean's Approval) (primary appointment)
Professor Emeritus of Cell Biology and Physiology

Bachelor of Science, Indiana University Bloomington, 1980
Bachelor of Arts, Indiana University Bloomington, 1981
Doctor of Philosophy, Harvard University, 1987

Timothy Hullar

Voluntary Research Professor of Otolaryngology

Margaret Naunheim Huston, M.D.

Associate Professor of Otolaryngology (primary appointment)
Division Chief of Laryngology
Bachelor of Arts, Duke University, 2009
Doctor of Medicine, University of Chicago, 2013

J

Ryan Scott Jackson, M.D.

Associate Professor of Otolaryngology (primary appointment)
Bachelor of Arts, Saint Louis University, 2004
Doctor of Medicine, Saint Louis University, 2009

Arnold Scott Jacobson, M.S., D.Dent.

Voluntary Clinical Instructor in Otolaryngology
Bachelor of Arts, University of Missouri Columbia, 1970
Doctor of Dentistry, Washington University in St Louis, 1976
Master of Science, University of Missouri Columbia, 1977

Kapil Jadhav

Voluntary Clinical Instructor in Otolaryngology

Pawina Jiramongkolchai, M.D., MSCI

Assistant Professor of Otolaryngology (primary appointment)
Doctor of Medicine, Vanderbilt University, 2015
Master of Science Clinical Investigation, Washington University in St Louis, 2019

K

Dorina Kallogjeri, M.P.H., M.D.

Associate Professor of Otolaryngology (primary appointment)
Associate Director of Outcomes Research
Doctor of Medicine, University of Tirana, 1997
Master of Public Health, Saint Louis University, 2007

Eugenia Kardaris

Voluntary Clinical Instructor in Otolaryngology

Andrew M Kim, M.S., D.Dent.

Voluntary Clinical Instructor in Otolaryngology
Voluntary Clinical Assistant Professor of Surgery
Bachelor of Arts, California State University, 1978
Doctor of Dentistry, Washington University in St Louis, 1984
Master of Science, Ohio State University (Duplicate of Ohio State University-Main Campus), 1987

Jinkyung Kim, Ph.D.

Assistant Professor of Otolaryngology (primary appointment)
Assistant Professor of Neuroscience
Bachelor of Science, Chung-Ang University, 2006
Doctor of Philosophy, Pohang University of Science & Technology, 2012

Prashanth Konatham Haribabu

Voluntary Clinical Instructor in Otolaryngology

Manoj Kumar, Ph.D., BPharm

Assistant Professor of Otolaryngology (primary appointment)
Assistant Professor of Neuroscience
Delhi University, 2009
West Virginia University, 2015

L

Aisling Sarah Leanne Last, M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2014
Doctor of Medicine, Washington University in St Louis, 2019

Carl Wesley Lee, M.D.

Voluntary Clinical Instructor in Otolaryngology
Doctor of Medicine, Case Western Reserve University, 1992
Bachelor of Arts, Stanford University, 1998

David Seamus Leonard, M.H.A., MB.ChB.

Professor of Otolaryngology (primary appointment)
Division Chief for Pediatric Otolaryngology
Bachelor of Arts, Dartmouth College, 1995
Foreign MD equivalent, National University of Ireland, 2000
Master of Health Administration, Harvard University, 2012

Judith E Lieu, M.D.

Professor of Otolaryngology (primary appointment)
Vice Chair Education Department of Otolaryngology
Bachelor of Science, University of California Davis, 1988
Doctor of Medicine, Washington University in St Louis, 1992

Miranda R Lindburg, M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, Washington University in St Louis, 2010
Doctor of Medicine, Washington University in St Louis, 2017

Xia Liu, MBBS

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, Jiangsu University (#####), 2008
Foreign MD equivalent, Jiangsu University (#####), 2013

M

Richard W Maack, M.D.

Voluntary Clinical Instructor in Otolaryngology
Voluntary Teaching Instructor in Otolaryngology
Bachelor of Science, Muhlenberg College, 1981
Doctor of Medicine, University of Maryland (Duplicate of University of Maryland-College Park), 1985

Katrina Sue McClannahan, Ph.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, University of Minnesota, 2002
Doctor of Philosophy, University of Washington, 2017

Murray D McGrady, M.D.

Voluntary Clinical Instructor in Otolaryngology
Bachelor of Science, University of Illinois at Urbana-Champaign, 1982
Doctor of Medicine, University of Illinois at Urbana-Champaign, 1986

Maithilee D Menezes, M.D.

Associate Professor of Otolaryngology (primary appointment)
Bachelor of Science, Grinnell College, 1997
Doctor of Medicine, Grinnell College, 2002

David W. Molter, M.D.

Professor Emeritus of Otolaryngology
Bachelor of Science, Duke University, 1980
Doctor of Medicine, Duke University, 1988

John Richard Monterubio

Voluntary Clinical Instructor in Otolaryngology

Nancy Tye Murray, M.S., Ph.D.

Professor Emeritus of Otolaryngology
Bachelor of Science, Texas Christian University, 1977
Master of Science, University of Iowa, 1979
Doctor of Philosophy, University of Iowa, 1984

O

Margaret A Ogden, M.D.

Professor of Otolaryngology (primary appointment)
Vice Chair for Clinical Operations Dept of Otolaryngology
Division Chief
Bachelor of Arts, Amherst College, 1997
Doctor of Medicine, Washington University in St Louis, 2002

Amanda J Ortmann, M.S., Ph.D.

Associate Professor of Otolaryngology (primary appointment)
Division Chief of Audiology
Bachelor of Science, Missouri Baptist University, 2001
Master of Science, Washington University in St Louis, 2003
Doctor of Philosophy, University of Pittsburgh, 2012

Adepitan Owosho

Voluntary Clinical Instructor in Otolaryngology

P

Ananya Pal, M.S., Ph.D.

Instructor in Otolaryngology (primary appointment)
Bachelor of Science, Kalinga Institute of Industrial Technology, 2014
Master of Science, Kalinga Institute of Industrial Technology, 2015
Doctor of Philosophy, National University of Singapore, 2020

Randal C Paniello, M.A., M.B.A., M.S., Ph.D., M.D.

Professor of Otolaryngology (primary appointment)
Christy J. and Richard S. Hawes III Professorship
Bachelor of Science, University of Illinois at Urbana-Champaign, 1979
Master of Science, University of Illinois at Urbana-Champaign, 1980
Doctor of Medicine, University of Illinois at Urbana-Champaign, 1984
Master of Business Administration, Washington University in St Louis, 1999
Master of Arts, Washington University in St Louis, 2010
Doctor of Philosophy, Washington University in St Louis, 2013

Bharat Panuganti, M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, Saint Louis University, 2011



Doctor of Medicine, Saint Louis University, 2015

Guangyong Peng, M.S., Ph.D., M.D.

Professor of Otolaryngology (primary appointment)
Professor of Pathology and Immunology
Doctor of Medicine, JIANGSU UNIVERSITY ZHENJIANG, 1993
Master of Science, Nanjing Medical University (#####), 1999
Doctor of Philosophy, Chinese Academy of Preventive Medicine, 2002

Jay Francis Piccirillo, M.D.

Professor of Otolaryngology (primary appointment)
Vice Chair - Research
Professor of Occupational Therapy
Professor of Biostatistics
Professor of Medicine
Bachelor of Arts, University of Vermont, 1979
Doctor of Medicine, University of Vermont, 1985

Patrik Pipkorn, M.D.

Associate Professor of Otolaryngology (primary appointment)
Doctor of Medicine, University of Gothenburg, 2007

Sidharth Venkata Puram, Ph.D., M.D.

Professor of Otolaryngology (primary appointment)
Professor of Genetics
Head of the Department of Otolaryngology
Lindburg Professorship in Otolaryngology
Bachelor of Science, Massachusetts Institute of Technology, 2005
Doctor of Philosophy, Harvard University, 2011
Doctor of Medicine, Harvard University, 2013

R

Casey Krauss Reimer, Ph.D.

Assistant Professor of Otolaryngology (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2019

Jason T. Rich, M.D.

Professor of Otolaryngology (primary appointment)
Bachelor of Science, Brigham Young University, 2000
Doctor of Medicine, Ohio State University-Main Campus, 2004

Matthew Rohlfig, M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, Wake Forest University, 2012
Doctor of Medicine, Wake Forest University, 2016

Lauren Tashima Roland, M.S., M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, Massachusetts Institute of Technology, 2007
Doctor of Medicine, Pennsylvania State University-College of Medicine, 2011
Master of Science, Washington University in St Louis, 2015

Mark A Rutherford, Ph.D.

Associate Professor of Otolaryngology (primary appointment)
Bachelor of Science, University of Missouri Columbia, 1999
Doctor of Philosophy, University of Oregon, 2005

S

Thomas Schiff, D.Dent.

Professor Emeritus of Diagnostic Services
Doctor of Dentistry, University of Alabama (Duplicate of University of Alabama in Tuscaloosa), 1961

John Stone Schneider, M.P.P., M.D.

Professor of Otolaryngology (primary appointment)
Division Chief - Rhinology
Assistant Dean for Faculty Promotions and Career Development
Master of Public Policy, University of Chicago, 2007
Doctor of Medicine, University of Chicago, 2007

Donald G Sessions, M.D.

Professor Emeritus of Otolaryngology
Bachelor of Arts, Princeton University, 1958
Doctor of Medicine, Washington University in St Louis, 1962

Lavinia Sheets, Ph.D.

Associate Professor of Otolaryngology (primary appointment)
Associate Professor of Developmental Biology
Associate Director of Basic/Translational Hearing Research
Bachelor of Science, Pacific University, 1996
Doctor of Philosophy, Oregon Health & Science University, 2007

Matthew Shew, M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, Bowdoin College, 2009
Doctor of Medicine, Indiana University – Purdue University Fort Wayne (IPFW), 2014

Emily A. Spataro, M.D.

Associate Professor of Otolaryngology (primary appointment)
Bachelor of Science, Duke University, 2007
Doctor of Medicine, Washington University in St Louis, 2012

Richard Benjamin Speaker, MB.BCh.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, University of California Davis, 2004
Foreign MD equivalent, University College Dublin National University of Ireland, 2010

Gershon J Spector, M.D.

Professor Emeritus of Otolaryngology
Bachelor of Arts, Johns Hopkins University Medical (Duplicate of Johns Hopkins University), 1960
Doctor of Medicine, University of Maryland (Duplicate of University of Maryland-College Park), 1964

T

Isolde E Thalmann, M.A., Ph.D.

Professor Emeritus of Otolaryngology
Bachelor of Science, Washington University in St Louis, 1968
Master of Arts, Washington University in St Louis, 1973
Doctor of Philosophy, California Western (Duplicate of California Western School of Law), 1982

V

Michael Valente, M.S., Ph.D.

Professor Emeritus of Otolaryngology (Audiology)
Bachelor of Arts, Adelphi University, 1970
Master of Science, Adelphi University, 1972
Doctor of Philosophy, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1975

W

Benjamin M Wahle, M.D.

Assistant Professor of Otolaryngology (primary appointment)
Bachelor of Science, University of Indianapolis, 2012
Doctor of Medicine, University of Indianapolis, 2017

Jarrett Walsh, Ph.D., M.D.

Associate Professor of Otolaryngology (primary appointment)
Bachelor of Science, Georgia Southern University, 2003
Doctor of Philosophy, Medical University of South Carolina, 2011
Doctor of Medicine, Medical University of South Carolina, 2011

Mark Edward Warchol, Ph.D.

Professor of Otolaryngology (primary appointment)
Professor of Neuroscience
Bachelor of Science, University of Washington, 1981
Doctor of Philosophy, Northwestern University, 1989

June Kleinfeld Wolff, D.Dent.

Voluntary Clinical Instructor in Otolaryngology
Doctor of Dentistry, Washington University in St Louis, 1985

Y

Tatyana Aleksandrovna Yakusheva, M.S., Ph.D.

Assistant Professor of Otolaryngology (primary appointment)
Master of Science, Saratov State University, 1997
Doctor of Philosophy, Peoples' Friendship University of Russia, 2002

Z

Yuanqin Zhang, Ph.D., MBBS

Instructor in Otolaryngology (primary appointment)
Foreign MD equivalent, Fudan University (#####), 2012
Doctor of Philosophy, Southern Illinois University Carbondale, 2021

Paul Zolkind, M.D.

Assistant Professor of Otolaryngology (primary appointment)
Associate Director of Head & Neck Research
Bachelor of Arts, Northwestern University, 2009
Doctor of Medicine, SUNY Downstate Health Sciences University, 2013

Research Electives

Otolaryngology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

The type of research will depend upon the current phase of the research program in each laboratory. Students should contact the director of each laboratory to negotiate.

Tatyana Yakusheva, PhD

Neuroscience Research Building
4370 Duncan Avenue
Phone: 314-362-1013

This lab studies the role of the vestibulocerebellum and its target nuclei for eye movement control and spatial orientation. We use a range of methodologies, including single and multiunit recordings, electrical brain stimulation, computational methods, pharmacology, and behavioral studies. Our main lines of research are as follows: 1) signal transformations carried out by the vestibulocerebellum during visual and vestibular stimulation; 2) neuronal computations performed by the anterior and posterior cerebellar vermis for spatial navigation in mice; 3) the role of the cerebellum-brainstem loop in motor learning in the vestibulo-ocular reflex; 4) the role of the vestibulocerebellum in neurodegenerative diseases; and 5) the role of cerebellar cortex interneurons in cerebellar cortex function.

Students will be instructed in one or several techniques and are expected to contribute significantly to the development of specific lab projects.

Judith E.C. Lieu, MD, MSPH

8600 MCC, 8th Floor
Phone: 314-747-8205

The focus of the Lieu Lab is clinical outcomes research in pediatric otolaryngology. The techniques and methodologies of clinical epidemiology and health services research are applied to investigate clinical problems in children. Projects currently underway include the evaluation of the quality of life of children with hearing loss with the use of hearing amplification, the evaluation of a tablet audiometer to diagnose and monitor hearing loss in children, and the evaluation of which children with hearing loss are at risk for speech-language and literacy delays. Other projects of the student's choosing that would utilize these research techniques may also be pursued.

Kevin K. Ohlemiller, PhD

2205 Central Institute for the Deaf
Phone: 314-747-7179



The focus of this lab is on gene–environment interactions in cochlear injury. We study the interaction of genes and environment that increase cochlear injury due to noise and ototoxic exposure, with an emphasis on how these may yield apparent presbycusis. Because cochlear function and injury is the same in mice and humans and governed by the same genes, we use mostly mouse models. Methods employed include standard auditory brainstem response assessment and intracochlear recording, quantitative light microscopy, immunocytochemistry, and Western blots. We and our collaborators have identified specific genes and inbred strains of mice that mimic the three major forms of human presbycusis: sensory, neural, and strial. Sensory presbycusis appears to be promoted by alleles and mutations that impair protective factors (e.g., antioxidant enzymes) or that impair ion homeostasis. These may enhance cochlear injury from noise and ototoxins. Neural presbycusis can be modeled in part by mutations that impair inner hair cell/afferent synaptic function. Although it is not yet clear what types of genes and mutations can lead to strial presbycusis, we have discovered multiple mouse strains that show age-related endocochlear potential reduction along with distinctive strial pathology that includes fewer marginal cells as well as fewer and larger strial capillaries.

We have also published quantitative trait loci that impact the qualitative character of cochlear noise injury. Important implications of our findings are as follows: 1) that there exists no single "mammalian" archetype of cochlear noise injury; and 2) that noise injury to the organ of Corti in young adult animals depends in part on the status of the cochlear lateral wall. The latter relation appears to be genetically linked and to not apply to older adults.

We collaborate widely, both within WashU Medicine and nationally. Our research is eminently adaptable in difficulty and scale to students' schedules and other requirements. Students may expect to learn the full range of methods we employ, including physiology, immunocytochemistry, histopathology, and cellular/molecular techniques.

Jay F. Piccirillo, MD
8430 MCC, 8th Floor
Phone: 314-362-8641

The Clinical Outcomes Research Office focuses on clinical epidemiology and health services research, encompassing diagnosis, prognosis, harm, and treatment effectiveness as well as health care delivery. Our methodology is rooted in clinical research architecture, biostatistics, and data processing, allowing us to study various diseases and conditions.

Current projects include the following:

- Exploring patient factors associated with the perceived benefit of amplification for hearing loss
- Assessing treatment effectiveness for moderate to severe obstructive sleep apnea
- Exploring new treatments for hereditary hemorrhagic telangiectasia–associated epistaxis
- Evaluating outcomes for patients with head and neck cancer

Students will learn about clinical research methodology, statistics, results reporting, and critical appraisal.

Courses

OTO 8030 Otolaryngology for Visiting Students (Clinical Elective)

This is four-week rotation for visiting students seeking a sub-internship experience with the WashU Department of Otolaryngology Head and Neck Surgery. Students participate as active team members within our clinical services, working closely with faculty and residents, and providing care in the clinic, hospital, and operating room settings. They also will have the opportunity to participate in educational activities and conferences. A typical rotation assignment would include 2 weeks on the Head and Neck service at Barnes-Jewish Hospital, and two additional 1-week experiences on other sub-specialty services (based on student's choice and availability). Although optional, participation at some of our clinical sites will require off-campus travel. Credit 4 units.

Typical periods offered: Medicine Year

OTO 8040 Otolaryngology (Clinical Elective)

This rotation introduces the student to clinical Otolaryngology (ENT), including the diagnosis and treatment of conditions in the ear, nose, throat, head, and neck. This may include experiences in the clinic, hospital, and operating room, and may include time with audiology, speech-language pathology, and the vestibular laboratory. Students will also attend academic activities/conferences. The emphasis of the ENT Elective is to provide experience in common problems one would see in primary care or family practice. For example, this may be valuable for students going into primary care who would like ambulatory ENT experience, or going into pediatrics who would like pediatric ENT experience. Students should communicate with the course directors regarding their specific goals prior to start of rotation, so that their experience can be tailored accordingly. Students interested in ENT as a career are encouraged to take ENT as a rotation while on their Phase 2 Surgery Clerkship and then take the ENT ACR towards the beginning of Phase 3. Those who did not take ENT during Phase 2 should touch base with the course directors to make an appropriate plan. Credit 2 units.

Typical periods offered: Medicine Year

OTO 9100 Otolaryngology Advanced Clinical Rotation (ACR)

The Otolaryngology Advanced Clinical Rotation (ENT-ACR) is a four-week rotation designed to provide a comprehensive sub-internship otolaryngology experience during the Phase III Gateway WUSM Curriculum. A typical schedule would include 2 weeks on the Head and Neck Service at Barnes-Jewish Hospital and 2 weeks on the Pediatric Otolaryngology Service at St. Louis Children's Hospital, although different service assignments may be considered at times based on availability. During the ACR, students will get direct practice with patient care, common bedside procedures (e.g., dressing changes, flexible Naso laryngoscopy; control of epistaxis; laceration repair), assisting in the operating room, and continuity of care via the clinic and inpatient rounding. They are expected to be active team members – helping with morning rounds, taking responsibility for assigned patients, communicating plans with nursing staff, and assisting with progress notes and orders. Throughout the day students are expected to maintain communication with staff regarding patient care and provide updates to otolaryngology residents and attendings. ACR students take two 12-hour weekend calls during the rotation, taken alongside the on-call ENT resident. Additional weekend assistance with rounds and cases will mirror internship expectations. Students

interested in ENT as a career are encouraged to take the ENT ACR towards the beginning of Phase 3. Those who did not have a prior ENT rotation while on their Phase 2 Surgery Clerkship should touch base with the course directors for guidance.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Pathology & Immunology

The Department of Pathology & Immunology is involved in the clinical diagnosis and monitoring of disease, in the teaching of pathology and immunology, and in research on the molecular basis of disease and immunology.

The department is responsible through its divisions for studying the pathogenesis and the biochemical and anatomical basis of diseases. Pathologists do research on disease processes using molecular, genetic, and structural analysis. Pathologists have the responsibility for the cytological and anatomical diagnosis of diseases and for developing novel structural and molecular approaches for the analysis of them, particularly cancers and infectious diseases. The divisions of Anatomic and Molecular Pathology, Immunobiology, Laboratory and Genomic Medicine, Genomic and Molecular Pathology, and Neuropathology have faculty involved in teaching, clinical service, and research. Many clinical faculty have appointments with Siteman Cancer Center.

The department teaches an extensive course during the second year of the curriculum and presents a number of conferences that third- and fourth-year students can attend. The department also offers a number of clinical electives, including an Advanced Clinical Rotation in Anatomic Pathology and Laboratory Medicine. The department plays a variety of leadership and instruction roles in the undergraduate Gateway Curriculum. Students can take elective rotations in Autopsy Pathology, Surgical Pathology, or Laboratory Medicine, or they may participate in the research activities of the faculty.

The Division of Immunobiology integrates immunobiology activities at the school. It is for conducting basic research in immunobiology and in the immunological basis of disease.

Many faculty in the department are involved in graduate teaching and participate in the various programs offered by the Division of Biology and Biomedical Sciences. The department has strong participation in the Immunology graduate program, with many opportunities in basic and translational research.

Website: <https://pathology.wustl.edu>

Faculty

Eric J. Huang, MD, PhD

Edward Mallinckrodt Professor and Chair,
Department of Pathology & Immunology
Pathologist-in-Chief, Barnes-Jewish Hospital

Joseph Gaut, MD, PhD

Anatomic and Molecular Pathology Division Chief

Ta-Chang Liu, MD, PhD, AGAF

Anatomic and Molecular Pathology Division Associate Chief

Kodi Ravichandran, PhD

Immunobiology Division Chief

Guantam Dantas, PhD

Laboratory and Genomic Medicine Division Co-Chief

Ann M. Grownowski, PhD

Laboratory and Genomic Medicine Division Co-Chief

Eric J. Duncavage, MD

Genomic and Molecular Pathology Division Chief

Molly Schroeder, PhD, FACMG

Genomic and Molecular Pathology Associate Division Chief

Robert E. Schmidt, MD, PhD

Neuropathology Division Chief

Visit our website for more information about our faculty and their appointments.

A

Sarah DeGenova Ackerman, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Assistant Professor of Developmental Biology

Bachelor of Science, The College of New Jersey, 2011

Doctor of Philosophy, Washington University in St Louis, 2016

Paul M Allen, M.S., Ph.D.

Professor Emeritus of Pathology and Immunology

Bachelor of Science, University of Michigan Ann Arbor, 1974

Master of Science, University of Michigan Ann Arbor, 1977

Doctor of Philosophy, University of Michigan Ann Arbor, 1981

Gaya K Amarasinghe, Ph.D.

Professor of Pathology and Immunology (primary appointment)

Alumni Professorship - Pathology and Immunology

Professor of Biochemistry and Molecular Biophysics

Professor of Molecular Microbiology

Bachelor of Science, City College, 1997

Doctor of Philosophy, University of Maryland Baltimore County, 2001

Sadaf Amin, Ph.D.

Assistant Professor of Pathology and Immunology (Pending Dean Approval) (primary appointment)



Doctor of Philosophy, Weill Cornell Medical College, 2018

Timothy Amukele, M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, CUNY City College, 1996

Doctor of Medicine, Albert Einstein College of Medicine, 2006

Maksym Artomov, M.S., Ph.D.

Professor of Pathology and Immunology (primary appointment)

Alumni Endowed Professor of Pathology and Immunology

Master of Science, University of Chicago, 2005

Doctor of Philosophy, Massachusetts Institute of Technology, 2009

B

Michael James Barratt, Ph.D.

Professor of Pathology and Immunology (primary appointment)

Doctor of Philosophy, King's College London, 1994

Cory Thomas Bernadt, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Nebraska Wesleyan University, 1998

Doctor of Philosophy, University of Nebraska, 2004

Doctor of Medicine, University of Nebraska, 2006

Adam Lee Booth, M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, University of Texas at Tyler, 2010

Doctor of Medicine, Ross University School of Medicine, 2016

Nicholas Craig Borcharding, M.S., Ph.D., M.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Iowa State University, 2012

Master of Science, University of Iowa, 2014

Doctor of Philosophy, Carver College of Medicine at University of Iowa, 2020

Doctor of Medicine, Carver College of Medicine at University of Iowa

Fouad Ismat Boulos, M.D.

Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, American University of Beirut, 1996

Doctor of Medicine, American University of Beirut, 2001

Victor Borisovich Brodsky, M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Boston University, 2001

Doctor of Medicine, Boston University, 2005

Elizabeth M Brunt, M.D.

Professor Emeritus of Pathology and Immunology

Bachelor of Science, Georgetown University, 1974

Doctor of Medicine, University of Texas Galveston, 1981

Carey-Ann Dawn Burnham, Ph.D.

Professor of Pathology and Immunology (primary appointment)

Vice Chair - Faculty Development

Professor of Molecular Microbiology

Professor of Medicine

Professor of Pediatrics

Bachelor of Science, University of Alberta, 2002

Doctor of Philosophy, University of Alberta, 2007

Paul Butters, M.S., D.O.

Assistant Professor of Pathology and Immunology (primary appointment)

Master of Science, A T Still University of Health Sciences, 2015

Doctor of Osteopathic Medicine, A T Still University of Health Sciences, 2015

Kathleen Byrnes, M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Washington University in St Louis, 2008

Doctor of Medicine, Tulane University, 2013

C

Laura Campisi, M.S., Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Master of Science, Université de Nice Sophia Antipolis, 2005

Doctor of Philosophy, Université de Nice Sophia Antipolis, 2009

Yang Cao, Ph.D.

Associate Professor of Pathology and Immunology (primary appointment)

Doctor of Philosophy, University of Wisconsin Madison, 2014

Eleanor Stevens Castro, M.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Bachelor of Arts, University of Louisville, 2015

Doctor of Medicine, University of Louisville, 2019

Anne L Chen, M.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, University of Miami, 2012

Doctor of Medicine, University of Miami, 2015

Jiye Cheng, M.S., Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Master of Science, Ohio State University-Main Campus, 2010

Doctor of Philosophy, Ohio State University-Main Campus, 2011

Kyunghee Choi, M.S., Ph.D.

Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Seoul National University, 1982

Master of Science, Seoul National University, 1984

Doctor of Philosophy, University of Illinois at Urbana-Champaign, 1988

John Spellman Aranake Chrisinger, M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Arts, Washington University in St Louis, 2004

Doctor of Medicine, Washington University in St Louis, 2012

Emily Coberly

Voluntary Clinical Professor of Pathology and Immunology

Leigh Anne Compton, Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Centenary College of Louisiana, 1998

Doctor of Philosophy, Vanderbilt University, 2005

Doctor of Medicine, Vanderbilt University, 2008

Joseph C. Corbo, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)

Professor of Genetics

Professor of Ophthalmology and Visual Sciences

Baccalaureatus, Stanford University, 1990

Bachelor of Science, Stanford University, 1990

Doctor of Philosophy, University of California, 1997

Doctor of Medicine, University of California, 1999

Richard James Cote, M.D.

Professor of Pathology and Immunology (primary appointment)

Paul and Ellen Lacy Professor of Pathology and Immunology

Doctor of Medicine, University of Chicago, 1980

Bridgit Crews, Ph.D.

Professor of Pathology and Immunology (primary appointment)

Professor of Anesthesiology

Doctor of Philosophy, University of California Santa Barbara, 2006

Erika C Crouch, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)

Carol B. and Jerome T. Loeb Professorship in Medical Education

Vice Chair - Education

Doctor of Philosophy, University of Washington, 1978

Doctor of Medicine, University of Washington, 1979

Suzanne Crumley, M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Arts, Luther College Iowa, 2006

Doctor of Medicine, University of Iowa, 2011

D

Sonika M Dahiya, M.D.

Professor of Pathology and Immunology (primary appointment)

Doctor of Medicine, Kasturba Medical College, 2000

Gautam Dantas, Ph.D.

Professor of Pathology and Immunology (primary appointment)

Conan Professorship in Laboratory and Genomic Medicine

Co-Division Chief - Division of Laboratory and Genomic Medicine

Professor of Molecular Microbiology

Professor of Pediatrics

Professor of Biomedical Engineering

Bachelor of Science, Macalester College, 2000

Doctor of Philosophy, University of Washington, 2005

Louis P Dehner, M.D.

Professor of Pathology and Immunology (primary appointment)

Professor of Pathology in Pediatrics

Bachelor of Arts, Washington University in St Louis, 1962

Doctor of Medicine, Washington University in St Louis, 1966

George J Despotis, M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Associate Professor of Anesthesiology

Bachelor of Arts, Greenville College, 1981

Doctor of Medicine, Saint Louis University, 1985

Rebekah Dumm, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, University of Delaware, 2015

Doctor of Philosophy, Duke University, 2020

Eric James Duncavage, M.D.

Professor of Pathology and Immunology (primary appointment)

Division Chief - Division of Genomic and Molecular Pathology

Bachelor of Arts, Vanderbilt University, 1998

Doctor of Medicine, University of Tennessee, 2004

William Michael Dunne, Ph.D.

Voluntary Clinical Professor of Pathology and Immunology

Bachelor of Science, University of Wisconsin Madison, 1975

Doctor of Philosophy, University of Wisconsin Madison, 1981

E

Allison Rae Eberly, Ph.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Chestnut Hill College, 2014

Doctor of Philosophy, Vanderbilt University, 2019

Charles S Eby, M.D.

Professor Emeritus of Pathology and Immunology

Bachelor of Science, Duke University, 1977

Doctor of Medicine, Vanderbilt University, 1981

Brian T. Edelson, Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Doctor of Philosophy, Washington University in St Louis, 1995

Doctor of Medicine, Washington University in St Louis, 2004

Takeshi Egawa, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)

Doctor of Medicine, Osaka University, 1994

Doctor of Philosophy, Osaka University, 2002

Ali Hassan Ellebedy, Ph.D.

Professor of Pathology and Immunology (primary appointment)

Professor of Molecular Microbiology

Professor of Medicine

Leo Loeb Endowed Professor

Bachelor of Science, Cairo University, 2004

Doctor of Philosophy, University of Tennessee Health Science Center, 2011



F

Christopher William Farnsworth, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Professor of Emergency Medicine
Bachelor of Science, Roberts Wesleyan College, 2009
Doctor of Philosophy, University of Rochester, 2017

Lijuan Feng, Ph.D.

Assistant Professor of Pathology & Immunology (Pending Dean Approval) (primary appointment)
Bachelor of Science, University of Science and Technology of China (#####), 2010
Doctor of Philosophy, Johns Hopkins University, 2017

John Lawrence Frater, M.D.

Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Notre Dame, 1992
Doctor of Medicine, Medical College of Ohio, 1996

Daved H Fremont, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Molecular Microbiology
Bachelor of Science, University of Wisconsin Madison, 1986
Doctor of Philosophy, University of California San Diego, 1993

G

Joseph P. Gaut, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Ladenson Professorship in Pathology
Division Chief - Division of Anatomic and Molecular Pathology
Professor of Medicine
Bachelor of Arts, Washington University in St Louis, 1996
Doctor of Philosophy, Washington University in St Louis, 2004
Doctor of Medicine, Washington University in St Louis, 2004

Daniel A Gibson, Ph.D.

Instructor in Pathology and Immunology (primary appointment)
Bachelor of Arts, University of Southern California, 2006
Doctor of Philosophy, University of Southern California, 2013

Susan Gilfillan, Ph.D.

Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Arts, University of Denver, 1982
Doctor of Philosophy, Stanford University, 1990

Jeffrey Ivan Gordon, M.D.

Professor of Pathology and Immunology (primary appointment)
Dr Robert J Glaser Distinguished University Professor
Director - Center for Genome Sciences
Professor of Developmental Biology
Professor of Molecular Microbiology
Professor of Medicine
Professor of Public Health
Bachelor of Arts, Oberlin College, 1969

Doctor of Medicine, University of Chicago, 1973

Ann Marie Gronowski, M.S., Ph.D.

Professor of Pathology and Immunology (primary appointment)
Oree M Carroll and Lillian B Ladenson Professor of Clinical Chemistry in Pathology and Immunology
Co-Division Chief - Division of Laboratory and Genomic Medicine
Professor of Obstetrics and Gynecology
Bachelor of Science, University of Illinois at Urbana-Champaign, 1985
Master of Science, Iowa State University, 1988
Doctor of Philosophy, University of Wisconsin Madison, 1992

Brenda Jean Grossman, M.S., M.D.

Voluntary Clinical Professor of Pathology and Immunology
Bachelor of Science, Ohio University-Main Campus, 1976
Doctor of Medicine, Medical College of Georgia, 1980
Master of Science, Saint Louis University, 2003

H

Allison Lynn Haas, Ph.D.

Assistant Professor of Pathology & Immunology (primary appointment)
Bachelor of Science, Bellarmine University, 2017
Doctor of Philosophy, University of Pittsburgh, 2023

Ian Sean Hagemann, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Assistant Dean for Admissions
Professor of Obstetrics and Gynecology
Bachelor of Arts, Princeton University, 2000
Doctor of Philosophy, Washington University in St Louis, 2008
Doctor of Medicine, Washington University in St Louis, 2008

Claudia Han, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, University of Virginia, 2016

Scott A Handley, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Missouri State University (Formerly Southwest Missouri State), 1998
Doctor of Philosophy, Washington University in St Louis, 2006

Ted H Hansen, M.S., Ph.D.

Professor Emeritus of Pathology and Immunology
Bachelor of Science, Michigan State University, 1970
Master of Science, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1972
Doctor of Philosophy, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1975

Anjum Hassan, M.D.

Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, Aga Khan University, 1989

Jasmin Herz, M.S., Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Cologne (Koln), 2000

Master of Science, University of Cologne (Koln), 2004
Doctor of Philosophy, University of Cologne (Koln), 2008

Matthew Charles Hibberd, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Assistant Professor of Public Health

Bachelor of Science, University of Nebraska, 2007

Doctor of Philosophy, Washington University in St Louis, 2016

Dana Ashley Hill, M.D.

Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Northwestern University, 1990

Doctor of Medicine, Washington University in St Louis, 1994

Eric Huang, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)

Head of the Department of Pathology and Immunology

Joseph M. Davie Distinguished Professor

Doctor of Medicine, National Taiwan University, 1986

Doctor of Philosophy, Cornell University, 1993

Andrew E. Hughes, Ph.D., M.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Doctor of Philosophy, Washington State University, 2017

Doctor of Medicine, Washington University in St Louis, 2019

Bachelor of Science, College of William and Mary

Tait Huso

Assistant Professor of Pathology and Immunology (Pending Dean Approval) (primary appointment)

J**Ronald R Jackups, Ph.D., M.D.**

Professor of Pathology and Immunology (primary appointment)

Professor of Pediatrics

Professor of Medicine

Bachelor of Science, Washington University in St Louis, 2000

Doctor of Philosophy, University of Illinois at Chicago, 2008

Doctor of Medicine, University of Illinois at Chicago, 2008

Pari Jafari, M.D.

Assistant Professor of Pathology & Immunology (primary appointment)

Bachelor of Science, University of Missouri Columbia, 2015

Doctor of Medicine, University of Chicago, 2020

Umang Jain, M.S., Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Manipal University, 2007

Master of Science, Manipal University, 2009

Doctor of Philosophy, Dalhousie University, 2015

K**Liang-I Kang, Ph.D., M.D.**

Assistant Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, University of Delaware, 2006

Doctor of Philosophy, University of Pittsburgh, 2013

Doctor of Medicine, University of Pittsburgh, 2014

Jonathan Kipnis, M.S., Ph.D.

Professor of Pathology and Immunology (primary appointment)

Alan A and Edith L Wolff Distinguished Professor

Professor of Neurology

Professor of Neuroscience

Professor of Neurological Surgery

Director of the Brain Immunology and Glia Center

Bachelor of Science, Tel Aviv University, 1998

Master of Science, Weizmann Institute of Science, 1999

Doctor of Philosophy, Weizmann Institute of Science, 2004

Eynav Yafit Klechevsky, Ph.D.

Associate Professor of Pathology and Immunology (primary appointment)

Doctor of Philosophy, Technion Israel Institute of Technology, 2007

Hannah Rachel Krigman, M.D.

Professor of Pathology and Immunology (primary appointment)

Bachelor of Arts, Amherst College, 1983

Doctor of Medicine, University of North Carolina at Chapel Hill, 1988

Kilannin Cathleen Krysiak, Ph.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, University of Illinois at Urbana-Champaign, 2006

Doctor of Philosophy, Washington University in St Louis, 2014

L**Jack H Ladenson, Ph.D.**

Professor Emeritus of Pathology and Immunology

Bachelor of Science, Pennsylvania State University-Main Campus, 1964

Doctor of Philosophy, University of Maryland-College Park, 1971

Dong Il Lee, Ph.D.

Instructor in Pathology and Immunology (primary appointment)

Bachelor of Science, University of Georgia, 2012

Doctor of Philosophy, Indiana University School of Medicine, 2019

Yi-Shan Lee, Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary appointment)

Doctor of Medicine, National Taiwan University, 2000

Doctor of Philosophy, Duke University, 2008

Cheryl Faye Lichti, Ph.D.

Associate Professor of Pathology and Immunology (primary appointment)

Bachelor of Arts, Hendrix College, 1988

Doctor of Philosophy, Duke University, 1993

Chieh-Yu Lin, M.D.

Associate Professor of Pathology and Immunology (primary appointment)



Doctor of Medicine, National Taiwan University, 2009

Chang Liu, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Professor of Surgery
Doctor of Medicine, Peking Union Medical College (#####formerly
#####), 2004
Doctor of Philosophy, Oregon Health & Science University, 2010

Ta-Chiang Liu, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, National Yang-Ming University, 1997
Doctor of Philosophy, Imperial College, 2003

Xiuli Liu, Ph.D., MBBS

Professor of Pathology and Immunology (primary appointment)
Foreign MD equivalent, Beijing University, 1990
Doctor of Philosophy, University of Arkansas for Medical Sciences,
2002

Ulrike Lorenz, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Executive Director Bursky Center for Human Immunology and
Immunotherapy Programs
Doctor of Philosophy, Freie Universität Berlin, 1989

M

Changqing Ma, Ph.D., MBBS

Professor of Pathology and Immunology (primary appointment)
Foreign MD equivalent, Peking University Health Science Center (####
###), 1998
Doctor of Philosophy, University of Pittsburgh Medical Center-Health
System, 2005

Nathan McLamb, M.D.

Assistant Professor of Pathology and Immunology (primary
appointment)
Associate of Applied Science, Wake Technical Community College,
2009
Bachelor of Science, North Carolina State University, 2012
Doctor of Medicine, East Carolina University, 2016

Nidia Messias, M.D.

Professor of Pathology and Immunology (primary appointment)
Doctor of Medicine, Faculdade Medicina Estadual (ISEP), 1998

Daniel L. Miller, Ph.D., M.D.

Assistant Professor of Pathology and Immunology (primary
appointment)
Doctor of Philosophy, University of Missouri Columbia, 2014
Doctor of Medicine, University of Missouri Columbia, 2016

Patrick Fleming Morse, M.D.

Assistant Professor of Pathology and Immunology (primary
appointment)
Doctor of Medicine, University of Missouri Columbia, 2020

Nima Mosammaparast, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Professor of Medicine

Bachelor of Science, University of Rochester, 1998

Doctor of Philosophy, University of Virginia, 2005

Doctor of Medicine, University of Virginia, 2006

Kenneth M Murphy, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Eugene Opie First Centennial Professor of Pathology and Immunology
Doctor of Philosophy, Johns Hopkins University, 1984
Doctor of Medicine, Johns Hopkins University, 1984

Theresa L Murphy, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Arizona, 1978
Doctor of Philosophy, Johns Hopkins University, 1983

N

Julie Ann Neidich, M.D.

Professor of Pathology and Immunology (primary appointment)
Professor of Pediatrics
Doctor of Medicine, George Washington University, 1983

Christopher A Nelson, Ph.D.

Associate Professor of Pathology and Immunology (primary
appointment)
Bachelor of Science, University of Wisconsin Madison, 1985
Doctor of Philosophy, Washington University in St Louis, 1994

O

Eugene Merle Oltz, Ph.D.

Voluntary Research Professor of Pathology and Immunology
Bachelor of Science, Cornell University, 1982
Doctor of Philosophy, Columbia University, 1987

Catherine Laaripuu Omosule, Ph.D.

Assistant Professor of Pathology & Immunology (primary
appointment)
Doctor of Philosophy, University of Missouri Columbia, 2021

P

Bijal A. Parikh, Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary
appointment)
Doctor of Philosophy, Rutgers University-New Brunswick, 2004
Doctor of Medicine, University of Medicine and Dentistry of New
Jersey, 2006

Jonathan Robert Brestoff Parker, M.S., Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary
appointment)
Bachelor of Science, Skidmore College, 2008
Master of Science, University College Cork National University of
Ireland, 2010
Doctor of Philosophy, University of Pennsylvania, 2015
Doctor of Medicine, University of Pennsylvania, 2016

Tomas Paulenda, M.S., Ph.D.

Instructor in Pathology and Immunology (primary appointment)

Master of Science, Comenius University in Bratislava, 2011
Doctor of Philosophy, Charles University, 2020

Jacqueline Elise Payton, Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Bradley University, 1996
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2002

Doctor of Medicine, University of Illinois at Urbana-Champaign, 2004

Richard J. Perrin, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Yale University, 1992
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2001

Doctor of Medicine, University of Illinois at Chicago, 2004

Stephen P. Persaud, Ph.D., M.D.

Assistant Professor of Pathology & Immunology (primary appointment)
Bachelor of Science, Cornell University, 2005
Doctor of Philosophy, Washington University in St Louis, 2015
Doctor of Medicine, Washington University in St Louis, 2015

John David Pfeifer, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Professor of Obstetrics and Gynecology
Bachelor of Arts, University of California, 1981
Doctor of Philosophy, University of California, 1987
Doctor of Medicine, University of California, 1988

Jerome Prusa, Ph.D.

Instructor in Pathology and Immunology (primary appointment)
Bachelor of Science, University of Nebraska at Omaha, 2013
Doctor of Philosophy, Washington University in St Louis, 2021

Kali Meredith Pruss, Ph.D.

Instructor in Pathology & Immunology (primary appointment)
Bachelor of Science, Dartmouth College, 2014
Doctor of Philosophy, Stanford University, 2020

R

Gwendalyn Jan Randolph, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
Unanue Distinguished Professor of Immunology
Bachelor of Science, Temple University, 1991
Doctor of Philosophy, State University of New York, 1995

Kodi S. Ravichandran, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Robert L. Kroc Professor of Pathology and Immunology
Division Chief of IMM
Doctor of Philosophy, University of Massachusetts Amherst, 1992

Alejandro Reyes

Voluntary Research Assistant Professor of Pathology and Immunology

Jon H Ritter, M.D.

Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Minnesota State University-Mankato, 1983
Doctor of Medicine, University of Minnesota, 1988

Stephen Matthew Roper, M.S., Ph.D.

Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Texas Tech University, 2004
Master of Science, Texas Tech University, 2007
Doctor of Philosophy, Medical University of South Carolina, 2015

Marianna B Ruzinova, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, Cornell University, 2004
Doctor of Medicine, Cornell University, 2005

S

Robert Edward Schmidt, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Division Chief - Division of Neuropathology
Bachelor of Arts, Washington University in St Louis, 1969
Doctor of Philosophy, Washington University in St Louis, 1976
Doctor of Medicine, Washington University in St Louis, 1976

Robert D Schreiber, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Andrew M Bursky and Jane M Bursky Distinguished Professor
Professor of Molecular Microbiology
Director of the Bursky Center for Human Immunology and Immunotherapy Programs
Bachelor of Arts, State University of New York, 1968
Doctor of Philosophy, State University of New York, 1973

Molly Schroeder, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Associate Professor of Pediatrics
Bachelor of Science, Saint Louis University, 2006
Doctor of Philosophy, Baylor College of Medicine, 2012

Katherine Elizabeth Schweteye, M.S., Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Washington University in St Louis, 2002
Master of Science, Washington University in St Louis, 2005
Doctor of Philosophy, Washington University in St Louis, 2011
Doctor of Medicine, Washington University in St Louis, 2011

Mitchell G Scott, M.S., Ph.D.

Voluntary Clinical Professor of Pathology and Immunology
Bachelor of Science, Washington University in St Louis, 1974
Master of Science, University of Missouri Columbia, 1977
Doctor of Philosophy, Washington University in St Louis, 1982

Alexey Sergushichev, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, ITMO University, 2016

Andrey S Shaw, M.D.

Voluntary Research Professor of Pathology and Immunology



Bachelor of Arts, Columbia University, 1979
Doctor of Medicine, Columbia University, 1984

Kathleen C Sheehan, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Notre Dame, 1980
Doctor of Philosophy, Saint Louis University, 1986

Cara L Shirai, M.S., Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Southeast Missouri State University, 2002
Master of Science, Southeast Missouri State University, 2005
Doctor of Philosophy, Saint Louis University, 2010

Jean Simpson

Voluntary Clinical Professor of Pathology and Immunology

Igor Smirnov, D.V.M.

Associate Professor of Pathology and Immunology (primary appointment)
Doctor of Veterinary Medicine, Moscow Veterinary Academy, 1993

Neetu Srivastava, M.S., Ph.D.

Instructor in Pathology & Immunology (primary appointment)
Master of Science, Madurai Kamaraj University, 2005
Doctor of Philosophy, Savitribai Phule Pune University, 2012

Hussein MH Sultan, D.Sc.

Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Science, Augusta University, 2017

Lulu Sun, Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, McGill University, 2007
Doctor of Philosophy, Washington University in St Louis, 2016
Doctor of Medicine, Washington University in St Louis, 2016

Chanchal Sur Chowdhury, Ph.D.

Instructor in Pathology and Immunology (primary appointment)
Doctor of Philosophy, University of Basel, 2014

Sanjay Joshua Swamidass, M.A., Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biomedical Engineering
Bachelor of Science, University of California Irvine, 2000
Master of Arts, University of California, 2006
Doctor of Philosophy, University of California, 2007
Doctor of Medicine, University of California, 2009

Chung Ho Szeto, Ph.D.

Assistant Professor of Pathology & Immunology (Pending Dean Approval) (primary appointment)
Doctor of Philosophy, University of Cambridge, 2023

T

Michiko Taniguchi, M.S., Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)

Bachelor of Science, Royal Melbourne Inst of Tech, 1999
Master of Science, University of Southern California, 2002
Doctor of Philosophy, Kobe University, 2010

Suzanne Renee Thibodeaux, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
Bachelor of Science, Tulane University, 2005
Doctor of Philosophy, University of Texas Health Sciences at San Antonio, 2011
Doctor of Medicine, University of Texas Health Sciences at San Antonio, 2013

Katarzyna Thompson, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, Medical University of Gdansk, 2014

Nicole Tolan, Ph.D.

Associate Professor of Pathology & Immunology (primary appointment)
Bachelor of Arts, Albion College, 2005
Doctor of Philosophy, Michigan State University, 2009

Ning Tsao, Ph.D.

Instructor in Pathology and Immunology (primary appointment)
Doctor of Philosophy, National Taiwan University, 2015

Jackson S Turner, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Tulsa, 2011
Doctor of Philosophy, University of Michigan Ann Arbor, 2017

Jane Willman Turner, M.D.

Professor of Pathology and Immunology (primary appointment)
Saint Louis University, 1992

U

Aayushi Uberoi, Ph.D., B.Eng

Assistant Professor of Pathology and Immunology (primary appointment)
Assistant Professor of Medicine
Bachelor of Engineering, SRM University, 2011
Doctor of Philosophy, University of Wisconsin Madison, 2017

V

Steven John Van Dyken, Ph.D.

Associate Professor of Pathology Immunology (primary appointment)
Bachelor of Science, Calvin College, 1998
Doctor of Philosophy, University of San Diego, 2006

Herbert W Virgin, Ph.D., M.D.

Professor Emeritus of Pathology and Immunology
Bachelor of Arts, Harvard University, 1977
Doctor of Philosophy, Harvard University, 1985

Doctor of Medicine, Harvard University, 1985

W

Xiaoxiao Wan, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, University of Missouri Columbia, 2015

Yi Wang, Ph.D.

Instructor in Pathology and Immunology (primary appointment)
Bachelor of Science, Peking University (#####), 2008
Doctor of Philosophy, University of Pennsylvania, 2015

Mark A Watson, Ph.D., M.D.

Professor of Pathology and Immunology (primary appointment)
Vice Chair of Faculty Development
Margaret Gladys Smith Professorship in Pathology and Immunology
Bachelor of Arts, University of Pennsylvania, 1985
Doctor of Philosophy, Washington University in St Louis, 1992
Doctor of Medicine, Washington University in St Louis, 1992

Daniel Morgan Webber, M.S., Ph.D., M.D.

Instructor in Pathology and Immunology (primary appointment)
Bachelor of Science, University of Arkansas Main Campus, 2004
Master of Science, University of Arkansas Main Campus, 2006
Doctor of Philosophy, University of Arkansas for Medical Sciences, 2017
Doctor of Medicine, University of Arkansas for Medical Sciences, 2017

Cody Hudson Weimholt, D.O.

Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, University of Missouri Columbia, 2005
Doctor of Osteopathic Medicine, A T Still University of Health Sciences, 2013

Anthony Williams, Ph.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Bachelor of Arts, Occidental College, 2002
Doctor of Philosophy, University of Miami, 2014

Y

Melanie Leann Yarbrough, Ph.D.

Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, University of Texas Southwestern Medical Center at Dallas, 2009

Lisa Yuen, Ph.D., M.D.

Assistant Professor of Pathology and Immunology (primary appointment)
Baccalaureatus, Washington University in St Louis, 2011
Doctor of Philosophy, Indiana University School of Medicine, 2018
Doctor of Medicine, Indiana University School of Medicine, 2020

Z

Pavel Zakharov, M.S., Ph.D.

Instructor in Pathology and Immunology (primary appointment)
Master of Science, Moscow State University, 2016
Doctor of Philosophy, Moscow State University, 2016

Mark A. Zaydman, Ph.D., M.D.

Associate Professor of Pathology and Immunology (primary appointment)
Bachelor of Science, Case Western Reserve University, 2007
Doctor of Medicine, Washington University in St Louis, 2016
Doctor of Philosophy, Washington University in St Louis

Jiasheng Zhang, Ph.D., MBBS

Assistant Professor of Pathology and Immunology (Pending Dean Approval) (primary appointment)
Foreign MD equivalent, Suzhou Medical College, 1983
Doctor of Philosophy, Kanazawa University, 2003

Xinming Zhuo, Ph.D.

Assistant Professor of Pathology and Immunology (Pending Dean Approval) (primary appointment)
Doctor of Philosophy, SUNY Health Science Center at Syracuse, 2014

Bernd Heinrich Zinselmeyer, Ph.D.

Associate Professor of Pathology and Immunology (primary appointment)
Doctor of Philosophy, University of Strathclyde, 2006

Research Electives

Pathology and Immunology Research Electives

For information about research opportunities available for students in Gateway EXPLORE or Gateway Phase 3, please visit the Research Lab Pages listings on the Department of Pathology & Immunology website.

Courses

PATH 8005 Autopsy Pathology (Clinical Elective)

This elective is designed to introduce students to autopsy pathology. Students will assist in performing autopsies and, together with the first-year pathology residents, will participate in all of the activities of the autopsy service including brain cutting, specialty microscopic conferences, and biweekly autopsy case conferences. Students will have the opportunity to review topics in forensic pathology. Students will be under the direction of senior pathology faculty.
Credit 2 units.

Typical periods offered: Medicine Year

PATH 8010 Dermatopathology (Clinical Elective)

The student will be involved in all activities of the dermatopathology service. These include review, discussion, and sign-out of microscopic skin specimens. Sign-out occurs each day with a team that includes an attending, fellow, and residents from both dermatology and pathology. The medical student will work closely with the residents and fellow to preview cases prior to sign-out. Dermatology Grand Rounds is held Thursday mornings and is mandatory. Other learning opportunities include informal unknown slide sessions, consensus conferences, and



journal clubs. Medical students will be required to complete at least one evidence-based medicine presentation during the rotation. The primary goal of this elective is to acquire basic competence in the diagnosis of skin diseases at the microscopic level.

Credit 4 units.

Typical periods offered: Medicine Year

PATH 8015 Cytopathology (Clinical Elective)

This elective is designed to familiarize students with the discipline of cytopathology and to encourage the development of basic skills. Cytopathology impacts many different areas of patient care and medical practice. The cytopathology laboratory at Barnes-Jewish Hospital receives a broad range of medical cytology material involving fine needle aspiration biopsies (FNA), body fluids and Pap tests. As a result, the elective is beneficial for students considering a career in pathology and for students planning careers in internal medicine, surgery, OB-GYN, ENT and radiology. The focus of the experience can be customized based on the interest of the student. Desk space and a microscope are provided.

Students on the elective will: 1. Learn how patient specimens are received and processed 2. Acquire skills in the microscopic diagnosis of disease through active participation 3. Learn the role of the cytopathologist in the care and management of patients. Students will have the opportunity to function as junior house staff managing their own cases with supervision from residents, fellows and attending cytopathologists. There are textbooks and extensive study sets to permit students to focus on specific areas of interest.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 8020 Molecular Pathology (Clinical Elective)

This elective is designed to introduce students to the field of molecular pathology, including established molecular diagnostics and Next Generation Sequencing clinical assays. Students will learn through observation in the laboratory, didactic sessions, resident and fellow presentations, sign-out with attending pathologists and clinical informatics workshops. Students will work with residents/fellows on the rotation and participate as part of the team.

Credit 4 units.

Typical periods offered: Medicine Year

PATH 8030 Surgical Pathology (Clinical Elective)

This elective is designed to familiarize students with the discipline of surgical pathology and to encourage the development of basic skills in gross pathology and histopathological interpretation. The laboratory of surgical pathology at Barnes-Jewish Hospital receives a broad range of medical biopsy material in addition to specimens derived from the busy surgical subspecialty practices. As a result, this elective is beneficial not only for students considering a career in pathology but also for students planning careers in internal medicine, surgery, obstetrics-gynecology, pediatrics, radiology, radiation oncology and dermatology. Students on this elective will: 1. Learn how patient specimens are received and processed 2. Acquire skills in the gross examination and microscopic diagnosis of disease through active participation 3. Learn the role of the pathologist in the preoperative, intraoperative and postoperative care and management of patients. Students will function as junior house staff managing their own cases with supervision from residents, fellows and attending pathologists. Students may also wish to participate in ongoing research projects within the department as time, and interest allows. At the end of the rotation, the students are required to do a formal case presentation for the residents, fellows and attending staff.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 8035 Introduction to Neuropathology (Clinical Elective)

The course is structured to give the student a full-time immersion in the specialty of neuropathology including both neurosurgical and neuroautopsy derived material. There are daily didactic sessions that cover the spectrum of neurological diseases, review gross and microscopic neuroanatomy, discuss approaches to the diagnosis of nervous system disease and point out the interrelationships of research to clinical problems. Multiple clinical conferences and diagnostic working sessions complement reading, use of a large microscopic divisional study set and project work. Time: 35 to 40 hours per week.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 8045 Clinical Laboratory Medicine (Clinical Elective)

This elective rotation is designed to teach the student how clinical laboratory assays are used in the diagnosis of disease and to understand the quality assurance tools the laboratory utilizes to assure the reliability of tests. The elective includes rotations through a variety of clinical laboratories including clinical chemistry, clinical microbiology, hematopathology, molecular pathology, and transfusion medicine. During the elective the student will have a daily schedule, which includes didactic sessions with faculty and regular interactions with house staff. Some examples of useful clinical skills acquired during the experience include: morphologic review of peripheral blood smears and bone marrow biopsies; interpretation of coagulation tests, biomarkers of cardiac damage and serum protein electrophoresis patterns; identification of infectious organisms; and appropriate use of blood component therapy and therapeutic apheresis. The rotation culminates with a case discussion presented by the medical student which focuses on application of clinical laboratory evaluations to direct patient care.

Credit 4 units.

Typical periods offered: Medicine Year

PATH 8170 OBGYN Pathology (Clinical Elective)

This elective stresses the principles of anatomic pathology when applied to operative material in obstetrics and gynecology. The subintern will examine gross and microscopic specimens in the ob-gyn pathology lab and review pertinent literature with a senior pathologist. Ample time will be available for attending regular conferences in ob-gyn and pathology.

Credit 2 units.

Typical periods offered: Medicine Year

PATH 9100 Anatomic Pathology and Laboratory Medicine Advanced Clinical Rotation (ACR)

The purpose of the Anatomic Pathology and Laboratory Medicine Advanced Clinical Rotation involves the development of expertise related to diagnostic pathology and laboratory testing in a well-supervised teaching environment. ACR students are under the supervision of anatomic pathology and laboratory medicine residents, fellows and attending pathologists. ACR students have the same daily schedules as first year anatomic pathology/clinical pathology residents. They are assigned the primary workup of patient specimens or patients on each sign-out day. An approach to the specimen or patient and required follow up or ancillary testing is planned in consultation with the resident, fellow or attending physician. The trainees assume the primary responsibility for generating any required reports and communication with other healthcare providers. As for most entering residents, there is no formal after-hours call schedule. Students attend the same conferences as the house staff.

Credit 4 units.

Typical periods offered: Medicine Year

Edward Mallinckrodt Department of Pediatrics

The primary aim of the teaching program of the Department of Pediatrics is to stimulate interest in developmental biology — in particular, human growth and development — to provide students with a foundation sufficiently comprehensive to have an appreciation of clinical pediatric problems, regardless of their future career choices in medicine.

The major clinical and research facilities are in St. Louis Children's Hospital, and the newborn services are at the Women & Infants Center. St. Louis Children's Hospital is a facility with 300 beds that accepts patients through 21 years of age with all types of medical and surgical problems. Hospital admissions average 11,200 annually. Pediatric medical ambulatory activity, including subspecialty and emergency visits, averages about 152,000 visits per year. Nearly 4,000 infants are born annually at the Washington University Medical Center.

Website: <http://pediatrics.wustl.edu>

Faculty

Department Chair

Gary A. Silverman, MD, PhD

Chief Medical Officers

Chief Medical Officer: Patrick Reich, MD

Associate Chief Medical Officer: Jason W. Rubin, MD

Department Vice Chairs

Executive Vice Chair: Juliane Bubeck Wardenburg, MD, PhD

Vice Chair of Basic and Translational Research: David Hunstad, MD

Vice Chair of Clinical Informatics: Kevin O'Bryan, MD

Vice Chairs of Clinical Investigation: Ana Maria Arbeláez, MD, MSCI and Stephanie Fritz, MD, MSCI

Vice Chair of Community Health & Strategic Planning: Rachel C. Orscheln, MD

Vice Chair of Outpatient Health: Cassandra M. Pruitt, MD, FAAP

Vice Chair of Quality & Safety: Beverly Brozanski, MD

Division Chiefs

Ana Maria Arbeláez, MD, MSCI

Juliane Bubeck Wardenburg, MD, PhD

Megan A. Cooper, MD, PhD

Patricia Dickson, MD

Jorge Di Paola, MD

Sarah Garwood, MD

Andrew Glatz, MD, MSCE

Carmen M. Halabi, MD, PhD

David Hunstad, MD

Lisa Moscoso, MD, PhD

Cassandra M. Pruitt, MD, FAAP

Kimberly S. Quayle, MD

Ronald Rubenstein, MD, PhD

Phillip I. Tarr, MD

Barbara B. Warner, MD, MSc

Visit our website for more information about our faculty and their appointments.

A

Mohamed Shebl Abdelbaki, M.D.

Professor of Pediatrics (primary appointment)
Doctor of Medicine, Cairo University, 2002

Manjusha Abraham, M.D.

Instructor in Pediatrics (primary appointment)
Doctor of Medicine, University of Cologne (Koln), 2011

Philip Mulayara Abraham, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Boston College, 2006
Doctor of Medicine, Ross University School of Medicine, 2010

Susan E Adams, Ph.D., M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, University of Kansas, 1977
Bachelor of Science, University of Kansas, 1977
Doctor of Philosophy, University of Kansas Medical (Duplicate of University of Kansas Medical Center), 1984
Doctor of Medicine, Washington University in St Louis, 1991

William S Adams, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1985
Doctor of Medicine, University of Missouri Columbia, 1989

Adedotun Adewale, M.D.

Assistant Professor of Pediatrics (primary appointment)



Doctor of Medicine, Obafemi Awolowo University, 2009

Jacob Charles Adney, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Dallas, 2015
Doctor of Medicine, Saint Louis University, 2020

Sophia E. Agapova, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2011
Doctor of Medicine, Columbia University, 2017

Manish Aggarwal, M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Radiology
Bachelor of Science, University of Iowa, 2008
Doctor of Medicine, Carver College of Medicine at University of Iowa, 2012

Fahd Aqeeb Ahmad, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Missouri Columbia, 2002
Doctor of Medicine, University of Missouri Columbia, 2006

Etihad S. Al-Falahi

Voluntary Clinical Instructor in Pediatrics

Matthew Alder, Ph.D., M.D.

Voluntary Clinical Professor of Pediatrics
University of Utah, 2001
University of Alabama at Birmingham School of Medicine, 2009
University of Alabama at Birmingham School of Medicine, 2009

Danielle Nicole Alfano, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Minnesota Twin Cities, 2007
Doctor of Medicine, Washington University in St Louis, 2011

Jennifer Marie Allen

Voluntary Clinical Assistant Professor of Pediatrics

Ardis Kay Allison, D.O.

Voluntary Clinical Instructor in Pediatrics
Doctor of Osteopathic Medicine, Oklahoma State University (Duplicate of Oklahoma State University-Main Campus), 1980

Patricia J Amato, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Science, Notre Dame College, 1979
Doctor of Medicine, School Not Found, 1982

Sabat Sardar Ameen

Voluntary Clinical Assistant Professor of Pediatrics

Karine Amirikyan, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Pennsylvania, 2009
Doctor of Medicine, Thomas Jefferson University, 2015

Jagruiti Shah Anadkat, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Ohio State University-Main Campus, 2000
Doctor of Medicine, Northeastern University, 2005

Kristen Minette Andersen

Voluntary Clinical Instructor in Pediatrics

Anne Marie Anderson, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2018

George Christopher Anderson, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, Saint Louis University, 1993

Dana E Ankney, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 2001
Doctor of Medicine, Wake Forest University, 2005

Amal F. Antoun

Voluntary Clinical Instructor in Pediatrics

Ana Maria Arbelaes, M.D.

Professor of Pediatrics (primary appointment)
David English Smith Professorship In Medicine
Division Chief - Division of Endocrinology & Diabetes
Doctor of Medicine, Universidad del Valle Med Sch, 1996

Amy Elizabeth Armstrong, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, Virginia Commonwealth University, 2012

Jennifer L. Arter, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Iowa, 1993
Doctor of Medicine, Carver College of Medicine at University of Iowa, 1998

Kofi Asare-Bawuah, MB.ChB.

Voluntary Clinical Professor of Pediatrics
University of Science and Technology (KNUST), 2003

Elizabeth G Atkinson, M.D.

Voluntary Clinical Instructor in Pediatrics
Doctor of Medicine, Hahnemann University, 1994

Robert K Atteberry, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, Saint Louis University, 1998

Adrienne Denise Atzemis, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, John Carroll University, 1996
Doctor of Medicine, Creighton University, 2000

Sarah Elizabeth Aubuchon, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, University of Missouri Kansas City, 2007
Doctor of Medicine, University of Missouri Kansas City, 2008

Katherine Lea Austin, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Missouri Columbia, 1994
Doctor of Medicine, University of Missouri Columbia, 1998

Sara Michelle Ayers, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Doctor of Medicine, University of Missouri Columbia, 1998

Fariba Azarpour, M.D.

Voluntary Clinical Instructor in Pediatrics
Doctor of Medicine, School Not Found, 1971

B

Joshua James Baiel, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Trinity Medical Sciences University, 2017

Saba Bajwa

Voluntary Clinical Assistant Professor of Pediatrics

Dustin M Baldrige, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Dallas, 2002
Doctor of Philosophy, Baylor University, 2010
Doctor of Medicine, Baylor University, 2011

David T Balzer, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Missouri Columbia, 1981
Doctor of Medicine, Saint Louis University, 1985

Maha Bano, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Central Florida, 2019

Angela L Bard, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Science, Indiana University Bloomington, 1976
Doctor of Medicine, Indiana University Bloomington, 1981

Alan Roy Barnette

Voluntary Clinical Instructor in Pediatrics

Laura Barton, M.D.

Instructor in Pediatrics (primary appointment)
Bachelor of Science, Northwestern University, 1998
Doctor of Medicine, University of Illinois at Chicago, 2002

Aamir Bashir, MBBS

Voluntary Clinical Professor of Pediatrics
King Edward Medical University, 2006

Kevin W Baszis, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 2004

Maria S Baszis, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, University of Missouri Kansas City, 2004

Marie Lynn Batty, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Saint Louis University, 2013
Doctor of Medicine, Saint Louis University, 2017

Susan L Baumer, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, University of Oregon, 1969

Doctor of Medicine, University of Pennsylvania, 1975

Christie A. Bayer, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Saint Louis University, 1986
Doctor of Medicine, University of Missouri Columbia, 1990

Julia M. Becker, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, University of Missouri Columbia, 1993
Doctor of Medicine, University of Missouri Columbia, 1997

Earl C Beeks, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Science, Howard University, 1977
Doctor of Medicine, University of Missouri Columbia, 1981

Halima Bello-Manga

Voluntary Research Associate Professor of Pediatrics

Walter F Benoist, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, University of Pennsylvania, 1968
Doctor of Medicine, Washington University in St Louis, 1972

Stephanie Ann Berdy, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Georgia, 2009
Doctor of Medicine, Georgetown University, 2013

Justin Hill Berger, Ph.D., M.D.

Instructor in Pediatrics (primary appointment)
Baccalaureatus, Bowdoin College, 2005
Doctor of Philosophy, Albert Einstein College of Medicine, 2014
Doctor of Medicine, Albert Einstein College of Medicine, 2014

Mary Elizabeth Bernardin, M.D.

Instructor in Pediatrics (primary appointment)
Bachelor of Science, Saint Louis University, 2009
Doctor of Medicine, Loyola University Chicago, 2013

Peter M Bess

Voluntary Clinical Assistant Professor of Pediatrics

Richard Betters, M.D.

Voluntary Clinical Professor of Pediatrics
Indiana University School of Medicine, 2011

Michelle Louise Beumer, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, University of Missouri Columbia, 1999

Shobha Bhaskar, MBBS

Associate Professor of Pediatrics (primary appointment)
Foreign MD equivalent, Bangalore University, 1994

Tarin Michael Q Bigley, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Molecular Microbiology
Assistant Professor of Pathology and Immunology
Bachelor of Science, University of Wisconsin Milwaukee, 2008
Doctor of Philosophy, Medical College of Wisconsin, 2014
Doctor of Medicine, Medical College of Wisconsin, 2016

Jean E Birmingham, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Ohio Wesleyan University, 1984
Doctor of Medicine, University of Missouri Columbia, 1988

Huldah C Blamoville, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Science, Queens College, 1959
Doctor of Medicine, Meharry Medical College, 1965

Kevin J Blanton

Voluntary Clinical Instructor in Pediatrics

Joshua Andrew Blatter, M.P.H., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Macalester College, 1996
Doctor of Medicine, University of Pittsburgh, 2008
Master of Public Health, University of Pittsburgh, 2014

Heather Blickenstaff, M.D.

Instructor in Pediatrics (Pending Dean Approval) (primary appointment)
Bachelor of Science, Indiana University Bloomington, 2016
Doctor of Medicine, Indiana University School of Medicine, 2020

Gordon R Bloomberg, M.D.

Professor Emeritus of Pediatrics
Bachelor of Arts, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1955
Bachelor of Science, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1955
Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1959

Trina Blythe, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Harvard University, 1992
Doctor of Medicine, Albany Medical College, 1996

Kelly Minnette Boland

Voluntary Clinical Assistant Professor of Pediatrics

Joshua P Boldt

Voluntary Clinical Instructor in Pediatrics

Nastassia Collen Bommel

Professor

Robert J Bradshaw, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Emory University, 1976
Bachelor of Science, Emory University, 1976
Doctor of Medicine, Saint Louis University, 1980

Sarah Nicole Bram, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2015

Celeste Capers Brancato, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Wellesley College, 1997
Doctor of Medicine, University of Iowa, 2002

Daphne Wang Branham, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, New York Medical College, 2015

Kaye Elizabeth Brathwaite, M.D.

Instructor in Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2015

Colleen Catherine Brennan, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 2011

Steven Kyle Brennan, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, University Victoria, 2007
Doctor of Medicine, University of Queensland, 2013

Kelleigh Elizabeth Briden, M.D.

Associate Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
Bachelor of Science, New York University, 2008
Doctor of Medicine, University of Connecticut, 2012

Mark Allen Brimble, Ph.D.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
University of Bath, 2013
University College London, 2021

Matthew A Broom

Voluntary Clinical Associate Professor of Pediatrics

Nicole Marie Brossier, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Missouri University of Science and Technology (Formerly University of Missouri at Rolla), 2004
Doctor of Medicine, University of Alabama in Birmingham, 2013

Rebekah L Browning, Ph.D., M.D.

Instructor in Pediatrics (primary appointment)
Bachelor of Arts, Davidson College, 2002
Doctor of Philosophy, Ohio State University-Main Campus, 2017
Doctor of Medicine, Ohio State University-Main Campus, 2017

Seth J Brownridge, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1978
Doctor of Medicine, Washington University in St Louis, 1982

Christopher Aaron Brownsworth, M.D.

Voluntary Clinical Professor of Pediatrics
University of Missouri Columbia, 2011

Beverly Sobchak Brozanski, M.D.

Professor of Pediatrics (primary appointment)
Susan and James C. Gould Professor of Pediatric Quality and Safety
Vice Chair - Quality Improvement & Safety
Doctor of Medicine, University of Pittsburgh, 2019

Melanie Merrell Bryan, M.D.

Instructor in Medicine (Pending Dean Approval) (primary appointment)
Bachelor of Arts, Barnard College, 2012
Doctor of Medicine, University of Missouri Columbia, 2018

Juliane Bubeck-Wardenburg, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Donald B Strominger Professor of Pediatrics
Division Chief - Division of Critical Care Medicine
Professor of Molecular Microbiology
Executive Vice Chair of Pediatrics
Doctor of Philosophy, Washington University in St Louis, 2017
Doctor of Medicine, Washington University in St Louis, 2017

Ayşe Bahar Budan Caliskan, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Istanbul University, 2001

Tara M. Budetti

Voluntary Clinical Assistant Professor of Pediatrics

Lorena Buffa, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, University of Missouri Columbia, 1998

Rebecca Kay Bullivant, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Eastern Illinois University, 1988
Doctor of Medicine, University of Illinois at Urbana-Champaign, 1992

Max H Burgdorf, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1970
Doctor of Medicine, Washington University in St Louis, 1974

Katherine Anne Burgener, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2017

Kylie Michelle Bushroe, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Dayton, 2014
Doctor of Medicine, Ohio State University College of Medicine, 2018

David Franklin Butler, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Creighton University, 2013

Lauren Elizabeth Buxbaum, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Illinois at Urbana-Champaign, 2011
Doctor of Medicine, Rush University, 2015

C

Kelley S. Caddel, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Indiana University Bloomington, 1998
Doctor of Medicine, George Washington University, 2008

Archna Calfee, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Case Western Reserve University, 1997
Doctor of Medicine, Washington University in St Louis, 2001

Joseph Edward Cangas

Voluntary Clinical Assistant Professor of Pediatrics

Charles E Canter, M.D.

Professor of Pediatrics (primary appointment)
Lois B. Tuttle and Jeanne B. Hauck Chair in Pediatrics
Bachelor of Science, Brown University, 1974
Doctor of Medicine, Saint Louis University, 1979

John R Carlile, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Kansas, 1972
Doctor of Medicine, University of Kansas Medical (Duplicate of University of Kansas Medical Center), 1975

Michael J. Carney, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, University of Notre Dame, 1987
Doctor of Medicine, University of Missouri Columbia, 1991

Jacquelyn L Carter

Voluntary Clinical Assistant Professor of Pediatrics

Erin Elizabeth Casey, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, University of Rochester, 2008
Doctor of Medicine, University of Rochester, 2012

Rubilinda Q Casino, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, University of Santo Tomas, 1979
Doctor of Medicine, University of Santo Tomas, 1979

Marta Celorrio Navarro, Pharm.D.

Assistant Professor of Pediatrics (primary appointment)
Lecturer
Doctor of Pharmacy, University of Navarra, 2015

Laura Cerny, M.D.

Voluntary Clinical Professor of Pediatrics
University of Illinois College of Medicine Peoria (UICOMP), 2002

Allison Leigh Chalupa, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Dayton, 2011
Doctor of Medicine, University of Cincinnati-Main Campus, 2015

Tattamangalam P Chandrika, M.S.

Voluntary Clinical Associate Professor of Pediatrics
Master of Science, University of Calcutta, 2000

William T Chao, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1975
Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1979

Bo-Ruei Chen, M.S., Ph.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, National Yang-Ming University, 2000
Master of Science, National Yang-Ming University, 2002
Doctor of Philosophy, Case Western Reserve University, 2011

Christine Leigh Chen, M.D.

Voluntary Clinical Assistant Professor of Pediatrics



Bachelor of Science, Saint Louis University, 2001
Doctor of Medicine, Saint Louis University, 2005

Jonathan C Chiles, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2004
Doctor of Medicine, University of Missouri Kansas City, 2004

Luana Chiquetto Paracatu, Ph.D.

Instructor in Pediatrics (primary appointment)
Doctor of Philosophy, Universidade Estadual Paulista (Unesp), 2016

Eileen Anna Ciccio, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2019

Julia Ann Ciurria, M.D., B.Eng

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Engineering, Queen's University, 2009
Doctor of Medicine, Royal College of Surgeons of Ireland, 2017

Regina A Clemens, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Philosophy, University of Pennsylvania, 2007
Doctor of Medicine, University of Pennsylvania, 2007

Samantha Clemon

Voluntary Clinical Assistant Professor of Pediatrics

Lindsay Davidson Clukies, M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Public Health
Bachelor of Science, McGill University, 2006
Doctor of Medicine, New York Medical College, 2011

Andrew Stephen Cluster, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Maryland-College Park, 2006
Doctor of Medicine, University of Texas Southwest, 2010

Darryl S Cohen, D.O.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, University of North Texas, 1976
Doctor of Osteopathic Medicine, School Not Found, 1981

Barbara A Cohan, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Michigan Ann Arbor, 1974
Doctor of Medicine, New York University, 1978

Elisabeth Cole, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Mount Holyoke College, 2006
Doctor of Medicine, Tulane University, 2015

F. Sessions Cole, M.D.

Professor Emeritus of Pediatrics
Bachelor of Arts, Amherst College, 1969
Doctor of Medicine, Yale University, 1973

John C. Cole, Ph.D., M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Washington University in St Louis, 1995
Doctor of Philosophy, Washington University in St Louis, 2003

Doctor of Medicine, Washington University in St Louis, 2003

Lora Pearlman Collier

Voluntary Clinical Instructor in Pediatrics

Eve Ruth Colson, M.Ed., M.D.

Professor of Pediatrics (primary appointment)
Associate Dean of Program Evaluation and Continuous Quality Improvement
Doctor of Medicine, Yale University, 1989
Master of Education, University of Illinois at Chicago, 2014

Bryanne Noel Colvin, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Dallas, 2006
Doctor of Medicine, Saint Louis University, 2010

Matthew Phillip Compton, M.D., B.Eng

Voluntary Clinical Professor of Pediatrics
Arizona State University, 2006
Loma Linda University, 2010

Susan Conger

Voluntary Clinical Instructor in Pediatrics

Jessica Cooke

Voluntary Clinical Assistant Professor of Pediatrics

Jonathan David Cooper, Ph.D.

Professor of Pediatrics (primary appointment)
Professor of Neurology
Professor of Genetics
Doctor of Philosophy, University of Bristol, 1990

Megan A Cooper, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Professor of Pathology and Immunology
Division Chief - Pediatric Rheumatology
Anthony R French, MD, PhD Professor of Pediatrics
Bachelor of Arts, College of Wooster, 1995
Doctor of Philosophy, Ohio State University-Main Campus, 2002
Doctor of Medicine, Ohio State University-Main Campus, 2004

Tara Conway Copper, M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Medical Director SLCH ED
Doctor of Medicine, University of Miami, 2017

Matthew J Cormier, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Saint Louis University, 2017
Doctor of Medicine, Saint Louis University, 2021

Samuel Reynaldo Cortez, M.D.

Instructor in Pediatrics (primary appointment)
Doctor of Medicine, Universidad Evangelica de El Salvador, 2014

Andrea Michele Coverstone, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Gonzaga University, 2004
Doctor of Medicine, Saint Louis University, 2009

Mary Michaeleen Cradock

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Arts, Rice University, 1987

Andrew Cronyn, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Arts, Princeton University, 1987

Doctor of Medicine, Albert Einstein College of Medicine, 1996

Betty Cross, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Science, University of Kansas, 1979

Doctor of Medicine, University of Kansas, 1983

Clayton Cummings, M.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Missouri Columbia, 1996

Doctor of Medicine, University of Missouri Columbia, 2000

D

Aashka P Dalal, M.D.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)

Bachelor of Arts, Washington University in St Louis, 2015

New York Medical College, 2021

Raja Sekhar Dandamudi, M.D., MBBS

Associate Professor of Pediatrics (primary appointment)

Foreign MD equivalent, Dr. NTR University of Health Sciences, 2002

Doctor of Medicine, University of the West Indies, 2017

Elizabeth A Daniels, M.D.

Assistant Professor of Pediatrics (primary appointment)

Maryland, 2011

Doctor of Medicine, Washington University in St Louis, 2018

Michael E Danter, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Science, University of Missouri Columbia, 1983

Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1987

Megan Therese Danzo Arguello

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)

Yasmeen Daud, M.D.

Professor of Pediatrics (primary appointment)

Doctor of Medicine, University of Missouri Kansas City, 2000

Megan Smith Daugherty, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, Cornell University, 2015

Doctor of Medicine, Ben Gurion University of the Negev, 2019

Stewart Matthew Davidson, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Florida, 2017

Doctor of Medicine, Florida International University, 2022

Jesse Alan Davis, M.D.

Instructor in Pediatrics (primary appointment)

Doctor of Medicine, American University of Integrative Sciences, School of Medicine, 2019

John C Davis, M.D.

Voluntary Clinical Associate Professor of Pediatrics

Doctor of Medicine, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1980

Ray S Davis, M.D.

Voluntary Clinical Professor of Pediatrics

Doctor of Medicine, University of Louisville, 1978

Trevor A Davis, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Iowa, 2014

Doctor of Medicine, Johns Hopkins University, 2018

Joshua Thomas Dearborn, M.S., Ph.D.

Instructor in Pediatrics (primary appointment)

Bachelor of Arts, University of Missouri in St Louis, 2005

Master of Science, University of Missouri in St Louis, 2007

Doctor of Philosophy, University of Missouri in St Louis, 2013

Dana Marie DeCuffa, M.D.

Assistant Professor of Pediatrics (primary appointment)

Doctor of Medicine, Saint Louis University, 2019

Jane E. Defalco, M.S., M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Arts, Rutgers University (Duplicate of Rutgers University-New Brunswick), 1977

Master of Science, Rutgers University (Duplicate of Rutgers University-New Brunswick), 1978

Doctor of Medicine, Case Western Reserve University, 1984

Rachel Stevens Deming, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Arts, Stanford University, 2008

Doctor of Medicine, University of California San Francisco, 2016

Leanne Michelle DePalma, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Notre Dame, 2004

Doctor of Medicine, University of Louisville, 2008

Nicole Catherine Deptula, M.D.

Associate Professor of Pediatrics (primary appointment)

Doctor of Medicine, American University of the Caribbean, 2009

Puja Desai, M.D.

Assistant Professor of Pediatrics (primary appointment)

Doctor of Medicine, Ross University School of Medicine, 2014

Gerry Deschamps, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Arts, Washington University in St Louis, 1976

Doctor of Medicine, University of Missouri Columbia, 1983

Jorge Andres Di Paola, M.D.

Professor of Pediatrics (primary appointment)

Elizabeth Finney McDonnell Chair in Pediatric Hematology/Oncology

Division Chief - Division of Hematology & Oncology

Doctor of Medicine, Universidad de Buenos Aires, 1990

Patricia Irene Dickson, M.D.

Professor of Pediatrics (primary appointment)
Centennial Professor of Pediatrics
Division Chief - Division of Genetics and Genomic Medicine
Baccalaureatus, University of Chicago, 1995
Doctor of Medicine, Columbia College of Physicians and Surgeons, 1999

Lizbeth H Didriksen

Voluntary Clinical Assistant Professor of Pediatrics

Stephanie Diggs, M.D.

Instructor in Pediatrics (primary appointment)
Doctor of Medicine, Morehouse College, 2017

Mary C Dinauer, Ph.D., M.D.

Professor Emerita of Pediatrics
Bachelor of Arts, Lawrence University, 1975
Doctor of Philosophy, University of Chicago, 1979
Doctor of Medicine, University of Chicago, 1981

Tulay F Dincer, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, School Not Found, 1977

Sarah Marie Ditch, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Missouri Columbia, 2013

Colin Christopher Dolan, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Missouri Columbia, 2018
Doctor of Medicine, Saint Louis University, 2022

Balraj Doray, Ph.D.

Associate Professor of Pediatrics (primary appointment)
Lecturer in Biology
Bachelor of Science, Southern Illinois University Carbondale, 1993
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 1999

Alla Dorfman, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, Chervovtsy State School of Med, 1986

Julie R Dorfman, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2015

Alexa Michelle Altman Doss, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2015
Doctor of Medicine, University of Missouri Kansas City, 2016

Catherine J Doty

Voluntary Clinical Instructor in Pediatrics

Charles H Dougherty, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, Holy Cross College, 1969
Doctor of Medicine, University of Rochester, 1973

Matthew P Dougherty

Voluntary Clinical Instructor in Pediatrics

Iesha Draper

Voluntary Clinical Assistant Professor of Pediatrics

Laura Albert Duckworth, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2017
Bachelor of Science, Vanderbilt University

Jennifer Gries Duncan, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Vanderbilt University, 1993
Doctor of Medicine, University of Chicago, 1997

Jennifer M Dunn, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Science, Duke University, 1996
Doctor of Medicine, Washington University in St Louis, 2000

Maria Laura Duque Lasio, M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Pathology and Immunology
Doctor of Medicine, Universidad Catolica de Santia, 2013

E**Adam C. Eaton, M.D.**

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Science, University of Illinois at Urbana-Champaign, 1992
Doctor of Medicine, Washington University in St Louis, 1997

Lori L Eberhart

Voluntary Clinical Assistant Professor of Pediatrics

Irem Eldem, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Hacettepe University, 2011

Alysa G. Ellis, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2004
Doctor of Medicine, University of Missouri Kansas City, 2005

Alexis M Elward, M.P.H., M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, Loyola College in Maryland, 1988
Doctor of Medicine, University of Maryland-College Park, 1994
Master of Public Health, Saint Louis University, 2006

Amanda R. Emke, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Saint Marys University, 1998
Doctor of Medicine, University of Missouri Columbia, 2002

Deborah Lynn Engle, M.S., Ed.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 1996
Master of Science, Truman State University (Formerly Northeast Missouri State University), 1997
Doctor of Education, North Carolina St University, 2010

Laura Ann Esswein, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Arts, Washington University in St Louis, 1987
Doctor of Medicine, University of Missouri Columbia, 1991

Timothy Robert Evans, M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Medicine
Doctor of Medicine, Creighton University, 2016

F

Christina Fahey, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Kentucky, 2019

Korre Leigh Fairman, D.O.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Osteopathic Medicine, Lake Erie College of Osteopathic Medicine, 2015

Alexandra Gybbon Fallon, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, San Diego State University, 2008
Doctor of Medicine, American University of the Caribbean School of Medicine, 2013

Elliott H Farberman, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, University of Rochester, 1969
Doctor of Medicine, Saint Louis University, 1973

Marjorie Ann Farrington, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 2019

Yuri Fedorovich, M.D.

Instructor in Pediatrics (primary appointment)
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2018

Richard A. Felkel, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, Saint Louis University, 1993
Doctor of Medicine, Saint Louis University, 1997

Kora Felsch

Voluntary Clinical Assistant Professor of Pediatrics

Isabel Fernandez-Holtzman, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, Michigan State University, 2019

Margaret Ashley Ferris, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Carnegie Mellon University, 2005
Doctor of Medicine, Washington University in St Louis, 2013

Melanie Erin Fields, M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Neurology
Bachelor of Science, Tulane University, 2003
Doctor of Medicine, University of Texas Medical School Houston, 2008

Mayte Ideliz Figueroa, M.D.

Professor of Pediatrics (primary appointment)
Doctor of Medicine, Mount Sinai School of Medicine, 1992

Gregory K Finn, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Hendrix College, 1985
Doctor of Medicine, Washington University in St Louis, 1992

Joseph D Finney, M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Public Health
Bachelor of Arts, Washington University in St Louis, 2007
Doctor of Medicine, Rush University, 2016

Emily Faith Rood Fishman, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Youngstown State University, 2005
Doctor of Medicine, Northeast Ohio Medical University, 2009

Phylicia Fleming

Voluntary Clinical Assistant Professor of Pediatrics

Jennifer Foersterling, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, Saint Louis University, 1997

Leslie A. Fogel, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Rice University, 2007
Doctor of Philosophy, Washington University in St Louis, 2016
Doctor of Medicine, Washington University in St Louis, 2016

Rebecca Hope Foster

Voluntary Clinical Associate Professor of Pediatrics

Mary E Fournier, M.P.H., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Rockhurst University, 1998
Doctor of Medicine, Saint Louis University, 2002
Master of Public Health, Harvard University, 2008

Sarah Annemarie Freedlund, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Purdue University-Main Campus, 2017
College of Medicine, 2021

Anthony Raymond French, M.S., Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Professor of Pathology and Immunology
Professor of Biomedical Engineering
Vice Chair of Physician Scientist Training
Bachelor of Science, University of Minnesota, 1989
Master of Science, University of Illinois at Urbana-Champaign, 1993
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 1995

Doctor of Medicine, University of Illinois at Urbana-Champaign, 1997

Stuart Howard Friess, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Brown University, 1985
Doctor of Medicine, Mount Sinai School of Medicine, 1999

Stephanie Ann Fritz, M.S., M.D.



Professor of Pediatrics (primary appointment)
Ferring Family Chair Professor of Pediatrics
Bachelor of Science, University of Wisconsin Milwaukee, 1997
Doctor of Medicine, Medical College of Wisconsin, 2001
Master of Science, Washington University in St Louis, 2008

G

Nishanth Noel Gabriel, M.S., Ph.D.

Instructor In Pediatrics (primary appointment)
Bachelor of Science, Kannur University, 2003
Master of Science, Cochin University of Science and Technology, 2005
Doctor of Philosophy, The Tamil Nadu Dr. M.G.R. Medical University, 2016

Mavis Gaisie, MB.ChB.

Voluntary Clinical Professor of Pediatrics
University of Science and Technology (KNUST), 2006

John P Galgani, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Science, Massachusetts College of Pharmacy and Health Sciences, 1977
Doctor of Medicine, Saint Louis University, 1982

Nailah Aisha Gallego Clemmons

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)

Tessa D Gardner, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Massachusetts Institute of Technology, 1968
Doctor of Medicine, Harvard University, 1972

Caryn Garriga

Voluntary Clinical Assistant Professor of Pediatrics

Megan Elizabeth Garvey-Whately, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
American University of the Caribbean School of Medicine, 2021

Sarah Kathryn Garwood, M.D.

Professor of Pediatrics (primary appointment)
Division Chief for Adolescent Medicine
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 1998
Doctor of Medicine, University of Missouri Columbia, 2002

Karen J Garzia

Voluntary Clinical Instructor in Pediatrics

Karuna Gausper, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2020
Doctor of Medicine, University of Missouri Kansas City, 2021

Margaret Elizabeth Gegick

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)

Elliot Field Gellman, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, Iowa State University, 1957

Doctor of Medicine, University of Missouri Columbia, 1961

Kolby Jean Gerling

Voluntary Clinical Assistant Professor of Pediatrics

Nicole Marie Gilbert, Ph.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Molecular Microbiology
Assistant Professor of Obstetrics & Gynecology
Doctor of Philosophy, Saint Louis University, 2011

Michelle Gill, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Homer E Nash Jr, MD Professorship of Pediatrics
Bachelor of Science, Louisiana State University Shreveport, 1988
Doctor of Philosophy, Louisiana State University Shreveport, 1993
Doctor of Medicine, Louisiana State University, 1995

Thomas J Girard, Ph.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Wisconsin Oshkosh, 1979
Doctor of Philosophy, Iowa State University, 1985

Sarah Katherine Girresch-Ward, Ph.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Philosophy, Tennessee State University, 2018

Andrew Charles Glatz, M.D.

Professor of Pediatrics (primary appointment)
Louis Larrick Ward Professor of Pediatrics
Division Chief of Pediatric Cardiology
Bachelor of Science, Princeton University, 1996
Doctor of Medicine, Washington University in St Louis, 2002

John F Gleeson, M.D.

Instructor in Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2007

Brian Glen, D.O.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Osteopathic Medicine, Campbell University, 2019

Lakshmi Gokanapudy Hahn, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of California Los Angeles, 2008
Doctor of Medicine, Saint George's University, 2014

Matthew I Goldsmith, M.S., M.D.

Professor of Pediatrics (primary appointment)
Assistant Professor of Genetics
Bachelor of Science, University of Toronto, 1987
Master of Science, University of Toronto, 1990
Doctor of Medicine, University of Toronto, 1995

Carol Gonzales

Voluntary Clinical Assistant Professor of Pediatrics

Catherine Frances Gooch, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Tennessee, 2016

Gary M Goodman, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Wayne State University, 1977

Doctor of Medicine, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1981

Daziale Goodwin

Voluntary Clinical Assistant Professor of Pediatrics

Gary S Gottesman, M.D.

Professor of Pediatrics (primary appointment)

Professor of Medicine

Baccalaureatus, Harvard University, 1982

Doctor of Medicine, University of Michigan Ann Arbor, 1988

Ronald M Grady, M.A., M.D.

Professor of Pediatrics (primary appointment)

Bachelor of Arts, Princeton University, 1984

Master of Arts, Washington University in St Louis, 1989

Doctor of Medicine, Washington University in St Louis, 1989

Laquita A Graham, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Arts, Washington University in St Louis, 1991

Doctor of Medicine, Saint Louis University, 1996

Jorge Luis Granadillo De Luque, M.D.

Assistant Professor of Pediatrics (primary appointment)

Doctor of Medicine, Univ Industrial de Santander, 2007

Dorothy K. Grange, M.D.

Professor of Pediatrics (primary appointment)

Bachelor of Arts, Mount Holyoke College, 1976

Doctor of Medicine, University of Florida, 1981

Cori L Grant, M.D.

Assistant Professor of Pediatrics (primary appointment)

Doctor of Medicine, Washington University in St Louis, 2015

Lauren Anne Grant, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, Saint Louis University, 2016

Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2020

Crystal Jean Gravatte, M.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Nevada Reno, 2008

Doctor of Medicine, University of Nevada Reno, 2013

Abby Margaret Green, M.D.

Associate Professor of Pediatrics (primary appointment)

Associate Professor of Pathology and Immunology

Doctor of Medicine, New York University School of Medicine, 2019

Ted Allen Green, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Science, Eastern Illinois University, 1990

Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1994

Sarah E. Greene, M.D.

Assistant Professor of Pediatrics (primary appointment)

Assistant Professor of Medicine

Bachelor of Science, Barnard College, 2005

Doctor of Medicine, Washington University in St Louis, 2016

Eric Lieberman Greer, Ph.D.

Associate Professor of Pediatrics (primary appointment)

Associate Professor of Genetics

Bachelor of Arts, Case Western Reserve University, 2004

Doctor of Philosophy, Stanford University, 2010

Sara Kathleen Greer, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Illinois at Urbana-Champaign, 2010

Doctor of Medicine, Johns Hopkins University, 2014

Lauren Waldholtz Gregory, M.S., M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Arts, Washington University in St Louis, 2011

Master of Science, Eastern Virginia Medical School, 2013

Doctor of Medicine, Eastern Virginia Medical School, 2017

Allie Ann Grither, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Arts, Johns Hopkins University, 2011

Doctor of Medicine, Saint Louis University, 2015

Georgeann Keh-Teng Groh, M.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Arts, Rice University, 2001

Doctor of Medicine, Baylor College of Medicine, 2006

Jesse Brookshire Groh, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Arts, Rice University, 2002

Doctor of Medicine, Baylor University, 2006

Rachel Lynn Guess, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, Texas A&M University, 2014

Doctor of Medicine, University of Texas Health Sciences at San Antonio, 2018

Joseph Donald Gunn, M.D.

Instructor in Pediatrics (primary appointment)

Bachelor of Arts, Saint Louis University, 1985

Doctor of Medicine, University of Virginia, 1989

Jun Guo, M.S., Ph.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Science, Nanjing University (#####), 1991

Master of Science, Dalian Medical University (#####), 1997

Doctor of Philosophy, Fudan University (#####), 2000

Kamal Gursahani, M.B.A., M.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Arts, Columbia University, 1997

Doctor of Medicine, University of Missouri Columbia, 2002

Master of Business Administration, Saint Louis University, 2012

H

Kimberly Noelle Hackney, D.O.

Voluntary Clinical Assistant Professor of Pediatrics

Doctor of Osteopathic Medicine, Des Moines University, 2009

Justin T Hagen



Voluntary Clinical Assistant Professor of Pediatrics

Michelle Lynn Hagene, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Southern Illinois University Carbondale, 2010
Doctor of Medicine, Southern Illinois University Carbondale, 2014

Carmen Marie Halabi, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Cell Biology and Physiology
Bachelor of Science, University of Iowa, 2001
Doctor of Philosophy, University of Iowa, 2009
Doctor of Medicine, University of Iowa, 2009

Bridget Catherine Hall, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2013
Doctor of Medicine, University of Missouri Kansas City, 2017

Bridget Hall

Voluntary Clinical Assistant Professor of Pediatrics

Melanie G Hampton, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Georgetown College, 1976
Doctor of Medicine, University of Louisville, 1981

Elinor F Hancock, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Fisk University, 1975
Doctor of Medicine, Meharry Medical College, 1982

Robin D Hanson, Ph.D., M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Johns Hopkins University, 1985
Doctor of Philosophy, Washington University in St Louis, 1993
Doctor of Medicine, Washington University in St Louis, 1993

Suzanne M Hanson, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Johns Hopkins University, 1989
Doctor of Medicine, Northwestern University, 1993

Michael Raymond Harris, M.S., Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, Saint Louis University, 1973
Master of Science, Saint Louis University, 1976
Doctor of Philosophy, Saint Louis University, 1981
Doctor of Medicine, Saint Louis University, 1991

Seth Matthew Harris, D.O.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Indiana University Bloomington, 2012
Doctor of Osteopathic Medicine, Michigan State University, 2017

Elizabeth Avis Harrison, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Vanderbilt University, 2002
Doctor of Medicine, Washington University in St Louis, 2006

Thomas J. Harrison, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Arts, Saint Louis University, 1970

Doctor of Medicine, University of Missouri Columbia, 1979

David E Hartenbach, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, Saint Louis University, 1983
Doctor of Medicine, University of Missouri Columbia, 1987

Laura Hartman

Voluntary Clinical Instructor in Pediatrics

Mary E Hartman, M.P.H., M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, Mount Holyoke College, 1994
Doctor of Medicine, University of Rochester, 1999
Master of Public Health, University of Pittsburgh, 2006

Rebecca Roelofs Hartog, M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Medicine
Bachelor of Arts, Columbia University, 2007
Doctor of Medicine, University of Pittsburgh, 2014
University of Pittsburgh Medical Center-Health System

John Edward Hartweger

Voluntary Clinical Instructor in Pediatrics

Martinique Hawkins, M.D.

Voluntary Clinical Professor of Pediatrics
Pennsylvania State University-College of Medicine, 2004

Robert J Hayashi, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Stanford University, 1982
Doctor of Medicine, Washington University in St Louis, 1986

Shawn Zenas He, M.D.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Washington University in St Louis, 2016
University of Chicago, 2023

Jennifer M. Heeley, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2003
Doctor of Medicine, Washington University in St Louis, 2009

Katherine Quinn Hefner

Voluntary Clinical Assistant Professor of Pediatrics

Sarah Ann Faasse Henkel, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, Colby College, 2007
Doctor of Medicine, Michigan State University, 2013

Kara E Hennelly, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 2015

Robyn Shea Herbert

Voluntary Clinical Assistant Professor of Pediatrics

David Herman

Voluntary Clinical Assistant Professor of Pediatrics

Milarys Hernandez Martinez, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Puerto Rico, 2017

Mary Jo Hernandez-Zipfel, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, University of North Carolina (Duplicate of University of North Carolina at Chapel Hill), 1996
Doctor of Medicine, University of Florida, 2001

Christina Kim Ahn Hickey, M.S., M.D.

Instructor in Pediatrics (primary appointment)
Bachelor of Science, Stanford University, 2003
Master of Science, Washington University in St Louis, 2009
Doctor of Medicine, Washington University in St Louis, 2009

Erin Margaret Hickey, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Connecticut, 2012
Doctor of Medicine, Lewis Katz School of Medicine at Temple University, 2016

Tunde Hidvegi, M.S., Ph.D.

Associate Professor of Pediatrics (primary appointment)
Master of Science, Eotvos Lorand University (University of Budapest), 1980
Doctor of Philosophy, Eotvos Lorand University (University of Budapest), 1988

Jennifer M Hinton

Voluntary Clinical Instructor in Pediatrics

Hieu Dinh Hoang, Ph.D.

Instructor in Pediatrics (primary appointment)
Bachelor of Science, San Jose State University, 2009
Doctor of Philosophy, University of Alabama in Tuscaloosa, 2015

Sandra Jean Hodel

Voluntary Clinical Instructor in Pediatrics

Dee Hodge, M.D.

Professor Emeritus of Pediatrics
Bachelor of Arts, Occidental College, 1974
Doctor of Medicine, University of California San Francisco, 1978

Erik R Hoefgen, M.S., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Missouri in St Louis, 2001
Master of Science, University of Missouri in St Louis, 2004
Doctor of Medicine, Southern Illinois University Carbondale, 2012

Jacqueline L. Hoffman, M.A., Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of California, 1973
Master of Arts, Harvard University, 1974
Doctor of Philosophy, Harvard University, 1979
Doctor of Medicine, Washington University in St Louis, 1994

Russell G. Hoffmann, Ph.D.

Voluntary Clinical Instructor in Pediatrics
Doctor of Philosophy, University of Florida, 1995

George Michael Hoganson, M.D.

Assistant Professor of Pediatrics (primary appointment)
Medical Director for Convenient Care/After Hours Clinics
Assistant Professor of Biology (Courtesy Affiliation)
Assistant Professor of Public Health
Bachelor of Arts, Loyola University Chicago, 2001
Doctor of Medicine, Loyola University Chicago, 2014

Nicholas Alan Holekamp, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Dartmouth College, 1982
Doctor of Medicine, Saint Louis University, 1987

Katherine Hollabaugh, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Wisconsin, 2014
Doctor of Medicine, Medical College of Wisconsin, 2018

Nancy E Holmes, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, University of Kansas, 1972
Doctor of Medicine, University of Missouri Columbia, 1976

Lori Rachel Holtz, M.S., M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Tulane University, 1999
Doctor of Medicine, Ohio State University-Main Campus, 2003
Master of Science, Saint Louis University, 2014

Amjad Horani, M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Cell Biology and Physiology
Doctor of Medicine, Hebrew University of Jerusalem, 2004
Bachelor of Science, Hebrew University of Jerusalem, 2015

Caroline Clare Horner, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 1993
Doctor of Medicine, Saint Louis University, 2000

Jennifer A. Horst, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Missouri Columbia, 2003
Doctor of Medicine, University of Missouri Columbia, 2007

Matthew Hosler, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
University of Missouri Columbia, 2007

Christine M Hrach, M.D.

Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2002

Keith A Hruska, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Creighton University, 1965
Doctor of Medicine, Creighton University, 1969

Paul W. Hruz, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Cell Biology and Physiology
Bachelor of Science, Marquette University, 1987
Doctor of Philosophy, Medical College of Wisconsin, 1993



Doctor of Medicine, Medical College of Wisconsin, 1994

Frederick Szujuei Huang, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 1990
Doctor of Medicine, Baylor University, 1994

Michael Angelo Cacdac Huang, M.S., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of the Philippines Manila, 2002
Doctor of Medicine, University of the Philippines Manila, 2004
Master of Science, Ohio State University-Main Campus, 2023

Anna Payton Huger, M.D.

Voluntary Clinical Instructor in Pediatrics
Doctor of Medicine, University of Missouri Columbia, 2019

Laura Kathleen Hulteen, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Illinois at Urbana-Champaign, 2015

David A Hunstad, M.D.

Professor of Pediatrics (primary appointment)
Arnold W Strauss, MD Endowed Professorship For Mentoring
Division Chief - Division of Infectious Diseases
Professor of Molecular Microbiology
Vice Chair of Basic and Translational Research
Bachelor of Arts, Carleton College, 1991
Doctor of Medicine, Washington University in St Louis, 1995

Jane Alyce Hunt, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Washington University in St Louis, 2014
Doctor of Medicine, Washington University in St Louis, 2014

Michael G Hunt

Voluntary Clinical Assistant Professor of Pediatrics

Catherine Carissa Hutter

Voluntary Clinical Associate Professor of Pediatrics

I

Richard J Iken, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, University of Wisconsin Madison, 1972
Doctor of Medicine, University of Missouri Columbia, 1978

Carl S Ingber, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, University of Rochester, 1968
Doctor of Medicine, Boston University, 1972

Tracy Lynn Ivy, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Washington University in St Louis, 2004
Doctor of Medicine, University of Virginia, 2009

J

Andrew Bok Seng Janowski, M.D.

Assistant Professor of Pediatrics (primary appointment)

Assistant Professor of Molecular Microbiology
Doctor of Medicine, University of Wisconsin, 2010

Nathaniel Robert Jensen, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Brigham Young University, 2011
Doctor of Philosophy, Medical University of South Carolina, 2021
Doctor of Medicine, Medical University of South Carolina, 2021

Shannon M. Joerger, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Southern Illinois University Edwardsville, 1995
Doctor of Medicine, University of Missouri Columbia, 2007

Denise R Johnson, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, Oakwood University, 1979
Doctor of Medicine, Loma Linda University, 1984

Joyce D Johnson, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Oberlin College, 1977
Doctor of Medicine, Case Western Reserve University, 1982

William Lee Johnson, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Science, University of Missouri Columbia, 1977
Doctor of Medicine, University of Missouri Columbia, 1981

Angela Marie Jones, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, Universidad Nacional de Colomb, 1989

Katherine McMullin Jones, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Amherst College, 2001
Doctor of Medicine, Washington University in St Louis, 2007

Larry A Jones, M.B.A., M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Johns Hopkins University, 1972
Doctor of Medicine, Johns Hopkins University Medical (Duplicate of Johns Hopkins University), 1976
Master of Business Administration, Washington University in St Louis, 1999

Lauren Jones, D.O.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Missouri Columbia, 2012
Doctor of Osteopathic Medicine, A T Still University of Health Sciences, 2017

Heather Robin Joyce, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Missouri Columbia, 2002
Doctor of Medicine, University of Missouri Columbia, 2006

Samuel F. Julian, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Texas Austin, 2001
Doctor of Medicine, University of Texas Southwest, 2007

Erzsebet Jung, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, School Not Found, 1987

K

Courtney Kaar, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Massachusetts Amherst, 2009
Doctor of Medicine, Saint Louis University, 2017

Alicia McDonnell Kamsheh, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Maryland-College Park, 2012
Doctor of Medicine, University of Pennsylvania, 2016

Carol M Kao, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Ohio State University-Main Campus, 2008
Doctor of Medicine, Ohio State University-Main Campus, 2012

Thomas J Kasper

Voluntary Clinical Instructor in Pediatrics

Bhushan Katira, Ph.D., MBBS

Assistant Professor of Pediatrics (primary appointment)
Foreign MD equivalent, University of Mumbai, 2003
Doctor of Philosophy, University of Toronto, 2020

Jenny E Kaufman, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1999
Doctor of Medicine, Washington University in St Louis, 2004

Karla Keaney

Voluntary Clinical Assistant Professor of Pediatrics

Robert S Kebler, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Muhlenberg College, 1980
Doctor of Medicine, Saint Louis University, 1984

Robert V Kellow

Voluntary Clinical Assistant Professor of Pediatrics

Michele E Kemp, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1977
Doctor of Medicine, Washington University in St Louis, 1981

Robert M Kennedy, M.D.

Professor Emeritus of Pediatrics
Bachelor of Science, Georgia Institute of Technology-Main Campus, 1975
Doctor of Medicine, Medical College of Georgia, 1980

Kaitlin Gabrielle Kenney, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Louisville, 2019

Elizabeth Jean Kent, M.D.

Voluntary Teaching Assistant Professor of Pediatrics
Voluntary Clinical Assistant Professor of Pediatrics

Louisiana State University, 2021

Aayush Khanal, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2019

Kent Leon Killian, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Saint Louis University, 1986
Doctor of Medicine, Saint Louis University, 1990

Jeong Kim-Judd

Voluntary Clinical Assistant Professor of Pediatrics

Allison A King, M.D.

Professor of Pediatrics (primary appointment)
Professor of Medicine
Professor of Surgery (General Surgery)
Professor of Occupational Therapy
Professor of Education (Courtesy)
Fred M. Saigh Distinguished Chair in Pediatric Research
Professor of Public Health
Bachelor of Science, Washington University in St Louis, 1992
Doctor of Medicine, University of Missouri Columbia, 1996

Katherine Abell King, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Saint Olaf College, 2011
Doctor of Medicine, University of Mississippi Medical Center, 2015

Abigail Kissel, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Northwestern University, 2006
Doctor of Medicine, Baylor College of Medicine, 2010

Maleewan Kitcharoensakkul, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, Mahidol University, 2002

Darci Elizabeth Klein, M.S., Ph.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, MISSOURI STATE UNIVERSITY (Duplicate of Missouri State University (Formerly Southwest Missouri State)), 2013
Master of Science, Oklahoma State University (Duplicate of Oklahoma State University-Main Campus), 2015
Doctor of Philosophy, Oklahoma State University (Duplicate of Oklahoma State University-Main Campus), 2019

Richard D Knight

Voluntary Clinical Instructor in Pediatrics

Daisuke Kobayashi, M.P.H., M.D.

Professor of Pediatrics (primary appointment)
Master of Public Health, Wayne State University, 2019
Doctor of Medicine, National Defense Medical College, 2021

Joel S Koenig, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Science, Yale University, 1978
Doctor of Medicine, Vanderbilt University, 1982

Michael Gilbert Koenig



Voluntary Clinical Assistant Professor of Pediatrics

Amanda Kolmar, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of California San Francisco, 2019

Julia Helen Kolodziej, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2018

Nikoleta S. Kolovos, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Pittsburgh, 1991
Doctor of Medicine, University of Pittsburgh, 1996

Jamie L Kondis, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Westminster College, 2002
Doctor of Medicine, Indiana University South Bend, 2006

Valerie Rose Kover, M.D.

Voluntary Clinical Instructor in Pediatrics
Doctor of Medicine, Drexel University, 2006

James M Krafcik

Voluntary Clinical Instructor in Pediatrics

Michael Alan Kramer, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Creighton University, 2016

Theodore Raymond Kremer, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Saint Louis University, 2011
Doctor of Medicine, Saint Louis University, 2015

Katherine L Kreusser, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Science, University of Pennsylvania, 1973
Doctor of Medicine, Indiana University Bloomington, 1978

Kendra Noelle Daiss Krietsch, M.S., Ph.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Arizona, 2012
Master of Science, University of Florida, 2015
Doctor of Philosophy, University of Florida, 2018

Cadence Amber Kuklinski, D.O.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Maryville University of Saint Louis, 2001
Doctor of Osteopathic Medicine, Des Moines University, 2012

Sakil Subhash Kulkarni, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, PGIMER, 2010

Denise Kung, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, University of Missouri Columbia, 1986
Doctor of Medicine, Yale University, 1991

Teresa Kurtz, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Voluntary Teaching Assistant Professor of Pediatrics

University of Minnesota, 2003

Abby Kushnir, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Northwestern University, 2002
Doctor of Medicine, Ohio State University (Duplicate of Ohio State University-Main Campus), 2006

L

Jennifer S Ladage, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, Valparaiso University (Duplicate of Valparaiso University), 1987
Doctor of Medicine, Saint Louis University, 1991

Stacie Sharon Laff, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Lawrence University, 1989
Bachelor of Music, Lawrence University, 1989
Doctor of Medicine, School Not Found, 1993

Alexandra Lahart, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Lake Forest College, 2009
Doctor of Medicine, University of Maryland-College Park, 2013

Li-Ling Lai

Voluntary Clinical Instructor in Pediatrics

Peter Donato LaRossa, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Rochester, 2004
Doctor of Medicine, University of Pittsburgh, 2014

Danielle S Larsen, M.A., M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Voluntary Teaching Assistant Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 2006
Master of Arts, Roosevelt University, 2008
Doctor of Medicine, University of Illinois at Chicago, 2020

Merideth Theresa Lathrop

Voluntary Clinical Assistant Professor of Pediatrics

Leland M Laycob, M.D.

Voluntary Clinical Instructor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1964
Doctor of Medicine, University of Missouri Columbia, 1968

Richard Lee Lazaroff, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, Brown University, 1974
Doctor of Medicine, Saint Louis University, 1978

Caroline Kim Lee, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, Wellesley College, 1995
Doctor of Medicine, University of Virginia, 1999

Caroline Martz Lee, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, Knox College, 2003

Doctor of Philosophy, University of North Carolina at Chapel Hill, 2009
Doctor of Medicine, University of North Carolina at Chapel Hill, 2011

Kathryn B Leonard, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Saint Louis University, 2006
Doctor of Medicine, Saint Louis University, 2010

Kenneth C Levy, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Emory University, 1983
Doctor of Medicine, University of Chicago, 1988

Jessica Michelle Lewis, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2010
Doctor of Medicine, New York University School of Medicine, 2017

Fuhai Li, Ph.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Computer Science & Engineering
Bachelor of Science, Yantai University, 2003
Doctor of Philosophy, Peking University (#####), 2008

Steve Ming-Che Liao, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of California Los Angeles, 1999
Doctor of Medicine, Saint Louis University, 2003

Anna Lijowska, M.D.

Professor of Pediatrics (primary appointment)
Doctor of Medicine, Jagiellonian University, 1988

Kim Hung Ho Liss, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Northwestern University, 2007
Doctor of Medicine, Northwestern University, 2011

David Liu, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2007

Hafsa Sultana Lodhi, M.B.A., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Missouri Columbia, 2013
Bachelor of Science, University of Missouri Columbia, 2013
Master of Business Administration, University of Missouri Columbia, 2015
Doctor of Medicine, University of Missouri Kansas City, 2019

Alina M. Lopez, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2006
Doctor of Medicine, University of Miami, 2010

Stephanie Nicole Lorts, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Illinois at Urbana-Champaign
(Duplicate of University of Illinois at Urbana-Champaign), 2011
Doctor of Medicine, Southern Illinois University (Duplicate of Southern Illinois University Carbondale), 2015

Mark E Lowe, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Harvey R Colten Professor of Pediatric Science
Senior Associate Dean for Research
Vice Chancellor for Research
Interim Head of the Department of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1973
Doctor of Philosophy, University of Pennsylvania, 1977
Doctor of Medicine, University of Miami, 1984

Ilana Rebecca Luft-Barrett

Voluntary Clinical Assistant Professor of Pediatrics

Clifford James Luke, Ph.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Liverpool, 1994
Doctor of Philosophy, University of Surrey, 1999

M

Shannon Nicole Macgregor, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Virginia Tech (Duplicate of Virginia Polytechnic Institute and State University), 2007
Doctor of Medicine, Eastern Virginia Medical School, 2016

John C. Madden, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Yale University, 1994
Doctor of Medicine, Washington University in St Louis, 2002

Jeffrey A Magee, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Professor of Genetics
Elizabeth H and James S McDonnell, III Professor in Pediatric Hematology/Oncology SLCH
Bachelor of Science, University of Wisconsin Madison, 1997
Doctor of Philosophy, Washington University in St Louis, 2005
Doctor of Medicine, Washington University in St Louis, 2005

Kathleen Elizabeth Mahoney, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Kenyon College, 2004
Doctor of Medicine, University of Missouri Columbia, 2010

Nayna Maini, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint George's University, 2020

Louise Cantisano Malburg, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 2015

Jay Randolph Malone, M.S., Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Oklahoma, 2005
Doctor of Medicine, University of Oklahoma, 2009
Master of Science, Creighton University, 2012
Doctor of Philosophy, Saint Louis University, 2019

Mark John Manary, M.D.

Professor of Pediatrics (primary appointment)



James P Keating Professor of Pediatrics
Professor of Public Health
Bachelor of Science, Massachusetts Institute of Technology, 1977
Doctor of Medicine, Washington University in St Louis, 1982

Arushi Manga, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Franklin and Marshall College, 2007
Doctor of Medicine, McGill University, 2011

Shelby Ann Markel

Voluntary Clinical Assistant Professor of Pediatrics

Elise Marker, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Saint Louis University, 2019
Saint Louis University, 2023

Megan Elizabeth Marolt, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2015
Doctor of Medicine, Creighton University, 2019

Bess Adkins Marshall, M.D.

Professor of Pediatrics (primary appointment)
Professor of Cell Biology and Physiology
Bachelor of Science, Vanderbilt University, 1982
Doctor of Medicine, Vanderbilt University, 1986

Megan Spokes Martin, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Notre Dame, 2007
Doctor of Medicine, University of Kansas, 2012

Kimberly Lashun Massey, M.P.H., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Piedmont College, 2004
Doctor of Medicine, Ross University School of Medicine Florida, 2010
Master of Public Health, George Washington University

Shakila Mathew, D.O.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Missouri University of Science and Technology (Formerly University of Missouri at Rolla), 2004
Doctor of Osteopathic Medicine, A T Still University of Health Sciences, 2009

Patrice Mathews, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Trinity University, 1984
Doctor of Medicine, University of Oklahoma, 1988

Dzmitry Matsiukevich, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Gomel State Medical University, 2003

Marvin M Maurer, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1968
Doctor of Medicine, Washington University in St Louis, 1972

Melissa Michelle Mavers, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Miami, 2003
Doctor of Philosophy, Saint Louis University, 2009
Doctor of Medicine, Saint Louis University, 2011
Stanford University

Ariane E May, M.P.H., M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, Tufts University, 1983
Master of Public Health, Boston University, 1992
Doctor of Medicine, School Not Found, 1993

Sarah Lynne Mayer

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
University of Iowa, 2015

Shannon Leigh McAllister, D.O.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2013
Doctor of Osteopathic Medicine, A T Still University of Health Sciences, 2019

Jina L McAtee

Voluntary Clinical Assistant Professor of Pediatrics

Megan McBride

Voluntary Clinical Instructor in Pediatrics

Maggie Steffen McCormick, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, Loyola University Chicago, 2004

Mark E. McGranahan, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Marquette University, 1993
Doctor of Medicine, Saint Louis University, 1997

Caitlin Lee McGrath, M.S., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Illinois at Urbana-Champaign, 2010
Doctor of Medicine, University of California Los Angeles, 2014
Master of Science, University of Washington, 2023

Thomas Casey McKinney, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, Illinois Wesleyan University, 1976
Doctor of Medicine, Washington University in St Louis, 1980

William A McManus, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Carroll College, 1980
Doctor of Medicine, Saint Louis University, 1986

Kyle P McNerney, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Chicago, 2010
Doctor of Medicine, Case Western Reserve University, 2014

Maria Romelinda Lazaro Mendoza, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of the Philippines College of Medicine, 2005

Shilpa Menolascino, M.D.

Voluntary Clinical Instructor in Pediatrics
Doctor of Medicine, University of Missouri Columbia, 2019

Sarah J. Mermelstein, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Indiana University Bloomington, 2002
Doctor of Medicine, Drexel University, 2007

Elizabeth Sarah Messer, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Washington University in St Louis, 2009
Doctor of Medicine, University of Illinois at Chicago, 2013

Marina Catherine Metzler, D.O.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Doctor of Osteopathic Medicine, West Virginia School of Osteopathic Medicine, 2020

Kelly Meyer, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Tulsa, 2014
Doctor of Medicine, University of Missouri Columbia, 2018

Mary Shaughnessy Meyer, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Saint Louis University, 1999
Doctor of Medicine, Saint Louis University, 2003

Jenny Lynn Miele, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Valparaiso University, 2001
Doctor of Medicine, University of Illinois at Chicago, 2005

Donna C Miller, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, Boston College, 1978
Doctor of Medicine, University of Miami, 1982

Deepa Mokshagundam, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Massachusetts Institute of Technology, 2009
Doctor of Medicine, University of Louisville, 2013

Christopher Molitor

Voluntary Clinical Instructor in Pediatrics

Jerome Michael Molleston, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Washington University in St Louis, 2010
Doctor of Philosophy, University of Pennsylvania, 2016
Doctor of Medicine, University of Pennsylvania, 2018

Brittany Montavon, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Marquette University, 2010
University of Illinois at Chicago, 2015

Maya Moody

Voluntary Clinical Assistant Professor of Pediatrics

Gail Lynn Moolsintong, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Science, University of Missouri Columbia, 1997
Doctor of Medicine, University of Missouri Columbia, 2001

Darlene A. Moore, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, Eastern Illinois University, 1974
Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1978

Lauren Rogowski Moran, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Illinois at Urbana-Champaign, 2010
Doctor of Medicine, University of Illinois at Chicago, 2014

Diane M Morie, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Saint Louis University, 1989
Doctor of Medicine, University of Missouri Columbia, 1993

Sharon Celeste Morley, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Professor of Pathology and Immunology
Park J White, M.D. Professor of Pediatrics
Doctor of Philosophy, Harvard University, 2002
Doctor of Medicine, Harvard University, 2002

Kayce Morton, D.O.

Voluntary Clinical Professor of Pediatrics
Kansas City University of Medicine and Biosciences, 2005

Lisa Mae Moscoso, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Division Chief - Division of Hospitalist Medicine
Bachelor of Science, University of Wisconsin Madison, 1989
Doctor of Philosophy, Washington University in St Louis, 1998
Doctor of Medicine, Washington University in St Louis, 1998

Lamya Suhail Mubayed, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Weill Cornell Medical College in Qatar, 2013

Janet Gwen Mueller, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, Kansas State University, 1985
Doctor of Medicine, Washington University in St Louis, 1992

Margaret M Mueller

Voluntary Clinical Assistant Professor of Pediatrics

Shalaka Ajit Mulherkar, M.S., Ph.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Mumbai University, 2002
Master of Science, University of Mumbai, 2004
Doctor of Philosophy, National Brain Research Centre, 2011

Jonathan E. Mullin, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Washington University in St Louis, 2005
Doctor of Medicine, Case Western Reserve University, 2010

Admire Munanairi, Ph.D.

Instructor in Pediatrics (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2015

Maria Ganninger Mura, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, University of Missouri Kansas City, 2000

Mark C. Murawski, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Villanova University, 1995
Doctor of Medicine, Saint Louis University, 1999

Gian Marco Musarra, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Central Florida, 1998
Doctor of Medicine, University of Miami, 2003

John A Myers, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1993
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 1997

Rachel Elizabeth Myers, D.O.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Rhodes College, 2018
A T Still University of Health Sciences, 2023

N**Venkata S. Nagireddi**

Voluntary Clinical Instructor in Pediatrics

Priyanka Nair, MBBS

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Kasturba Medical College, 2011

Tasnim A Najaf, M.D.

Professor of Pediatrics (primary appointment)
Doctor of Medicine, Dow Medical College Karachi, 1991

Alison C Nash, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Science, Howard University, 1977
Doctor of Medicine, Baylor University, 1981

Ameera Farhat Nauman

Voluntary Clinical Assistant Professor of Pediatrics

Lynn G Nelms

Voluntary Clinical Instructor in Pediatrics

Tara Marie Neumayr, M.D.

Associate Professor of Pediatrics (primary appointment)
Medical Director of the Cardiac Intensive Care Unit
Bachelor of Arts, Duke University, 1999
Doctor of Medicine, University South Dakota Vermillion, 2003

Hoanh Thi Nguyen, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Tulane University, 2003

Ellen Margaret Nicastro, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Arts, Saint Louis University, 2000
Doctor of Medicine, Saint Louis University, 2004

Ramzi T Nicolas

Voluntary Clinical Associate Professor of Pediatrics

David Craig Norman, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1988
Doctor of Medicine, School Not Found, 1992

Karen K Norton, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Science, Loyola University (Duplicate of Loyola University New Orleans), 1985
Doctor of Medicine, Louisiana State University, 1989

Douglass Susumu Nozaki, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, University of California San Diego, 1991
Doctor of Medicine, Saint Louis University, 1996

Caroline Grace Nugent, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, University of Kansas, 2015
Doctor of Medicine, University of Kansas, 2020

O**Kevin Sullivan O'Bryan, M.D.**

Associate Professor of Pediatrics (primary appointment)
Vice Chair of Clinical Informatics
Doctor of Medicine, University of Michigan Ann Arbor, 2010

Shawn David O'Connor, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Georgia, 2006
Doctor of Medicine, Medical College of Georgia, 2010

Sarah Grace O'Grady

Voluntary Clinical Instructor in Pediatrics

Jerome H O'Neil, M.B.A., M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, University of Missouri Columbia, 1977
Doctor of Medicine, Saint Louis University, 1981
Master of Business Administration, University of Massachusetts Amherst, 2007

Dean Thomas Odegard, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, Washington University in St Louis, 2019

Erin Engelhardt Orf, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Georgetown University, 2010
Doctor of Medicine, University of Missouri Columbia, 2015

Bradley William Ornstein, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Washington, 2001

Doctor of Medicine, Washington University in St Louis, 2005

Andrea Cohron Orr, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Georgia, 2007
Doctor of Medicine, Medical College of Georgia, 2013

William B Orr, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Georgia, 2009
Doctor of Medicine, Medical College of Georgia, 2013

Rachel C. Orscheln, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Missouri Columbia, 1994
Doctor of Medicine, University of Missouri Columbia, 1998

Irma I Ortiz-Arroyo, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Puerto Rico, 1981
Doctor of Medicine, University of Puerto Rico Medical School, 1985

Anthony Walter Orvedahl, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Pathology and Immunology
Doctor of Philosophy, University of Texas Southwestern Medical Center at Dallas, 2012
Doctor of Medicine, University of Texas Southwestern Medical Center at Dallas, 2012

Austin James Ostermeier, M.S., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Missouri Columbia, 2007
Master of Science, Stanford University, 2010
Doctor of Medicine, University of Missouri Columbia, 2015

Alison H Oswald

Voluntary Clinical Instructor in Pediatrics

Maria Cristina Ow, Ph.D.

Instructor in Pediatrics (primary appointment)
Doctor of Philosophy, University of Georgia, 2001

P

Pamela B Padda, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, University of Michigan Ann Arbor, 1986
Doctor of Medicine, University of Illinois at Urbana-Champaign, 1990

Stephen Pak, Ph.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Sydney, 1990
Doctor of Philosophy, University of New South Wales, 1996

Jennifer Ann Panasci

Voluntary Clinical Assistant Professor of Pediatrics

Robert T Paschall, M.A., M.D.

Professor Emeritus of Pediatrics
Bachelor of Science, University of Tennessee, 1967
Doctor of Medicine, University of Tennessee, 1974

Master of Arts, Park University, 1986

Purvi R Patel, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, Rice University, 1996
Doctor of Medicine, Baylor University, 2000

Rinkal Raj Patel

Voluntary Clinical Assistant Professor of Pediatrics

Diliane Charles Pelikan, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 1997
Doctor of Medicine, University of Missouri Kansas City, 1997

Meryl Kersten Perlman, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, Harvard University, 1996
Doctor of Medicine, University of Chicago, 2001

David H Perlmutter, M.D.

Professor of Pediatrics (primary appointment)
Spencer T and Ann W Olin Distinguished Professor in the School of Medicine
Bachelor of Science, University of Rochester, 1974
Doctor of Medicine, Saint Louis University, 1978

Gayln Perry, M.D.

Instructor in Pediatrics (Pending Dean Approval) (primary appointment)
Texas A&M University, 1988

Gillian Clare Pet, M.S., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of California Berkeley, 2006
Master of Science, Washington University in St Louis, 2010
Doctor of Medicine, Washington University in St Louis, 2011

Lance W Peterson, Ph.D., M.D.

Instructor in Pediatrics (primary appointment)
Bachelor of Science, Washington University in St Louis, 2009
Doctor of Philosophy, University of Pennsylvania, 2016
Doctor of Medicine, University of Pennsylvania, 2018

Thomas M Pfeiffer, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Medizinische Universität Wien, 2014

Megan Elizabeth Philibert, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2018

Emily Kristine Phillips, M.D.

Instructor in Pediatrics (Pending Dean Approval) (primary appointment)
Bachelor of Science, University of Wisconsin Madison, 2014
Doctor of Medicine, Medical College of Wisconsin, 2019

Catherine Pike

Voluntary Clinical Assistant Professor of Pediatrics

Christopher James Pingel, M.D.

Voluntary Clinical Assistant Professor of Pediatrics



Bachelor of Science, Washington University in St Louis, 2003
Doctor of Medicine, Saint Louis University, 2007

Jessica E Pittman, M.P.H., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Oberlin College, 1998
Doctor of Medicine, Washington University in St Louis, 2004
Master of Public Health, University North Carolina, 2009

Alexander S Plattner, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of North Carolina at Chapel Hill, 2018

Daniel S Plax, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Brown University, 1988
Doctor of Medicine, Washington University in St Louis, 1993

Steven I Plax, M.D.

Professor Emeritus of Clinical Pediatrics
Bachelor of Arts, Washington University in St Louis, 1957
Doctor of Medicine, University of Missouri Columbia, 1961

Santiago Boye Plurad, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1982
Doctor of Medicine, School Not Found, 1987

Deepika Polineni, M.P.H., M.D.

Professor of Pediatrics (primary appointment)
Professor of Medicine
Bachelor of Arts, University of Missouri Kansas City, 2001
Master of Public Health, Boston University, 2003
Doctor of Medicine, University of Missouri Kansas City, 2004

Juanita C Polito-Colvin, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, University of Dallas, 1975
Doctor of Medicine, Southwest Texas State University, 1979

Brooke Ivan Polk, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Colorado State University, 2008
Doctor of Medicine, University of Colorado Boulder, 2012

Anthony Gerard Pompa, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, United States Air Force Academy, 2012
Doctor of Medicine, University of Pittsburgh, 2016

Claudia Preuschoff, M.D.

Voluntary Clinical Instructor in Pediatrics
Doctor of Medicine, Wake Forest University, 1983

Cassandra Michelle Pruitt, M.D.

Professor of Pediatrics (primary appointment)
Vice Chair of Outpatient Health
Division Chief for Academic Pediatrics
Bachelor of Arts, Emory University, 1994
Doctor of Medicine, Texas Tech University, 1999

Peter J Putnam, M.D.

Voluntary Clinical Associate Professor of Pediatrics

Bachelor of Science, Williams College, 1993
Doctor of Medicine, Dartmouth College, 2007

Jenna M Putzel, M.P.H., M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 2004
Baccalaureatus, Washington University in St Louis
Master of Public Health, Saint Louis University

Q

Robert Louis Quaas, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Cornell College, 1970
Bachelor of Science, University of South Dakota, 1973
Doctor of Medicine, University of Chicago, 1975

Kimberly S Quayle, M.D.

Professor of Pediatrics (primary appointment)
Dana Brown Chair for Emergency Medicine at St. Louis Children's Hospital
Division Chief - Division of Emergency Medicine
Bachelor of Arts, University of Missouri Columbia, 1984
Doctor of Medicine, Washington University in St Louis, 1988

R

Edon Rabinowitz, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint George's University, 2012

Mohammad H Rahman

Voluntary Clinical Instructor in Pediatrics

Pathmawathy T Ramesvara, M.S.

Voluntary Clinical Instructor in Pediatrics
Master of Science, School Not Found, 1972

Rakesh Rao, M.D., MBBS

Professor of Pediatrics (primary appointment)
Foreign MD equivalent, University College of Medical Sciences (UCMS), 1992
Doctor of Medicine, Maulana Azad Medical College, 1996

Emanuel Rashet, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1958
Doctor of Medicine, Saint Louis University, 1962

Timothy Patrick Ratz, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Voluntary Teaching Assistant Professor of Pediatrics
Bachelor of Science, Rockhurst University, 2017
Doctor of Medicine, Saint Louis University, 2021

Sheryl S Ream, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Saint Louis University, 1982
Doctor of Medicine, Saint Louis University, 1986

Shawn Robert Reathaford, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Evansville, 1993
Doctor of Medicine, University of Illinois at Urbana-Champaign, 1999

Timothy Reed

Voluntary Clinical Instructor in Pediatrics

Maliha Rehman, MBBS

Voluntary Clinical Professor of Pediatrics
King Edward Medical University, 2006

Patrick Joseph Reich, M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Medicine
Bachelor of Science, Saint Louis University, 2007
Doctor of Medicine, Saint Louis University, 2011

Phillip D Reichert, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Saint Louis University, 1992
Doctor of Medicine, Saint Louis University, 1996

Brian Davis Reinholz, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2019

Catherine R Remus, M.S.N., M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Luther College (Duplicate of Luther College Iowa), 1975
Master of Science in Nursing, Rush University, 1978
Doctor of Medicine, School Not Found, 1983

Elizabeth A Remus

Voluntary Clinical Assistant Professor of Pediatrics

George H Rezabek, D.O.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, Saint Louis College of Pharmacy, 1982
Doctor of Osteopathic Medicine, School Not Found, 1988

Sandeep Kaur Riar, MBBS

Associate Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
Foreign MD equivalent, Christian Medical College, 1996

Noor Riaz, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2008

Brian E Richter

Voluntary Clinical Assistant Professor of Pediatrics

Melissa Marie Riley, M.D.

Professor of Pediatrics (primary appointment)
Doctor of Medicine, Northeast Ohio Medical University, 2005

Katherine Rivera-Spoljaric, M.S., M.D.

Professor of Pediatrics (primary appointment)
W. McKim O. Marriott Professor of Pediatrics
Bachelor of Science, University of Puerto Rico, 1997
Doctor of Medicine, University of Puerto Rico, 2001

Master of Science, Washington University in St Louis, 2008

William L. Rives, M.S., M.D.

Professor of Pediatrics (primary appointment)
Master of Science, University of Missouri Columbia, 1992
Doctor of Medicine, University of Missouri Columbia, 1996

Kris Ann Roberts, D.O.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Midland Lutheran College, 1991
Doctor of Medicine, A T Still University of Health Sciences, 1995

Janis B Robinson, M.A., M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, Saint Joseph College, 1969
Master of Arts, Yale University, 1972
Doctor of Medicine, University of Pennsylvania, 1977

Justin William Robison, D.O.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Osteopathic Medicine, Nova Southeastern University, 2013

Rebecca Ann Rockamann

Voluntary Clinical Assistant Professor of Pediatrics

Melissa A Roewe, D.O.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Osteopathic Medicine, Lake Erie College of Osteopathic Medicine in Bradenton, 2009

Ram Kevin Rohatgi, M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Radiology
Doctor of Medicine, Saint Louis University, 2013

Sandeep Rohatgi, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Saint Louis University, 1989
Doctor of Medicine, University of Medicine and Dentistry of New Jersey, 1993

David A. Rosen, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Molecular Microbiology
Bachelor of Science, University of Michigan Ann Arbor, 2002
Doctor of Philosophy, Washington University in St Louis, 2010
Doctor of Medicine, Washington University in St Louis, 2010

Joan Lee Rosenbaum, M.S., M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, Rice University, 1978
Master of Science, University of California, 1980
Doctor of Medicine, University of Texas Austin, 1983

Isabel L Rosenbloom, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, Goucher College, 1979
Doctor of Medicine, University of Maryland (Duplicate of University of Maryland-College Park), 1984

Kelly Ross, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Missouri Kansas City, 1991



Doctor of Medicine, University of Missouri Columbia, 1996

William J Ross, M.D.

Voluntary Clinical Associate Professor of Pediatrics

Bachelor of Arts, Miami University (Duplicate of Miami University-Oxford), 1968

Doctor of Medicine, Washington University in St Louis, 1972

Jeffrey Harold Rothweiler, Ph.D.

Voluntary Clinical Associate Professor of Pediatrics

Doctor of Philosophy, Saint Louis University, 1989

Rene Martin Roy, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Arts, Harvard University, 2002

Doctor of Philosophy, University of Wisconsin Madison, 2012

Doctor of Medicine, University of Wisconsin Madison, 2014

Ella Rozin

Voluntary Clinical Assistant Professor of Pediatrics

Ronald Craig Rubenstein, Ph.D., M.D.

Professor of Pediatrics (primary appointment)

Robert C. Strunk Endowed Chair for Lung and Respiratory Research
Division Chief - Division of Allergy, Immunology, & Pulmonary Medicine

Bachelor of Science, Massachusetts Institute of Technology, 1984

Doctor of Philosophy, University of Texas Southwest, 1990

Doctor of Medicine, University of Texas Southwest, 1991

Jason Wilder Katz Rubin, M.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Arts, University of Pennsylvania, 2006

Doctor of Medicine, Tufts University, 2011

Joshua Bennett Rubin, M.S., Ph.D., M.D.

Professor of Pediatrics (primary appointment)

Professor of Neuroscience

Professor of Neurology

Bachelor of Science, Yale University, 1982

Master of Science, Albert Einstein College of Medicine, 1992

Doctor of Philosophy, Albert Einstein College of Medicine, 1994

Doctor of Medicine, Albert Einstein College of Medicine, 1994

Christina M Ruby-Ziegler, M.D.

Voluntary Clinical Professor of Pediatrics

Bachelor of Science, Loyola University New Orleans, 1990

Doctor of Medicine, Northwestern University, 1994

Emily Puetz Rudloff

Voluntary Clinical Assistant Professor of Pediatrics

James Robert Rudloff, M.D.

Assistant Professor of Pediatrics (Pending Executive Faculty Approval)
(primary appointment)

Bachelor of Science, University of Notre Dame, 2011

Doctor of Medicine, University of Missouri Columbia, 2017

Martin D Rudloff, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Arts, Central Methodist College (Duplicate of Central Methodist University), 1977

Doctor of Medicine, Washington University in St Louis, 1981

David Rudnick, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)

Associate Professor of Developmental Biology

Bachelor of Science, University of Illinois at Urbana-Champaign, 1987

Doctor of Philosophy, Washington University in St Louis, 1994

Doctor of Medicine, Washington University in St Louis, 1994

Daniel G. Rudolph, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Science, Saint Louis University, 1988

Doctor of Medicine, Saint Louis University, 1992

Nisreen Rumman, MBChB

Associate Professor of Pediatrics (Pending Executive Faculty Approval)
(primary appointment)

University of Baghdad, 2000

Diane Mary Rup, M.A., M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Arts, State University of New York, 1976

Master of Arts, State University of New York, 1979

Doctor of Medicine, Case Western Reserve University, 1986

Brigida Agnese Rusconi, M.S., Ph.D.

Instructor in Pediatrics (primary appointment)

Bachelor of Science, University of Fribourg, 2007

Master of Science, University of Zurich, 2009

Doctor of Philosophy, University of Lausanne, 2014

Lisa A Ryan, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Doctor of Medicine, University of Nebraska, 2019

S

Brooke E. Sadler, M.S., Ph.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Arts, George Washington University, 2006

Master of Science, Arizona State University, 2010

Doctor of Philosophy, Arizona State University, 2014

Ahmed Sameh Said, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)

Doctor of Medicine, Ain Shams University, 2000

Doctor of Philosophy, Ain Shams University, 2009

Surbhi Saini, M.D.

Associate Professor of Pediatrics (primary appointment)

Doctor of Medicine, Panjab University, 2007

Martine Saint-Cyr, M.D.

Assistant Professor of Pediatrics (primary appointment)

Doctor of Medicine, University of Connecticut, 2012

Daniell M Salthouse, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Illinois at Springfield (Formerly Sangamon State University), 2016

Doctor of Medicine, Saint Louis University, 2020

Charles Michael Samson, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of North Carolina at Chapel Hill, 1998
Doctor of Medicine, University of Washington, 2003

Gretchen A Sander, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Vanderbilt University, 2000
Doctor of Medicine, Loyola University Chicago, 2004

Heidi L Sandige, M.A., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Northwestern University, 1991
Master of Arts, Washington University in St Louis, 2003
Doctor of Medicine, Washington University in St Louis, 2005

Lila Sarah Sanning, M.D.

Instructor in Pediatrics (primary appointment)
Bachelor of Science, Saint Louis University, 2012
Doctor of Medicine, University of Missouri Columbia, 2016

Marco Sardiello, Ph.D.

Professor of Pediatrics (primary appointment)
Doctor of Philosophy, University of Bari, 2003

Diana Sater-Roukoz

Voluntary Clinical Instructor in Pediatrics

Matthew Michael Sattler, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, Dartmouth College, 2014
Doctor of Medicine, Dartmouth College, 2018

Scott Saunders, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Developmental Biology
Bachelor of Science, University of Minnesota, 1983
Doctor of Philosophy, Stanford University, 1990
Doctor of Medicine, Stanford University, 1990

Krishnasamy Savadamuthu

Voluntary Clinical Assistant Professor of Pediatrics

Blaine M Sayre, M.P.H., M.D.

Voluntary Clinical Professor of Pediatrics
Doctor of Medicine, Washington University in St Louis, 1968
Master of Public Health, University of California Berkeley, 1972

Joseph Schachter, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Indiana University Bloomington, 1974
Doctor of Medicine, Indiana University Bloomington, 1979

Kim E Schamel, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Missouri in St Louis, 1997
Doctor of Medicine, University of Missouri in St Louis, 2001

Janet Nagel Scheel, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Georgetown University, 1980
Doctor of Medicine, Georgetown University, 1985

Allek Lee Scheele, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Missouri Columbia, 2011
Doctor of Medicine, University of Missouri Columbia, 2015

Ellen Merrick Schill, Ph.D., M.D.

Instructor in Pediatrics (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2017
Doctor of Medicine, Washington University in St Louis, 2017

Howard J Schlansky, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, University of Missouri Kansas City, 1976
Doctor of Medicine, University of Missouri Kansas City, 1978

Margaret Ann Schmandt, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, University of Iowa, 1982
Doctor of Medicine, Saint Louis University, 1987

Erica Grace Schmitt, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Pathology and Immunology
Bachelor of Science, University of Wisconsin Madison, 2006
Doctor of Philosophy, Medical College of Wisconsin, 2013
Doctor of Medicine, Medical College of Wisconsin, 2015

Jacquelyn C Schnidman, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, University of Missouri Columbia, 1975
Doctor of Medicine, Saint Louis University, 1979

Laura Graves Schuettelpelz, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Professor of Developmental Biology
Alan L. Schwartz Chair in Pediatrics STLCH
Doctor of Philosophy, Northwestern University, 2000
Doctor of Medicine, Northwestern University, 2005

Carly Rae Schuetz, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Marshall University, 2010
Doctor of Medicine, Marshall University, 2014

Aaron Michael Schuh, M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Public Health
Doctor of Medicine, University of Missouri Columbia, 2017

Allison Schuh, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Minnesota, 2016

Ginny Lynn Schulz, M.S.N., Ph.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Missouri Columbia, 2006
Master of Science in Nursing, University of Missouri Columbia, 2011
Doctor of Philosophy, University of Missouri Columbia, 2018

Alan L Schwartz, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Alumni Endowed Professor of Pediatrics
Professor of Developmental Biology
Bachelor of Arts, Case Western Reserve University, 1970



Doctor of Philosophy, Case Western Reserve University, 1974
Doctor of Medicine, Case Western Reserve University, 1976

Drew J. Schwartz, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Obstetrics and Gynecology
Assistant Professor of Molecular Microbiology
Bachelor of Science, Duke University, 2007
Doctor of Philosophy, Washington University in St Louis, 2015
Doctor of Medicine, Washington University in St Louis, 2015

Colleen Seematter, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint Louis University, 1998

Anchal Sethi

Voluntary Clinical Assistant Professor of Pediatrics

Penelope G Shackelford, M.D.

Professor Emerita of Pediatrics
Bachelor of Science, University of Wisconsin Madison, 1964
Doctor of Medicine, Washington University in St Louis, 1968

Neel Shah, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, Saint George's University, 2019

Rachel E. Shakofsky, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, University of Missouri Columbia, 2003
Doctor of Medicine, University of Missouri Columbia, 2007

Jaiprakash Sharma, M.S., Ph.D.

Instructor in Pediatrics (primary appointment)
Bachelor of Science, University of Rajasthan, 2002
University of North Bengal, 2005
Doctor of Science, National Brain Research Centre, 2012

Angela Marie Shaw, M.S., M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Illinois at Chicago, 2011
Master of Science, University of Texas Houston, 2018

Eleanor Maria Shaw, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, University of Missouri Columbia, 1978
Doctor of Medicine, University of Missouri Columbia, 1983

Joshua Antoine Colin Shaw, M.D.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Bachelor of Science, United States Naval Academy, 2013
Southern Illinois University School of Medicine (SIU-SOM), 2022

Megan Elizabeth Shelton

Voluntary Clinical Assistant Professor of Pediatrics

Melissa Anne Shenep, M.S., Sc.M., M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Emory University, 2013
Doctor of Medicine, University of Tennessee Health Science Center, 2017
Master of Science, Saint Jude Children's Research Hospital, 2023

Master of Science, Saint Jude Children's Research Hospital, 2023

Shalini Shenoy, M.D., MBBS

Professor of Pediatrics (primary appointment)
Foreign MD equivalent, Kasturba Medical College, 1981
Doctor of Medicine, Kasturba Medical College, 1985

Marwan Shinawi, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Hebrew University of Jerusalem, 1989
Doctor of Medicine, Technion Israel Institute of Technology, 1996

Min-Yi Katherin Shiue, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Washington University in St Louis, 1992
Doctor of Medicine, Washington University in St Louis, 1996

Darla Royce Shores, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of New Mexico-Main Campus, 1996
Doctor of Medicine, University of New Mexico-Main Campus, 2002
Doctor of Philosophy, Johns Hopkins University, 2017

Jennifer N Silva, M.D.

Professor of Pediatrics (primary appointment)
James G. Berges and Elizabeth Mannen Berges Professor of Pediatric Cardiology SLCH
Bachelor of Arts, Union College New York, 1997
Doctor of Medicine, Saint George's University, 2002

Gary Arthur Silverman, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Professor of Genetics
Professor of Cell Biology and Physiology
Bachelor of Science, Washington Jefferson College, 1978
Doctor of Philosophy, University of Chicago, 1982
Doctor of Medicine, University of Chicago, 1984

Connie Darlene Simmons

Voluntary Clinical Instructor in Pediatrics

Kimberly Sirl

Voluntary Clinical Associate Professor of Pediatrics

Bryan Anthony Sisk, M.D.

Assistant Professor of Pediatrics (primary appointment)
Assistant Professor
Bachelor of Science, University of Missouri Columbia, 2007
Doctor of Medicine, Case Western Reserve University, 2013

Kyleigh Kay Skedgell

Voluntary Clinical Assistant Professor of Pediatrics

Alan Joseph Skoultchi, M.S., M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Duke University, 1989
Master of Science, University of Pennsylvania, 1990
Doctor of Medicine, University of Medicine and Dental Of New Jersey (Duplicate of University of Medicine and Dentistry of New Jersey), 1995

Patrick Edward Sloan, M.S., M.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Illinois at Urbana-Champaign, 2005
Master of Science, University of Illinois at Urbana-Champaign, 2006
Doctor of Medicine, University of Illinois at Urbana-Champaign, 2013

Carolyn Anne Delaney Smith, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Rice University, 1996
Doctor of Medicine, Washington University in St Louis, 2000

Joshua C Smith, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Southeast Missouri State University, 1999
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2004

Mallory Brooke Smith, M.S., M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Texas Medical Branch at Galveston, 2014
Master of Science, University of Washington School of Public Health, 2021

Sherea Monica Smith, M.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Orthopedic Surgery
Doctor of Medicine, University of Missouri Columbia, 2014

David Stuart Sonderman, M.D.

Voluntary Clinical Instructor in Pediatrics
Doctor of Medicine, Loyola University Chicago, 2012

Melissa Lily An Song, M.D.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Bachelor of Arts, Dartmouth College, 2014
Doctor of Medicine, University of Missouri Columbia, 2020

Kathryn August Spectorsky, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Georgetown University, 2010
Doctor of Medicine, University of Cincinnati-Main Campus, 2014

Jennifer E. Sprague, Ph.D., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Indiana University Bloomington, 2000
Doctor of Philosophy, Washington University in St Louis, 2007
Doctor of Medicine, Washington University in St Louis, 2007

Evangelos Spyridakis, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Athens Medical School, 2014

Mythili Srinivasan, M.S., Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Madras, 1981
Master of Science, Madurai Kamaraj University, 1983
Doctor of Philosophy, Saint Louis University, 1991
Doctor of Medicine, Saint Louis University, 1996

Danielle R St Leger

Voluntary Clinical Instructor in Pediatrics

Kristin Voellinger Stahl, M.D.

Voluntary Clinical Instructor in Neurology
Bachelor of Arts, Johns Hopkins University, 1992
Doctor of Medicine, University of Missouri Columbia, 1996

Sarah A Stanage, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2001
Doctor of Medicine, University of Louisville, 2008

Edward Stapleton, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Doctor of Medicine, University of Texas Health Science Center, 2014

Norman P Steele, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Indiana University Bloomington, 1968
Doctor of Medicine, Indiana University Bloomington, 1972

Miriam Bathia Steinham, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2011
Doctor of Medicine, Washington University in St Louis, 2015

Leena Stemler, M.D.

Associate Professor of Pediatrics (Pending Executive Faculty Approval)
(primary appointment)
Doctor of Medicine, Brown University, 2007

Randall S Sterkel, M.D.

Voluntary Clinical Professor of Pediatrics
Bachelor of Arts, Duke University, 1989
Doctor of Medicine, Washington University in St Louis, 1993

Anita R Stiffelman, M.D.

Voluntary Clinical Associate Professor of Pediatrics
Bachelor of Arts, Washington University in St Louis, 1983
Doctor of Medicine, New York Medical College, 1987

Sierra Stippich, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Creighton University, 2017
Doctor of Medicine, Creighton University, 2021

Jeffrey R Stokes, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Science, Kansas State University, 1987
Doctor of Medicine, University of Kansas Medical Center, 1991

Janis Marie Stoll, M.D.

Associate Professor of Pediatrics (primary appointment)
Doctor of Medicine, Eastern Virginia Medical School, 2004
Bachelor of Arts, Washington University in St Louis, 2012

Stephen I Stone, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Illinois at Chicago, 2005
Doctor of Medicine, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2010

Gregory A Storch, M.D.

Professor of Pediatrics (primary appointment)
Ruth L. Siteman Professor of Pediatrics
Professor of Molecular Microbiology



Professor of Medicine

Bachelor of Arts, Harvard University, 1969

Doctor of Medicine, New York University, 1973

Brian Ross Stotter, M.D.

Associate Professor of Pediatrics (primary appointment)

Doctor of Medicine, Tufts University, 2013

Robert H Strashun, M.A., M.D.

Voluntary Clinical Associate Professor of Pediatrics

Bachelor of Arts, Yeshiva University, 1978

Master of Arts, Yeshiva University, 1978

Doctor of Medicine, New York University, 1982

M. Anne Street, M.A., M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Science, Defiance College, 1968

Master of Arts, University of Connecticut, 1970

Doctor of Medicine, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1976

Rosa M Suarez-Solar, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Arts, University of Puerto Rico (Duplicate of University of Puerto Rico), 1990

Doctor of Medicine, School Not Found, 1991

Curie Marie Subramanian, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, Saint Louis University, 2014

Doctor of Medicine, Saint Louis University, 2018

Lisa Suffian, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Bachelor of Science, University of Missouri Kansas City, 1990

Doctor of Medicine, University of Missouri Kansas City, 1996

Christopher Alan Sumski, D.O.

Assistant Professor of Pediatrics (primary appointment)

Doctor of Medicine, Kansas City University of Medicine and Biosciences, 2013

Kimberly Anne Sutton, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Notre Dame, 2012

Doctor of Medicine, University of Illinois at Chicago, 2016

Stuart C Sweet, Ph.D., M.D.

Professor Emeritus of Pediatrics

Bachelor of Science, University of Michigan Ann Arbor, 1981

Doctor of Philosophy, University of Michigan Ann Arbor, 1989

Doctor of Medicine, University of Michigan Ann Arbor, 1990

Amanda Sweetland

Voluntary Clinical Instructor in Pediatrics

Stephen Matthew Sykes, Ph.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Science, Mount Allison University, 2000

Doctor of Philosophy, University of Pennsylvania, 2007

Susan C. Sylvia

Voluntary Clinical Instructor in Pediatrics

Nicholas Szoko, Ph.D., M.D.

Assistant Professor of Pediatrics (primary appointment)

Assistant Professor of Public Health

Bachelor of Arts, Johns Hopkins University, 2012

Doctor of Medicine, Case Western Reserve University, 2017

Doctor of Philosophy, University of Pittsburgh, 2024

T

Linda Ann Tackes, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Doctor of Medicine, University of Missouri Kansas City, 1993

Phillip Irwin Tarr, M.D.

Professor of Pediatrics (primary appointment)

Melvin E Carnahan Professor of Pediatrics

Division Chief - Division of Gastroenterology, Hepatology, & Nutrition

Professor of Molecular Microbiology

Bachelor of Arts, Brown University, 1975

Doctor of Medicine, Yale University, 1980

Samuel John Taylor, Ph.D.

Assistant Professor of Pediatrics (primary appointment)

University of Western Australia, 2011

University of Western Australia, 2016

Kristen A Terrill

Voluntary Clinical Assistant Professor of Pediatrics

Donna T Thackrey, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Science, John Carroll University, 1990

Main Campus), 1994

Stephen Thierauf

Voluntary Clinical Instructor in Pediatrics

Suzanne Thompson

Voluntary Clinical Assistant Professor of Pediatrics

Stefani Stevanija Tica, M.P.H., M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Arts, Duke University, 2012

Master of Public Health, Indiana University Indianapolis, 2017

Doctor of Medicine, Indiana University School of Medicine, 2017

Mary A Tillman, M.D.

Voluntary Clinical Professor of Pediatrics

Doctor of Medicine, Howard University, 1960

Robert W Tolan, M.A., M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Arts, Indiana University Bloomington, 1982

Master of Arts, Indiana University Bloomington, 1983

Doctor of Medicine, Washington University in St Louis, 1987

Tomi Toler, M.S., D.P.H.

Assistant Professor of Pediatrics (primary appointment)

Assistant Professor of Public Health

Bachelor of Arts, University of Missouri Columbia, 2007

Master of Science, University of North Carolina at Greensboro, 2009

Doctor of Public Health, Tulane University, 2025

Inna Treskov, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Missouri Columbia, 2006

Sangita Trivedi, MB.ChB.

Voluntary Clinical Professor of Pediatrics
Devi Ahilya Vishwavidyalaya, 1984

Shao Ching Tu, M.D.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Doctor of Medicine, Kaohsiung Medical University, 2019

Michael P Turmelle, M.D.

Professor of Pediatrics (primary appointment)
Bachelor of Arts, Bowdoin College, 1994
Doctor of Medicine, Johns Hopkins University, 1998

Yumirle Padron Turmelle, M.D.

Associate Professor of Pediatrics (primary appointment)
Associate of Arts, Miami Dade Community College, 1993
Bachelor of Arts, University of Miami, 1995
Doctor of Medicine, University of Florida, 2000

Ashley Davidson Turner, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, University of Missouri Columbia, 2016

Ashlyn Brooke Turner, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, University of Iowa, 2008
Doctor of Medicine, University of Illinois College, 2012

April L Tyus

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Washington University in St Louis, 1995

U**Margaret Clare Ulland, M.D.**

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Loyola University Chicago, 2015
Stritch School of Medicine, 2023

Elizabeth C Uttersson, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Notre Dame, 1994
Doctor of Medicine, Creighton University, 1998

V**Pablo Ezequiel Valguarnera, D.Sc.**

Instructor in Pediatrics (primary appointment)
Bachelor of Science, Universidad de Buenos Aires, 2009
Doctor of Science, Universidad Nacional de San Martín Argentina, 2015

George Van Hare, M.D.

Professor Emeritus of Pediatrics
Bachelor of Science, Bates College, 1980

Doctor of Medicine, University of Connecticut, 1980

Heather Marie Vannoy-Storm

Voluntary Clinical Assistant Professor of Pediatrics

Yasasvi Vasili, M.D.

Assistant Professor of Pediatrics (primary appointment)
Doctor of Medicine, East Tennessee State University, 2015

Daniel Joseph Verbaro, M.D.

Instructor in Pediatrics (Pending Dean Approval) (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2020

Laird Henry Vermont, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, University of Illinois at Urbana-Champaign, 1989
Doctor of Medicine, Saint Louis University, 1993

Zachary Andrew Vesoulis, M.S., M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Science, Miami University-Oxford, 2005
Doctor of Medicine, Ohio State University-Main Campus, 2009
Master of Science, Washington University in St Louis, 2019

Luke Timothy Viehl, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Saint Louis University, 2012
Doctor of Medicine, Saint Louis University, 2016

Arpita Vyas, MB.ChB.

Associate Professor of Pediatrics (primary appointment)
Foreign MD equivalent, University of Sheffield, 2001

W**Kathryn K. Wade**

Voluntary Clinical Instructor in Pediatrics

Jean V Wagner

Voluntary Clinical Assistant Professor of Pediatrics

Colleen M Wallace, M.D.

Professor of Pediatrics (primary appointment)
Director, Humanities Program
Assistant Dean for Student Affairs
Bachelor of Science, University of Notre Dame, 1997
Doctor of Medicine, Washington University in St Louis, 2001

Jennifer Anne Wambach, M.D.

Professor of Pediatrics (primary appointment)
Richard G. Engelsmann Distinguished Professor of Pediatrics SLCH
Bachelor of Science, Vanderbilt University, 1997
Doctor of Medicine, Vanderbilt University, 2001

Cierra Jo Wandro

Voluntary Clinical Assistant Professor of Pediatrics

Barbara B. Warner, M.S., M.D.

Professor of Pediatrics (primary appointment)
F. Sessions Cole, MD, Chair in Newborn Medicine
Division Chief - Division of Newborn Medicine
Bachelor of Science, University of Dayton, 1976



Master of Science, University of Massachusetts Amherst, 1981
Doctor of Medicine, University of Cincinnati-Main Campus, 1985

Courtney E Watza

Voluntary Clinical Assistant Professor of Pediatrics

Joy Wen, M.D.

Voluntary Clinical Professor of Pediatrics
University of Missouri Kansas City, 2010

Kristin Kay Wenger, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Ohio Wesleyan University, 1997
Doctor of Medicine, Washington University in St Louis, 2008

Larissa Man-Yin Wenren, M.D.

Assistant Professor of Pediatrics (Pending Dean Approval) (primary appointment)
Bachelor of Arts, Harvard University, 2011
Doctor of Medicine, Boston University, 2019

Jennifer Corinne Wessman, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, College of William and Mary, 2001
Doctor of Medicine, Commonwealth College, 2005

Neil Harris White, M.D.

Professor Emeritus of Pediatrics
Bachelor of Science, State University of New York at Albany, 1971
Doctor of Medicine, Albert Einstein College of Medicine, 1975

Halana Victoria Whitehead, M.D.

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Pennsylvania, 2009
Doctor of Medicine, Case Western Reserve University, 2013

Karen Whiteside, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Science, Washington University in St Louis, 1993
Doctor of Medicine, Washington University in St Louis, 1998

Rae Alexandra Wilkerson Maixner

Voluntary Clinical Assistant Professor of Pediatrics

Kristine G Williams, M.P.H., M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Arts, Georgetown University, 1989
Doctor of Medicine, Georgetown University, 1994
Master of Public Health, Saint Louis University, 2001

Akemie Williams Gray

Voluntary Clinical Assistant Professor of Pediatrics

David B Wilson, Ph.D., M.D.

Professor of Pediatrics (primary appointment)
Professor of Developmental Biology
Bachelor of Arts, Kalamazoo College, 1980
Doctor of Philosophy, Washington University in St Louis, 1986
Doctor of Medicine, Washington University in St Louis, 1986

Susan May Wiltrakis, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Valparaiso University, 2010

Doctor of Medicine, University of Alabama in Birmingham, 2012

Loralee Jane Wold, M.D.

Voluntary Clinical Instructor in Pediatrics
Bachelor of Arts, Saint Louis University, 1993
Doctor of Medicine, Saint Louis University, 1997

Katie Knoedelseder Wolfe, M.Ed., M.D.

Associate Professor of Pediatrics (primary appointment)
Director of the Pediatric Residency Program
Bachelor of Science, Vanderbilt University, 2007
Doctor of Medicine, Saint Louis University, 2011
Master of Education, University of Cincinnati-Main Campus, 2022

Kel Vin Woo, Ph.D., M.D.

Instructor in Pediatrics (primary appointment)
Doctor of Philosophy, Vanderbilt University, 2010
Doctor of Medicine, Vanderbilt University, 2012

Mark Norman Woolley, M.D.

Assistant Professor of Pediatrics (primary appointment)
Bachelor of Science, Rockhurst University, 2009
Doctor of Medicine, Saint Louis University, 2013

Ronald Edward Worthington

Voluntary Clinical Professor of Pediatrics

Jeffrey M Wright, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Vanderbilt University, 1975
Doctor of Medicine, Washington University in St Louis, 1979

Linda Xiao-Chen Wu, D.O.

Assistant Professor of Pediatrics (primary appointment)
Adjunct Instructor
Bachelor of Science, University of Waterloo, 2007
Doctor of Osteopathic Medicine, Midwestern University, 2015

Kathie R Wuellner, M.D.

Voluntary Clinical Professor of Clinical Pediatrics
Bachelor of Science, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1973
Doctor of Medicine, Saint Louis University, 1978

Hayley Wurzel, M.D.

Voluntary Clinical Assistant Professor of Pediatrics
Bachelor of Science, Brown University, 1995
Doctor of Medicine, Washington University in St Louis, 1999

Adam Thomas McLean Wyatt, M.Ed., Ph.D., MEPD

Associate Professor of Pediatrics (primary appointment)
Bachelor of Arts, University of Southern California, 2004
Master of Education, University of Southern California, 2007
Doctor of Philosophy, University of Georgia, 2011
Master of Environmental Planning and Design, University of Georgia, 2016

Kristine M Wylie, Ph.D.

Associate Professor of Pediatrics (primary appointment)
Associate Professor of Molecular Microbiology
Associate Professor of Obstetrics and Gynecology
Bachelor of Arts, Southern Illinois University Edwardsville, 1996

Doctor of Philosophy, Saint Louis University, 2009

Todd N Wylie

Associate Professor of Pediatrics (primary appointment)

Bachelor of Science, Southern Illinois University Edwardsville, 1995

Emily Jean Wynia, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2009

Doctor of Medicine, University of Missouri Columbia, 2015

X

Xunjun Xiao, M.S., Ph.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Science, China Agricultural University, 1998

Master of Science, China Agricultural University, 2001

Doctor of Philosophy, Virginia Polytechnic Institute and State University, 2005

Y

Mona Yassin, M.D.

Voluntary Clinical Instructor in Pediatrics

Doctor of Medicine, School Not Found, 1979

Aecha Marion Ybarra, M.S., M.D.

Associate Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Miami, 2003

Master of Science, Barry University, 2007

Doctor of Medicine, Saint George's University, 2012

Julia Catherine Young, M.D.

Voluntary Clinical Assistant Professor of Pediatrics

Doctor of Medicine, Saint Louis University, 1999

Staci R. Young, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Science, Truman State University (Duplicate of Truman State University (Formerly Northeast Missouri State University)), 1997

Doctor of Medicine, Southern Illinois University (Duplicate of Southern Illinois University Carbondale), 2002

Cecilia H Yu, M.D.

Voluntary Clinical Associate Professor of Pediatrics

Bachelor of Science, Brown University, 1987

Doctor of Medicine, University of Texas Southwest, 1992

Z

Kristina Zalud, M.D.

Instructor in Pediatrics (primary appointment)

Doctor of Medicine, Creighton University, 2020

Christina Elizabeth Zanaboni, M.D.

Assistant Professor of Pediatrics (primary appointment)

Doctor of Medicine, Saint Louis University, 2016

Dominic Battista Zanaboni, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, Rockhurst University, 2011

Doctor of Medicine, University of Missouri Columbia, 2016

Ritu L Zei, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, Washington University in St Louis, 2008

Doctor of Medicine, Medical College of Wisconsin, 2013

Bo Zhang, Ph.D.

Instructor in Pediatrics (primary appointment)

Bachelor of Science, Wuhan University (#####), 2005

Doctor of Philosophy, Chinese Academy of Sciences, 2013

XINYI ZHOU

Voluntary Clinical Assistant Professor of Pediatrics

Amy Christine Zimmermann, M.D.

Voluntary Clinical Instructor in Pediatrics

Bachelor of Science, University of Missouri Columbia, 1998

Doctor of Medicine, University of Missouri Columbia, 2003

Kristin Elizabeth Zorn, M.D.

Assistant Professor of Pediatrics (primary appointment)

Bachelor of Science, University of Wisconsin, 2012

Doctor of Medicine, University of Wisconsin, 2017

Andrew C. Zuckerman

Voluntary Clinical Instructor in Pediatrics

Research Electives

Pediatrics Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Ana Maria Arbeláez, MD

Northwest Tower, 10th Floor

Phone: 314-286-1138

Clinical research in diabetes mellitus; clinical research studies on hypoglycemia-associated autonomic failure in patients with type 1 diabetes mellitus and on cystic fibrosis-related diabetes

Charles E. Canter, MD

Northwest Tower, Division of Cardiology, 8th Floor

Phone: 314-454-6095

Single-center and multicenter clinical studies and trials in pediatric cardiomyopathy, heart failure and heart transplantation

F. Sessions Cole, MD, and Jennifer Wambach, MD, MS

Northwest Tower, 8th Floor, and McDonnell Pediatric Research Building, 5th Floor

Phone: 314-454-6148



Using candidate gene sequencing, exome sequencing, whole genome sequencing, and computational prediction and filtering strategies for the discovery of deleterious variants in population-based cohorts, case-control cohorts, and trios of affected infant and parents, our laboratory focuses on discovering novel candidate genes associated with neonatal respiratory distress syndrome and understanding the contribution of genetic variation in candidate genes of the pulmonary surfactant metabolic pathway (including surfactant protein B, surfactant protein C, NKX2-1, and ABCA3) to the risk of neonatal respiratory distress syndrome.

Stephanie A. Fritz, MD, MSCI

Northwest Tower, Room 10125
Phone: 314-454-4115

Our research team studies the epidemiology, microbial virulence mechanisms, and host defenses against community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) colonization, transmission and disease. We are investigating the transmission dynamics of CA-MRSA in households as well as interventions to interrupt the transmission of CA-MRSA and to prevent subsequent infections. Our lab also explores the microbial and host genomic determinants as well as the host immune response to staphylococcal toxins implicated in the pathogenesis of CA-MRSA in patients across the spectrum of disease states. Our goal is to develop novel approaches for the prevention of CA-MRSA infections.

Carmen Halabi, MD, PhD

McDonnell Pediatric Research Building, 4th Floor, Room 4107
Phone: 314-286-1376

Our focus is on the extracellular matrix in vascular development and disease. Specifically, we study the extracellular matrix proteins that make up the elastic fibers of blood vessels. Elastic fibers convey elasticity to blood vessels, allowing large arteries to store energy during systole and release it during diastole. Abnormalities in elastic fiber components lead to various complications, including hypertension, stiff vessels, and aneurysms. In the laboratory, we utilize mouse models to understand how abnormalities in these proteins lead to disease, which helps us not only to learn about the normal function of these proteins but also to identify potential novel therapeutic targets.

Robert J. Hayashi, MD

St. Louis Children's Hospital, Suite 9S
Phone: 314-454-4118

Our clinical research interests include stem cell transplantation and its complications, including post-transplant lymphoproliferative disease and the long-term side effects of therapy.

Keith A. Hruska, MD

McDonnell Pediatric Research Building, 5th Floor
Phone: 314-286-2772

The research in the laboratory focuses on chronic kidney disease and its complications of the chronic kidney disease mineral bone disorder syndrome, which involves skeletal frailty, cardiovascular disease, and vascular calcification. The lab has discovered important new pathologic mechanisms of disease leading to vascular calcification through systemic effects of factors involved in renal repair and hyperphosphatemia. Translational studies that continue to develop new therapeutic approaches are being aggressively pursued. New therapies for chronic kidney disease and its complications are being studied in clinical trials.

Paul Hruz, MD, PhD

McDonnell Pediatric Research Building, 3rd Floor
Phone: 314-286-2797

Our research interests include structure/function relationships in facilitative glucose transporters, congenital and acquired lipodystrophy syndromes, and insulin resistance associated with HIV protease inhibitor therapy.

David A. Hunstad, MD

McDonnell Pediatric Research Building, Room 6106
Phone: 314-286-2710

Work in our lab focuses on the interactions of pathogenic bacteria with their hosts. We aim to elucidate the modulation of host immune responses by pathogens and to determine the mechanisms by which these bacteria present specific virulence factors on their surfaces. Currently, we use cultured bladder epithelial cell models and murine models of cystitis to investigate the ability of uropathogenic *Escherichia coli* to modulate host innate and adaptive immune responses. In addition, we are studying the molecular mechanisms by which selected outer membrane proteins contribute to the virulence of uropathogenic *E. coli*. Our primary goal is to discover novel targets for interventions that will prevent and better treat bacterial infections of the urinary tract. Along these lines, we are leveraging recent discoveries in UTI pathogenesis to design nanoparticle-based therapies for the prevention of acute and recurrent UTI. We have also launched a new translational study of immune responses to UTI in male and female infants, paired with an innovative new mouse model of male UTI that permits first-ever studies of sex differences in these infections.

S. Celeste Morley, MD, PhD

McDonnell Pediatric Research Building, Room 6105
Phone: 314-286-2136

Our laboratory investigates the molecular mechanisms underlying immune cell signaling and trafficking using mouse models. We hope to identify the molecules that are critical for host defense against infectious organisms such as pneumococcus. Our focus is currently on an actin-binding protein called L-plastin, which is required for normal T and B cell motility.

Alan L. Schwartz, PhD, MD

425 McDonnell Sciences Building
Phone: 314-286-1709

Our investigative efforts are aimed at understanding the biology of cell surface receptors, including the biochemical and molecular dissection of the mechanisms responsible for the receptor-mediated endocytosis of blood coagulation proteins and the regulation of intracellular protein turnover.

Shalini Shenoy, MD

St. Louis Children's Hospital, Suite 9S
Phone: 314-454-6018

Investigation of novel reduced-intensity transplant strategies for pediatric nonmalignant disorders and the immunologic basis of graft-versus-host disease and graft rejection

Gregory A. Storch, MD; Kristine Wylie, PhD; Todd Wylie, BS; and Richard S. Buller, PhD

St. Louis Children's Hospital, Suite 2N52
Phone: 314-454-6079

Our focus is the study of infectious disease genomics. Our laboratory is interested in applying genomic analysis to a variety of problems in infectious diseases, mostly related to viral infections. Recent studies include the use of next-generation sequencing to define the human virome in immunocompromised children; improved methods for detecting viruses using next-generation sequencing; the use of next-generation sequencing for clinical diagnosis; analysis of the human transcriptome response to acute infections; sequencing of the genome of enterovirus D68; and the development of a rapid diagnostic test for enterovirus D68. Students would have the opportunity to learn genomic techniques, including informatics analysis.

Phillip I. Tarr, MD

McDonnell Pediatric Research Building, Room 6103
Phone: 314-286-2848

Our work involves research in the areas of pediatric gastroenterology, hepatology and nutrition. Students have opportunities in broadly encompassing research projects. Investigators in the division have funded and vibrant projects in liver disease (fatty liver disease, acute liver failure, biliary atresia, liver transplants, cystic fibrosis liver disease), inflammatory bowel diseases (Crohn's disease, ulcerative colitis), infections of the gastrointestinal tract (diarrhea), acute liver failure, Hirschsprung disease, diarrhea, gut microbiome, aflatoxin injury to the liver and stunting, health services research, necrotizing enterocolitis, antibiotic-resistant pathogens in the human gut, and quality improvement, particularly related to inflammatory bowel disease management. Short- and long-term projects can be arranged around these and other related efforts. The exact nature of the project

depends on the time that the student can contribute to the effort and the availability of any of the division faculty, who all have established track records as mentors. Interested students should contact any of our faculty or Dr. Tarr to discuss the possibilities.

Neil H. White, MD, CDE

St. Louis Children's Hospital, Northwest Tower, 10th Floor
Phone: 314-286-1157

Our work involves patient-oriented research in the management of diabetes in children. Arrangements can be made for involvement in or the development of projects aimed at improving outcomes of or the prevention of diabetes mellitus and its complications.

David B. Wilson, MD, PhD

St. Louis Children's Hospital, Northwest Tower, 9th Floor
Phone: 314-286-2834

Our research is focused on the molecular switches that regulate control genes during early embryonic development and differentiation.

Courses

PEDS 8010 Pediatric Asthma and Allergy (Clinical Elective)

In a predominantly outpatient setting, students will evaluate patients with a wide variety of allergic and immunologic disorders including asthma, allergic rhinitis, anaphylaxis, food allergy, atopic dermatitis, urticaria, angioedema and primary immunodeficiency. Rotation goals include: (1) the extension of history-taking skills to include environmental exposures, (2) the recognition of physical findings suggestive of allergic disease, (3) understanding the indications and interpretation of diagnostic testing including skin testing and assessment of pulmonary function, and (4) application of appropriate therapeutic strategies to these disorders. Weekly didactic conferences and inpatient consultations provide additional educational opportunities to the student.
Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8020 Pediatric Critical Care (Clinical Elective)

This elective is designed to familiarize the student with the diagnosis and treatment of critical illness in infants and children. The student will be part of the PICU team at St. Louis Children's Hospital which includes an attending, fellow, residents, and nurse practitioners. The student will be expected to function as the front line provider for 2-3 patients daily, depending on acuity. The schedule will consist of primarily day shifts with the option of having some night shifts as well.
Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8025 Pediatric Cardiac Catheterization (Clinical Elective)

This course will provide the student with an introduction to the anatomy and physiology of congenital heart disease. In addition, there will be exposure to treatment of congenital heart disease through interventional cardiology.
Credit 2 units.

Typical periods offered: Medicine Year



PEDS 8030 Outpatient Pediatric Cardiology (Clinical Elective)

Students will be exposed to the wide spectrum of pediatric cardiology on an outpatient basis. In addition to general cardiology clinics, several subspecialty clinics are also available, including heart failure/transplant, electrophysiology/inherited arrhythmias, pulmonary hypertension, William's syndrome, Down syndrome, cardiac neurodevelopmental, COVID-19/MIS-C, Fontan, aortopathy, dysautonomia, and preventive cardiology clinics. Students will independently evaluate clinic patients referred for a variety of cardiac complaints, including a wide variety of congenital cardiac lesions, cardiac murmurs, chest pain, syncope, and arrhythmias and report their findings to the attending. Cardiac auscultation skills will be enhanced through auscultation of cardiac patients in a clinic environment.

Students will learn basics of ECG and echocardiogram interpretation by reviewing studies performed during clinic with the attending. Clinics are held at St. Louis Children's Hospital, the Children's Specialty Care Center West County, the Children's Specialty Care South County, Graham Road clinic in North St. Louis County, and Shiloh clinic in Shiloh, IL. Students also have the option to participate in outreach clinics that occur on a monthly basis (locations include Cape Girardeau, Rolla, Bonne Terre, and Columbia). Depending on interest, students may spend additional time in the echocardiography laboratory for more in-depth exposure to echocardiography, including fetal echocardiography. Participation in weekly surgical conference and daily cardiology educational conferences is encouraged.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8035 Genetics and Genomic Medicine (Clinical Elective)

From diagnosis to management, and from rare diseases to the most common conditions, medical genetics is changing how we practice and increasingly guiding our day-to-day healthcare decisions. We now have the ability to treat and even cure some genetic disorders with gene therapy or targeted medication. We can diagnose extremely rare disorders using exome and genome sequencing, and even describe new, previously unrecognized disorders -ending our patients' diagnostic odyssey and changing their lives for the better. Regardless of your future specialty, you will be increasingly exposed to genetic testing requests and results. Our goal in the Division of Genetics and Genomic Medicine is to provide you with an opportunity to increase your knowledge base and skills in human genetics and directly apply it to the care of your patients. Students will actively participate in the evaluation, diagnosis, and management of adult and pediatric patients in the ambulatory and inpatient setting. They will be expected to participate in weekly case conference. Students will have an opportunity to visit clinical laboratories if desired.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8045 Pediatric Rheumatology (Clinical Elective)

Opportunities are available to care for children with a variety of rheumatologic and immunologic disorders. Students will see patients in outpatient clinics and inpatient consultations. An in-depth approach to evaluating autoimmune disease and disorders of the immune system will be provided. Students will participate in evaluation of new and return patients with a variety of rheumatologic diseases, including juvenile idiopathic arthritis (JIA), systemic lupus erythematosus (SLE), juvenile dermatomyositis (JDM), auto-inflammatory/periodic fever syndromes, and scleroderma. The student will also learn the approach to patients with positive autoantibodies, joint pain, muscle pain, and other common complaints that a general pediatrician may encounter. Locations include SLCH inpatient/outpatient, SLCH Specialty Care Center clinics, and Shriners Hospital clinics. Students will have the opportunity to attend multiple conferences.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8050 Pediatric Gastroenterology, Hepatology, and Nutrition (Clinical Elective)

The rotation in Pediatric Gastroenterology, Hepatology, and Nutrition provides broad exposure to specialized and common pediatric gastrointestinal and hepatobiliary problems. Division patients are seen in the outpatient suites, in the procedure room, and in the inpatient floors at St. Louis Children's Hospital and satellite locations. Students evaluate outpatients with common pediatric complaints like abdominal pain, constipation, and poor growth. Additionally, students experience the ongoing outpatient care of patients with liver disease, inflammatory bowel disease, short-gut syndrome, celiac disease, eosinophilic esophagitis, and other rare disorders. The inpatient service provides experience in caring for patients with acute illnesses such as gastrointestinal bleeding, malnutrition, liver failure, complications of inflammatory bowel disease, and pancreatitis. Students participate in diagnostic and therapeutic endoscopic procedures. Students may participate in a weekly GI didactic conference, GI/Surgery conference, and/or GI/Pathology conference.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8055 Antimicrobial Use, Resistance, and Stewardship (Clinical Elective)

In 2019, the CDC estimated that 2.6 million Americans develop an infection with an antimicrobial resistant (AMR) organism each year; of these individuals, nearly 44,000 will die from their infection. Worldwide, more than 250,000 children die annually at least in part from infections due to AMR organism. The primary driver of AMR is the use – and, more importantly, the misuse – of antibiotics. Approximately 20% of pediatric ambulatory and emergency department visits result in an antibiotic prescription, and between 35-70% of hospitalized children receive at least one dose of an antibiotic during their hospitalization. Of these antibiotics, more than 30% are thought to be prescribed inappropriately. Antimicrobial stewardship programs (ASPs) aim to combat AMR but ensuring the judicious use of antibiotics within healthcare systems. This elective rotation will be focused on educating students on the current state of domestic and global antibiotic resistance and the mechanisms by which healthcare systems are addressing the problem of AMR. Students will participate in the daily antimicrobial stewardship activities conducted by the St. Louis Children's Hospital ASP, attend weekly stewardship and clinical infectious diseases meetings, and review antimicrobial use data.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8060 Pediatric Infectious Diseases (Clinical Elective)

This elective is designed to engage students in the clinical aspects of routine and complex infectious diseases in children (ages birth to 18 years). Students will perform ID specialty consultations on both inpatients and outpatients. Regular daily activities will include evaluation of new patients, work rounds on inpatient consults, and teaching rounds with the ID fellow and/or attending. Students will attend the general pediatric ID clinic and the pediatric HIV clinic, one half-day each per week. Formal teaching includes HIV and ID Core Curriculum sessions, a weekly pediatric ID case conference, a weekly joint clinical conference with the adult ID division, and weekly clinical microbiology teaching rounds with Pathology faculty from the bacteriology and molecular diagnostics labs.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8065 Pediatric Emergency Medicine (Clinical Elective)

The goal of this elective is to provide the senior medical student with a broad introductory clinical experience in pediatric emergency medicine. Functioning as a sub-intern in the Emergency Unit of St. Louis Children's Hospital, the student will have the opportunity to evaluate and manage patients with a wide variety of emergent and urgent medical and surgical problems, including respiratory distress, abdominal pain, lacerations, musculoskeletal injuries, rashes, fever, etc. The Emergency Department offers a unique clinical learning experience, seeing a large clinical variety and many undifferentiated patients in a fast-paced environment. Teaching conferences are provided by the attending staff in the Emergency Department. Attending staff and senior pediatric residents provide 24-hour on-site supervision.

Credit 4 units.

Typical periods offered: Medicine Year

PEDS 8070 Child Abuse Pediatrics (Clinical Elective)

The medical student will work with the Child Protection Program (CPP) at St. Louis Children's Hospital, which consists of two Child Abuse Pediatrics attending physicians, a Pediatric nurse practitioner, a clinic nurse, and social workers. Pediatric residents or Pediatric Emergency Medicine fellows also may be rotating with the team at the same time. The student will observe inpatient consults for physical and sexual abuse and outpatient clinic patients for physical and sexual abuse. The student may attend court cases (off campus) and watch expert witness testimony by the CPP physicians/nurse practitioner. The student may attend Fatality Review meetings (off campus). The student will observe a forensic interview at the Child Advocacy Center (off campus). The student may see acute sexual assault cases conducted by the Sexual Assault (SANE) nurse practitioners in the Emergency Department. The student will be asked to complete a short project on a topic related to child maltreatment and will present it to the team at the end of the rotation. The student will be given a list of readings/didactic activities to do during the rotation. The student will have daily (45 minute) lectures with one of the child abuse attending physicians on a variety of topics related to child maltreatment and will attend the Child Protection team meeting (1 hour) every day. The student can also attend Pediatric Residency noon conference during this rotation.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8075 Pediatric Endocrinology and Diabetes (Clinical Elective)

Students will be exposed to a broad array of endocrine disorders including diabetes, thyroid, growth, puberty, calcium, adrenal, and pituitary disease. The student will round with the inpatient consult team including faculty and fellows (1-3 weeks) and see patients with endocrine attendings in outpatient clinics (1 week). Outpatient clinics include general endocrinology, diabetes, and pediatric weight management clinics.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8080 Clinical Pediatric Pulmonary Medicine (Clinical Elective)

This elective provides an excellent opportunity for students to be exposed to the full scope of respiratory diseases and sleep disorders in infants and children. Pediatric referrals will be seen in both inpatient and outpatient settings.

Rotation goals for students include:

1. Gain greater insights into the genetics, epidemiology, pathophysiology, and clinical presentations of lung diseases in children.

2. Learn the importance of the physical examination using inspection, percussion, and auscultation.

3. Understand indications and interpretation of diagnostic tests, such as chest imaging, blood gas measurements, polysomnography, pulmonary function testing, and flexible bronchoscopy.

4. Learn about various treatment modalities available for common lung diseases.

Unique aspects of this rotation include:

- A broad exposure to children with asthma, cystic fibrosis, sleep disorders, ciliopathies, interstitial lung diseases, chronic lung disease of infancy, congenital lung malformations, and advanced cardiopulmonary diseases referred for lung transplantation.
- Weekly didactic sessions and divisional clinical conferences provide opportunities for the trainee to develop his or her presentation skills.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8085 Newborn Critical Care (Clinical Elective)

This elective will take place in the Neonatal Intensive Care Unit (NICU) at St. Louis Children's Hospital and will provide valuable exposure to neonatal care for future pediatric providers. Students will join one of the acute care NICU teams consisting of an attending, fellow, resident, nurse practitioners, dietician, pharmacist, and discharge coordinator. They will follow 3-5 patients under the direct supervision of their resident, fellow, and attending, participating in formulation of diagnostic and treatment plans, coordination of care, and communication with families. Throughout the rotation, students will broaden their understanding of pathophysiology as it relates to the transition from fetal to neonatal life, and in common neonatal disease processes. There will be emphasis on improving clinical problem-solving skills, communication within the team, as well as with ancillary staff and families.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8090 Pediatric Clinical Immunology (Clinical Elective)

In this two-week pediatric immunology elective, students will gain experience applying immunologic knowledge to clinical practice. Students will participate in the evaluation and management of a variety of outpatient clinics, including Pediatric Immunology, Allergy, Rheumatology, and Immunology Bone Marrow Transplant (BMT). They will also participate in inpatient consultations and join rounds with Pediatric Immunology faculty and fellows.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8095 Pediatric Nephrology (Clinical Elective)

This course is designed to provide the student with a broad exposure to all aspects of pediatric kidney disease and an opportunity to explore a desired aspect of the field in-depth. The student will be an integral part of the Nephrology team and as such will see both inpatients through our consult service and outpatients in various clinics at St. Louis Children's Hospital (general nephrology, dialysis, transplant, other specialized clinics). Discussions and rounds with the attending staff and fellows emphasize the relationship between clinical problems and the pathophysiology of the underlying disease. These informal teaching sessions are supplemented by more formal didactic sessions including nephrology attending rounds, a weekly division-wide educational conference, renal research rounds and Renal Grand Rounds, which are conducted weekly in conjunction with the Division of Nephrology at Barnes-Jewish Hospital. Kidney biopsy material



is reviewed with the renal pathologists. Attendance at the weekly pediatric grand rounds and pediatric case conferences is encouraged. Opportunities in clinical and translational research projects will be discussed with interested students.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 8245 Pediatric Hematology and Oncology (Clinical Elective)

The course follows a standard sub-intern rotation format, with the student performing most of the tasks of the house staff in the care of hematology/oncology patients in pediatrics. There is no required overnight call or weekend coverage. At the end of the rotation the student will be required to present an evidence based presentation on an compelling topic in our discipline during our weekly educational conference.

Credit 4 units.

Typical periods offered: Medicine Year

PEDS 8900 Primary Care Pediatrics (Clinical Elective)

This elective is a unique opportunity for medical students to take a deeper dive into the knowledge, skillsets, and relationships that comprise primary care pediatrics. Students will be expected to see patients in the primary care outpatient setting for well child checks and sick visits. Students will be expected to create an Individual Learning Plan to direct their learning outside of clinic time.

Credit 2 units.

Typical periods offered: Medicine Year

PEDS 9100 Pediatrics Advanced Clinical Rotation (ACR)

This is the general inpatient pediatric ACR. The student will be assigned to an inpatient pediatric floor team at St. Louis Children's Hospital. With supervision, students will be expected to manage 4-6 patients. Students are expected to preroound on their patients, present on rounds, perform daily tasks including calling consults and PMDs, write orders (to be cosigned), write notes (to be cosigned), and participate in handoffs. Students will spend 3 weeks on day shifts and 1 week on night shifts.

The elective will provide experience in the management of many pediatric medical conditions and will include the care of patients with various diseases including but not limited to pulmonary, infectious diseases, gastrointestinal, renal, endocrine, neurological, and rheumatologic issues. Other common conditions include failure to thrive, altered mental status, and fever of unknown origin.

Credit 4 units.

Typical periods offered: Medicine Year

PEDS 9200 Newborn Critical Care Advanced Clinical Rotation (ACR)

This rotation will take place in the Neonatal Intensive Care Unit (NICU) at St. Louis Children's Hospital. Students will join one of the acute care NICU teams consisting of an attending, fellow, resident, nurse practitioners, dietician, pharmacist, and discharge coordinator. They will follow 4-8 patients under the direct supervision of their resident, fellow, and attending, participating in formulation of diagnostic and treatment plans, coordination of care, and communication with families. Throughout the rotation, students will broaden their understanding of pathophysiology as it relates to the transition from fetal to neonatal life, and in common neonatal disease states. There will be emphasis on improving clinical problem-solving skills, communication within the team, as well as with ancillary staff and families. This rotation provides valuable exposure to neonatal care for the future pediatric provider.

Credit 4 units.

Typical periods offered: Medicine Year

PEDS 9250 Pediatric Critical Care Advanced Clinical Rotation (ACR)

Critical care of the pediatric patient is an important part of training for anyone interested in caring for children in their careers. This rotation will offer students the opportunity to be an integral part of the care of these children and their families. The rotation will take place in the Pediatric Intensive Care Unit (PICU) at St. Louis Children's Hospital. The student will be part of a team of providers made up of an attending, fellow, residents and nurse practitioners. The schedule will include 3 weeks of day shift and 1 week of night shift. Students will be expected to function as a sub-intern and act as the front line provider for 3-4 patients each day, depending on acuity. In addition to refining their understanding of pathophysiology, students will develop communication skills with both families, ancillary staff, consulting services and community providers.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Psychiatry

Instruction in psychiatry is given throughout the medical curriculum. Emphasis is on the teaching of psychiatry as a medical discipline, including the biological, social and psychological mechanisms and manifestations of psychiatric illness as well as psychological reactions to other illnesses. Psychiatric disorders are common and disabling illnesses. An explosion of knowledge resulting from research in neuroscience, genetics and epidemiology is leading to exciting advances in understanding and treating these disorders. Our department is heavily involved in this research, and our didactic curriculum integrates current clinical information with research advances to help students develop the knowledge, skills and attitudes needed to recognize these illnesses and to understand the basic principles of treatment.

William Greenleaf Eliot Division of Child & Adolescent Psychiatry

The Division of Child & Adolescent Psychiatry offers a varied teaching program for medical students, residents in psychiatry, and fellows at St. Louis Children's Hospital and the 4444 Forest Park Child Psychiatry Clinic, which provides outpatient services to children with an array of psychiatric concerns. Trainees are assigned to various services, including the Child and Adolescent Psychiatry (CAP) Clinic, the Pediatric Behavioral Health Unit at St. Louis Children's Hospital, and the CAP Consult services, where they participate in diagnostic evaluations and see patients in treatment, under the supervision of a fellow and the attending physician.

Website:

<http://www.psychiatry.wustl.edu>

Faculty

Eric J. Lenze, MD

Department Chair

Visit our website for more information about our faculty and their appointments.

A

Arpana Agrawal, Ph.D.

Professor of Psychiatry (primary appointment)

Lecturer in Psychology

James and Juanita Wittmer Professor

Doctor of Philosophy, Virginia Commonwealth University, 2004

Kirsten Gilbert Alberts, Ph.D.

Associate Professor of Psychiatry (primary appointment)

Bachelor of Arts, Stanford University, 2005

Doctor of Philosophy, Yale University, 2014

Muhammad Ali, M.S., Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Universität des Saarlandes, 2014

University of Luxembourg, 2019

Government College University, Faisalabad, 2010

Andrey P Anokhin, M.S., Ph.D.

Professor of Psychiatry (primary appointment)

Master of Science, Moscow State University, 1981

Doctor of Philosophy, Russia Academy of Science, 1987

Scott J Arbaugh, M.D.

Voluntary Clinical Instructor in Psychiatry

Bachelor of Arts, Saint Louis University, 1980

Doctor of Medicine, Saint Louis University, 1985

Naazia H Azhar, M.B.A., M.D.

Assistant Professor of Psychiatry (primary appointment)

Bachelor of Science, Union College New York, 2008

Master of Business Administration, Union College New York, 2009

Doctor of Medicine, Albany Medical College, 2012

B

Devin E Banks, M.S., Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Assistant Professor of Public Health

Bachelor of Arts, University of California Berkeley, 2011

Master of Science, Indiana University Purdue University Indianapolis, 2016

Doctor of Philosophy, Indiana University Purdue University Indianapolis, 2020

Vadim Baram

Voluntary Clinical Instructor in Psychiatry

Desiree Cherie Baumgartner, M.D.

Instructor in Psychiatry (primary appointment)

Doctor of Medicine, Washington University in St Louis, 2015

Laura J Bierut, M.D.

Professor of Psychiatry (primary appointment)

Alumni Endowed Professor of Psychiatry

Bachelor of Arts, Harvard University, 1982

Doctor of Medicine, Washington University in St Louis, 1987

John Bilbily, M.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Medicine, University of Kentucky, 2017

Callie Lynn Bishop, M.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Medicine, Medical College of Wisconsin, 2017

Kevin J. Black, M.D.

Professor of Psychiatry (primary appointment)

Professor of Neurology

Professor of Radiology

Professor of Neuroscience

Bachelor of Science, Brigham Young University, 1986

Doctor of Medicine, Duke University, 1990

Donald David Bohnenkamp, M.D.

Professor of Psychiatry (primary appointment)

Bachelor of Science, Saint Louis University, 2003

Doctor of Medicine, University of Nebraska Medical Center, 2007

Kelly N Botteron, M.D.

Professor Emeritus of Psychiatry

Bachelor of Arts, University of Kansas, 1984

Doctor of Medicine, University of Kansas Medical Center, 1988

Robert Harry Brady, M.D.

Assistant Professor of Psychiatry (primary appointment)

Bachelor of Science, University of Notre Dame, 1988

Doctor of Medicine, Tufts University, 1995

Kathleen K Bucholz, M.S., Ph.D.

Professor Emeritus of Psychiatry

Bachelor of Arts, Yale University, 1972

Master of Science, Yale University, 1982

Doctor of Philosophy, Yale University, 1986

Michael Bunis, M.S., Psy.D.

Associate Professor of Psychiatry (primary appointment)

Bachelor of Science, Loyola College in Maryland, 2002

Master of Science, Loyola College in Maryland, 2006

Doctor of Psychology, Loyola College in Maryland, 2010

C

Maria C Camacho, Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Bachelor of Arts, Stanford University, 2014

Doctor of Philosophy, Washington University in St Louis, 2022

Jeffrey R Carley, M.D.

Assistant Professor of Psychiatry (primary appointment)



Doctor of Medicine, Carver College of Medicine at University of Iowa, 2021

Robert Michael Carney, Ph.D.

Professor Emeritus of Psychiatry
Bachelor of Arts, University of Missouri Columbia, 1969
Doctor of Philosophy, Washington University in St Louis, 1978

Anil Govind Cashikar, M.S., Ph.D.

Associate Professor of Psychiatry (primary appointment)
Associate Professor of Neurology
Bachelor of Science, Bangalore University, 1989
Master of Science, Madurai Kamaraj University, 1991
Doctor of Philosophy, Jawaharlal Nehru University, 1997

Patricia A Cavazos-Rehg, Ph.D.

Professor of Psychiatry (primary appointment)
Professor of Public Health
Director of AI & Digital Mental Health
Founder's Distinguished Professor of Precision Psychiatry
Bachelor of Arts, University of Texas San Antonio, 1998
Doctor of Philosophy, State University of New York, 2004

Gregory Peter Cejas, M.D.

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2012
Doctor of Medicine, University of Missouri Columbia, 2017

Matthew B Chapman, M.D.

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Science, Saint Louis University, 2013
Doctor of Medicine, Creighton University, 2018

Mina Charepoo, M.D.

Associate Professor of Psychiatry (primary appointment)
Bachelor of Arts, State University of New York at Buffalo, 1997
Doctor of Medicine, Drexel University, 2002

Christopher Charlot, M.D.

Assistant Professor of Psychiatry (Child) (primary appointment)
Bachelor of Science, Washington University in St Louis, 2005
Doctor of Medicine, Washington University in St Louis, 2014

Li-Shiun Chen, M.P.H., Sc.D., M.D.

Professor of Psychiatry (primary appointment)
Doctor of Medicine, National Taiwan University, 1993
Master of Public Health, Johns Hopkins University, 1995
Doctor of Science, Johns Hopkins University, 1998

Theodore J Cicero, M.S., Ph.D.

Professor Emeritus in Psychiatry
Bachelor of Science, Villanova University, 1964
Master of Science, Purdue University (Duplicate of Purdue University-Main Campus), 1966
Doctor of Philosophy, Purdue University (Duplicate of Purdue University-Main Campus), 1969

C. Robert Cloninger, M.D.

Emeritus Professor of Psychiatry
Bachelor of Arts, University of Texas Austin, 1966

Doctor of Medicine, Washington University in St Louis, 1983

John Nicholas Constantino

Voluntary Research Professor of Psychiatry

Charles Richard Conway, M.D.

Professor of Psychiatry (primary appointment)
Professor of Radiology
Doctor of Medicine, University of Missouri Columbia, 1995

Juan C Corvalan, M.D.

Assistant Professor Emeritus of Clinical Psychiatry
Bachelor of Arts, School Not Found, 1957
Doctor of Medicine, School Not Found, 1965

Hadia Crider, M.D.

Instructor in Psychiatry (Pending Dean Approval) (primary appointment)
Bachelor of Science, University of Missouri Columbia, 2007
Doctor of Medicine, Medical University of the Americas (MUA), 2013

Lucia del Pilar Cristancho Pimiento, M.D.

Professor of Psychiatry (primary appointment)
Doctor of Medicine, Univ Industrial de Santander, 2000

Carlos Cruchaga, M.S., Ph.D.

Professor of Psychiatry (primary appointment)
Barbara Burton & Reuben Morris III Professor
Professor of Neurology
Professor of Genetics
Bachelor of Science, University of Navarra, 2000
Master of Science, University of Navarra, 2002
Doctor of Philosophy, University of Navarra, 2005

D

David Nicholas Daniels, M.D.

Associate Professor of Psychiatry (primary appointment)
Doctor of Medicine, Loyola University Chicago, 2013

Mary A Davis, M.D.

Assistant Professor Emeritus of Clinical Psychiatry
Bachelor of Arts, Ohio State University (Duplicate of Ohio State University-Main Campus), 1947
Doctor of Medicine, Washington University in St Louis, 1952

Victoria Carmen De Leon, M.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Medicine, University of Kentucky, 2017

Nathaniel Adam Dell, M.A., M.S.W., Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Assistant Professor of Public Health
Bachelor of Arts, Southern Illinois University Edwardsville, 2011
Master of Arts, University of Chicago, 2012
Master of Social Work, Saint Louis University, 2016
Doctor of Philosophy, Saint Louis University, 2022

Fanghong Dong, M.A., M.M.Sc., Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Arts, Shandong University (#####), 2008
Master of Medical Science, Shandong University (#####), 2012

Master of Arts, University of Pennsylvania, 2020
Doctor of Philosophy, University of Pennsylvania, 2020
Bachelor of Science in Nursing, Shandong University (#####)

Meghan Rose Donohue, Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Philosophy, Georgia State University, 2018

E**Abdallah M. El-Thaileb, Ph.D.**

Assistant Professor of Psychiatry (primary appointment)
Doctor of Philosophy, University of Louisville, 2015

Matthew S Ellis, M.P.H., Ph.D., DEGREE-3-200

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Arts, Rockhurst University, 2004
Master of Public Health, Washington University in St Louis, 2011
Master of Psychiatric Epidemiology, Washington University in St Louis, 2011
Doctor of Philosophy, Saint Louis University, 2021

Baris C Ercal, Ph.D., M.D.

Assistant Professor of Psychiatry (primary appointment)
Assistant Division Director for Adult Outpatient Services
Bachelor of Arts, Harvard University, 2010
Doctor of Philosophy, Washington University in St Louis, 2017
Doctor of Medicine, Washington University in St Louis, 2017

F**Nuri Bradford Farber, M.D.**

Professor of Psychiatry (primary appointment)
Vice Chair - Education
Bachelor of Arts, Washington University in St Louis, 1985
Doctor of Medicine, Washington University in St Louis, 1989

Robert T. Fitzgerald, M.P.H., Ph.D.

Associate Professor of Psychiatry (primary appointment)
Adjunct Instructor
Bachelor of Science, Abilene Christian University, 1998
Master of Public Health, Saint Louis University, 2000
Doctor of Philosophy, Saint Louis University, 2012

Kenneth E Freedland, M.A., Ph.D.

Professor Emeritus of Psychiatry
Bachelor of Science, University of Oregon, 1975
Master of Arts, University of Hawaii at Manoa, 1979
Doctor of Philosophy, University of Hawaii at Manoa, 1982

G**Bridget Mary Galati, D.O.**

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Science, University of Dayton, 2010
Doctor of Osteopathic Medicine, Des Moines University, 2016

Marcie Epstein Garland, M.D.

Professor of Psychiatry (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2008

Doctor of Medicine, University of Missouri Kansas City, 2008

Torie Gettinger, M.S.W., Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Science, Saint Louis University, 2008
Master of Social Work, Saint Louis University, 2009
Doctor of Philosophy, Saint Louis University, 2022

Andrea Marie Giedinghagen, M.D.

Associate Professor of Psychiatry (Child) (primary appointment)
Bachelor of Arts, Cornell University, 2007
Doctor of Medicine, Washington University in St Louis, 2013

Luis Giuffra, M.S., Ph.D., M.D.

Voluntary Clinical Professor of Psychiatry
Bachelor of Science, School Not Found, 1983
Master of Science, School Not Found, 1985
Doctor of Medicine, School Not Found, 1986
Doctor of Philosophy, Yale University, 1991

Paul E Glaser, M.S., Ph.D., M.D.

Professor of Psychiatry (Child) (primary appointment)
Bachelor of Science, University of Chicago, 1986
Master of Science, University of Chicago, 1986
Doctor of Philosophy, Washington University in St Louis, 1996
Doctor of Medicine, Washington University in St Louis, 1996

Anne Glowinski

Voluntary Clinical Professor of Psychiatry

Mark Gold, M.D.

Voluntary Research Professor of Psychiatry
Bachelor of Arts, Washington University in St Louis, 1971
Doctor of Medicine, University of Florida, 1975

Julia D. Grant, M.A., Ph.D.

Voluntary Research Associate Professor of Psychiatry
Bachelor of Arts, Davidson College, 1989
Master of Arts, Wake Forest University, 1993
Doctor of Philosophy, Pennsylvania State University (Duplicate of Pennsylvania State University-Main Campus), 1997

H**Rita N Haddad, M.D.**

Associate Professor of Psychiatry (primary appointment)
Doctor of Medicine, University of Balamand, 2013

Melissa A. Harbit, M.D.

Professor of Psychiatry (primary appointment)
Vice Chair - Clinical Affairs
Bachelor of Science, University of Iowa, 1993
Doctor of Medicine, University of Iowa, 1997

Michael P. Harms, Ph.D.

Professor of Psychiatry (primary appointment)
Doctor of Philosophy, Massachusetts Institute of Technology, 2002

Sarah McConnell Hartz, Ph.D., M.D.

Professor of Psychiatry (primary appointment)
Bachelor of Arts, Knox College, 1996



Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2002

Doctor of Medicine, University of Iowa, 2005

Steven Arthur Harvey, M.D.

Voluntary Clinical Instructor in Psychiatry

Bachelor of Arts, Washington University in St Louis, 1988

Doctor of Medicine, Washington University in St Louis, 1992

Alexander S Hatoum, Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Philosophy, University of Colorado Boulder, 2019

Andrew C Heath, Ph.D.

Professor of Psychiatry (primary appointment)

Spencer T. Olin Professor of Psychology in Psychiatry

Professor of Genetics

Professor of Psychological & Brain Sciences

Bachelor of Arts, University of Oxford, 1979

Doctor of Philosophy, University of Oxford, 1983

Laura P Hennefield, M.S., Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Bachelor of Science, State University of New York at Purchase, 2005

Master of Science, CUNY Hunter College, 2008

Doctor of Philosophy, Washington University in St Louis, 2015

Tamara G Hershey, Ph.D.

Professor of Psychiatry (primary appointment)

James S McDonnell Professor of Cognitive Neuroscience

Professor of Radiology

Director of the McDonnell Center for Systems Neuroscience

Division Director - Translational Neuroscience

Professor of Neurology

Adjunct Professor

Bachelor of Arts, Earlham College, 1988

Doctor of Philosophy, Washington University in St Louis, 1996

Jarrold Holiday, M.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Medicine, University of Kansas Medical Center, 2016

Barry Allen Hong, M.Div., Ph.D.

Professor Emeritus of Psychiatry

Bachelor of Arts, Concordia University, 1969

Master of Divinity, Concordia University, 1972

Doctor of Philosophy, Saint Louis University, 1978

Jaime Patricia Hook, M.D.

Associate Professor of Psychiatry (primary appointment)

Bachelor of Arts, Rhodes College, 2000

Doctor of Medicine, Saint Louis University, 2005

Caroline P Hoyniak, Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Philosophy, Indiana University Bloomington, 2019

Vasilis C Hristidis, M.D.

Assistant Professor of Psychiatry (primary appointment)

Bachelor of Arts, Columbia University, 2012

Doctor of Medicine, Stony Brook School of Medicine, 2021

James J Hudziak

Voluntary Research Professor of Psychiatry

I

Laura Ibanez, M.S., Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Assistant Professor of Neurology

Bachelor of Arts, University of Barcelona, 2007

Bachelor of Science, University of Barcelona, 2007

Master of Science, University of Barcelona, 2008

Doctor of Philosophy, University of Barcelona, 2015

Sayaka Inoue, Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Philosophy, University of Tokyo, 2013

Keith E Isenberg, M.D.

Professor Emeritus of Psychiatry

Bachelor of Arts, Wabash College, 1974

Doctor of Medicine, Indiana University Bloomington, 1978

Abhirami Kannan Iyer, M.S., Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Bachelor of Science, University of Mumbai, 2007

Master of Science, University of Mumbai, 2009

Doctor of Philosophy, Indiana University Indianapolis, 2016

Yukitoshi Izumi, Ph.D., M.D.

Professor of Psychiatry (primary appointment)

Doctor of Medicine, Yamagata University, 1985

Doctor of Philosophy, Yamagata University, 1989

J

Celina Rose Jacobi, M.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Medicine, Washington University in St Louis, 2012

Aleksandar Janca, M.D.

Voluntary Research Professor of Psychiatry

Doctor of Medicine, School Not Found, 1900

Michael R Jarvis, M.S., Ph.D., M.D.

Professor of Psychiatry (Pending Executive Faculty Approval) (primary appointment)

Bachelor of Science, University of Minnesota, 1977

Master of Science, University of Illinois at Urbana-Champaign, 1980

Doctor of Philosophy, University of Illinois at Urbana-Champaign, 1982

Doctor of Medicine, Washington University in St Louis, 1985

Emma Covey Johnson, M.A., Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Lecturer in Psychological & Brain Sciences

Bachelor of Science, University North Carolina, 2013

Master of Arts, University of Colorado Boulder, 2016

Doctor of Philosophy, University of Colorado Boulder, 2017

Christine Juang, Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Assistant Professor of Psychological & Brain Sciences
Assistant Professor of Neurology
Doctor of Philosophy, University of Southern California, 2018

K

Celeste Marie Karch, Ph.D.

Professor of Psychiatry (primary appointment)
Barbara Burton and Reuben M Morriss III Professorship
Doctor of Philosophy, University of Florida, 2009

Nicole Renee Karcher, M.A., Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Lecturer in Psychological & Brain Sciences
Bachelor of Arts, College of William and Mary, 2008
Master of Arts, University of Missouri Columbia, 2012
Doctor of Philosophy, University of Missouri Columbia, 2017

Saaid Khojasteh, M.D.

Professor of Psychiatry (primary appointment)
Division Director of Outpatient Psychiatry
Doctor of Medicine, Shiraz University of Medical Sciences, 1981

Mary Claire Kimmel, Ph.D., M.D.

Associate Professor of Psychiatry (primary appointment)
Doctor of Medicine, Drexel University, 2007
Doctor of Philosophy, Uppsala University, 2023

Neha Navsaria Kirtane, M.A., Ph.D.

Professor of Psychiatry (primary appointment)
Bachelor of Arts, Bryn Mawr College, 1999
Master of Arts, Columbia University, 2003
Doctor of Philosophy, Temple University, 2008

Alexxai V Kravitz, Ph.D.

Associate Professor of Psychiatry (primary appointment)
Associate Professor of Neuroscience
Associate Professor of Anesthesiology
Interim Division Director for Basic Neuroscience
Bachelor of Arts, Wesleyan University, 2001
Doctor of Philosophy, University of Pennsylvania, 2009

Jan Kubanek, Ph.D.

Associate Professor of Psychiatry (primary appointment)
Associate Professor of Neurology
Associate Professor of Radiology
Doctor of Philosophy, Washington University in St Louis, 2023

Erin Doty Kurtz

Voluntary Clinical Instructor in Psychiatry

Anatoliy Kuznetsov, M.D.

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Arts, Washington University in St Louis, 2011
Doctor of Medicine, University of Missouri Kansas City, 2017

L

Suzanne Nicole L'Ecuyer, M.D.

Associate Professor of Psychiatry (primary appointment)
Doctor of Medicine, University of Louisville, 1997

Catherine Anne La Starza, D.O.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Osteopathic Medicine, Midwestern University Illinois, 2022

Timothy O. Laumann, Ph.D., M.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2017
Doctor of Medicine, Washington University in St Louis, 2017

Rachel Emma Lean, Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2015

Lucas P Lebovitz, M.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Medicine, University of Southern California, 2021

Eric J Lenze, M.D.

Professor of Psychiatry (primary appointment)
Wallace and Lucille K Renard Professor of Psychiatry
Head of the Department of Psychiatry
Professor of Anesthesiology
Doctor of Medicine, Washington University in St Louis, 1994

Shannon N Lenze, M.S., Ph.D.

Professor of Psychiatry (primary appointment)
Adjunct Instructor
Bachelor of Science, University of Illinois at Urbana-Champaign, 1995
Master of Science, University of Pittsburgh, 2003
Doctor of Philosophy, University of Pittsburgh, 2007

Angela Lin, M.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2018

Penelope Alatheia Lind

Voluntary Research Associate Professor of Psychiatry

Kelechi Loynd, M.D.

Voluntary Clinical Assistant Professor of Psychiatry
Doctor of Medicine, Saint Louis University, 2006

Joan L Luby, M.D.

Professor of Psychiatry (Child) (primary appointment)
Samuel and Mae S. Ludwig Chair in Psychiatry at Barnes-Jewish Hospital
Bachelor of Arts, Brown University, 1981
Doctor of Medicine, Wayne State University, 1985

Federica Lucantonio, Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Philosophy, University of Maryland Baltimore, 2013

Philip A Ludbrook, MBBS

Professor Emeritus of Psychiatry
Professor Emeritus
Foreign MD equivalent, University of Adelaide, 1963

Patrick Joseph Lustman, M.S.W., Ph.D.

Professor Emeritus of Psychiatry
Bachelor of Arts, University of Illinois at Chicago, 1972
Master of Social Work, University of Wisconsin Madison, 1974
Doctor of Philosophy, Michigan State University, 1980

M**Pamela A Madden, M.S., Ph.D.**

Professor of Psychiatry (primary appointment)
Bachelor of Science, University of Pittsburgh, 1978
Master of Science, University of Pittsburgh, 1983
Doctor of Philosophy, University of Pittsburgh, 1992

Susan Eileen Maloney, M.A., Ph.D.

Associate Professor of Psychiatry (primary appointment)
Bachelor of Arts, University of Missouri in St Louis, 2003
Master of Arts, University of Missouri in St Louis, 2007
Doctor of Philosophy, University of Missouri in St Louis, 2012

Daniel T. Mamah, M.D.

Professor of Psychiatry (primary appointment)
Doctor of Medicine, Semmelweis University, 1998

Lauren Ashley Marks, M.D.

Associate Professor of Psychiatry (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2015

Natasha M.V. Marrus, Ph.D., M.D.

Associate Professor of Psychiatry (primary appointment)
Associate Professor of Radiology
Bachelor of Arts, University of Southern California, 1999
Bachelor of Science, University of Southern California, 1999
Doctor of Philosophy, Washington University in St Louis, 2007
Doctor of Medicine, Washington University in St Louis, 2007

Dario Maschi, Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Philosophy, Universidad de Buenos Aires, 2012

Gregory Warren Mattingly, M.D.

Voluntary Clinical Assistant Professor of Psychiatry
Bachelor of Science, University of Missouri Columbia, 1985
Doctor of Medicine, Washington University in St Louis, 1989

Kimberli McCallum, M.D.

Voluntary Clinical Assistant Professor of Psychiatry
Bachelor of Science, Brown University, 1981
Doctor of Medicine, Yale University, 1986

Shannon Rose McGuire

Voluntary Clinical Assistant Professor of Psychiatry

Steven James Mennerick, Ph.D.

Professor of Psychiatry (primary appointment)
John P Feighner Professor of Neuropsychopharmacology
Associate Dean for Biology and Biomedical Sciences
Professor of Neuroscience
Bachelor of Arts, Earlham College, 1988
Doctor of Philosophy, Washington University in St Louis, 1995

Miguel A Minaya, D.Sc.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Science, Universidad Automoma de Madrid, 2015

David M Montani, M.D.

Voluntary Clinical Instructor in Psychiatry
Bachelor of Arts, Harvard University, 1991

Doctor of Medicine, Washington University in St Louis, 1996

Blake William Moore, Ph.D.

Professor Emeritus of Biochemistry in Psychiatry
Bachelor of Science, University of Akron (Duplicate of University of Akron Main Campus), 1948
Doctor of Philosophy, Northwestern University, 1952

David H Morris

Voluntary Clinical Assistant Professor of Psychiatry

Randi H Mozenter, M.A., Ph.D.

Voluntary Clinical Instructor in Psychiatry
Bachelor of Arts, Washington University in St Louis, 1980
Master of Arts, Washington University in St Louis, 1982
Doctor of Philosophy, Washington University in St Louis, 1989

George E Murphy, M.D.

Professor Emeritus of Psychiatry
Bachelor of Science, Oregon State University, 1949
Doctor of Medicine, Washington University in St Louis, 1952

N**Elliot C Nelson, M.D.**

Professor of Psychiatry (primary appointment)
Bachelor of Arts, Johns Hopkins University, 1982
Doctor of Medicine, University of Illinois at Urbana-Champaign, 1986

Ginger E. Nicol, M.D.

Professor of Psychiatry (primary appointment)
Bachelor of Arts, University of Iowa, 1998
Doctor of Medicine, University of Iowa, 2002

Kevin K. Noguchi, M.A., Ph.D.

Associate Professor of Psychiatry (primary appointment)
Bachelor of Science, University of California Santa Barbara, 1996
Master of Arts, University of California Los Angeles, 1998
Doctor of Philosophy, University of California Los Angeles, 2003

Thomas John Nowotny, M.D.

Voluntary Clinical Assistant Professor of Psychiatry
Bachelor of Science, Washington University in St Louis, 1980
Doctor of Medicine, Washington University in St Louis, 1985

O**Brendan Joseph O'Connor, M.D.**

Associate Professor of Psychiatry (primary appointment)
Bachelor of Science, Creighton University, 2006
Doctor of Medicine, Creighton University, 2010

Kalu Onuma

Voluntary Clinical Instructor in Psychiatry

Akinkunle Owoso, M.D.

Professor of Psychiatry (primary appointment)
Bachelor of Arts, University of Oklahoma, 2003
Bachelor of Science, University of Oklahoma, 2003
Doctor of Medicine, University of Oklahoma, 2007

P**Steven Marc Paul, M.S., M.D.**

Professor of Psychiatry (primary appointment)
Professor of Neurology
Bachelor of Science, Tulane University, 1972
Master of Science, Tulane University, 1975
Doctor of Medicine, Tulane University, 1975

Ian Leonard Pearson, M.D.

Instructor in Psychiatry (Pending Dean Approval) (primary appointment)
Doctor of Medicine, Rush University, 2016

Michele L. Pergadia, M.S., Ph.D.

Professor of Psychiatry (primary appointment)
Bachelor of Arts, Washington University in St Louis, 1991
Master of Science, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 1998
Doctor of Philosophy, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2001

Michael T Perino, M.A., Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Arts, New York University, 2008
Master of Arts, CUNY John Jay College Criminal Justice, 2010
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2018

Susan B Perlman, Ph.D.

Professor of Psychiatry (primary appointment)
Doctor of Philosophy, Duke University, 2019

Marco Pignatelli, M.D.

Associate Professor of Psychiatry (primary appointment)
Doctor of Medicine, University of Rome, 2008

Elizabeth F Pribor, M.D.

Voluntary Clinical Associate Professor of Psychiatry
Bachelor of Arts, Emory University, 1981
Doctor of Medicine, Saint Louis University, 1985

Madelon T Price, Ph.D.

Research Professor Emerita of Neurobiology in Psychiatry
Bachelor of Arts, Washington University in St Louis, 1953
Doctor of Philosophy, Washington University in St Louis, 1973

Rumi Kato Price, M.A., Ph.D.

Professor Emeritus of Psychiatry
Bachelor of Arts, Ochanomizu University, 1976
Master of Arts, University of California, 1982
Doctor of Philosophy, University of California, 1988

John R. Pruett, Ph.D., M.D.

Professor of Psychiatry (Child) (primary appointment)
Professor of Psychological & Brain Sciences (Courtesy)
Professor of Radiology
Bachelor of Arts, Princeton University, 1990
Doctor of Philosophy, Washington University in St Louis, 2000
Doctor of Medicine, Washington University in St Louis, 2000

Q**Darin F Quach, D.O., Ph.D.**

Assistant Professor of Psychiatry (primary appointment)
Bachelor of Science, University of California San Diego, 2006
Doctor of Philosophy, Michigan State University, 2016
Doctor of Osteopathic Medicine, Michigan State University, 2018

R**Tahir Rahman, M.D.**

Associate Professor of Psychiatry (primary appointment)
Doctor of Medicine, University of Kansas Medical Center, 1995

Alex Taylor Ramsey, M.A., Ph.D.

Associate Professor of Psychiatry (primary appointment)
Adjunct Instructor
Bachelor of Science, University of Evansville, 2008
Master of Arts, Southern Illinois University Carbondale, 2010
Doctor of Philosophy, Southern Illinois University Carbondale, 2012

Radhika Rao, M.D.

Voluntary Clinical Instructor in Psychiatry
Doctor of Medicine, University of South Dakota, 2001

Mary Katherine O Ray, Ph.D.

Assistant Professor of Psychiatry (primary appointment)
Assistant Professor of Radiology
Doctor of Philosophy, University of Alabama in Tuscaloosa, 2018

Angela M. Reiersen, M.D.

Associate Professor of Psychiatry (Child) (primary appointment)
Bachelor of Science, University of California Davis, 1994
Doctor of Medicine, University of Southern California, 1999

Daniel B. Reising

Voluntary Clinical Instructor in Psychiatry

Heather Nicole Rhymer

No Rank
Associate of Arts, Washington University in St Louis, 2016
Bachelor of Science, Washington University in St Louis, 2024

John P Rice, M.A., Ph.D.

Professor Emeritus of Psychiatry
Bachelor of Arts, Cornell University, 1969
Master of Arts, Washington University in St Louis, 1972
Doctor of Philosophy, Washington University in St Louis, 1975

Thomas F Richardson, M.D.

Professor of Psychiatry (primary appointment)
Bachelor of Arts, Millikin University, 1960
Doctor of Medicine, Washington University in St Louis, 1963

Cynthia E Rogers, M.D.

Professor of Psychiatry (primary appointment)
Blanche F Ittleson Professor of Psychiatry (Child Psychiatry)
Division Director of Child and Adolescent Psychiatry
Professor of Public Health
Bachelor of Arts, Harvard University, 1998



Doctor of Medicine, Washington University in St Louis, 2005

John W Rohrbaugh, Ph.D.

Professor Emeritus of Psychiatry

Bachelor of Science, Heidelberg College (Duplicate of Heidelberg University), 1968

Doctor of Philosophy, University of Illinois (Duplicate of University of Illinois at Urbana-Champaign), 1973

Jennifer Skrzypczynski Romo, M.A., Psy.D.

Voluntary Clinical Instructor of Psychiatry

Doctor of Psychology, Argosy University-Chicago, 2015

Bachelor of Arts, University of Chicago

Master of Arts, Argosy University-Chicago

Alexander Bernard Rose

Voluntary Clinical Instructor in Psychiatry

Max S. Rosen, M.D.

Assistant Professor of Psychiatry (primary appointment)

Bachelor of Science, Washington University in St Louis, 2010

Doctor of Medicine, Washington University in St Louis, 2015

Eugene Harold Rubin, Ph.D., M.D.

Professor Emeritus of Psychiatry

Bachelor of Arts, University of Rochester, 1971

Doctor of Philosophy, Washington University in St Louis, 1977

Doctor of Medicine, Washington University in St Louis, 1978

James Rutherford, M.D.

Assistant Professor Emeritus of Clinical Psychiatry

Bachelor of Arts, Drake University, 1975

Doctor of Medicine, University of Iowa, 1980

S

Frank Scott Saccone, Ph.D.

Professor of Psychiatry (primary appointment)

Bachelor of Arts, Rensselaer Polytechnic Institute, 1990

Doctor of Philosophy, Brown University, 1995

Kruthika Sampathgiri, M.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Medicine, Albert Einstein College of Medicine, 2019

Sayli Sant

Assistant Professor of Psychiatry (primary appointment)

Carolyn E. Sartor, M.S., Ph.D.

Voluntary Research Associate Professor of Psychiatry

Bachelor of Science, Oberlin College, 1994

Master of Science, Catholic University America (Duplicate of Catholic University of America), 1999

Doctor of Philosophy, Palo Alto College, 2005

Breno Satler de Oliveira Diniz, Ph.D., M.D.

Professor of Psychiatry (primary appointment)

Universidade Federal de Minas Gerais (UFMG), 2003

Universidade de Sao Paulo, 2011

Rebecca Frye Schwarzlose, Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Assistant Professor of Psychological and Brain Sciences (Courtesy Affiliation)

Bachelor of Arts, Northwestern University, 2002

Doctor of Philosophy, Massachusetts Institute of Technology, 2008

Adelita Segovia Langlely

Voluntary Clinical Associate Professor of Psychiatry

Lawrence Evan Shapiro, Ph.D.

Voluntary Clinical Instructor in Psychiatry

Doctor of Philosophy, 1990

Hongjin Shu, Ph.D., M.D.

Assistant Professor of Psychiatry (primary appointment)

Doctor of Medicine, Shanghai Second Medical University (#####), 1991

Doctor of Philosophy, Yamagata University, 2002

Nathan M Simon, M.S., M.D.

Professor Emeritus of Clinical Psychiatry

Bachelor of Science, Yale University, 1949

Master of Science, Yale University, 1950

Doctor of Medicine, Washington University in St Louis, 1955

Elias Quade Smith

Assistant Professor of Psychiatry (primary appointment)

James B Smith, M.D.

Associate Professor Emeritus of Clinical Psychiatry

Bachelor of Arts, University of Missouri Columbia, 1963

Doctor of Medicine, University of Missouri Columbia, 1967

Timothy Eric Spiegel, M.D.

Professor of Psychiatry (Child) (primary appointment)

Bachelor of Science, University of Missouri Columbia, 2001

Doctor of Medicine, Saint Louis University, 2006

Afshan Sultana, M.D.

Instructor in Psychiatry (Child) (primary appointment)

Doctor of Medicine, University of Karachi, 1996

Yun Ju Sung, Ph.D.

Professor of Psychiatry (primary appointment)

Professor of Biostatistics

Doctor of Philosophy, University of Minnesota, 2003

Dragan M Svrakic, Ph.D., M.D.

Professor of Psychiatry (primary appointment)

Doctor of Medicine, University of Belgrade, 1978

Doctor of Philosophy, University of Belgrade, 1989

Chad M Sylvester, Ph.D., M.D.

Professor of Psychiatry (Child) (primary appointment)

Professor of Radiology

Bachelor of Science, University of Notre Dame, 2001

Doctor of Philosophy, Washington University in St Louis, 2009

Doctor of Medicine, Washington University in St Louis, 2009

Hannah Selene Szlyk, M.S.S.W., Ph.D.

Assistant Professor of Psychiatry (primary appointment)

Assistant Professor of Public Health

Bachelor of Arts, Kenyon College, 2009

Master of Science in Social Work, Columbia University, 2011

Doctor of Philosophy, University of Texas Austin, 2018

T

Mini Tandon, D.O.

Voluntary Teaching Professor of Psychiatry
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 1997
Doctor of Osteopathic Medicine, Kansas City University of Medicine and Biosciences, 2002

V

Jessica Vanderlan, M.A., Ph.D.

Voluntary Clinical Instructor in Psychiatry
Bachelor of Arts, University of Michigan (Duplicate of University of Michigan Ann Arbor), 2004
Master of Arts, Alliant University (Duplicate of Alliant International University (AIU)), 2013
Doctor of Philosophy, Alliant University (Duplicate of Alliant International University (AIU)), 2015

Theresa Nieva Villaflores, M.D.

Instructor in Psychiatry (Child) (primary appointment)
Doctor of Medicine, University of Missouri Kansas City, 1999

Alecia C. Vogel-Hammen, Ph.D., M.D.

Assistant Professor of Psychiatry (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2010
Doctor of Medicine, Washington University in St Louis, 2013

W

Reuben R Welch, M.Ed., Ph.D.

Professor of Psychiatry (primary appointment)
Lecturer in Psychological and Brain Sciences
Bachelor of Arts, Point Loma Nazarene University, 1980
Master of Education, University of Missouri Columbia, 1982
Doctor of Philosophy, University of Missouri Columbia, 1988

Michael L Wenzinger, M.D.

Associate Professor of Psychiatry (primary appointment)
Doctor of Medicine, Eastern Virginia Medical School, 2014

Diana J Whalen, Ph.D.

Associate Professor of Psychiatry (primary appointment)
Lecturer in Psychological & Brain Sciences
Bachelor of Science, University of Pittsburgh, 2005
Doctor of Philosophy, University of Pittsburgh, 2014

Denise Wilfley, Ph.D.

Professor of Psychiatry (primary appointment)
Scott Rudolph University Professor
Professor of Psychological & Brain Sciences
Professor of Medicine
Professor of Pediatrics
Professor of Public Health
Doctor of Philosophy, University of Missouri Columbia, 1989

Jessica C Williams, M.D.

Assistant Professor of Psychiatry (Pending Dean Approval) (primary appointment)

Bachelor of Arts, Washington University in St Louis, 2017
Doctor of Medicine, University of Florida, 2021

Joshua L Wilson, M.D.

Instructor in Psychiatry (primary appointment)
Bachelor of Science, University of North Texas, 2008
Doctor of Medicine, University of Texas Health Science Center, 2012

David F Wozniak, M.A., Ph.D.

Professor Emeritus of Psychiatry
Bachelor of Arts, Hobart College (Duplicate of Hobart William Smith Colleges), 1973
Master of Arts, Connecticut College, 1977
Doctor of Philosophy, Washington University in St Louis, 1984

X

Kevin Y Xu, M.P.H., M.D.

Assistant Professor of Psychiatry (primary appointment)
Assistant Professor of Public Health
Bachelor of Arts, Columbia University, 2014
Master of Public Health, Mount Sinai School of Medicine, 2018
Doctor of Medicine, Mount Sinai School of Medicine, 2018

Y

Rebecca Frances Young, M.P.H., M.D.

Assistant Professor of Psychiatry (primary appointment)
Master of Public Health, University of Arkansas for Medical Sciences, 2020
Doctor of Medicine, University of Arkansas for Medical Sciences, 2020

Carla Marie Yuede, Ph.D.

Professor of Psychiatry (primary appointment)
Professor of Neuroscience
Professor of Neurology
Doctor of Philosophy, University of Missouri in St Louis, 2006

Z

Charles F Zorumski, M.D.

Professor of Psychiatry (primary appointment)
Samuel B. Guze Professor of Psychiatry
Director of the Taylor Family Institute for Innovative Psychiatric Research
Professor of Neuroscience
Bachelor of Arts, Saint Louis University, 1974
Doctor of Medicine, Saint Louis University, 1978

Research Electives

Psychiatry Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Note: There are always a number of research projects in the Department of Psychiatry. For additional information, contact Dr. Nuri Farber at 314-362-2460.

Andrey Anokhin, PhD

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Phone: 314-286-2201
andrey@wustl.edu

This research elective is intended for students interested in cognitive neuroscience, biological psychiatry, and behavior genetics. Dr. Anokhin's laboratory investigates the links between genes, brain and behavior in order to better understand the complex etiology of mental disorders. Our major focus is on the externalizing spectrum of psychopathology characterized by deficits in inhibitory self-regulation and related psychopathologies, including ADHD, conduct disorder and addictive behaviors. We are particularly interested in the intermediate phenotypes (endophenotypes) mediating genetic risk for addiction, such as impulsivity, risk taking, and abnormal reward processing. In our laboratory-based studies with human volunteers, including twins, we investigate individual differences in brain activity using the recording of brain oscillations (event-related brain potentials) and functional magnetic resonance imaging (fMRI). For example, an ongoing longitudinal study of adolescent twins explores the developmental and genetic determinants of brain activity related to reward and punishment processing, inhibitory control of behavior, and risk taking to identify prospective predictors of substance abuse and associated behavioral problems. In another ongoing study, we examine twins who are discordant for adolescent marijuana use in order to identify the consequences of substance abuse for the brain, cognition and emotion and to distinguish them from preexisting risk factors. Interested students will be able to learn a variety of methods used in these studies, such as the recording and analysis of neural activity, including electroencephalogram (EEG) and event-related brain potentials (ERPs), MRI scanning, startle response, autonomic measures, the administration of neuropsychological and behavioral tests, and the statistical analysis of data. The format of this research elective may include the following: (1) directed reading; (2) participation in laboratory experiments involving human subjects; (3) analysis of existing data from various research projects; and (4) designing and piloting new behavioral experiments. Qualifications include reliability and responsibility, the ability to commit a specified amount of time per week and to work a schedule that can be negotiated on an individual basis, and good computer skills.

Deanna M. Barch, PhD

Cognitive and Affective Neuroscience of Schizophrenia and Depression

4525 Scott Avenue, Suite 1153K
Phone: 314-747-2160

Students may participate in the conduct of clinical studies of schizophrenia and depression. Involvement in clinical studies can include training and experience in interviewing psychiatric patients, or it may involve gaining experience in the techniques of assessing cognitive and emotional function using behavioral and brain imaging methods.

Laura Jean Bierut, MD

Renard Building
Phone: 314-362-2544

This research elective will focus on analyzing data from high-risk studies of smoking and other addictions. Students will have the opportunity to examine genetic and environmental factors that place some individuals at risk for developing nicotine, alcohol and other substance dependence and that protect others from the development of these disorders.

Kevin J. Black, MD

4525 Scott Ave., Room 2205
Phone: 314-362-5041
kevin@wustl.edu

Students will participate in ongoing studies of brain imaging, movement disorders or neuropsychiatric illnesses. Degree of participation will relate to the student's available research time, skills and interest. Visit the laboratory's webpage for examples of past research.

Ginger E. Nicol, MD

Taylor Avenue Building, Suite 121
Phone: 314-362-5154

We are part of the Healthy Mind Lab in the department of psychiatry, and our clinical research broadly focuses on increasing longevity and quality of life in children, adolescents, adults and older adults. Our specific projects focus primarily on obesity treatment and prevention, and they include clinical and genetic studies of psychotropic medications known to cause weight gain, like antipsychotic agents. We are interested in developing and testing medication-assisted psychotherapies with agents like ketamine and psilocybin for weight management and disordered eating. We also employ mobile health (mHealth) tools for collecting data and for delivering healthy lifestyle and behavioral weight loss treatments, and we use precision functional and molecular brain imaging techniques to study individual, brain-based mechanisms of illness and treatment response. This elective offers the student a broad exposure to clinical research protocols, including protocols in adults and children. Students will have an opportunity to focus on a particular project of interest.

Courses

PSY 8005 Psychiatry Consult (Clinical Elective)

Students spend four weeks on the psychiatry consult service at Barnes-Jewish Hospital. Under the supervision of house staff and attending physicians, students participate in the evaluation and collaborative management of inpatients on medical and surgical units for a broad range of psychiatric and behavioral concerns. They learn about the intersection between psychiatry and other medical specialties and important skills for collaborative patient care. Students attend departmental conferences and other educational sessions, and they also prepare and present a clinical topical review of their choice.

Credit 4 units.

Typical periods offered: Medicine Year

PSY 8010 Outpatient Community Psychiatry (Clinical Elective)

This elective will provide the student with a significant outpatient experience in Psychiatry. Students will be paired with a Resident physician and have exposure to two adult clinics and one child clinic over the course of the rotation. Students will observe and assist in the diagnosis and treatment of patients in the clinic setting. Students will attend scheduled lectures and conferences over the course of the rotation relevant to outpatient Psychiatry and meet weekly with the outpatient clinic attending for clinical discussion and review. During the elective, the student will learn about the outpatient presentations of psychiatric disorders, a variety of treatment techniques (psychotherapy and psychopharmacology), and general principles of outpatient clinical management.

Credit 4 units.

Typical periods offered: Medicine Year

PSY 8015 Inpatient Psychiatry (Clinical Elective)

This is a senior rotation that provides the students with an opportunity to expand their knowledge of inpatient clinical psychiatry by functioning as interns. Students attend all staffing and teaching conferences given to first-year psychiatry residents and are responsible for the assessment and management of acute psychiatric patients. Immediate supervision is provided by the inpatient attending, and additional supervision can be arranged as desired. Teaching emphasis is directed toward psychiatric diagnosis, appropriate use of psychopharmacologic agents, psychotherapeutic intervention, use of community resources and pursuit of the psychiatric scientific literature. The student will write a self-selected clinical topic relevant to treatment and management of psychiatric inpatients.

Credit 4 units.

Typical periods offered: Medicine Year

PSY 8020 Child Psychiatry (Clinical Elective)

This elective in child psychiatry offers rich experiences in St. Louis Children's Hospital Pediatric Behavioral Health Unit and the Consult-Liaison service. It provides experience in age-appropriate diagnostic and treatment methods in children and adolescents and families with mental health conditions. You will also have the opportunity to work as part of our multi-disciplinary team with physicians, nurse practitioners, therapists, and social workers. A portion of your time may be spent in the outpatient clinics if interested and if circumstances permit.

Credit 2 units.

Typical periods offered: Medicine Year

PSY 8025 Forensic Psychiatry (Non-Clinical Elective)

The medical student will learn many aspects of forensic psychiatry including criminal competency, the insanity defense, civil litigation, workman's compensation, malpractice, civil commitment, and guardianship. The rotation is primarily self-directed through selected readings, but the student will have opportunities to observe and participate in forensic evaluations depending on faculty availability. The student will meet with the Course Director a minimum of two

hours per week to discuss readings and case law. They will also shadow at the St. Louis Psychiatric Rehabilitation Center, a nearby forensic hospital, as well as observed the Sexually Violent Predator unit in Farmington, Missouri. The student will also be assigned readings of landmark cases, textbooks, psychiatric expert opinions, and attend civil hearings. There may be the opportunity to witness sexually violent predator evaluations and/or treatment. The student will be required to write a forensic report based on an evaluation during the rotation or using materials from a previously pre-recorded evaluation. The objectives will be measured by attendance and by formal evaluation of the student's participation and knowledge during the supervision discussion. It will also be determined by the thoroughness and quality of their written forensic report.

Credit 4 units.

Typical periods offered: Medicine Year

PSY 8030 Schizophrenia Precursors & Prodromal States (Clinical Elective)

This is an opportunity for trainees to gain knowledge and experience related to evaluation of children and adolescents who may be at high risk for schizophrenia or other psychotic disorders. It is mainly a reading elective, in which students are required to read scientific related to the topic of the elective, discuss readings with the course director, and write a brief paper reviewing existing literature on a related sub-topic. There may also be opportunity to see about 1-2 patients per week through an outpatient consultation clinic which evaluates patients with characteristics suggestive of prodromal schizophrenia (such as new-onset attenuated psychotic symptoms along with recent deterioration in functioning) and/or early life characteristics that may indicate risk for developing schizophrenia later in life. Since the full symptoms of schizophrenia are often preceded by a wide range of childhood behavioral and developmental abnormalities, this rotation helps trainees integrate information regarding the continuity between childhood development and adult psychopathology. There may be opportunities to learn how to administer and score specialized assessments. The amount of direct clinical care of patients is usually not more than one half-day per week.

Credit 2 units.

Typical periods offered: Medicine Year

PSY 8035 Interventional Psychiatry (Clinical Elective)

The Phase III elective experience in child neurology is designed to adapt to the individual goals and objectives of students. The elective takes place in one or two 2-week blocks that occur among five possible venues as chosen by the student after discussion with the course director:

1. Outpatient clinics,
2. Inpatient ward service,
3. Inpatient general consult service,
4. NICU consult service, and
5. Video EEG (VEEG) monitoring service.

The combination of services and experiences will be arranged directly between the student and the Course Director prior to beginning the rotation.

In the outpatient clinics, students will rotate between a variety of subspecialty clinics and work with a variety of attendings in order to experience the breadth of outpatient pediatric neurology. Students rotating on the inpatient ward service will work closely with the pediatric neurology resident to develop neurology-specific care plans and will function above a clerkship level. No call or weekend duties will be expected on this rotation. On the general consult services, students will work with the consult attending and pediatric neurology residents on that team to see consults in the PICU, CICU, ER, and other hospital floors. The NICU consult team focuses on infants in the NICU. Student rotating on the VEEG monitoring service will focus on learning the indications and uses of VEEG and basic EEG reading skills.



Credit 2 units.

Typical periods offered: Medicine Year

PSY 9100 Psychiatry Advanced Clinical Rotation (ACR)

This is an advanced rotation that provides the students with an opportunity to expand their knowledge of inpatient clinical psychiatry by functioning as interns. While rotating through the inpatient psychiatry units on the main campus, students will encounter patients with a variety of severe psychiatric illnesses that are oftentimes complicated by various medical comorbidities requiring consultation services. Students will work on patient care teams with a PGY-1, and an attending psychiatrist. Students attend all staffing and teaching conferences given to first-year psychiatry residents and are responsible for the assessment and management of acute psychiatric patients. This includes writing notes, entering orders, and updating the handoff list. The students will also complete one week of night-float with a PGY-1, and shadow a PGY-2 in the Emergency Department's behavioral health unit. Immediate supervision is provided by the inpatient attending, senior resident, and intern on the service. Teaching emphasis is directed toward psychiatric diagnosis, appropriate use of psychopharmacologic agents, psychotherapeutic intervention, the use of community resources and pursuit of the psychiatric scientific literature.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Radiation Oncology

The Department of Radiation Oncology was created in 2001, after having been part of the Mallinckrodt Institute of Radiology for many decades. The department has a broad academic program that focuses on excellence in patient care and the development of new treatment paradigms; innovative research in each of our three divisions: Clinical, Medical Physics and Cancer Biology; and teaching graduate students, medical students, residents in both radiation oncology and medical physics, and allied health personnel.

The department is one of the largest, most academically balanced, and best equipped in the country, and it is responsible for all radiation therapy procedures at Washington University Medical Center and at Siteman Cancer Center facilities throughout the St. Louis regional area. Our faculty have gained international recognition for innovative technological advances in physics and treatment planning, biological research, computer applications and clinical investigation.

We have advanced treatment planning computer systems for 3D conformal and intensity-modulated radiation therapy as well as the latest Gamma Knife, the ICON unit. We have six linear accelerators with on-board CT imaging capability. The brachytherapy suite includes capabilities for high dose rate remote after-loading and for image-guided permanent prostate seed implants. Interstitial and external hyperthermia treatments are also available.

The Department of Radiation Oncology offers the following formal educational programs:

- Clinical Residency Training Program (four years), ACGME-accredited; established 1971
- Medical Physics Residency Training Program (two years), CAMPEP-accredited; established 1993
- Post-PhD Graduate Certificate in Medical Physics (one to two years), CAMPEP-accredited; established 2017
- Master of Science (MS) in Medical Physics (two years), CAMPEP-accredited; established 2020
- Doctor of Philosophy (PhD) in Medical Physics (two to five years); established 2022

Website:

<http://radonc.wustl.edu>

Faculty

Sana Karam, MD, PhD

Department Head

James Randall, MD

Medical Student Director

Joanna Yang, MD, MPH

Clinical Residency Program Director

Phillip Wall, PhD, MS

Medical Physics Residency Program Director

Michael Altman, PhD

Director of Education in Medical Physics

Visit our website for more information about our faculty and their appointments.

A

Michael Bernard Altman, Ph.D.

Professor of Radiation Oncology (primary appointment)

Doctor of Philosophy, University of Chicago, 2010

Anthony John Apicelli, Ph.D., M.D.

Associate Professor of Radiation Oncology (primary appointment)

Bachelor of Science, Princeton University, 1999

Doctor of Philosophy, Washington University in St. Louis, 2009

Doctor of Medicine, Washington University in St. Louis, 2009

B

Nadia Marie Benabdallah, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)

Bachelor of Science, University of Paris, 2012

Master of Science, University of Paris, 2016

Doctor of Philosophy, University of Paris, 2017

Carmen Renee Bergom, M.S., Ph.D., M.D.

Associate Professor of Radiation Oncology (primary appointment)

Bachelor of Science, Massachusetts Institute of Technology, 1998

Master of Science, University of Cambridge, 1999

Doctor of Philosophy, Medical College of Wisconsin, 2006



Doctor of Medicine, Medical College of Wisconsin, 2008

Amit Bhatt, Ph.D., M.D.

Assistant Professor of Radiation Oncology (primary appointment)

Bachelor of Science, University of Michigan Dearborn, 1997

Doctor of Philosophy, University of Wisconsin, 2002

Doctor of Medicine, Rush University, 2006

C

Douglas Ford Caruthers, M.S.

Instructor in Radiation Oncology (primary appointment)

Master of Science, University of Texas Health Science Center, 2010

Li-Yun Chen, Ph.D.

Instructor in Radiation Oncology (primary appointment)

Doctor of Philosophy, Keele University, 2019

Jessika Contreras, M.D.

Associate Professor of Radiation Oncology (primary appointment)

Bachelor of Arts, Johns Hopkins University, 2009

Bachelor of Science, Johns Hopkins University, 2009

Doctor of Medicine, University of South Florida, 2014

Austen Curcuro, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)

Bachelor of Science, Loyola University Chicago, 2014

Master of Science, Washington University in St Louis, 2018

Doctor of Philosophy, Washington University in St Louis, 2023

David T Curiel, Ph.D., M.D.

Professor of Radiation Oncology (primary appointment)

Distinguished Professor of Radiation Oncology

Professor of Medicine

Professor of Obstetrics and Gynecology

Bachelor of Arts, West Georgia College, 1978

Doctor of Medicine, Emory University, 1982

Doctor of Philosophy, University of Groningen, 2000

D

Arash Darafsheh, M.S., Ph.D.

Professor of Radiation Oncology (primary appointment)

Bachelor of Science, University of Tehran, 2004

Master of Science, University of North Carolina at Charlotte, 2011

Doctor of Philosophy, University of Pennsylvania, 2015

Jennifer De Los Santos, M.D.

Professor of Radiation Oncology (primary appointment)

Doctor of Medicine, University of Florida, 1995

Carl J. DeSelm, Ph.D., M.D.

Associate Professor of Radiation Oncology (primary appointment)

Bachelor of Science, Dartmouth College, 2004

Doctor of Medicine, Washington University in St Louis, 2012

Doctor of Philosophy, Washington University in St Louis, 2016

Venkata Rao Devineni, M.D.

Voluntary Clinical Associate Professor of Radiation Oncology

Doctor of Medicine, Osmania Medical College, 1973

Igor Dmitriev, Ph.D.

Associate Professor of Radiation Oncology (primary appointment)

Doctor of Philosophy, SRC Vector, 1994

Robert E Drzymala, Ph.D.

Professor Emeritus of Radiation Oncology

Bachelor of Science, Northern Illinois University, 1972

Doctor of Philosophy, University of Oklahoma, 1977

E

Sharbacha Edward, Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)

Doctor of Philosophy, University of Texas M.D. Anderson Cancer

Center, 2022

F

Farnoush Forghani-Arani, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)

Bachelor of Science, Shiraz University of Medical Sciences, 2000

Master of Science, University of Tehran, 2002

Doctor of Philosophy, Colorado School of Mines, 2013

G

Jose L Garcia, M.S.

Assistant Professor of Radiation Oncology (primary appointment)

Bachelor of Science, University of Puerto Rico, 1995

Master of Science, Rosalind Franklin University of Medicine and

Science (Formerly Finch University of Health Sciences), 1997

Hiram Alberto Gay, M.D.

Professor of Radiation Oncology (primary appointment)

Bachelor of Science, University of Puerto Rico, 1996

Doctor of Medicine, University of Puerto Rico, 2000

Sreekrishna M Goddu, M.S., Ph.D.

Professor of Radiation Oncology (primary appointment)

Bachelor of Science, Andhra University, 1983

Master of Science, Andhra University, 1985

Doctor of Philosophy, Andhra University, 1991

Yuxing Gu, Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)

Doctor of Philosophy, University of Missouri Columbia, 2000

H

Lannis Hall, M.P.H., M.D.

Voluntary Clinical Professor of Radiation Oncology

Bachelor of Arts, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1988

Doctor of Medicine, Howard University, 1992

Master of Public Health, Saint Louis University, 1995

Dennis E Hallahan, M.D.

Professor of Radiation Oncology (primary appointment)

Professor of Cell Biology and Physiology

Professor of Pathology and Immunology

Professor of Molecular Microbiology



Professor of Biomedical Engineering
Bachelor of Science, University of Illinois at Urbana-Champaign, 1980
Doctor of Medicine, Rush University, 1984

Yao Hao, Ph.D.

Associate Professor of Radiation Oncology (primary appointment)
California, 2004
Doctor of Philosophy, University of Massachusetts Lowell, 2016

Joseph Harms, Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Doctor of Philosophy, Georgia Institute of Technology-Main Campus, 2018

Ibrahim Hatipoglu, M.S., Ph.D.

Instructor in Radiation Oncology (primary appointment)
Bachelor of Science, Istanbul University, 2004
Master of Science, University of Anatolia, 2006
Doctor of Philosophy, University of Anatolia, 2012

Dean Hobbis, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Eckerd College, 2015
Master of Science, University of South Florida, 2018
Doctor of Philosophy, University of South Florida, 2020

Donghua Hu, Ph.D.

Instructor in Radiation Oncology (primary appointment)
Bachelor of Science, Anhui University of Traditional Chinese Medicine (#####), 2011
Doctor of Philosophy, University of Tasmania, 2018

Jiayi Huang, M.D.

Professor of Radiation Oncology (primary appointment)
Doctor of Medicine, University of Massachusetts Medical School Worcester, 2007

Geoffrey Douglas Hugo, Ph.D.

Professor of Radiation Oncology (primary appointment)
Director - Physics Division, Medical Physics
Professor of Computer Science and Engineering
Endowed Professor of Radiation Oncology
Doctor of Philosophy, University of California Los Angeles, 2003

K

Vaishali Kapoor, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Arts, Delhi University, 2006
Master of Science, All India Institute of Medical Sciences, 2008
Doctor of Philosophy, All India Institute of Medical Sciences, 2013

Sana D Karam, M.S., M.D., Doctorate

Professor of Radiation Oncology (primary appointment)
Elizabeth H and James S McDonnell III Distinguished Professor of Medicine
Head of the Department of Radiation Oncology
Bachelor of Science, American University of Beirut, 1991
Master of Science, University of Maryland at Baltimore, 1994
Doctorate, University of Washington, 2001

Doctor of Medicine, Georgetown University, 2008

TaeHo Kim, Ph.D.

Professor of Radiation Oncology (primary appointment)
Doctor of Philosophy, Washington University in St Louis, 2007

Nels C Knutson, M.S., Ph.D.

Associate Professor of Radiation Oncology (primary appointment)
Bachelor of Science, University of Montana Missoula, 2009
Master of Science, Louisiana State University, 2012
Doctor of Philosophy, University of Massachusetts Lowell, 2016

L

Susan Joy Laduzinsky, M.D.

Assistant Professor of Radiation Oncology (primary appointment)
Doctor of Medicine, University of Illinois at Chicago, 1983

Hugh HC Lee, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Hanyang University, 2009
Master of Science, Seoul National University, 2011
Doctor of Philosophy, Purdue University-Main Campus, 2016

Jason Dole Lee, Ph.D., M.D.

Associate Professor of Radiation Oncology (primary appointment)
Doctor of Philosophy, Duke University, 2009
Doctor of Medicine, Duke University, 2010

Hua Li, Ph.D.

Professor of Radiation Oncology (primary appointment)
Doctor of Philosophy, Huazhong University of Science and Technology (#####, HUST), 2001

Hsiu-San Lin, Ph.D., M.D.

Professor Emeritus of Radiation Oncology
Doctor of Medicine, National Taiwan University, 1960
Doctor of Philosophy, University of Chicago, 1968

Zhi Hong Lu, Ph.D.

Associate Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Fudan University (####), 1990
Doctor of Philosophy, University of Mississippi Medical Center, 1999

M

Mustafaa Saleem Mahmood, M.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Arts, Saint Louis University, 2015
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2019

Stephanie Markovina, M.D.

Associate Professor of Radiation Oncology (primary appointment)
Doctor of Medicine, University of Wisconsin Madison, 2010

Thomas Rolf Mazur, Ph.D.

Associate Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Union College New York, 2007
Doctor of Philosophy, University of Texas Austin, 2014

Jeff Michael Michalski, M.B.A., M.D.

Professor of Radiation Oncology (primary appointment)
Carlos Perez Distinguished Professor of Radiation Oncology
Director - Clinical Division, Clinical Programs
Vice Chair - Department of Radiation Oncology
Professor of Radiology
Bachelor of Science, University of Wisconsin Madison, 1982
Doctor of Medicine, Medical College of Wisconsin, 1986
Master of Business Administration, Washington University in St Louis, 2001

Justin Mikell, Ph.D.

Associate Professor of Radiation Oncology (primary appointment)
Associate Professor of Radiology
Bachelor of Science, University of Illinois at Urbana-Champaign, 2002
Doctor of Philosophy, University of Texas Houston, 2015

Timothy John Mitchell, M.S., Ph.D.

Associate Professor of Radiation Oncology (primary appointment)
Bachelor of Science, John Carroll University, 2005
Master of Science, Washington University in St Louis, 2007
Doctor of Philosophy, University of Missouri in St Louis, 2014

Eric Daniel Morris, Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Michigan Technological University, 2015
Doctor of Philosophy, Wayne State University, 2020

Naoshad Muhammad, M.S., Ph.D.

Instructor in Radiation Oncology (primary appointment)
Bachelor of Science, Bundelkhand University, 2005
Master of Science, Jamia Hamdard University, 2009
Doctor of Philosophy, Savitribai Phule Pune University, 2016

Robert J Myerson, Ph.D., M.D.

Professor Emeritus of Radiation Oncology
Bachelor of Arts, Princeton University, 1969
Doctor of Philosophy, University of California, 1974
Doctor of Medicine, University of Miami, 1980

N**Gilbert H Nussbaum, M.A., Ph.D.**

Associate Professor Emeritus of Radiation Oncology
Bachelor of Science, City College, 1960
Master of Arts, Harvard University, 1962
Doctor of Philosophy, Harvard University, 1967

O**Seung Jong Oh, M.S., Ph.D.**

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Korea Advanced Institute of Science & Technology, 2001
Master of Science, Catholic University of Korea, 2003
Doctor of Philosophy, Catholic University of Korea, 2011

P**Stephanie Mabry Perkins, M.D.**

Professor of Radiation Oncology (primary appointment)
S. Lee Kling Endowed Chair of Radiation Oncology
Bachelor of Science, Union University, 2001
Doctor of Medicine, University of Tennessee at Memphis, 2005

James Vernon Piephoff, M.D.

Voluntary Clinical Instructor in Radiation Oncology
Bachelor of Science, Citadel Military College of South Carolina, 1985
Doctor of Medicine, University of South Carolina (Duplicate of University of South Carolina Columbia), 1989

Michael Thomas Prusator, M.S., Ph.D.

Associate Professor of Radiation Oncology (primary appointment)
Bachelor of Science, University of Ozarks, 2012
Master of Science, University of Oklahoma Health Sciences Center, 2014
Doctor of Philosophy, University of Oklahoma Health Sciences Center, 2018

James A Purdy, M.A., Ph.D.

Emeritus Professor of Radiation Oncology
Bachelor of Science, Lamar University, 1967
Master of Arts, University of Texas Austin, 1969
Doctor of Philosophy, University of Texas Austin, 1971

R**Nikhil Rammohan, M.S., M.D.**

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Johns Hopkins University, 2008
Master of Science, Johns Hopkins University, 2009
Doctor of Medicine, Northwestern University, 2018

James Randall, M.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, University of Texas, 2015
Doctor of Medicine, University of Texas Medical Branch at Galveston, 2019

Clifford Grant Robinson, M.D.

Professor of Radiation Oncology (primary appointment)
Professor of Medicine
Bachelor of Science, University of Pittsburgh, 2000
Doctor of Medicine, Case Western Reserve University, 2004

Buck Edward Rogers, M.A., Ph.D.

Professor of Radiation Oncology (primary appointment)
Professor of Radiology
Bachelor of Science, Loyola University Chicago, 1989
Master of Arts, Washington University in St Louis, 1991
Doctor of Philosophy, Washington University in St Louis, 1995

Tapán Roy, M.S.

Voluntary Clinical Instructor in Radiation Oncology
Master of Science, Baroda Medical College, 1974

S**Ziad Saleh, M.S., Ph.D.**

Assistant Professor of Radiation Oncology (primary appointment)



Master of Science, University of Florida, 2003
Doctor of Philosophy, Florida Institute of Technology, 2010

Pamela Parker Samson, M.A., M.P.H., M.S., M.D.

Associate Professor of Radiation Oncology (primary appointment)
Bachelor of Arts, University North Carolina, 2001
Master of Arts, University of Washington, 2003
Master of Science, University of Cincinnati-Main Campus, 2007
Doctor of Medicine, University of Cincinnati-Main Campus, 2011
Master of Public Health, Washington University in St Louis, 2020

Matthew Schmidt, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Valdosta State University, 2011
Master of Science, Duke University, 2013
Doctor of Philosophy, University of Massachusetts Lowell, 2022

Julie K Schwarz, Ph.D., M.D.

Professor of Radiation Oncology (primary appointment)
Professor of Cell Biology and Physiology
Bachelor of Science, Duke University, 1995
Doctor of Philosophy, Washington University in St Louis, 2004
Doctor of Medicine, Washington University in St Louis, 2004

Christopher Spencer, M.A., M.D.

Voluntary Clinical Instructor in Radiation Oncology
Master of Arts, Truman State University (Duplicate of Truman State University (Formerly Northeast Missouri State University)), 2006
Doctor of Medicine, Saint Louis University, 2010

T

Maria A Thomas, Ph.D., M.D.

Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Creighton University, 2000
Doctor of Philosophy, Saint Louis University, 2006
Doctor of Medicine, Saint Louis University, 2008

Wade L Thorstad, M.D.

Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Trinity University, 1986
Doctor of Medicine, University of Texas Austin, 1991

Amaris Renee Tippey, Ph.D.

Voluntary Clinical Assistant Professor of Radiation Oncology
Doctor of Philosophy, East Carolina University, 2014

V

Gregory Riccardo Vlacich, Ph.D., M.D.

Professor of Radiation Oncology (primary appointment)
Doctor of Philosophy, University of Chicago, 2007
Doctor of Medicine, University of Chicago, 2009

W

Phillip Douglas Hardenbergh Wall, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Davidson College, 2014
Master of Science, Louisiana State University, 2017

Doctor of Philosophy, Louisiana State University, 2020

Bruce J Walz, M.D.

Voluntary Clinical Associate Professor of Radiation Oncology
Bachelor of Arts, Washington University in St Louis, 1962
Doctor of Medicine, Washington University in St Louis, 1966

Michael Richard Waters, M.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Davidson College, 2010
Doctor of Medicine, Virginia Commonwealth University, 2019

Y

Joanna Chensi Yang, M.P.H., M.D.

Associate Professor of Radiation Oncology (primary appointment)
Bachelor of Arts, Stanford University, 2008
Doctor of Medicine, Mount Sinai School of Medicine, 2013
Master of Public Health, Harvard University, 2018

Z

Hailei Zhang, M.S., Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Henan University (#####), 2013
Master of Science, Henan University (#####), 2016
Doctor of Philosophy, Fudan University (#####), 2019

Jin Zhang, M.Eng., Ph.D.

Associate Professor of Radiation Oncology (primary appointment)
Bachelor of Science, Tianjin University (#####), 2005
Master of Engineering, Tianjin Polytechnic University (#####), 2008
Doctor of Philosophy, University of Connecticut, 2012

Xiandong Zhao, Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Doctor of Philosophy, Southern Methodist University, 2017

Xiaodong Zhao, Ph.D.

Assistant Professor of Radiation Oncology (primary appointment)
Doctor of Philosophy, Louisiana State University, 2020

Imran Zoberi, M.D.

Professor of Radiation Oncology (primary appointment)
Bachelor of Science, University of South Dakota, 1992
Doctor of Medicine, Washington University in St Louis, 1996

Jacqueline Esthappan Zoberi, Ph.D.

Professor of Radiation Oncology (primary appointment)
Bachelor of Arts, University of Chicago, 1995
Doctor of Philosophy, University of Chicago, 2000

Research Electives

Radiation Oncology Research Electives

The Cancer Biology division provides opportunities for graduate students in the Division of Biology and Biomedical Sciences (DBBS) and the Medical Scientist Training Program (MSTP) to train with faculty in the cancer biology research laboratories.

Please visit the Department of Radiation Oncology website for more information about current research in the department.

Courses

Graduate Programs in Medical Physics

For course information related to the Master of Science in Medical Physics, the PhD in Medical Physics, and the Post-PhD Graduate Certificate in Medical Physics, please visit the Medical Physics page (p. 78) of this *Bulletin*.

MD/MSTP Programs

The Department of Radiation Oncology offers courses that are open to students in the MD and MSTP (MD/PhD) programs. For course information, please visit the online course listings.

RADONC 8005 Clinical Radiation Oncology (Clinical Elective)

The Radiation Oncology clinical division offers an elective with emphasis on the evaluation, planning, and administration of radiation therapy in patients with malignant tumors. Students will have the opportunity to enhance their knowledge of the natural history of cancer, as well as its pathological and biological features. Students will sharpen their clinical skills by participating in the management of cancer patients. Students will be mentored to prepare and lead a department noon conference on the management of a specific patient's care, including literature review and discussion. Students will be expected to prepare for clinical consultations by reviewing patient records and relevant literature, obtaining the patient's history and performing a physical examination. This will be followed by presenting findings and a proposed care plan to the attending and resident physicians.

Credit 2 units.

Typical periods offered: Medicine Year

RADONC 9100 Radiation Oncology Advanced Clinical Rotation (ACR)

The Radiation Oncology clinical division offers an elective with emphasis on the evaluation, planning, and administration of radiation therapy in patients with malignant tumors. The objective of this course is to expose students to the field of Radiation Oncology through clinical experience. Students will have the opportunity to enhance their knowledge of the natural history of cancer, as well as its pathological and biological features. Students will sharpen their clinical skills by participating in the management of cancer patients. Students will be

expected to prepare for clinical consultations by reviewing patient records and relevant literature, obtaining the patient's history and performing a physical examination. This will be followed by presenting findings and a proposed care plan to the attending and resident physicians.

Credit 4 units.

Typical periods offered: Medicine Year

Department of Radiology

The Edward Mallinckrodt Institute of Radiology — more commonly known as Mallinckrodt Institute of Radiology or MIR — serves as the Department of Radiology for Washington University School of Medicine in St. Louis, helping to guide the consulting physician in the discovery, the treatment, and, ultimately, the healing of disease. Established in 1930, MIR is one of the largest and most scientifically sophisticated radiology centers worldwide.

Internationally recognized for its groundbreaking research, the Institute continues to pioneer new radiological techniques for better patient care.

Milestones

- Development of the first diagnostic test for gallbladder disease
- Design and construction of the first cross-sectional X-ray laminagraph
- Collaboration on design and installation of the first cyclotron located in a U.S. medical center
- Development of positron emission tomography (PET)
- Installation of one of the world's first computed tomography (CT) and magnetic resonance (MR) scanners
- Interfacing of a minicomputer with a gamma camera to improve the accuracy and efficiency of nuclear medicine procedures
- Establishment of the first mobile mammography van west of the Mississippi River
- Integration of CT and MR scans with a three-dimensional technology application of organic chemistry to the preparation of radiopharmaceuticals used in medical imaging
- Measurement of cerebral blood flow and metabolism
- Establishment of one of the largest and most comprehensive interventional radiology services in the United States
- Application of PET for measuring metabolic activity in relation to cardiac blood flow
- Early adoption of sequential PET/MR imaging

The Institute occupies more than 400,000 total square feet and comprises its own 12-story building, with satellite facilities in Barnes-Jewish and St. Louis Children's hospitals; the Clinical Sciences Research and East buildings; the Scott Avenue Imaging Center; the Center for Advanced Medicine; the Knight Emergency and Trauma Center; and the South County Siteman Cancer Center. The department



provides diagnostic radiology, nuclear medicine and radiation physics services for all hospitals in the Washington University Medical Center, Barnes-Jewish West County and Barnes-Jewish St. Peters hospitals. The Institute also provides diagnostic radiology for the Washington University Orthopedic and Barnes-Jewish Hospital Outpatient Orthopedic center.

MIR clinical facilities are on several floors of the Institute, with general diagnostic radiology on the second floor; neuroradiology on the third floor; gastrointestinal and genitourinary radiology and ultrasonography on the fourth floor; and MRI on the fifth floor. A comprehensive interventional radiology center occupies the eighth floor. Nuclear medicine is on the ninth floor of the Barnes-Jewish Hospital West Pavilion. Orthopedic imaging and musculoskeletal radiology services are on the sixth floor of the Center for Advanced Medicine. The Breast Health Center, on the fifth floor of the Center for Advanced Medicine, is a multidisciplinary facility that provides a full range of breast imaging services and interventional procedures. In the north wing of St. Louis Children's Hospital is a complete pediatric radiology facility, offering ultrasound, nuclear medicine, CT and MRI, and interventional radiology.

The Institute has 102 examination rooms used for diagnostic radiology. Clinical and research equipment includes two PET/CT scanners, 13 CT scanners, two PET scanners, one PET/MR scanner, 15 MR scanners (including an 11.7-Tesla research scanner), 12 high-end ultrasound machines (plus seven portable units), nine interventional radiology systems, five digital chest units, 10 computer radiography units, two neurointerventional radiology systems and six mammography units. In addition, as part of the department's community outreach effort, the Institute co-sponsors with the Alvin J. Siteman Cancer Center a mobile mammography van that provides screening services at corporate and public sites in the St. Louis area.

MIR has approximately 200,000 square feet devoted to research, with facilities in the Clinical Sciences Research Building (radiological sciences), in the East Building (electronic radiology), in the Scott Avenue Imaging Center (neurological PET, molecular pharmacology, biomedical MR imaging, optical imaging and cardiovascular imaging), and in the Center for Clinical Imaging Research (a bioimaging facility for basic and translational inpatient and outpatient clinical research).

Administrative, teaching and support functions occupy the sixth floor and the ninth through the 12th floors of the Institute. Information and training related to the use of radioactive materials is handled by Environmental Health and Safety; for more information, contact the department's director Daniel Doenges, CHP, at 314-362-2988 or daniel.doenges@wustl.edu.

Website: <https://www.mir.wustl.edu>

Faculty

Richard L. Wahl, MD
Department Chair

Visit our website for more information about our faculty and their appointments.

A

Diane S Abou, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, University of Montpellier II, 2003
Master of Science, Faculté des sciences d'Orsay, 2005
Doctor of Philosophy, Delft University of Technology, 2010

Joseph J.H. Ackerman, Ph.D.

Professor of Radiology (primary appointment)
William Greenleaf Eliot Professor Emeritus of Chemistry
Bachelor of Arts, Boston University, 1972
Doctor of Philosophy, Colorado State University, 1977

Ankita Aggarwal, MBBS

Assistant Professor of Radiology (primary appointment)
Foreign MD equivalent, Government Medical College, 2009

Tabassum Ahmad, M.D.

Associate Professor of Radiology (primary appointment)
Doctor of Medicine, Aga Khan University, 1996

Mercy Iyabode Akerele, Ph.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Philosophy, University of Leeds, 2019

Houman Alizadeh, M.D.

Voluntary Clinical Associate Professor of Radiology
Doctor of Medicine, Babol University of Medical Sciences, 1995

Hongyu An, M.S., Ph.D.

Professor of Radiology (primary appointment)
Professor of Neurology
Bachelor of Science, Tianjin University (#####), 1993
Master of Science, Washington University in St Louis, 1999
Doctor of Philosophy, Washington University in St Louis, 2001

Mark Anthony Anastasio, M.S., Ph.D.

Professor of Radiology (primary appointment)
Professor of Computer Science & Engineering
R. Gilbert Jost Distinguished Professor of Imaging Sciences and Artificial Intelligence
Illinois Institute of Technology, 1992
University of Pennsylvania, 1993
University of Chicago, 2001

Trevor John Andrews, Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, University of Texas Austin, 1994
Doctor of Philosophy, University of Texas Health Sciences at San Antonio, 2005

B

Jonathan C Baker, M.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Saint Louis University, 2000
Doctor of Medicine, Washington University in St Louis, 2004

Edwin J Baldelomar, Ph.D.

Instructor in Radiology (primary appointment)

Bachelor of Science, University of Texas Arlington, 2011
Doctor of Philosophy, University of Hawaii at Manoa, 2019

Dennis M Balfe, M.D.

Professor Emeritus of Radiology
Bachelor of Science, Santa Clara University, 1968
Doctor of Medicine, Medical College of Wisconsin, 1975

David Hilton Ballard, M.S., M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, McNeese State University, 2008
Master of Science, McNeese State University, 2011
Doctor of Medicine, Louisiana State University Health Sciences Center at New Orleans, 2015

Krystle G. Barhaghi, M.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Tulane University, 2014

Remco Bastiaannet, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, University of Twente, 2011
Master of Science, University of Twente, 2013
Doctor of Philosophy, University of Utrecht, 2020

Adam Quentin Bauer, M.S., Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 2001
Master of Science, Washington University in St Louis, 2005
Doctor of Philosophy, Washington University in St Louis, 2009

Debbie Lee Bennett, M.D.

Professor of Radiology (primary appointment)
Section Chief - Breast Imaging
Ronald and Hanna Evens Professor of Women's Health
Bachelor of Science, Princeton University, 2003
Doctor of Medicine, Harvard University, 2008

Kevin Michael Bennett, Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Milwaukee School of Engineering, 1998
Doctor of Philosophy, Medical College of Wisconsin, 2003

Donald Benson

Associate Professor of Radiology (Pending Executive Faculty Approval)
(primary appointment)

Tammie Lee Smith Benzinger, Ph.D., M.D.

Professor of Radiology (primary appointment)
Professor of Neurological Surgery
Hugh Monroe Wilson Professor of Radiology
Bachelor of Arts, Williams College, 1993
Doctor of Philosophy, University of Chicago, 1998
Doctor of Medicine, University of Chicago, 2000

Mikhail Y Berezin, M.S., Ph.D.

Associate Professor of Radiology (primary appointment)
Master of Science, Moscow Institute of Oil & Gas, 1987
Doctor of Philosophy, Moscow Institute of Oil & Gas, 1991

Sagine Audra Berry-Tony, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Stony Brook University, 2008
Doctor of Medicine, George Washington University, 2013

Sanjeev Bhalla, M.D.

Professor of Radiology (primary appointment)
Section Chief - Cardiothoracic
Professor of Medicine
Bachelor of Science, Yale University, 1990
Doctor of Medicine, Columbia College of Physicians and Surgeons, 1994

Andrew J Bierhals, M.P.H., M.D.

Professor of Radiology (primary appointment)
Professor of Medicine
Professor of Pediatrics
Bachelor of Science, University of Pittsburgh, 1993
Master of Public Health, University of Pittsburgh, 1996
Doctor of Medicine, University of Pittsburgh, 2000

Joelle Biernacki, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 1988
Doctor of Medicine, University of Missouri Kansas City, 1989

Janine Diane Bijsterbosch, M.S., Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Maastricht University, 2006
Master of Science, University of Sheffield, 2007
Doctor of Philosophy, University of Sheffield, 2011

Tyler M Blazey, Ph.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, University of Minnesota Twin Cities, 2010
Doctor of Philosophy, Washington University in St Louis, 2019

Mitra Bill Boodram, M.D.

Voluntary Clinical Instructor in Radiology
Bachelor of Science, McMaster University, 1983
Doctor of Medicine, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 1989

Daniel Braga, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Florida State University, 2012
Doctor of Medicine, Saint George's University, 2018

Jennie Esther Brodsky, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, New York University, 2003
Doctor of Medicine, New York University School of Medicine, 2007

Arianna Cloe Buckley, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Southern Methodist University, 2011
Doctor of Medicine, Southern Illinois University Carbondale, 2015

Scott Michael Bugenhagen, Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Milwaukee School of Engineering, 2007
Doctor of Philosophy, Medical College of Wisconsin, 2014



Doctor of Medicine, Medical College of Wisconsin, 2016

James Benjamin Burke, M.D.

Instructor in Radiology (Pending Dean Approval) (primary appointment)

Bachelor of Arts, Auburn University Main Campus, 2014

Doctor of Medicine, University of South Alabama, 2019

C

Runnan Cao, Ph.D.

Instructor in Radiology (primary appointment)

Bachelor of Science, Shandong Normal University (#####), 2012

Doctor of Philosophy, Chinese Academy of Sciences, 2018

Daniel Charles Castro, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Science, University of Washington, 2011

Master of Science, University of Michigan Ann Arbor, 2013

Doctor of Philosophy, University of Michigan Ann Arbor, 2016

Karen A Caudill, M.D.

Assistant Professor of Radiology (primary appointment)

Assistant Professor of Pediatrics

Bachelor of Science, University of Missouri Kansas City, 1996

Doctor of Medicine, University of Missouri Kansas City, 1996

Ganesh B Chand, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Science, Tribhuvan University, 2003

Master of Science, Tribhuvan University, 2007

Doctor of Philosophy, Georgia State University, 2015

Aisling M. Chaney, Ph.D., MSBI

Assistant Professor of Radiology (primary appointment)

MSBI-Masters in Bioimaging, Imperial College, 2012

Doctor of Philosophy, University of Manchester, 2016

Andrew Lee Chang, Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)

Doctor of Philosophy, Washington University in St Louis, 2020

Doctor of Medicine, Washington University in St Louis, 2020

Jodie Chang, M.D.

Voluntary Clinical Assistant Professor of Radiology

Doctor of Medicine, Washington University in St Louis, 2017

Arindam Rano Chatterjee, M.D.

Associate Professor of Radiology (primary appointment)

Bachelor of Science, Columbia University, 2000

Doctor of Medicine, University of Tennessee at Memphis, 2006

Sadaf Summer Chaudhry, M.D.

Voluntary Clinical Instructor in Radiology

Bachelor of Science, Boston University, 2003

Doctor of Medicine, Boston University, 2007

Sherwin Chiu, M.D.

Assistant Professor of Radiology (primary appointment)

Doctor of Medicine, University of Alabama at Birmingham School of Medicine, 2018

Marc F. Clemente, M.D.

Voluntary Clinical Instructor in Radiology

Bachelor of Science, University of California Davis, 1993

Doctor of Medicine, Saint Louis University, 1997

Paul Kevin Commean, B.E.E.

Assistant Professor of Radiology (primary appointment)

Assistant Professor of Physical Therapy

Bachelor of Electrical Engineering, Georgia Institute of Technology-Main Campus, 1982

Thomas E Conturo, Ph.D., M.D.

Associate Professor of Radiology (primary appointment)

Bachelor of Arts, University of Pennsylvania, 1981

Doctor of Philosophy, Vanderbilt University, 1989

Doctor of Medicine, Vanderbilt University, 1989

Constance Stone Courtois, M.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Science, Wofford College, 1980

Doctor of Medicine, Medical University of South Carolina, 1985

Dewitte T Cross

Professor Emeritus of Radiology

Joseph P Culver, Ph.D.

Professor of Radiology (primary appointment)

Sherwood Moore Professor of Radiology

Professor of Physics (Courtesy)

Professor of Electrical and Systems Engineering

Bachelor of Arts, Whitman College, 1985

Bachelor of Science, University of Washington, 1988

Doctor of Philosophy, University of Pennsylvania, 1997

Douglas J Curry, M.D.

Voluntary Clinical Instructor in Radiology

Doctor of Medicine, University of Texas Southwest, 1997

Brian Cusworth, M.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Arts, Harvard University, 2007

Doctor of Medicine, Washington University in St Louis, 2019

D

Michael D Darcy, M.D.

Professor of Radiology (primary appointment)

Bachelor of Science, Ohio State University-Main Campus, 1976

Doctor of Medicine, Ohio State University-Main Campus, 1979

Farrokh Dehdashti, M.D.

Professor of Radiology (primary appointment)

Barry A and Marilyn J Siegel Professor of Radiology

Senior Vice Chair - Division of Nuclear Medicine

Doctor of Medicine, Pahlavi University, 1977

Christina Doherty, M.D.

Associate Professor of Radiology (primary appointment)

Bachelor of Science, Truman State University (Formerly Northeast Missouri State University), 1997

Doctor of Medicine, Southern Illinois University Carbondale, 2001

Steven Don, M.D.

Professor of Radiology (primary appointment)
Bachelor of Arts, Johns Hopkins University, 1981
Doctor of Medicine, Vanderbilt University, 1985

Abygail Dulle

Instructor in Radiology (Pending Dean Approval) (primary appointment)

James R Duncan, Ph.D., M.D.

Professor of Radiology (primary appointment)
Bachelor of Science, University of Michigan Ann Arbor, 1982
Doctor of Philosophy, Washington University in St Louis, 1988
Doctor of Medicine, Washington University in St Louis, 1988

E**Adam Thomas Eggebrecht, M.S., Ph.D.**

Associate Professor of Radiology (primary appointment)
Master of Science, Washington University in St Louis, 2005
Doctor of Philosophy, Washington University in St Louis, 2009

Cihat Eldeniz, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Bogazici University, 2006
Master of Science, Duke University, 2008
Doctor of Philosophy, University of North Carolina at Chapel Hill, 2014

Allen Devaney Elster, M.A., M.B.A., M.D., B.Eng

Professor of Radiology (primary appointment)
Bachelor of Engineering, Vanderbilt University, 1976
Master of Arts, University of Oxford, 1978
Doctor of Medicine, Baylor College of Medicine, 1980
Master of Business Administration, Wake Forest University, 1999

Azadeh Eslambolchi, M.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Tehran University of Medical Sciences, 2008

Ronald G Evens, M.D.

Professor Emeritus of Radiology
Bachelor of Arts, Washington University in St Louis, 1961
Doctor of Medicine, Washington University in St Louis, 1964

F**Katharina Franziska Feister, M.D.**

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Suffolk University, 2013
Doctor of Medicine, University of Miami, 2018

Keith C Fischer, M.D.

Emeritus Associate Professor of Radiology
Bachelor of Arts, Oberlin College, 1967
Doctor of Medicine, Johns Hopkins University Medical (Duplicate of Johns Hopkins University), 1971

Shaney Flores, M.S.

Instructor in Radiology (primary appointment)
Bachelor of Science, University of Texas Pan American, 2011
Master of Science, University of Missouri in St Louis, 2023

Tyler Jacob Fraum, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, University of Chicago, 2008
Doctor of Medicine, Duke University, 2012

Nelly Friedrichsen, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Martinique, 2002
Master of Science, Université Paris 6 Pierre and Marie Curie, 2008
Doctor of Philosophy, University of Paris, 2012

G**Joel Richard Garbow, Ph.D.**

Professor of Radiology (primary appointment)
Bachelor of Science, University of Illinois at Urbana-Champaign, 1978
Doctor of Philosophy, University of California Berkeley, 1983

Heather Vallhonrat Garrett, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Arts, University of Virginia, 1996
Doctor of Medicine, Washington University in St Louis, 2002

Aimilia Gastounioti, Ph.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Philosophy, National Technical University of Athens, 2014

David S Gierada, M.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Davenport University, 1983
Doctor of Medicine, Wayne State University, 1988

Matthew F. Glasser, Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)
Assistant Professor of Neuroscience
Bachelor of Science, Emory University, 2006
Doctor of Philosophy, Washington University in St Louis, 2017
Doctor of Medicine, Washington University in St Louis, 2017

Harvey S Glazer, M.D.

Professor of Radiology (primary appointment)
Bachelor of Arts, Washington University in St Louis, 1971
Doctor of Medicine, Washington University in St Louis, 1976

Brian A Gordon, M.S., Ph.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Psychological & Brain Sciences
Bachelor of Science, University of Illinois at Urbana-Champaign, 2003
Master of Science, University of Illinois at Urbana-Champaign, 2006
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2010

Evan Moss Gordon, Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Duke University, 2004
Doctor of Philosophy, Georgetown University, 2012

Jennifer E Gould, M.D.

Professor of Radiology (primary appointment)
Bachelor of Arts, Cornell University, 1993
Doctor of Medicine, Washington University in St Louis, 1997

Manu Shri Goyal, M.S., M.D.

Professor of Radiology (primary appointment)



Professor of Neurology
Professor of Neuroscience
Bachelor of Science, University of Illinois at Chicago, 2000
Master of Science, University of Oxford, 2001
Doctor of Medicine, University of Chicago, 2005

Andrew Greer, M.S., M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, University of Missouri Columbia, 2006
Master of Science, Georgetown University, 2010
Doctor of Medicine, University of Nebraska Medical Center, 2015

Perry W Grigsby, M.B.A., M.S., M.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, University of Kentucky, 1974
Master of Science, University of Kentucky, 1978
Doctor of Medicine, University of Kentucky, 1982
Master of Business Administration, Washington University in St Louis, 1990

Robert John Gropler, M.D.

Professor of Radiology (primary appointment)
Senior Vice Chair - Division of Radiological Sciences, Research Laboratories
Associate Professor of Medicine
Professor of Biomedical Engineering
Bachelor of Science, Allegheny College, 1977
Doctor of Medicine, University of Cincinnati-Main Campus, 1981

Lin Gu, M.B.A., M.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Peking Union Medical College (#####formerly #####), 2010
Master of Business Administration, Washington University in St Louis, 2019

Carlos J Guevara, M.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Surgery (General Surgery)
Bachelor of Science, University South Carolina, 2002
Doctor of Medicine, Duke University, 2006

Caroline Guglielmetti, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Universite Paul Sabatier, 2008
Master of Science, Universite Paul Sabatier, 2010
Doctor of Philosophy, University of Antwerp, 2016

Punita Gupta, M.P.H., M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Arts, Washington University in St Louis, 1995
Master of Public Health, Saint Louis University, 1996
Doctor of Medicine, University of Illinois at Urbana-Champaign, 2000

Fernando R Gutierrez, M.D.

Professor of Radiology (primary appointment)
Professor of Medicine
Doctor of Medicine, University of Valladolid, 1974

Gloria J. Guzman Perez-Carrillo, M.B.A., M.P.H., M.S., M.D.

Associate Professor of Radiology (primary appointment)

Bachelor of Arts, Johns Hopkins University, 1999
Doctor of Medicine, University of Puerto Rico, 2004
Master of Science, University of Granada, 2011
Master of Public Health, University of Arizona, 2019
Master of Business Administration, University of Arizona, 2023

H

Satvik Ramiah Hadigal, M.D.

Assistant Professor of Radiology (Pending Dean Approval) (primary appointment)
Bachelor of Science, Emory University, 2011
Doctor of Medicine, Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2019

Paul Wayne Hargan, M.D.

Voluntary Clinical Instructor in Radiology
Doctor of Medicine, Southern Illinois University Carbondale, 1977

Bruce L Hedgepeth, M.D.

Voluntary Clinical Instructor in Radiology
Bachelor of Science, Arizona State University, 1986
Doctor of Medicine, University of Arizona, 1990

Gyu Seong Heo, M.S., Ph.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, Sogang University, 2006
Master of Science, Sogang University, 2008
Doctor of Philosophy, Texas A&M University, 2016

Thomas Eugene Herman, M.D.

Instructor in Radiology (primary appointment)
Bachelor of Arts, Dartmouth College, 1971
Doctor of Medicine, Johns Hopkins University, 1975

Rebecca L Hulett, M.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Pediatrics
Baccalaureatus, Mount Holyoke College, 1977
Doctor of Medicine, University of Michigan Ann Arbor, 1981

I

Resten Imaoka, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, University of California Davis, 2008
Doctor of Medicine, Saint George's University, 2013

Masatoshi Inoue, M.M.Sc., D.M.Sc.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, University of Tokyo, 2007
Master of Medical Science, University of Tokyo, 2009
DMSc-Doctor of Medical Science, University of Tokyo, 2013

Joseph Edward Ippolito, Ph.D., M.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
Bachelor of Science, Cornell University, 1998
Doctor of Philosophy, Washington University in St Louis, 2007
Doctor of Medicine, Washington University in St Louis, 2007

Malak Itani, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, American University of Beirut, 2003
Doctor of Medicine, American University of Beirut, 2007

J**Amin Haghighat Jahromi, M.D.**

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Tehran University of Medical Sciences, 2007

William P James, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Arts, Washington University in St Louis, 1989
Doctor of Medicine, University of Missouri Columbia, 1993

Cylen Javidan, M.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Medicine
Associate Professor of Pediatrics
Doctor of Medicine, Iran University of Medical Sciences, 1994

Jack W Jennings, M.S., Ph.D., M.D.

Professor of Radiology (primary appointment)
Section Chief - Musculoskeletal
Professor of Orthopedic Surgery
Bachelor of Science, Wheaton College Illinois, 1992
Master of Science, Ohio State University-Main Campus, 1995
Doctor of Philosophy, University of South Florida, 1999
Doctor of Medicine, University of South Florida, 2002

Hao Jiang, M.S., Ph.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, Gandhi Memorial Science College (G.G.M. Science College), 2006
Master of Science, Murray State University, 2009
Doctor of Philosophy, Virginia Polytechnic Institute and State University, 2014

R. Gilbert Jost, M.D.

Professor Emeritus of Radiology
Bachelor of Arts, Harvard University, 1964
Doctor of Medicine, Yale University, 1969

K**Pavan Kumar Kavali, M.D.**

Associate Professor of Radiology (primary appointment)
Associate Professor of Surgery (General Surgery)
Bachelor of Science, Georgia Institute of Technology-Main Campus, 2003
Doctor of Medicine, Morehouse School of Medicine, 2010

James E. Kelly, M.A., M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, University of Notre Dame, 1999
Master of Arts, Washington University in St Louis, 2005
Doctor of Medicine, Washington University in St Louis, 2005

Pegah Khoshpouri, M.D.

Assistant Professor of Radiology (primary appointment)
Tehran University of Medical Sciences, 2013

Stephanie Hewon Kim, Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Massachusetts Institute of Technology, 2006
Doctor of Philosophy, University of Chicago, 2013
Doctor of Medicine, University of Chicago, 2015

Thomas Kim, M.B.A., M.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Washington University in St Louis, 1988
Master of Business Administration, Northwestern University, 2013

Katerina Sunn Konstantinoff, M.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2018

Veera Venkata Satyanarayana Kothapalli, M.S., Ph.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, Andhra University, 2005
Master of Science, Royal Institute of Technology, 2010
Doctor of Philosophy, Royal Institute of Technology, 2015

Lawrence M Kotner, M.D.

Associate Professor Emeritus of Radiology
Bachelor of Arts, Washington University in St Louis, 1965
Doctor of Medicine, Washington University in St Louis, 1968

Mariya Kristeva

Assistant Professor of Radiology (Pending Dean Approval) (primary appointment)

Shinjini Kundu, M.S., Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)
Assistant Professor of Electrical & System Engineering
Bachelor of Science, Stanford University, 2011
Master of Science, Stanford University, 2011
Doctor of Philosophy, Carnegie Mellon University, 2016
Doctor of Medicine, University of Pittsburgh Medical Center-Health System, 2017

L**Richard Laforest, M.S., Ph.D.**

Professor of Radiology (primary appointment)
Professor of Radiation Oncology
Bachelor of Arts, University of Laval, 1989
Master of Science, University of Laval, 1991
Doctor of Philosophy, University of Laval, 1994

Michael H Lanier, Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)
Baccalaureatus, Washington University in St Louis, 2006
Doctor of Philosophy, Washington University in St Louis, 2017
Doctor of Medicine, Washington University in St Louis, 2017

John Joowon Lee, Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Brown University, 1990



Doctor of Philosophy, University of Illinois at Urbana-Champaign, 1998

Doctor of Medicine, University of Illinois at Urbana-Champaign, 2002

Michelle Lee, M.D.

Professor of Radiology (primary appointment)

Bachelor of Science, University of Wisconsin Madison, 1993

Doctor of Medicine, Northwestern University, 2001

David Alan Leitman, D.O.

Voluntary Clinical Instructor in Radiology

Bachelor of Science, Lindenwood University, 2006

Doctor of Medicine, A T Still University of Health Sciences, 2010

Paula M Leiva, M.D.

Associate Professor of Radiology (primary appointment)

Doctor of Medicine, Univ Nacional de Cuyo, 2000

Yongjian Liu, M.S., Ph.D.

Professor of Radiology (primary appointment)

Bachelor of Science, Henan Normal University #####, 1997

Master of Science, Zhejiang University (National Che Kiang University) (####), 2000

Doctor of Philosophy, University of Missouri Columbia, 2007

David Loy

Voluntary Clinical Instructor in Radiology

Daniel Ryder Ludwig, M.D.

Associate Professor of Radiology (primary appointment)

Bachelor of Science, Brown University, 2009

Doctor of Medicine, University of Pittsburgh, 2014

Jose Marcio Luna, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Science, Universidad Distrital Francisco José de Caldas, 2004

Master of Science, University of New Mexico-Main Campus, 2009

Doctor of Philosophy, University of New Mexico-Main Campus, 2014

M

Carlos Andres Mahia, M.D.

Assistant Professor of Radiology (primary appointment)

Doctor of Medicine, Universidad Nacional de Cuyo Mendoza, 2001

Mariam Akbar Malik, M.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Science, University of Minnesota Twin Cities, 2007

Doctor of Medicine, Saint Louis University, 2013

Christopher Devin Malone, M.D.

Associate Professor of Radiology (primary appointment)

Associate Professor of Surgery

Bachelor of Science, Bucknell University, 2005

Doctor of Medicine, Tulane University, 2011

Naganathan B Mani, M.S., MBBS

Professor of Radiology (primary appointment)

Professor of Surgery (General Surgery)

Foreign MD equivalent, Tamilnadu Medical University, 1995

Master of Science, PGIMER, 1999

Jaimee Elizabeth Mannix, M.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Science, William Jewell College, 2011

Doctor of Medicine, Creighton University, 2015

Daniel Scott Marcus, Ph.D.

Professor of Radiology (primary appointment)

Bachelor of Arts, Washington University in St Louis, 1995

Bachelor of Science, Washington University in St Louis, 1995

Doctor of Philosophy, Washington University in St Louis, 2001

Scott Allen Marek, Ph.D.

Assistant Professor of Radiology (primary appointment)

Assistant Professor of Psychiatry

Bachelor of Science, John Carroll University, 2012

Doctor of Philosophy, University of Pittsburgh, 2017

Julio Cesar Marin Concha, M.S., M.D.

Assistant Professor of Radiology (Pending Dean Approval) (primary appointment)

Doctor of Medicine, Universidad Peruana Cayetano Heredia, 2019

Master of Science, Dresden International University, 2021

Parisa Mazaheri, M.D.

Assistant Professor of Radiology (primary appointment)

Doctor of Medicine, Tehran University, 2012

William H McAlister, M.D.

Professor of Radiology (primary appointment)

Professor of Pediatrics

Bachelor of Science, Wayne State University, 1950

Doctor of Medicine, Wayne State University, 1954

Elizabeth G. McFarland, M.D.

Professor of Radiology (primary appointment)

Doctor of Medicine, University of San Diego, 1987

Nicole S McKay, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Arts, University of Auckland, 2008

Bachelor of Science, University of Auckland, 2010

Master of Science, University of Auckland, 2013

Doctor of Philosophy, University of Auckland, 2019

Robert Carolin McKinstry, M.S., Ph.D., M.D.

Professor of Radiology (primary appointment)

William R. Orthwein, Jr. and Laura Rand Orthwein Chair in Radiology and Pediatrics

Senior Vice Chair - Division of Diagnostic Imaging at MIR

Professor of Pediatrics

Bachelor of Science, Boston University, 1984

Master of Science, Massachusetts Institute of Technology, 1986

Doctor of Philosophy, Massachusetts Institute of Technology, 1991

Doctor of Medicine, Harvard University, 1992

Amanda Laleh Mehrsheikh, M.D.

Assistant Professor of Radiology (primary appointment)

Doctor of Medicine, University of Toledo, 2019

Vincent Michael Mellnick, M.D.

Professor of Radiology (primary appointment)

Section Chief - Abdominal

Bachelor of Arts, University of Notre Dame, 2002
Doctor of Medicine, University of Texas Houston, 2006

Christine Onsy Menias, M.D.

Voluntary Research Professor of Radiology
Bachelor of Science, Marquette University, 1990
Doctor of Medicine, George Washington University, 1995

Joyce Chipo Mhlanga, M.D.

Associate Professor of Radiology (primary appointment)
Doctor of Medicine, University of Liverpool, 2000

William D Middleton, M.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Duke University, 1977
Doctor of Medicine, Duke University, 1981

Mikhail V Milchenko, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Master of Science, Moscow State University, 1999
Doctor of Philosophy, Louisiana Tech University, 2005

Michelle M Miller-Thomas, M.D.

Professor of Radiology (primary appointment)
Vice Chair of Faculty Development
Bachelor of Science, California Institute of Technology, 1998
Doctor of Medicine, Saint Louis University, 2002

Aaron Joseph Mintz, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Stanford University, 2005
Doctor of Medicine, Washington University in St Louis, 2013

Stephen M Moerlein, M.A., Pharm.D., Ph.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
Bachelor of Science, University of Illinois at Chicago, 1976
Master of Arts, Washington University in St Louis, 1979
Doctor of Philosophy, Washington University in St Louis, 1982
Doctor of Pharmacy, University of Florida, 2008

Lisa B Mogil, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Columbia University, 2012
Doctor of Medicine, State University of New York at Buffalo, 2017

Barbara S Monsees, M.D.

Professor Emeritus of Radiology
Bachelor of Arts, Brandeis University, 1971
Doctor of Medicine, Washington University in St Louis, 1975

Carrie Christina Morrison, M.D.

Voluntary Clinical Instructor in Radiology
Bachelor of Science, University of Missouri Columbia, 1982
Doctor of Medicine, University of Iowa, 1991

N**Ayman Nada, M.M.Sc., M.D., MBChB**

Associate Professor of Radiology (primary appointment)
Bachelor of Medicine and Bachelor of Surgery, Cairo University, 2010
Master of Medical Science, Cairo University, 2014

Doctor of Medicine, Cairo University, 2017

Ying Hwey Nai, Ph.D., B.Eng

Assistant Professor of Radiology (primary appointment)
Bachelor of Engineering, Nanyang Technological University, 2008
Doctor of Philosophy, Tohoku University, 2017

Kelby Brett Napier, Ph.D., M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Eastern Kentucky University, 2001
Doctor of Philosophy, University of Louisville, 2006
Doctor of Medicine, University of Louisville, 2008

Vamsi R. Narra, M.B.A., M.D.

Professor of Radiology (primary appointment)
Senior Vice Chair for Clinical Imaging Informatics and New Clinical Business Development
Doctor of Medicine, Osmania Medical College, 1990
Master of Business Administration, Washington University in St Louis, 2015

Adam David Naylor, M.D., B.Eng

Assistant Professor of Radiology (primary appointment)
Bachelor of Engineering, University of Michigan Ann Arbor, 2013
Doctor of Medicine, Washington University in St Louis, 2018

Arash Nazeri, M.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Tehran University of Medical Sciences, 2013

Michael Lee Nickels, Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Northern Kentucky University, 2001
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2007

Benjamin Edward Northrup, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Arts, Truman State University (Formerly Northeast Missouri State University), 2004
Doctor of Medicine, Dartmouth College, 2009

O**Megan O'Brien**

Voluntary Clinical Instructor in Radiology

Lisa M Oakley, M.D.

Assistant Professor of Radiology (Pending Executive Faculty Approval)
(primary appointment)
Bachelor of Science, Stanford University, 1988
Doctor of Medicine, Duke University, 1992

P**Ashwin Singh Parihar, M.D., MBBS**

Assistant Professor of Radiology (primary appointment)
Foreign MD equivalent, Uttarakhand Technical University, 2014
Doctor of Medicine, PGIMER, 2019

Matthew S Parsons, M.D.

Professor of Radiology (primary appointment)
Bachelor of Arts, Miami University-Oxford, 1995



Doctor of Medicine, University of Cincinnati-Main Campus, 2000

Daniel D Picus, M.D.

Professor of Radiology (primary appointment)
Senior Vice Chair - Special Projects
Professor of Surgery (General Surgery)
Bachelor of Science, University of Illinois at Urbana-Champaign, 1977
Doctor of Medicine, University of Chicago, 1981

Janet Helen Pollard, M.D.

Associate Professor of Radiology (primary appointment)
Doctor of Medicine, University of Oklahoma, 2008

Maria Rosana Ponisio, M.D.

Associate Professor of Radiology (primary appointment)
Doctor of Medicine, La Plata University, 1990

Vikas Prasad, MBBS

Professor of Radiology (primary appointment)
Foreign MD equivalent, Gandhi Memorial Science College (G.G.M. Science College), 2001

Linda Ruth Proctor, M.D.

Voluntary Clinical Instructor in Radiology
Bachelor of Science, University of Pennsylvania, 1985
Doctor of Medicine, University of Pennsylvania, 1989

Q

Lin Qiu, Ph.D.

Instructor in Radiology (primary appointment)
Doctor of Philosophy, East China Normal University (#####), 2014

James D Quirk, M.A., Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Massachusetts Institute of Technology, 1994
Master of Arts, Washington University in St Louis, 1998
Doctor of Philosophy, Washington University in St Louis, 2001

R

Amir Ata Rahnamaei Azar

Assistant Professor of Radiology (primary appointment)

Marcus E Raichle, M.D.

Professor of Radiology (primary appointment)
Alan A and Edith L Wolff Distinguished Professor of Medicine
Professor of Neuroscience
Professor of Neurology
Professor of Psychological & Brain Sciences
Professor of Biomedical Engineering
Bachelor of Science, University of Washington, 1960
Doctor of Medicine, University of Washington, 1964

Cyrus A Raji, Ph.D., M.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Neurology
Bachelor of Arts, University of Pittsburgh, 2004
Bachelor of Science, University of Pittsburgh, 2004
Doctor of Philosophy, University of Pittsburgh, 2009
Doctor of Medicine, University of Pittsburgh, 2010

Mohamed Zakariya Rajput, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Augustana College Illinois, 2009
Doctor of Medicine, Loyola University Chicago, 2013

Ryan Vittal Raut, Ph.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, University of Wisconsin, 2016
Doctor of Philosophy, Washington University in St Louis, 2021

Nanette Rahee Reed, M.D.

Assistant Professor of Radiology
Bachelor of Science, University of Notre Dame, 2000
Doctor of Medicine, Baylor College of Medicine, 2004

Martin Nicholas Reis, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Princeton University, 1994
Doctor of Medicine, Columbia University, 2000

Michael Patrick Reiter, M.D., B.Eng

Instructor in Radiology (primary appointment)
Bachelor of Engineering, Villanova University, 1998
Doctor of Medicine, Rust College, 2002

Patricia Manuela Ribeiro Pereira, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Universidade de Aveiro, 2010
Master of Science, Universidade de Aveiro, 2012
Doctor of Philosophy, Universidade de Aveiro, 2016

Nassir Rostambeigi, M.S., M.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Surgery (General Surgery)
Doctor of Medicine, Tehran University, 2005
Master of Science, Monash University, 2008

Henry D Royal, M.D.

Professor Emeritus of Radiology
Bachelor of Science, Providence College, 1970
Doctor of Medicine, Saint Louis University, 1974

S

Thomas Hellmut Schindler, Ph.D., M.D.

Professor of Radiology (primary appointment)
Professor of Medicine
Doctor of Medicine, University of Leipzig, 1995
Doctor of Philosophy, University of Geneva, 2009

Sally J Schwarz, M.S.

Professor Emerita of Radiology
Bachelor of Science, University of Iowa, 1971
Master of Science, University of Southern California, 1976

Janice Semenkovich, M.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Yale University, 1977
Doctor of Medicine, Washington University in St Louis, 1981

Ikbal Sencan Egilmez, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)

Bachelor of Science, Fatih University, 2007
Master of Science, University of California Los Angeles, 2010
Doctor of Philosophy, University of California Los Angeles, 2013

Noah McKimmey Seymore, M.D.

Voluntary Clinical Assistant Professor of Radiology
Bachelor of Science, University of North Carolina at Chapel Hill, 2011
Doctor of Medicine, East Carolina University, 2015

Gary D Shackelford, M.D.

Professor Emeritus of Radiology
Bachelor of Arts, Northwestern University, 1964
Doctor of Medicine, Washington University in St Louis, 1968

Ghazal Shadmani, M.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Shiraz University of Medical Sciences, 2004

Amar S Shah, M.D., Master

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Lehigh University, 2014
Doctor of Medicine, Washington University in St Louis, 2019
Master's degree, Washington University in St Louis, 2019

Vijay Sharma, M.S., Ph.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Panjab University, 1980
Master of Science, Panjab University, 1983
Doctor of Philosophy, Panjab University, 1987

Anup Shashindra Shetty, M.D.

Professor of Radiology (primary appointment)
Bachelor of Arts, Duke University, 2003
Doctor of Medicine, University of Texas Southwest, 2007

Joshua S Shimony, Ph.D., M.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Technion Israel Institute of Technology, 1982
Doctor of Philosophy, University of Tennessee, 1988
Doctor of Medicine, University of Illinois at Urbana-Champaign, 1995

Koresh Isaac Shoghi, M.S., Ph.D.

Professor of Radiology (primary appointment)
Bachelor of Science, University of California Los Angeles, 1996
Master of Science, University of California Los Angeles, 2000
Doctor of Philosophy, University of California Los Angeles, 2005

Monica Shokeen, Ph.D.

Associate Professor of Radiology (primary appointment)
Vice Chair of Diversity, Equity, and Justice
Associate Professor of Medicine
Doctor of Philosophy, Washington University in St Louis, 2006

Hui Hua Shu, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 1986
Doctor of Medicine, University of Missouri Kansas City, 1987

Barry Alan Siegel, M.D.

Professor of Radiology (primary appointment)
Professor of Medicine
Bachelor of Arts, Washington University in St Louis, 1966

Doctor of Medicine, Washington University in St Louis, 1969

Cary Lynn Siegel, M.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Davenport University, 1983
Doctor of Medicine, Davenport University, 1987

Marilyn J Siegel, M.D.

Professor of Radiology (primary appointment)
Professor of Radiology in Pediatrics
Bachelor of Arts, Washington University in St Louis, 1965
Doctor of Medicine, State University of New York, 1969

Jothilingam Sivapackiam, M.S., Ph.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, Madurai Kamaraj University, 1996
Master of Science, Madurai Kamaraj University, 1998
Doctor of Philosophy, Pondicherry University, 2004

Emily Louise Smith, M.D.

Assistant Professor Emeritus of Radiology
Bachelor of Arts, Washington University in St Louis, 1964
Doctor of Medicine, Washington University in St Louis, 1968

Abraham Z Snyder, Ph.D., M.D.

Professor of Radiology (primary appointment)
Associate Professor of Neurology
Bachelor of Arts, Columbia University, 1970
Doctor of Philosophy, Rockefeller University, 1977
Doctor of Medicine, State University of New York, 1981

Sheng-Kwei Song, M.S., Ph.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Tamkang University, 1981
Master of Science, University of Alabama in Tuscaloosa, 1986
Doctor of Philosophy, Washington University in St Louis, 1990

Robert Peter Stachecki, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, University of Notre Dame, 2003
Doctor of Medicine, Georgetown University, 2007

Carl J Stokes, M.D.

Assistant Professor of Radiology (primary appointment)
Washington University in St Louis, 2020

Benjamin S Strnad, M.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Arts, University of Texas Austin, 2010
Doctor of Medicine, University of Texas Medical School Houston, 2014

Alexander L Sukstansky, M.S., D.Sc., Ph.D.

Associate Professor of Radiology (primary appointment)
Master of Science, Kharkov State University, 1971
Doctor of Philosophy, Donetsk State University, 1980
Doctor of Science, Donetsk State University, 1991

Christopher A. Swingle, M.B.A., D.O.

Assistant Professor of Radiology (primary appointment)
Bachelor of Arts, University of Kansas, 1996
Doctor of Osteopathic Medicine, Kansas City University of Medicine and Biosciences, 2000



Master of Business Administration, Washington University in St Louis,
2023

T

Yasasvi Tadavarthi, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Georgia Institute of Technology-Main Campus,
2016
Doctor of Medicine, Medical College of Georgia, 2020

Yuan-Chuan Tai, M.E.E., Ph.D.

Professor of Radiology (primary appointment)
Senior Vice Chair of Radiology
Professor of Electrical and Systems Engineering
Bachelor of Science, National Tsing Hua University, 1988
Master of Electrical Engineering, University of Texas Arlington, 1992
Doctor of Philosophy, University of California Los Angeles, 1998

Rui Tang, M.A., Ph.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, University of Science and Technology of China (#
#####), 2002
Master of Arts, Washington University in St Louis, 2004
Doctor of Philosophy, Washington University in St Louis, 2009

Ting Y Tao, Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)
Section Chief - Pediatrics
Bachelor of Science, Washington University in St Louis, 2000
Doctor of Philosophy, Washington University in St Louis, 2008
Doctor of Medicine, Washington University in St Louis, 2008

Sharlene A Teefey, M.D.

Professor Emeritus of Radiology
Doctor of Medicine, University of Hawaii at Manoa, 1980

Matthew Allan Thomas, Ph.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Philosophy, University of Arkansas at Little Rock, 2012

Daniel Lyndon Jaffe Thorek, Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, University of Toronto, 2004
Doctor of Philosophy, University of Pennsylvania, 2010

Zhude Tu, M.S., Ph.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Beijing Normal University (#####), 1988
Doctor of Philosophy, Beijing Normal University (#####), 1995
Master of Science, University of Saint Thomas, 2000

U

Alexander Ushinsky, M.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Surgery (General Surgery)
Bachelor of Science, University of California San Diego, 2010
Doctor of Medicine, University of California San Diego, 2014

V

Theodore Louis Vander Velde, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Calvin College, 1989
Doctor of Medicine, Wayne State University, 1993

Wenzel G Vas, M.D.

Voluntary Clinical Instructor in Radiology
Doctor of Medicine, St. John's Medical College, 1973

Suresh Vedantham, M.D.

Professor of Radiology (primary appointment)
Professor of Surgery (General Surgery)
Bachelor of Arts, Northwestern University, 1988
Doctor of Medicine, University of Chicago, 1992

Andrei G Vlassenko, Ph.D., M.D.

Associate Professor of Radiology (primary appointment)
Doctor of Medicine, Moscow Med Stomatology Inst, 1987
Doctor of Philosophy, Institute of Neurology, 1991

Katie Dieu Thu Vo, M.D.

Professor of Radiology (primary appointment)
Section Chief - Neuroradiology
Bachelor of Arts, Wellesley College, 1986
Bachelor of Science, Massachusetts Institute of Technology, 1986
Doctor of Medicine, Cornell University, 1991

Cornelius Jan von Morze, Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, University of California Berkeley, 2001
Doctor of Philosophy, University of California San Francisco, 2008

W

Richard L Wahl, M.D.

Professor of Radiology (primary appointment)
Professor of Radiation Oncology
Michel M Ter-Pogossian Professor of Radiology
Bachelor of Arts, Wartburg College, 1974
Doctor of Medicine, Washington University in St Louis, 1978

Jerold W Wallis, M.S., M.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Biomedical Engineering
Bachelor of Science, Yale University, 1976
Master of Science, Stanford University, 1981
Doctor of Medicine, Stanford University, 1981

Liang Wang, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Tianjin Medical University (#####), 1994
Doctor of Medicine, Tianjin Medical University (#####), 1994

Qing Wang, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Changsha University of Science and Technology (#
#####), 1999



Master of Science, Northeast Electrical University or Northeast Dianli University (#####), 2002
Doctor of Philosophy, Washington University in St Louis, 2011

Shuo Wang, Ph.D.

Associate Professor of Radiology (primary appointment)
Associate Professor of Neurological Surgery
Doctor of Philosophy, California Institute of Technology, 2014

Wei Wang, M.S., Ph.D., M.D.

Assistant Professor of Radiology (primary appointment)
Doctor of Medicine, Peking University Health Science Center (#####), 1999
Master of Science, University of Tennessee, 2002
Doctor of Philosophy, Washington University in St Louis, 2006

Danielle Marie Weems, M.S., M.D.

Instructor in Radiology (primary appointment)
Bachelor of Science, University of Mississippi, 1994
Master of Science, Washington University in St Louis, 1996
Doctor of Medicine, Washington University in St Louis, 2003

Muriah Dawn Wheelock, Ph.D.

Assistant Professor of Radiology (primary appointment)
Assistant Professor of Statistics and Data Science (Courtesy Affiliation)
Bachelor of Arts, University of Alabama in Tuscaloosa, 2010
Doctor of Philosophy, University of Alabama in Tuscaloosa, 2016

Kimberly N Wiele, M.D.

Professor of Radiology (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 1981
Doctor of Medicine, University of Missouri Kansas City, 1981

Franz J Wippold, M.D.

Professor Emeritus of Radiology
Bachelor of Arts, Westminster College, 1973
Doctor of Medicine, Saint Louis University, 1977

Jonathan Rodger Wood, M.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Northwestern University, 2004
Doctor of Medicine, University of Rochester, 2009

Pamela K Woodard, M.D.

Professor of Radiology (primary appointment)
Elizabeth E Mallinckrodt Professor of Radiology
Head of the Department of Radiology
Director of The Edward Mallinckrodt Institute of Radiology
Professor of Medicine
Professor of Pediatrics
Professor of Biomedical Engineering
Bachelor of Arts, Duke University, 1986
Doctor of Medicine, Duke University, 1990

X

Jinbin Xu, M.Eng., Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Taiyuan University of Technology (#####), 1991
Master of Engineering, Taiyuan University of Technology (#####), 1994

Doctor of Philosophy, Taiyuan University of Technology (#####), 1998

Y

Dmitriy A Yablonskiy, M.S., D.Sc., Ph.D.

Professor of Radiology (primary appointment)
Master of Science, Kharkov State University, 1970
Doctor of Philosophy, Institute for Physics and Eng, 1973
Doctor of Science, Institute for Physics and Eng, 1981

Z

Hanwen Zhang, M.S., Ph.D.

Associate Professor of Radiology (primary appointment)
Bachelor of Science, Lanzhou University (#####), 1993
Master of Science, China Institute of Atomic Energy, 2000
Doctor of Philosophy, University of Basel, 2005

Zhongwei Zhang, Ph.D., M.D.

Associate Professor of Radiology (primary appointment)
Doctor of Medicine, Rowan College at Burlington County, 2000
Doctor of Philosophy, Sun Yat-Sen University (#####), 2009

Alexander Zheleznyak, M.S., MMed

Instructor in Radiology (primary appointment)
Bachelor of Arts, Washington University in St Louis, 1983
Master of Science, University of Missouri in St Louis, 1997
Mordovia State University

Jie Zheng, M.S., Ph.D.

Professor of Radiology (primary appointment)
Bachelor of Science, Beijing University, 1986
Master of Science, University of Cincinnati-Main Campus, 1992
Doctor of Philosophy, University of Cincinnati-Main Campus, 1994

Dong Zhou, M.S., Ph.D.

Assistant Professor of Radiology (primary appointment)
Bachelor of Science, Shandong University (#####), 1990
Master of Science, Shandong University (#####), 1995
Doctor of Philosophy, Washington University in St Louis, 2004

Research Electives

Radiology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Interested students should contact the appropriate individual in each division regarding the types of research projects available.

David Ballard, MD

Abdominal Imaging Section, Mallinckrodt Institute Radiology
Phone: 314-362-2928
davidballard@wustl.edu

Dr. Ballard's lab is engaged in clinical and translation 3D printing research with 3D-printed models for procedural planning, medical devices, and medical devices/implants impregnated with bioactive compounds. He is also active in clinical research in a broad scope of abdominal malignancies and infectious processes. Dr. Ballard is willing to mentor trainees and students at all levels for research in clinical 3D printing, translational 3D printing, clinical radiology, and radiology education.

Tom Conturo, MD, PhD

East Building, 2nd Floor, Rm 2120

Phone: 314-362-8421

Magnetic resonance (MR) imaging is a noninvasive means of providing images of the human body at high spatial resolution and contrast sensitivity. The contrast can be manipulated to depend on different properties of tissue water, enabling the study of a variety of biological processes. In some cases, endogenous or exogenous paramagnetic MR contrast agents are used to alter the MRI contrast by perturbing the tissue water environment. Recently, new MRI hardware has also enabled techniques having high temporal resolution. Using the unique contrast properties of MRI and the higher spatial/temporal resolution, noninvasive techniques can be devised to study neuronal activity, tissue perfusion, water mobility (diffusion), and neuronal fiber pathways in the human brain. The goals of Dr. Conturo's research lab are to develop and apply MR imaging techniques for quantitative imaging of cerebral perfusion, brain function, water diffusion, and neuronal fiber pathways. These techniques utilize the MR signal effects of exogenous bolus-injected contrast agents, endogenous hemoglobin, and microscopic water diffusion. Long-term goals are to apply these methodologies toward imaging and understanding tissue structure, function, and physiology in the brain and other organs in normal and abnormal conditions. The approaches that are used in this laboratory cover a broad range of areas, including MRI physics, MRI pulse sequence development, theoretical derivations, computer simulations, image-processing, computer graphics, custom contrast agent design and synthesis, phantom studies, animal models, human studies, clinical patient studies, and comparison with other imaging modalities.

Farrokh Dehdashti, MD

Nuclear Medicine PET Facility, 10th Floor, Mallinckrodt Institute of Radiology

Phone: 314-362-1474

Positron emission tomography (PET) is an imaging technique that produces images reflective of biochemical processes of normal and abnormal tissues. PET is complementary to anatomic imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI). The ability of PET to quantify fundamental processes, such as blood flow, oxygen metabolism, glucose metabolism, and receptor density, makes this technique very desirable to both investigators and clinicians. Dr. Dehdashti's research utilizes the conventional PET radiopharmaceutical, F-18 fluorodeoxyglucose (FDG), as well as a variety of unique PET radiopharmaceuticals such as Cu-64-diacetyl-bis(N4-methylthiosemicarbazone) (Cu-64 ATSM), a

hypoxic imaging tracer, and 18F-labeled 3'-deoxy-3'-fluorothymidine (FLT), a proliferative imaging tracer. Below is a partial list of the research projects relating to PET: (1) PET assessment of progesterone receptors in patients with newly diagnosed breast cancer with a new progesterone-receptor imaging tracer, 21-[18F]Fluoro-16,17-[(R)-1'-furylmethylidene]dioxo]-19-norpregn-4-ene-3,20 dione (FFNP); (2) assessment of cell proliferation with a new tracer, N-(4-(6,7-dimethoxy-3,4-dihydroisoquinolin-2(1H)-yl)butyl)-2 (2-[18F]-fluoroethoxy)-5-methylbenzamide ([18F]3c), also called [18F]ISO-1 by imaging sigma receptors in patients with various solid cancers; (3) PET assessment of tumor hypoxia using 64Cu-ATSM in patients with cervical cancer (the major goal of this project is to predict prognosis); (4) FDG-PET/CT study in cervical cancer to evaluate the change in tumor FDG heterogeneity and SUVmax during chemoradiation and whether these changes are predictive of response to therapy; (5) PET using [18F]FHBG (9-[4-fluoro-3-hydroxymethyl-butyl]guanine), analog of Penciclovir, an acycloguanosine derivative and antiviral drug, for possible tracking of GvHD in patients who were prior recipients of unrelated allogeneic bone marrow transplant for any hematologic malignancy; and (6) FLT-PET/CT to assess tumor cell proliferation in patient must have histologically or cytologically confirmed ER+ stage IV or metastatic invasive breast cancer.

Rob J. Gropler, MD

East Building, Room 1307

Phone: 314-747-3878

The focus of our lab is on cardiovascular imaging research. The research in the Cardiovascular Imaging Laboratory is designed to better understand the relationship between myocardial perfusion, intermediary metabolism and mechanical function in both normal and abnormal cardiac states. The research involves the integration of several imaging techniques with diverse strengths such as PET, MRI, CT and echocardiography. The success of the research requires several paths of investigation to be pursued in parallel. For example, in order to image the biologic processes of interest requires continued technical developments for each of the imaging methods listed above. There are ongoing efforts to permit more accurate PET measurements of myocardial substrate metabolism. They include the development of novel tracers of extracted substrates, the development of acquisition schemes to assess endogenous substrate metabolism, and the validation of mathematical approaches to correlate the tracer kinetics with the underlying metabolic processes. These studies are being pursued in small and large animal models and then in humans. Another example includes the current efforts to develop approaches to image the coronary arteries noninvasively by MRI using novel contrast agents and acquisition schemes. In addition, techniques are being developed to permit MR guided interventions on the coronary arteries. This undertaking includes the development of novel guide-wire tracking and catheter tracking schemes using both passive and active approaches. Finally, to permit assessments of myocardial oxygenation and thus, perfusion, techniques are being developed to permit BOLD imaging the myocardium. Another path of the research is to determine how this perfusional-metabolic-functional relation is altered by normal life changes and then determine how disease states alter the relationship. For example, both PET and echocardiography

are being used to characterize the age- and gender-related changes on myocardial perfusion, substrate metabolism and function. To study the relationship in disease states, similar studies are being performed in patients with diabetes and obesity. A third path is to determine the mechanisms responsible for these changes in this metabolic-functional relation and identify potential interventions that may reverse or ameliorate them. In this regard, similar imaging studies are being performed to determine the importance of nitric oxide and the PPAR α system in defining this metabolic-functional relation.

Stephen M. Moerlein, PharmD, PhD

East Building, 1st Floor

Phone: 314-362-8466

Our research interests lie in the general area of labeled tracer development for nuclear medicine imaging, especially positron-emission tomography (PET). Developmental effort begins with synthesis of target structures, preclinical screening that involves in vitro biochemistry and pharmacological testing, and ex vivo biodistribution studies in small animals. Promising tracers are then examined by in vivo imaging of animal subjects and tracer kinetic modeling. The final step in the transition of a radiochemical into a labeled drug takes into account radiation dosimetry, pharmaceutical quality, and the development of automated production and GMP production processes to streamline delivery to human subjects. Each of these aspects of radiopharmaceutical development are investigated, with a primary emphasis in novel agents for evaluation of pathological processes in neurology and oncology.

Marc Raichle, MD

East Building, 2nd Floor

Phone: 314-362-6907

We use functional imaging techniques — both positron emission tomography and functional magnetic resonance imaging — to study the normal organization of the human brain and the effect of selected diseases. The research focuses on both the methodology (imaging and experimental) and specific questions in cognitive neuroscience.

Courses

For more information, contact Michelle Miller-Thomas, MD, Coordinator of Radiology Medical Student Education, at miller-thomasm@wustl.edu or 314-362-5949.

RADIOL 8005 General Radiology (Clinical Elective)

This four-week Radiology elective allows students to rotate through four of the following Radiology services: Abdomen, Musculoskeletal, Neuroradiology, Nuclear Medicine, Emergency Radiology, Mammography, Chest, Pediatrics, and Interventional Radiology.

The primary course objectives are to familiarize students with the scope of diagnostic and interventional radiology, including the consulting role radiologists provide to primary care and specialty providers; risks/benefits and cost effectiveness of radiologic examinations; guidelines for ordering common studies; and the radiologic appearance and workup of specific disease entities.

Students spend most of each day in the Radiology reading rooms with residents, fellows, and faculty for interactive teaching at the workstation, driven by daily clinical cases. Students will attend morning and noon didactic conferences with the residents. The students will have a primarily observational role in conferences and in the clinical setting. On Thursday afternoons, students will participate in an interactive conference led by a Radiology resident on a scheduled topic in Radiology. Prior to each Thursday conference, students are expected to view assigned lectures from the course material available online (WUSTL Box). On Friday afternoons, students will present an interesting case from the week in the format of a PowerPoint presentation. All of the PowerPoint presentations will be submitted at the end of the rotation for grading. Students will also be evaluated on their preparedness and participation in the afternoon conferences. Credit 4 units.

Typical periods offered: Medicine Year

RADIOL 8015 Clinical Nuclear Medicine (Clinical Elective)

The clinical service in Nuclear Medicine (NM) is divided into five sections: outpatient general NM, inpatient general NM, Positron Emission Tomography (PET), Pediatric NM studies, NM Cardiac studies, and radionuclide therapy. The recommended schedule will be to spend weeks 1 and 3 in the Center for Advanced Medicine/BJH North Campus (second floor), where the emphasis will be on outpatient general and pediatric Nuclear Medicine with some time in the PET reading room. Week 2 will be in South Campus (West Pavilion 9th floor) and split between inpatient general nuclear medicine, outside PET facilities (morning), cardiac NM services (afternoon), and radionuclide therapy. The schedule for Week 4 will be Monday to Wednesday Center for Advanced Medicine/BJH North Campus and Thursday to Friday on South Campus. This rotation's primary objective is to provide exposure to the full range of clinical nuclear medicine studies. Under the direct supervision of the NM attendings, the student in person (or via Zoom when in-person training is unavailable) will participate in planning and interpreting imaging studies for patients referred to the Division. An opportunity also exists to explore instrumentation techniques, including dedicated computer applications utilized to interpret NM studies. In addition to the clinical experience, the student will attend the NM daily morning conference, held via Zoom or in person from 8-9:00 am. Also, the student may attend the daily diagnostic radiology resident noon conference via Zoom or in-person from 12-1:00 pm. The student will also be able to participate in any conferences within the Department of Radiology and case management conferences where NM studies are discussed. The students are encouraged to prepare a case for the Friday follow-up conference under an NM faculty member's supervision during their rotation.

Credit 2 units.

Typical periods offered: Medicine Year

RADIOL 8030 Cardiothoracic Radiology (Clinical Elective)

A four-week elective emphasizing the interactions between cardiothoracic radiologists and the various clinical services, to include thoracic surgery, thoracic oncology, pediatric and adult cardiology, and pulmonary medicine. Learn to read chest radiographs at the viewing console while providing liaison with the clinical teams. This active elective will include the daily chest teaching conference and participation in weekly pulmonary case conference, thoracic surgery, thoracic oncology conferences, as well as the imaging of the heart using CT and MR. Students spend most of each day in the Radiology



reading rooms with residents, fellows, and faculty for interactive teaching at the workstation, driven by daily clinical cases. The students will have a primarily observational role in conferences and in the clinical setting and will attend morning and noon didactic conferences with the residents. The student will be expected to present a single case from what they have seen during the rotation at a 7AM teaching conference.

Credit 4 units.

Typical periods offered: Medicine Year

RADIOL 9100 Diagnostic Radiology Advanced Clinical Rotation (ACR)

As part of this 4 week Advanced Clinical Rotation in Diagnostic Radiology (DR-ACR), trainees will participate in interpretation and communicating results of various imaging modalities, such as radiography, CT, and ultrasound. Students will perform duties similar to a radiology resident dictating preliminary reports with an attending radiologist, determining most appropriate imaging examinations for patients, and communicating time-dependent results and alternative imaging strategies with ordering providers. There will be opportunity to observe the read out sessions of other residents to enhance the medical students exposure to numerous cases and familiarize them with the process of image interpretation. While the course material will be most applicable to students interested in Diagnostic Radiology, the resulting knowledge, skills and abilities in image interpretation and appropriateness will prove useful for students in any specialty who routinely order imaging examinations. All students will gain experience in interpretation of chest radiographs and based on their future residency of interest, the rotation will be customized to allow rotations in the various areas of diagnostic imaging to help set them up for success in their future residencies (for example neuroimaging). The DR-ACR will include image interpretation and performing examinations for adult patients at Barnes-Jewish Hospital in diagnostic reading rooms including inpatient, outpatient and emergency department.

Credit 4 units.

Typical periods offered: Medicine Year

RADIOL 9150 Interventional Radiology Advanced Clinical Rotation (ACR)

As part of this 4 week Advanced Clinical Rotation in Interventional Radiology (IR-ACR), trainees will participate in image-guided procedures as well as the care of patients before and after those procedures. The opportunities include participating in the care of patients requiring innovative IR treatments for their uterine fibroids, prostatic hypertrophy, peripheral arterial disease, venous disease, portal hypertension and numerous types of cancer. In addition, the increasing use of ultrasound, fluoroscopy and computer tomography to guide an ever increasing array of minimally invasive procedures means that trainees preparing for a broad array of specialties may benefit from this course. While the experiences will be most applicable to students interested in Interventional and Diagnostic Radiology, the resulting knowledge, skills and abilities will also likely prove useful for students interested in Critical Care, Emergency Medicine, Anesthesiology and multiple surgical specialties. The IR-ACR will include caring for adult and pediatric patients at Barnes-Jewish Hospital, Barnes-Jewish West County Hospital and St Louis Children's Hospital. The course will include inpatient as well as outpatient experiences.

Credit 4 units.

Typical periods offered: Medicine Year

Mary Culver

Department of Surgery

Formal instruction in surgery begins during Phase 2 of the MD program's Gateway Curriculum, with a required eight-week clinical clerkship. During this curricular phase, students are assigned to two general surgery clinical rotations lasting three weeks each within the Department of Surgery. These clinical experiences provide students with opportunities to participate in the care of surgical patients (both inpatient and outpatient); to spend time in the operating rooms; and to attend seminars, teaching conferences, and case-based discussions on a regular basis. During Phase 3, students may elect to participate in a variety of sub-internship rotations offered within the Department of Surgery. The sub-internships cover general surgical specialties and subspecialties, including trauma surgery, pediatric surgery, transplant surgery, vascular surgery, cardiovascular and thoracic surgery, urologic surgery, and plastic and reconstructive surgery.

Website:

<http://www.surgery.wustl.edu>

Faculty

Bethany Sacks, MD, MEd

Clerkship Director

Visit our website for more information about our faculty and their appointments.

A

Rebecca L Aft, Ph.D., M.D.

Professor of Surgery (General Surgery) (primary appointment)
Jeffrey F. Moley Professorship in Endocrine and Oncologic Surgery
Bachelor of Science, University of Wisconsin Madison, 1978
Doctor of Philosophy, University of Wisconsin Madison, 1983
Doctor of Medicine, Washington University in St Louis, 1992

Yousef Al-Shraideh, MBBS

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Foreign MD equivalent, Jordan University of Science & Technology, 2001

Brent Allen, M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Utah State University, 1975
Doctor of Medicine, Washington University in St Louis, 1979

David Michael Alvarado, Ph.D.

Assistant Professor of Surgery (Pediatric Surgery) (primary appointment)
Bachelor of Science, University of South Florida, 2007



Doctor of Philosophy, Johns Hopkins University, 2014

Christopher Thomas Arett, M.D.

Associate Professor of Surgery (Urologic Surgery) (primary appointment)

Bachelor of Science, Washington University in St Louis, 1999

Doctor of Medicine, Washington University in St Louis, 2003

Stephanie Armocida, M.D.

Instructor in Surgery (General Surgery) (primary appointment)
College of Medicine, 2018

B

Saifeddin Moh'D Ahmad Badran, Ph.D., M.D.

Assistant Professor of Surgery (Plastic and Reconstructive Surgery)
(primary appointment)

Doctor of Medicine, University of Jordan, 2015

Doctor of Philosophy, Qatar University, 2023

Jeffrey Allen Bailey, M.P.A., M.D.

Professor of Surgery (General Surgery) (primary appointment)

Master of Public Administration, Golden Gate University California,
1986

Doctor of Medicine, Saint Louis University, 1996

Ana Amelia Baumann Walker, M.A., Ph.D.

Associate Professor of Surgery (Public Health Sciences) (primary appointment)

Associate Professor of Anesthesiology

Associate Professor of Public Health

Bachelor of Arts, Brasilia University, 2000

Master of Arts, Brasilia University, 2003

Doctor of Philosophy, Utah State University, 2008

Kimberly Crawford Berni, M.D.

Instructor in Surgery (Urologic Surgery) (primary appointment)

Bachelor of Science, University of Missouri Columbia, 1988

Doctor of Medicine, University of Missouri Columbia, 1993

Sam B Bhayani, M.D.

Professor of Surgery (Urologic Surgery) (primary appointment)

Robert Killian Royce, M.D. Distinguished Professor of Urologic Surgery

Chief Medical Officer

Holekamp Family Chair in Urologic Services

Bachelor of Science, Cornell University, 1992

Doctor of Medicine, Washington University in St Louis, 1996

Jeffrey Alan Blatnik, M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Arts, Miami University-Oxford, 2003

Doctor of Medicine, Case Western Reserve University, 2007

Grant Bochicchio, M.P.H., M.D.

Professor of Surgery (General Surgery) (primary appointment)

Harry Edison Professor of Surgery

Section Chief - Division of Acute & Critical Care Surgery

Master of Public Health, University of Pittsburgh, 1989

Doctor of Medicine, Pennsylvania State University-Main Campus, 1993

Michael Bonebrake, M.D.

Assistant Professor of Surgery (General Surg) (primary appointment)

Bachelor of Science, Kansas State University, 2001

Doctor of Medicine, Creighton University, 2007

Keith E Brandt, M.D.

Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)

William G. Hamm Professor of Surgery (Plastic and Reconstructive Surgery)

Bachelor of Science, Texas A&M University, 1979

Doctor of Medicine, University of Texas Health Science Center, 1983

Whitney Brandt, M.D.

Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)

Bachelor of Science, University of Illinois at Urbana-Champaign, 2010

Stritch School of Medicine, 2014

Alexander Angelo Brescia, M.D.

Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)

Bachelor of Science, University of Notre Dame, 2010

Doctor of Medicine, Saint Louis University, 2015

Danielle Jere Brown, M.D.

Assistant Professor of Surgery (Plastic & Recon Surg) (primary appointment)

Bachelor of Science, Millsaps College, 2011

Doctor of Medicine, University of Mississippi, 2018

Taylor Clarke Brown, M.H.S., M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science, Rhodes College, 2007

Doctor of Medicine, University of Louisville, 2011

Master of Health Science, Yale University, 2018

L. Michael Brunt, M.D.

Professor of Surgery (General Surgery) (primary appointment)

Pruett Professor of Surgery

Section Chief - Section of Minimally Invasive

Bachelor of Arts, University of Mississippi, 1976

Doctor of Medicine, Johns Hopkins University, 1980

Sara Anne Buckman, Pharm.D., M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)

Doctor of Pharmacy, University of Wisconsin Madison, 1999

Doctor of Medicine, University of Wisconsin Madison, 2008

Arnold D Bullock, M.D.

Professor of Surgery (Urologic Surgery) (primary appointment)

Alan A and Edith L Wolff Distinguished Professor

Bachelor of Science, Xavier University of Louisiana, 1983

Doctor of Medicine, Johns Hopkins University, 1987

C

Yin Cao, M.P.H., D.Sc.



Associate Professor of Surgery (Public Health Sciences) (primary appointment)

Associate Professor of Medicine

Master of Public Health, Columbia University, 2009

Doctor of Science, Harvard University, 2013

M. Richard Carlin, M.D.

Associate Professor Emeritus of Clinical Surgery (Urologic Surgery)

Bachelor of Arts, Dartmouth College, 1943

Doctor of Medicine, Yale University, 1947

Su-Hsin Chang, M.A., Ph.D.

Associate Professor of Surgery (Public Health Sciences) (primary appointment)

Bachelor of Arts, National Chengchi University, 1995

Master of Arts, Massachusetts Institute of Technology, 2004

Doctor of Philosophy, Johns Hopkins University, 2010

Will C Chapman, M.D.

Professor of Surgery (General Surgery) (primary appointment)

Eugene M. Bricker Professor of Surgery (General Surgery)

Section Chief - Section of Transplantation

Division Chief - Division of General Surgery

Bachelor of Arts, University of North Carolina at Chapel Hill, 1980

Doctor of Medicine, University of South Carolina Columbia, 1984

William Cavanaugh Chapman, M.P.H., M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Arts, University North Carolina, 2009

Doctor of Medicine, Georgetown University, 2015

Master of Public Health, Washington University in St Louis, 2018

Matthew Claxton, D.P.M.

Assistant Professor of Surgery (General Surg) (primary appointment)

Bachelor of Science, Rosalind Franklin University of Medicine and

Science (Formerly Finch University of Health Sciences), 1997

Doctor of Podiatric Medicine, Rosalind Franklin University of Medicine

and Science (Formerly Finch University of Health Sciences), 2000

Baccalaureatus, University of Chicago

Amber Coffey, M.D.

Associate Professor of Surgery (Plastic & Recon Surg) (primary appointment)

Doctor of Medicine, Johns Hopkins University, 2008

Graham A Colditz, M.P.H., M.D., MBBS

Professor of Surgery (General Surgery) (primary appointment)

Deputy Director for the Institute of Public Health

Division Chief - Division of Public Health

Professor of Medicine

Niess-Gain Professor of Medicine

Professor of Public Health

Bachelor of Science, University of Queensland, 1977

Foreign MD equivalent, University of Queensland, 1979

Master of Public Health, Harvard University, 1982

Doctor of Medicine, University of Queensland, 1998

H. Groves Cooke, M.S., D.Dent.

Voluntary Clinical Instructor in Surgery (Plastic and Reconstructive Surgery)

Bachelor of Arts, De Paul University, 1967

Doctor of Dentistry, Washington University in St Louis, 1971

Master of Science, George Washington University, 1975

Douglas E Coplen, M.D.

Professor of Surgery (Urologic Surgery) (primary appointment)

Bachelor of Arts, Wabash College, 1981

Doctor of Medicine, Indiana University Bloomington, 1985

Michelle Cowan, M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)

Doctor of Medicine, Medical College of Virginia, 2007

James L Cox, M.D.

Evarts A. Graham Professor Emeritus of Surgery (Cardiothoracic Surgery)

Bachelor of Science, University of Mississippi, 1964

Doctor of Medicine, University of Tennessee, 1967

Patrick Alexander Craft, M.M.Sc., D.O.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science, University of Kentucky, 2008

Master of Medical Science, Marshall University, 2010

Doctor of Osteopathic Medicine, West Virginia School of Osteopathic Medicine, 2015

Darren Robert Cullinan, Sc.M., M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science in Nursing, University of Iowa, 2008

Doctor of Medicine, University of Tennessee Health Science Center, 2013

Master of Science, Washington University in St Louis, 2019

Kelly Bettina Currie, M.D.

Associate Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)

Adjunct Lecturer

Bachelor of Science, State University of New York at Buffalo, 2004

Doctor of Medicine, State University of New York at Buffalo, 2008

D

Ralph James Damiano, M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)

Evarts Ambrose Graham Professor of Surgery (Cardiothoracic Surgery)

Bachelor of Arts, Dartmouth College, 1976

Doctor of Medicine, Duke University, 1980

Kia L Davis, M.P.H., Sc.D.

Assistant Professor of Surgery (Public Health Sciences) (primary appointment)

Assistant Professor of Public Health

Baccalaureatus, Washington University in St Louis, 2003

Master of Public Health, Saint Louis University, 2007

Doctor of Science, Harvard University, 2015

Omar Dawood, M.D.

Assistant Professor of Surgery (Urological Surgery) (Pending Dean Approval) (primary appointment)
Bachelor of Science, University of Illinois at Urbana-Champaign, 2016
Doctor of Medicine, Southern Illinois University School of Medicine (SIU-SOM), 2020

Patrick A Dillon, M.D.

Professor of Surgery (Pediatric Surgery) (primary appointment)
Professor of Pediatrics
Bachelor of Arts, Brown University, 1983
Doctor of Medicine, Georgetown University, 1988

Maria Bernadette Majella Doyle, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Mid-America Transplant/Department of Surgery Endowed
Distinguished Professor of Abdominal Transplantation
Bachelor of Science, Trinity College Dublin, 1990
Doctor of Medicine, Trinity College Dublin, 1996

Bettina Drake, M.P.H., Ph.D.

Professor of Surgery (Public Health Sciences) (primary appointment)
Assistant Vice Provost of Community-Engaged Research
Director of the Confluence Collaborative for Community-Engaged Research, Teaching and Practice
Michael F. Neidorff Professor
Bachelor of Science, Baylor University, 2001
Master of Public Health, University of Texas Health Science Center, 2003
Doctor of Philosophy, University of South Carolina Columbia, 2006

Kefu Du, M.D.

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Bachelor of Science, Duke University, 2007
Doctor of Medicine, University of Tennessee, 2011

Victoria Dzundzev

Voluntary Clinical Assistant Professor of Surgery

E**Joseph W Eades, M.D.**

Voluntary Clinical Assistant Professor of Surgery (Plastic and Reconstructive Surgery)
Bachelor of Arts, Amherst College, 1956
Doctor of Medicine, Washington University in St Louis, 1960

J. Chris Eagon, M.S., M.D.

Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Arts, Williams College, 1984
Doctor of Medicine, Harvard University, 1988
Master of Science, University of Utah, 1997

Timothy J Eberlein, M.A., M.D.

Professor of Surgery (General Surgery) (primary appointment)
Spencer T. and Ann W. Olin Distinguished Professor
Senior Associate Dean for Cancer Programs
Director, Siteman Cancer Center
Professor of Pathology and Immunology
Bachelor of Science, University of Pittsburgh, 1973

Doctor of Medicine, University of Pittsburgh, 1977
Master of Arts, Harvard University, 1996

Trina Ghosh Ebersole, M.D.

Assistant Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2009
Doctor of Medicine, University of Missouri Kansas City, 2015

James R Edgerton

Voluntary Clinical Professor of Surgery (General Surgery)

Pirooz Eghtesady, M.S., D.Sc., M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Emerson Chair in Pediatric Cardiothoracic Surgery
Professor of Pediatrics
Bachelor of Science, University of California Los Angeles, 1987
Master of Science, University of California Los Angeles, 1987
Doctor of Science, University of California Los Angeles, 1993
Doctor of Medicine, University of California Los Angeles, 1993

Zachary P Englert, D.O.

Voluntary Clinical Assistant Professor of Surgery (General Surgery)
Bachelor of Science, Pennsylvania State University (Duplicate of Pennsylvania State University-Main Campus), 2005
Doctor of Osteopathic Medicine, Philadelphia College of Osteopathic Medicine, 2009

Catherine Entriiken

Voluntary Clinical Assistant Professor of Surgery

F**Jason Michael Farrow, M.D.**

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Doctor of Medicine, University of California, 2015

Robert S Figenshau, M.D.

Professor of Surgery (Urologic Surgery) (primary appointment)
Taylor Family and Ralph V. Clayman, M.D. Professor of Surgery (Urologic Surgery)
Bachelor of Science, Macalester College, 1981
Doctor of Medicine, University of Minnesota, 1987

Ida K Fox, M.D.

Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Bachelor of Science, Haverford College, 1994
Doctor of Medicine, University of Rochester, 1999

Bradley D. Freeman, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, University of Central Florida, 1984
Doctor of Medicine, Duke University, 1988

G**Feng Gao, Ph.D.**

Professor of Surgery (Public Health Sciences) (primary appointment)
Professor of Medicine



Professor of Biostatistics

Doctor of Philosophy, Emory University, 2003

Mathieu Garand, M.S., Ph.D.

Instructor in Surgery (Cardiothoracic Surgery) (primary appointment)

Bachelor of Science, Université de Sherbrooke, 2002

Master of Science, Queen's University, 2004

Doctor of Philosophy, Queen's University, 2009

Michelle Gary

Instructor in Surgery (General Surgery) (primary appointment)

William A Gay, M.D.

Professor Emeritus of Surgery (Cardiothoracic Surgery)

Bachelor of Arts, Virginia Military Institute, 1957

Doctor of Medicine, Duke University, 1961

Andrew E. Gelman, Ph.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)

Jacqueline G and William E Maritz Endowed Chair in Immunology and Oncology

Professor of Pathology and Immunology

Bachelor of Science, University of California Los Angeles, 1996

Doctor of Philosophy, University of Pennsylvania, 2006

Patrick J Geraghty, M.D.

Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science, Northwestern University, 1989

Doctor of Medicine, Northwestern University, 1991

William Ewald Gillanders, M.S., M.D.

Professor of Surgery (General Surgery) (primary appointment)

Mary Culver Professorship in Surgery

Bachelor of Arts, Williams College, 1987

Doctor of Medicine, Duke University, 1991

Master of Science, Medical University of South Carolina, 2006

Katelyn Glaenzer

Voluntary Clinical Assistant Professor of Surgery

Jeffrey Scott Glaser, M.D.

Instructor in Surgery (Urologic Surgery) (primary appointment)

Bachelor of Arts, Northwestern University, 1983

Doctor of Medicine, University of Missouri Columbia, 1987

Katherine LuBell Glover-Collins, Ph.D., M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science, Xavier University of Louisiana, 2001

Doctor of Philosophy, Meharry Medical College, 2009

Doctor of Medicine, Meharry Medical College, 2009

Simon P Goedegebuure, Ph.D.

Associate Professor of Surgery (General Surgery) (primary appointment)

Doctor of Philosophy, Erasmus University Rotterdam, 1989

Omar Guerra, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Arts, Saint Louis University, 1995

Doctor of Medicine, Universidad Central del Caribe, 1999

H

Daniel Gordon Hafenrichter, M.D.

Assistant Professor of Surgery (General Surg) (primary appointment)

Bachelor of Science, University of California Davis, 1984

Doctor of Medicine, Washington University in St Louis, 1989

Emily Hahn

Voluntary Clinical Assistant Professor of Surgery

Michael Harkins

Voluntary Clinical Instructor in Surgery (Plastic Surgery)

Hunter Hays

Voluntary Clinical Assistant Professor of Surgery

Brendan Heiden, M.D.

Assistant Professor of Surgery (Cardio Surg) (primary appointment)

Doctor of Medicine, University of Michigan Ann Arbor, 2018

Katherine M. Holzem, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Arts, University of Pennsylvania, 2005

Doctor of Medicine, Washington University in St Louis, 2017

Mark Houston Hoofnagle, Ph.D., M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science, Bucknell University, 1999

Doctor of Philosophy, University of Virginia, 2008

Doctor of Medicine, University of Virginia, 2009

Ashley J Housten, M.P.A., O.T.D.

Associate Professor of Surgery (Public Health Sciences) (primary appointment)

Associate Professor of Occupational Therapy

Bachelor of Arts, University of Washington, 2005

Master of Public Administration, George Mason University, 2007

Doctor of Occupational Therapy, Washington University in St Louis, 2014

Donald V Huebener, M.A., M.S., D.Dent.

Professor Emeritus of Surgery

Doctor of Dentistry, Washington University in St Louis, 1969

Master of Science, Case Western Reserve University, 1971

Master of Arts, Washington University in St Louis, 1975

Jean Marie Hunleth, M.P.H., Ph.D.

Associate Professor of Surgery (Public Health Sciences) (primary appointment)

Instructor of Anthropology (Courtesy Affiliation)

Associate Professor of Public Health

Bachelor of Arts, Vanderbilt University, 1998

Master of Public Health, Northwestern University, 2011

Doctor of Philosophy, Northwestern University, 2011

Steven R Hunt, M.D.

Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Arts, Dartmouth College, 1992

Doctor of Medicine, Stanford University, 1997

I**Mohsen Ibrahim, M.D.**

Instructor in Surgery (Cardiothoracic Surgery) (primary appointment)
Doctor of Medicine, University of Rome, 1999

J**Aimee S. James, M.A., M.P.H., Ph.D.**

Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Arts, Goucher College, 1995
Master of Arts, University of Houston, 1998
Doctor of Philosophy, University of Houston, 1999
Master of Public Health, University of Texas Houston, 2000

Mengmeng Ji, M.S., Ph.D., MBBS

Instructor in Surgery (Public Health Sciences) (primary appointment)
Foreign MD equivalent, Kunming Medical University, 2016
Master of Science, University of Illinois at Urbana-Champaign, 2019
Doctor of Philosophy, University of Illinois at Urbana-Champaign, 2021

Shu Jiang, M.S., Ph.D.

Associate Professor of Surgery (Public Health Sciences) (primary appointment)
Bachelor of Science, Simon Fraser University, 2015
Master of Science, University of Western Ontario, 2016
Doctor of Philosophy, University of Waterloo, 2018

Dane P Johnson, M.D.

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Bachelor of Science, University of Minnesota, 2007
Doctor of Medicine, University of Minnesota, 2011

Michael Hiroshi Johnson, M.D.

Professor of Surgery (Urologic Surgery) (primary appointment)
Division Director of Urology
Bachelor of Arts, Dartmouth College, 2001
Doctor of Medicine, University of Washington, 2009

Charles Jones, M.D.

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Bachelor of Science, University of Missouri Columbia, 2012
Doctor of Medicine, University of Missouri Columbia, 2017

K**Puja Kachroo, M.S., M.D.**

Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Bachelor of Science, Boston University, 2001
Master of Science, Columbia University, 2003
Doctor of Medicine, Ross University School of Medicine, 2007

Tsuyoshi Kaneko, M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
John M Shoenberg Professor of Surgery (Cardiothoracic Surgery)
Division Chief of Cardiothoracic Surgery

Doctor of Medicine, Keio University, 2002

Alison Marie Karadjoff, D.O.

Instructor in Surgery (General Surgery) (primary appointment)
Bachelor of Science, Michigan State University, 2014
Doctor of Osteopathic Medicine, Michigan State University, 2019

Kirsten Karkow

Voluntary Clinical Instructor in Surgery

Demetrios Katsikas, M.D.

Voluntary Clinical Instructor in Surgery (Urological Surgery)
Bachelor of Science, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1985
Doctor of Medicine, Wayne State University, 1989

Michael Christopher Keirse, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Arts, University of Missouri Kansas City, 2016
Doctor of Medicine, University of Missouri Kansas City, 2018

Amy Frances Kells, Ph.D., M.D.

Associate Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Bachelor of Science, Vanderbilt University, 1984
Doctor of Philosophy, Vanderbilt University, 1992
Doctor of Medicine, Vanderbilt University, 1993

Adeel Khan, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Bahria University, 1997
Doctor of Medicine, Aga Khan University, 2002

Saira Khan, M.P.H., Ph.D.

Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
Bachelor of Science, Southeast Missouri State University, 2004
Master of Public Health, Drexel University, 2008
Doctor of Philosophy, University of North Carolina at Chapel Hill, 2016

Tariq Khan, Ph.D.

Instructor in Surgery (General Surg) (Pending Dean Approval) (primary appointment)
Doctor of Philosophy, King Abdulaziz University, 2017

Ali Khiabani, M.H.A., M.S., M.D.

Assistant Professor of Surgery (Cardio Surg) (Pending Dean Approval) (primary appointment)
Illinois Institute of Technology, 2010
Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2011
Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2015
Rosalind Franklin University of Medicine and Science (Formerly Finch University of Health Sciences), 2015

Allie E Kidd, M.P.H., M.D.

Assistant Professor of Surgery (General Surg) (primary appointment)
Bachelor of Arts, Boston College, 2010
Master of Public Health, Tulane University, 2017



Doctor of Medicine, Tulane University, 2017

Jae Sung Kim, M.A., Ph.D.

Professor of Surgery (General Surgery) (primary appointment)

Professor of Cell Biology and Physiology

Bachelor of Science, Seoul National University, 1988

Master of Arts, Seoul National University, 1990

Doctor of Philosophy, University of Wisconsin, 1999

Savannah Kipfer

Voluntary Clinical Assistant Professor of Surgery

Voluntary Clinical Assistant Professor of Surgery

John P. Kirby, M.S., M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science, University of Illinois at Urbana-Champaign, 1988

Doctor of Medicine, University of Illinois at Urbana-Champaign, 1993

Master of Science, University of Illinois at Urbana-Champaign, 1999

Mary E Klingensmith, M.D.

Professor Emerita of Surgery

Bachelor of Arts, Wellesley College, 1988

Doctor of Medicine, Duke University, 1992

Coen Klos

Voluntary Research Associate Professor of Surgery (General Surgery)

Ira Joe Kodner, M.D.

Professor Emeritus of Surgery (General Surgery)

Bachelor of Arts, Washington University in St Louis, 1963

Doctor of Medicine, Washington University in St Louis, 1967

Paul Kogan, M.D.

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)

Doctor of Medicine, SUNY Downstate Health Sciences University, 2012

Bachelor of Science, SUNY Geneseo

Shannon Ruth Kotch, M.D.

Instructor in Surgery (General Surgery) (primary appointment)

Doctor of Medicine, Pennsylvania State University-College of Medicine, 2014

Kunal Deepak Kotkar, M.D.

Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)

Doctor of Medicine, Grant Medical College, 2004

Benjamin D. Kozower, M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)

Neidorff Family and Robert C Packman Professor

Bachelor of Science, University of Rochester, 1993

Doctor of Medicine, University of Rochester, 1997

Lindsay Kranker, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Doctor of Medicine, University of Colorado Anschutz Medical Campus, 2014

Bachelor of Science, Johns Hopkins University

Mary Margaret Kratz

Voluntary Clinical Assistant Professor of Surgery

Daniel Kreisel, Ph.D., M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)

G Alexander Patterson MD and Mid America Transplant Endowed

Distinguished Chair in Lung Transplantation

Professor of Pathology and Immunology

Doctor of Medicine, Mount Sinai School of Medicine, 1995

Doctor of Philosophy, University of Pennsylvania, 2002

STEVEN KURZWEIL

Voluntary Clinical Instructor in Surgery

L

Natasha Leigh-Matijakovich, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Doctor of Medicine, University of Birmingham, 2020

Lijin Li, Ph.D., MMed

Instructor in Surgery (General Surgery) (Pending Dean Approval) (primary appointment)

Doctor of Philosophy, University of Arizona, 2005

Shanghai Medical University), 1991

Shanghai Medical University), 1994

Wenjun Li, M.S., M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)

Doctor of Medicine, Guangdong Medical College (#####), 1991

Master of Science, Sun Yat-Sen University (#####), 2004

Xiaowei Li, M.S., Ph.D.

Assistant Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)

Bachelor of Science, Fisher More College, 2002

Master of Science, Fisher More College, 2005

Doctor of Philosophy, Clemson University, 2012

Fuyi Liao, M.D.

Instructor in Surgery (Cardiac Surgery) (Pending Dean Approval) (primary appointment)

Doctor of Medicine, Sun Yat-Sen University (#####), 2001

Jerry Michael Liddell, D.P.M.

Assistant Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science, University of Utah, 1995

Doctor of Podiatric Medicine, Ohio College of Podiatric Medicine, 2002

Patricia Limpert, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)

University of Missouri Kansas City, 2000

Saint Louis University, 2021

Yiing Lin, Ph.D., M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)

Bachelor of Science, Duke University, 1997
Doctor of Philosophy, Washington University in St Louis, 2005
Doctor of Medicine, Washington University in St Louis, 2005

Jessica Danielle Lindemann, Ph.D., M.D.

Instructor in Surgery (General Surg) (primary appointment)
Bachelor of Science, Millikin University, 2011
Doctor of Medicine, University of Rochester, 2015
Doctor of Philosophy, University of Cape Town, 2020

Erin Lynn Linnenbringer, M.S., Ph.D.

Associate Professor of Surgery (Public Health Sciences) (primary appointment)
Bachelor of Science, Washington University in St Louis, 2000
Master of Science, Northwestern University, 2003
Doctor of Philosophy, University of Michigan Ann Arbor, 2014

Ying Liu, Ph.D., M.D.

Associate Professor of Surgery (Public Health Sciences) (primary appointment)
Doctor of Medicine, Florida Beacon Bible College, 1995
Doctor of Philosophy, Texas Tech University, 2006

Jeffrey A Lowell, M.D.

Professor Emeritus of Surgery
Bachelor of Arts, Oberlin College, 1981
Doctor of Medicine, Yale University, 1985

Esther Jiaxin Lu, M.S., Ph.D.

Professor of Surgery (Public Health Sciences) (primary appointment)
Associate Professor of Biostatistics
Bachelor of Science, Nankai University (#####), 1997
Master of Science, National Univ of Singapore, 2002
Doctor of Philosophy, Medical College of Wisconsin, 2007

Mark A Ludwig, M.D.

Voluntary Clinical Instructor in Surgery (General Surgery)
Bachelor of Arts, Emory University, 1972
Doctor of Medicine, University of Chicago, 1976

Chongliang Luo, Ph.D.

Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
Doctor of Philosophy, University of Connecticut, 2017

Jingqin Luo, M.S., Ph.D.

Professor of Surgery (Public Health Sciences) (primary appointment)
Professor of Medicine
Professor of Biostatistics
Bachelor of Science, Renmin University of China (#####), 1998
Master of Science, Duke University, 2003
Doctor of Philosophy, Duke University, 2006

M**Robert Matthew MacGregor, M.D.**

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, University of Virginia, 2012
Doctor of Medicine, Eastern Virginia Medical School, 2016

Susan E Mackinnon, M.D.

Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Minot Packer Fryer Professor of Plastic Surgery
Professor of Occupational Therapy
Professor of Otolaryngology
Bachelor of Arts, Queens College, 1971
Doctor of Medicine, Queen's University, 1975

Kiran Mahajan, M.S., Ph.D.

Associate Professor of Surgery (Urologic Surgery) (primary appointment)
Master of Science, Madurai Kamaraj University, 1991
Doctor of Philosophy, Indian Institute of Science, 1998

Nupam P Mahajan, Ph.D.

Professor of Surgery (Urologic Surgery) (primary appointment)
Endowed Professorship of Urologic Surgery Research
Doctor of Philosophy, Indian Institute Of Technology, 1997

Arnab Majumder, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Arts, Case Western Reserve University, 2007
Doctor of Medicine, Ohio State University-Main Campus, 2011

Jonathan Maldonado, M.D.

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Doctor of Medicine, Loma Linda University, 2016

Julie Ann Margenthaler, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Endowed Chair for Surgical Excellence in Breast Cancer
Bachelor of Arts, Boston University, 1993
Doctor of Medicine, Southern Illinois University Carbondale, 1997

Gregory Martens, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Indiana University School of Medicine, 2012

Colin Martin, M.D.

Professor of Surgery (Pediatric Surgery) (primary appointment)
Drs. Brad and Barbara Warner Professor of Pediatric General Surgery
Division Chief - Division of Pediatric Surgery
Bachelor of Arts, Carson-Newman College, 1999
Doctor of Medicine, Wayne State University, 2003

Muhammad Faraz Masood, M.D.

Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Doctor of Medicine, Dow Medical College Karachi, 2001

Sara Matsumoto, M.D.

Instructor in Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Saint Louis University, 2019

Tony W McClure

Voluntary Clinical Assistant Professor of Surgery

Ryan McEnaney, M.D.



Associate Professor of Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Saint Louis University, 2007

Matthew Justin McHale

Voluntary Clinical Assistant Professor of Surgery

Andrew McLaughlin

Voluntary Clinical Assistant Professor of Surgery

Michelle Leah Medintz

Voluntary Clinical Assistant Professor of Surgery

Lawrence Mendelow, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Duke University, 1983

Meredith Metcalf, M.D.

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Doctor of Medicine, University of Tennessee Health Science Center, 2014

Bryan F Meyers, M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Patrick and Joy Williamson Endowed Professor of Surgery (Cardiothoracic Surgery)
Bachelor of Arts, Yale University, 1982
Doctor of Medicine, University of Chicago, 1986

Jacob Ryan Miller, M.D.

Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Bachelor of Science, Indiana University Bloomington, 2020
Doctor of Medicine, Indiana University Indianapolis, 2020

Danny Mou, M.P.H., M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Arts, Harvard University, 2008
Doctor of Medicine, Emory University, 2015
Master of Public Health, Harvard University, 2020

Nabil A Munfakh, M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Bachelor of Science, University of Michigan Ann Arbor, 1981
Doctor of Medicine, University of Michigan Ann Arbor, 1985

Takashi Murashita, M.D.

Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Doctor of Medicine, Kyoto University, 2004

Gregory P Murphy, M.D.

Associate Professor of Surgery (Urologic Surgery) (primary appointment)
Bachelor of Arts, Tufts University, 2006
Doctor of Medicine, University of Massachusetts Amherst, 2011

Matthew G Mutch, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Solon and Bettie Gershman Professorship in Colon and Rectal Surgery

Section Chief - Section of Colon-Rectal Surgery
Bachelor of Arts, Saint Olaf College, 1990
Doctor of Medicine, Washington University in St Louis, 1994

Meera Muthukrishnan, Ph.D.

Instructor in Surgery (Public Health Sciences) (Pending Dean Approval) (primary appointment)
Doctor of Philosophy, Saint Louis University, 2020

Terence M. Myckatyn, M.D.

Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Doctor of Medicine, University of British Columbia, 1997
Bachelor of Science, University of Northern British Columbia, 2003

N

Ruben Nava, M.D.

Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Doctor of Medicine, Univ of Armed Forces: Military, 2000

Trang Nguyen, M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Johns Hopkins University, 2003
Doctor of Medicine, Johns Hopkins University, 2010

Richard James Nissen, M.S., D.Dent.

Voluntary Clinical Assistant Professor of Surgery (Plastic and Reconstructive Surgery)
Bachelor of Science, Iowa State University, 1979
Doctor of Dentistry, University of Iowa, 1983
Master of Science, Washington University in St Louis, 1985

Grace Niziolek, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Doctor of Medicine, University of North Carolina at Chapel Hill, 2014
Bachelor of Science, Virginia Tech, 2021

O

Beryne Odeny, M.P.H., MB.ChB., Ph.D.

Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
Foreign MD equivalent, University of Nairobi, 2006
Master of Public Health, University of Washington-Seattle Campus, 2014
Doctor of Philosophy, University of Washington-Seattle Campus, 2022

John Westley Ohman, M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)
Associate Professor of Radiology
Division Director of Vascular Surgery
Bachelor of Science, University of Texas Austin, 2008
Doctor of Medicine, University of Texas Health Science Center, 2012

Kerri A Ohman, M.D.



Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, University of Michigan Ann Arbor, 2008
Doctor of Medicine, University of Michigan Ann Arbor, 2012

George A Oliver, M.D.

Assistant Professor Emeritus of Clinical Surgery (General Surgery)
Bachelor of Arts, Washington University in St Louis, 1948
Doctor of Medicine, Washington University in St Louis, 1952

John A Olson, Ph.D., M.D.

Professor of Surgery (General Surgery) (primary appointment)
Bixby Professor of Surgery (General Surgery)
Head of the Department of Surgery
Bachelor of Science, University of Michigan Ann Arbor, 1986
Doctor of Philosophy, University of Florida, 1990
Doctor of Medicine, University of Florida, 1992

Tiffany Medlin Osborn, M.P.H., M.D.

Professor of Surgery (General Surgery) (primary appointment)
Professor of Emergency Medicine
Bachelor of Science, University of Houston, 1992
Doctor of Medicine, University of Texas Health Sciences at San Antonio, 1997
Master of Public Health, Liverpool School of Tropical Medicine, 2009

Bo Overschmidt, M.D.

Assistant Professor of Surgery (Plastic & Recon Surg) (Pending Dean Approval) (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2018

P

Roheena Zainab Panni, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Aga Khan University, 2011

Yikyung Park, M.S., D.Sc.Epi.

Professor of Surgery (Public Health Sciences) (primary appointment)
Bachelor of Science, EWAH Womans University, 1994
Master of Science, EWAH Womans University, 1996
D.Sc-Doctor of Science Epidemiology, Harvard University, 2005

Jeffrey Andrew Parres, M.D.

Voluntary Clinical Instructor in Surgery (Urologic Surgery)
Bachelor of Arts, Washington University in St Louis, 1983
Doctor of Medicine, University of Missouri Columbia, 1987

Michael K Pasque, M.D.

Professor Emeritus of Surgery
Doctor of Medicine, University of Oklahoma, 1978

Kamleshkumar Patel, M.D.

Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Joseph B. Kimbrough Chair for Pediatric Dentistry
Bachelor of Science, University of Missouri Kansas City, 2000
Doctor of Medicine, University of Arizona, 2005

G Alexander Patterson, M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Joseph C Bancroft Professor of Surgery (Cardiothoracic Surgery)
Doctor of Medicine, Queen's University, 1974

Michelle Pavlak-Hawkins

Voluntary Clinical Assistant Professor of Surgery

Amit Audumbar Pawale, MBBS

Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Foreign MD equivalent, Shivaji University, 2001

Mitchell A Pet, M.D.

Associate Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2011

Gordon W Philpott, M.D.

Professor Emeritus of Surgery (General Surgery)
Bachelor of Science, Yale University, 1957
Doctor of Medicine, Washington University in St Louis, 1961

Christopher Prevel

Voluntary Clinical Professor of Surgery (Plastic & Reconstructive Surgery)

Kasiemobi E Pulliam, M.D.

Assistant Professor of Surgery (Pediatric Surg) (primary appointment)
Doctor of Medicine, Indiana University School of Medicine, 2016

Varun Puri, M.S., M.D.

Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Section Chief of Thoracic Surgery
Bachelor of Science, All India Institute of Medical Sciences, 1998
Master of Science, Creighton University, 2007
Doctor of Medicine, Washington University in St Louis, 2009

R

Nishant Raj, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Saint Johns University, 2004
Doctor of Medicine, Ross University School of Medicine, 2009

Ricardo Rao, M.D.

Voluntary Clinical Instructor in Surgery (General Surgery)
Bachelor of Arts, University of California San Diego, 1983
Doctor of Medicine, University of Missouri Columbia, 1987

Matthew Randall Rosengart, M.P.H., M.D.

Professor of Surgery (General Surgery) (primary appointment)
Theodore and Bertha Bryan Professor of Environmental Medicine
Bachelor of Arts, Johns Hopkins University, 1991
Doctor of Medicine, University of Alabama at Birmingham School of Medicine, 1995
Master of Public Health, University of Washington School of Public Health, 2004

Golnesa Rouie Miab

Voluntary Clinical Assistant Professor of Surgery

Kathryn J Rowland, M.D.



Associate Professor of Surgery (Pediatric Surgery) (primary appointment)
Bachelor of Arts, Baylor University, 2004
Doctor of Medicine, Washington University in St Louis, 2008

Brian G Rubin, M.D.

Professor Emeritus of Surgery
Bachelor of Arts, Colgate University, 1979
Doctor of Medicine, University of Vermont, 1984

Ashly Ruf

Voluntary Clinical Assistant Professor of Surgery

S

Bethany Cara Sacks, M.Ed., M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Connecticut College, 1995
Doctor of Medicine, Mount Sinai School of Medicine, 1999
Master of Education, University of Houston, 2010

Justin M Sacks, M.B.A., M.D.

Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Sydney M Jr and Robert H Shoenberg Endowed Chair in Plastic & Reconstructive Surgery
Division Chief - Division of Plastic Surgery
Bachelor of Science, Cornell University, 1993
Doctor of Medicine, Mount Sinai School of Medicine, 1998
Master of Business Administration, Johns Hopkins University, 2015

Luis A Sanchez, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Gregorio A. Sicard Distinguished Professor
Professor of Radiology
Bachelor of Science, Yale University, 1983
Doctor of Medicine, Harvard University, 1987

Donald C Sauer, M.D.

Assistant Professor Emeritus of Clinical Surgery (General Surgery)
Bachelor of Arts, Washington University in St Louis, 1956
Doctor of Medicine, Washington University in St Louis, 1960

Matthew Schaeffer, M.D.

Instructor in Surgery (General Surgery) (Pending Dean Approval) (primary appointment)
Bachelor of Arts, Grinnell College, 2014
Boonshoft School of Medicine, 2025

Matthew Robert Schill, M.D.

Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Bachelor of Science, University of Iowa, 2009
Doctor of Medicine, Washington University in St Louis, 2013

Douglas J Schuerer, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Allegheny College, 1991
Doctor of Medicine, University of Pittsburgh, 1995

Thomas Sensing

Voluntary Clinical Assistant Professor of Surgery

Thembekile Chengeto Loice Shato, M.P.H., Ph.D.

Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
Bachelor of Science, University of Cape Town, 2012
Master of Public Health, University of Cape Town, 2017
Doctor of Philosophy, Saint Louis University, 2020

Jaimie T Shores

Voluntary Clinical Professor of Surgery

Sachin Mahavir Shridharani

Voluntary Clinical Associate Professor of Surgery (Plastic and Reconstructive Surgery)

Michelle Ilana Silver, M.S., Ph.D.

Associate Professor of Surgery (Public Health Sciences) (primary appointment)
Associate Professor of Public Health
Bachelor of Science, Stanford University, 2007
Master of Science, Johns Hopkins University, 2009
Doctor of Philosophy, Johns Hopkins University, 2015

Matthew Leon Silveira, M.S., M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Pennsylvania State University-Main Campus, 2001
Doctor of Medicine, Temple University, 2005
Master of Science, Temple University, 2010

Woodson Smelser, M.D.

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Bachelor of Science, University of Missouri Columbia, 2011
Doctor of Medicine, University of Missouri Kansas City, 2015

Jason Andrew Snyder, M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Kettering University, 2004
Doctor of Medicine, Marshall University, 2008

Rebecca Ann Sorber, M.D.

Assistant Professor of Surgery (General Surg) (primary appointment)
Doctor of Medicine, Indiana University School of Medicine, 2016

Marguerite Spruce, M.D.

Voluntary Clinical Assistant Professor of Surgery
Bachelor of Science, University of Missouri Columbia, 2011
Doctor of Medicine, University of Missouri Columbia, 2015

Daniel Charles Stoeckel

Voluntary Clinical Instructor in Surgery

Steven M Strasberg, M.D.

Professor Emeritus of Surgery
Doctor of Medicine, University of Toronto, 1963

Jacqueline Stuber, M.D.

Assistant Professor of Surgery (General Surg) (primary appointment)



Bachelor of Science, Ohio State University-Main Campus, 2014
Doctor of Medicine, Case Western Reserve University, 2018

Siobhan Sutcliffe, M.H.S., M.S., Ph.D.

Professor of Surgery (Public Health Sciences) (primary appointment)
Bachelor of Science, Princeton University, 1998
Master of Health Science, Johns Hopkins University, 2001
Master of Science, Johns Hopkins University, 2004
Doctor of Philosophy, Johns Hopkins University, 2005

Hubert S Swana, M.D.

Professor of Surgery (Urologic Surgery) (primary appointment)
Bachelor of Arts, Case Western Reserve University, 1988
Doctor of Medicine, Case Western Reserve University, 1993

T

Marissa Morningstar Tenenbaum, M.D.

Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Bachelor of Science, University of Wisconsin Madison, 1998
Doctor of Medicine, Washington University in St Louis, 2002

Gregory S Tentindo

Voluntary Clinical Instructor in Surgery

Ruth Tevlin, M.D., Doctorate, MBChB

Assistant Professor of Surgery (Plastic & Recon Surg) (primary appointment)
Bachelor of Medicine and Bachelor of Surgery, University College Dublin National University of Ireland, 2009
Doctor of Medicine, University College Dublin National University of Ireland, 2015
Doctorate, University College Dublin National University of Ireland, 2015

Chelsea Thampy, M.D.

Instructor in Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Temple University, 2019

Lewis Jones Thomas, M.D.

Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
Bachelor of Science, Washington University in St Louis, 2008
Doctor of Medicine, University of Missouri Columbia, 2012

Adetunji Toriola, M.P.H., MB.ChB., Ph.D.

Professor of Surgery (Public Health Sciences) (primary appointment)
Foreign MD equivalent, Obafemi Awolowo University, 1998
Master of Public Health, University of Kuopio, 2007
Doctor of Philosophy, University of Tampere, 2011

Erica J Traxel, M.D.

Associate Professor of Surgery (Urologic Surgery) (primary appointment)
Bachelor of Science, Texas A&M University, 1998
Doctor of Medicine, Technical College of the Lowcountry, 2002

Thomas H Tung, M.D.

Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)

Bachelor of Science, Duke University, 1986
Doctor of Medicine, University of Maryland-College Park, 1990

Isaiah Turnbull, M.S., M.D.

Associate Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, University of Oregon, 1998
Master of Science, Washington University in St Louis, 2008
Doctor of Medicine, Washington University in St Louis, 2008

V

Rembrandt VanDruff

Voluntary Clinical Assistant Professor of Surgery

Jesse Daya Vrecenak, M.D.

Associate Professor of Surgery (Pediatric Surgery) (primary appointment)
Bachelor of Science, Yale University, 2003
Doctor of Medicine, University of Pennsylvania, 2007

W

Alyssa Danielle Wait, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, University of Notre Dame, 2001
Doctor of Medicine, Indiana University School of Medicine, 2005

Fei Wan, M.S., Ph.D.

Associate Professor of Surgery (primary appointment)
Master of Science, University of Vermont, 2001
Doctor of Philosophy, University of Pennsylvania, 2015

Zachary James Wanken, M.S., M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Saint Louis University, 2015
Master of Science, Dartmouth College, 2019

Erika Waters, M.P.H., M.S., Ph.D.

Professor of Surgery (Public Health Sciences) (primary appointment)
Bachelor of Science, Arizona State University, 1999
Master of Science, Rutgers University-New Brunswick, 2003
Doctor of Philosophy, Rutgers University-New Brunswick, 2006
Master of Public Health, Johns Hopkins University, 2007

Michael D Weiss, D.P.M.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Ohio State University-Main Campus, 1977
Doctor of Podiatric Medicine, Ohio College of Podiatric Medicine, 1981

Nicholas Alan Welko, M.S., M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Case Western Reserve University, 2012
Master of Science, Case Western Reserve University, 2012
Doctor of Medicine, University of Pittsburgh, 2017



Jason R Wellen, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Emory University, 1998
Doctor of Medicine, Saint George's University, 2002

Samuel A Wells, M.D.

Professor Emeritus of Surgery
Doctor of Medicine, Emory University, 1961

Brad C White, M.D.

Voluntary Clinical Instructor in Surgery (Urologic Surgery)
Bachelor of Science, Illinois State University, 1986
Doctor of Medicine, Loyola University Chicago, 1993

Paul Edward Wise, M.D.

Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Georgetown University, 1992
Doctor of Medicine, Johns Hopkins University, 1996

Andrew Wishy

Voluntary Clinical Assistant Professor of Surgery

Matthew D Wood, M.S., Ph.D.

Associate Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Bachelor of Science, Saint Louis University, 2005
Master of Science, Washington University in St Louis, 2008
Doctor of Philosophy, Washington University in St Louis, 2009

Loughlin Wylie, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Indiana University School of Medicine, 2019

X

Yan Xie

Voluntary Research Assistant Professor of Surgery

Y

Yan Yan, M.A., M.H.S., Ph.D., M.D.

Professor of Surgery (Public Health Sciences) (primary appointment)
Professor of Biostatistics
Doctor of Medicine, Nanjing Medical University (#####), 1983
Master of Arts, Georgetown University, 1993
Master of Health Science, Johns Hopkins University, 1995
Doctor of Philosophy, Johns Hopkins University, 1998

Muhammad T Yasin, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Doctor of Medicine, Punjab University, 1985

Andrew Yeh, M.D.

Assistant Professor of Surgery (Pediatric Surgery) (primary appointment)
Bachelor of Science, University of Toronto, 2007
Doctor of Medicine, University of Hawaii Oahu, 2012

Robert A Young, M.S., J.D., M.D.

Voluntary Clinical Instructor in Surgery (Plastic and Reconstructive Surgery)

Bachelor of Arts, University of Michigan (Duplicate of University of Michigan Ann Arbor), 1973
Master of Science, Ohio State University (Duplicate of Ohio State University-Main Campus), 1975
Doctor of Medicine, Ohio State University (Duplicate of Ohio State University-Main Campus), 1978
Juris Doctor, Saint Louis University, 1997

Jennifer Yu, M.D.

Assistant Professor of Surgery (General Surgery) (primary appointment)
Bachelor of Science, Washington University in St Louis, 2008
Doctor of Medicine, Washington University in St Louis, 2012

Z

Augusto Zani, Ph.D., M.D.

Professor of Surgery (Pediatric Surgery) (Pending Executive Faculty Approval) (primary appointment)
Doctor of Medicine, La Sapienza University, 2001
Doctor of Philosophy, University College London, 2013

Elke Zani-Ruttenstock, M.D.

Assistant Professor of Surgery (Pediatric Surg) (Pending Executive Faculty Approval) (primary appointment)
Doctor of Medicine, Medical University Graz (Medizinische Universität Graz), 2007

Mohamed A Zayed, Ph.D., M.D.

Professor of Surgery (General Surgery) (primary appointment)
Professor of Radiology
Division Chief of Surgical Sciences
Bachelor of Science, University North Carolina, 2002
Doctor of Philosophy, University of North Carolina at Chapel Hill, 2007
Doctor of Medicine, University of North Carolina at Chapel Hill, 2009

Christian W Zemlin, Ph.D.

Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Adjunct Instructor
Doctor of Philosophy, Humboldt University, 2012

William Young Zhu, M.D.

Assistant Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Doctor of Medicine, University of California San Diego, 2019

Research Electives

Surgery Research Electives

Students at all levels are encouraged and welcomed to get involved with surgical research. Many opportunities exist within the Department of Surgery for students to participate in advanced clinical or research experiences.

For the most up-to-date medical student research opportunities, please visit the Research page of the Department of Surgery website.

Courses

SURGERY 8000 General Surgery (Clinical Elective)

Students in the General Surgery Clinical Elective are placed in one of eight services. During this rotation, students take on responsibilities that closely mirror those of a first-year surgical resident, allowing them to gain hands-on experience, build essential surgical skills, and manage patients more independently under the supervision of attendings, fellows and residents. Students are involved in pre-operative, intra-operative, and post-operative care of surgical patients the outpatient setting, operative room and hospital ward. This includes performing histories and physicals, participating in surgical procedures, and engaging in rounds. The student will also participate in affiliated conferences and in-house call with the surgical team. General Surgery services include: Abdominal Transplant Surgery, Acute & Critical Care Surgery, Colon & Rectal Surgery, Hepatobiliary-Pancreatic Surgery, Minimally Invasive Surgery, Pediatric Surgery, Surgical Oncology & Endocrine Surgery, and Trauma Night Float & Emergency Surgical Consults

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 8010 Minimally Invasive Surgical Skills (Non-Clinical Elective)

The Minimally Invasive Surgical Skills (MISS) Elective is designed to provide surgery-bound MS4 learners with early, structured exposure to foundational robotic and laparoscopic surgical principles and technical skills. Through a combination of asynchronous didactic modules, in-person introductory instruction, proctored simulation sessions, and self-directed practice, MISS prepares learners to enter residency with foundational competence in minimally invasive surgery. This supports accelerated skill development, enhanced learner confidence, and earlier operative participation. Students will practice and demonstrate proficiency in laparoscopic camera navigation, Fundamentals of Laparoscopic Surgery (FLS) tasks, robotic bedside assisting, and robotic console skills.

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 8015 Cardiothoracic Surgery (Clinical Elective)

The elective in cardiothoracic surgery is a four-week clinical rotation with two-week blocks divided between adult cardiac, pediatric cardiothoracic, and general thoracic surgery (according to the student's preference). Students will participate in morning work rounds, attend the operative procedures of their choice, and attend weekly conferences and teaching rounds. Students will be introduced not only to the surgical procedures, but also to the postoperative care of the surgical patients. On the pediatric and adult cardiac services, students will be introduced to the principles of cardiopulmonary bypass, repair of congenital heart defects, ventricular assist devices, heart lung transplantation and procurement, coronary artery bypass surgery (on and off pump), valve repair and replacement, complex aortic surgery, the MAZE procedures and others. On the adult cardiac surgery service, students will function as sub-interns under the direct supervision of a faculty member. On the thoracic surgical rotation, students will have the opportunity to perform bronchoscopy, esophagoscopy, gastroscopy, and participate in surgical resections of lung cancer and esophageal cancer, as well as surgery for emphysema and for benign esophageal conditions. Students will also participate

in lung transplantation surgery. Medical students are also invited to participate in ongoing research projects under the mentorship of surgery faculty. Please contact the course director if you are interested in this option.

Credit 4 units.

Typical periods offered: Medicine Year

SURGERY 8020 Plastic & Reconstructive Surgery (Clinical Elective)

The period on Plastic Surgery may either be spent as a clinical clerkship or conducting a research project. The purpose of the clinical clerkship is to familiarize the student with the basic principles of Plastic Surgery. The student will have successive assignments to each of the attending staff and the ward resident services during the four weeks. This will expose the student to the breadth and depth of plastic surgery. Alternatively, if the student has identified a focus of interest, the student may participate on those services of special interest, such as hand or pediatric plastic surgery. The student will assume an active role on the plastic surgery service and will participate in the total management of a wide variety of surgical problems including congenital anomalies, microvascular surgery, surgery of the upper extremity, peripheral nerve surgery, cosmetic surgery, and general reconstructive plastic surgery.

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 8030 Urologic Surgery (Clinical Elective)

The clinical elective will offer the interested student experience with a spectrum of problems in clinical urology - both adult and pediatric. The student will learn the basic diagnostic procedures and management of surgical and non-surgical aspects of patient care under the supervision of the attending staff and house staff. Clinical conferences are held every Wednesday.

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 8050 Vascular Surgery (Clinical Elective)

This elective is designed to give students in-depth experience in the clinical management of patients on the Vascular Surgery Service. The elective will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative management of patients with surgically treated vascular diseases/conditions. Students will serve as clerks and will be responsible for patient management with house staff under the guidance of the fellow and attending surgeons. There will be opportunity for students to evaluate patients, decide on a diagnostic and management strategy, and provide care under house staff and faculty guidance, as well as ample opportunity to attend and participate in conferences. Notice: If a student desires to work more closely with a specific attending, he/she must make special arrangements with the faculty member prior to beginning this elective.

Credit 2 units.

Typical periods offered: Medicine Year

SURGERY 9100 General Surgery Advanced Clinical Rotation (ACR)

Students in the General Surgery ACR are placed in one of the following eight services. Students may enroll in this ACR twice, with the second assignment on a different service than the first. On each Surgical service, participation will involve floor management, ER evaluation, operating room participation and outpatient clinic experience. Emphasis will be on correlating anatomy to function in normal and pathologic states and clinical management of Surgical patients. Duties: rounding on inpatients, participating in service and department wide education conference, participating/assisting in operations, seeing and evaluating new, return and postoperative patients in clinic, taking call in the emergency room. This will be done under the guidance of attendings, fellows and residents. **Acute and Critical Care Surgery**



The ACCS service provides experience with a broad range of general surgical problems. Typically, students encounter patients with acute traumatic injuries or burns and are exposed to many acute surgical problems such as acute abdominal emergencies, skin and soft tissue infections (including some amputations), acute appendicitis, and acute cholecystitis. Students will likely experience a combination of laparoscopic, robotic, and open operations. Students also gain experience with pre-operative evaluation and operative management of patients undergoing elective surgical procedures such as hernia repair and cholecystectomy. **Colorectal Surgery**

The Colorectal Surgery rotation covers all aspects of benign and malignant colorectal and anal disease. The operative procedures vary from simple anorectal procedures to large open abdominal, robotic and laparoscopic operations. Students will likely encounter both urgent/emergent and elective operations. **Hepatobiliary and Pancreatic Surgery**

The HPB service exposes students to a variety of surgical conditions of the pancreas, liver, stomach, and biliary tract. This includes benign and cancerous conditions. Students may also encounter surgeries for various types of sarcomas. They will encounter laparoscopic, robotic, and large open operations. **Minimally Invasive Surgery**

The MIS service exposes students to a variety of surgical problems (including hernias, gallstone disease, gastrointestinal foregut problems, morbid obesity, and endocrine disorders). Students are exposed to basic and advanced minimally invasive surgery (laparoscopic and robotic operations) as well as complex open operations. **Pediatric Surgery**

Pediatric surgery is essentially general surgery on children. Students are exposed to a wide variety of conditions involving the gastrointestinal tract, genitourinary tract, lung, diaphragm, etc. The service handles a significant amount of penetrating and blunt trauma, burns, and other acute surgical emergencies such as appendicitis, intestinal obstruction, and perforated viscus. In addition, the student will be exposed to surgery on newborns for vascular access and intestinal and abdominal wall conditions. Students will be exposed to a variety of surgical approaches including open, laparoscopic, and thoracoscopic procedures. **Surgical Oncology**

The Surgical Oncology (formerly Endocrine/Oncology) service is primarily dedicated to the treatment of some of the most common cancers in adults (including breast, melanoma, and thyroid). Students will also obtain experience with many other surgeries for benign disease processes in breast and endocrine glands (thyroid, parathyroid, and adrenal). Students may also encounter surgery for sarcomas and a unique operation that involves heated intra-peritoneal chemotherapy for advanced cancers (HIPEC). They will likely encounter some laparoscopic procedures (adrenalectomy). **Transplant Surgery**

Abdominal Organ Transplantation exposes students to a blend of medical and surgical care of solid-organ transplant patients (kidney, pancreas, and liver). Organ procurements provide the ultimate exposure to human anatomy in a heart-beating, brain-dead donor. Students will likely experience other hepato-biliary procedures (liver resection, pancreatic resection, biliary tract surgery etc) for benign/malignant conditions and vascular access procedures (AV fistula formation), providing broad anatomical exposure. Most of these operations are performed with large, open incisions but students may encounter some laparoscopic procedures (cholecystectomy). **Vascular Surgery**

Vascular Surgery exposes the student to a broad range of surgical vascular pathology, from varicose veins and peripheral arterial disease to the most complex thoracoabdominal and abdominal aneurysms. They may also see some amputations. Students will likely encounter a mix of urgent/emergent and elective procedures. The students will be exposed to the use of endovascular technology, in addition to the use of standard open surgical techniques.

Credit 4 units.

Typical periods offered: Medicine Year

SURGERY 9150 Cardiothoracic Surgery Advanced Clinical Rotation (ACR)

This will be a four-week clinical experience focusing on evaluation, diagnosis and treatment of cardiac and thoracic surgical conditions as well as postoperative care and common on-call problems. This is a mostly inpatient experience, with some outpatient clinic. Students will learn how to perform clinical duties and responsibilities of a PGY-1. Participation will involve ICU management (beginning with reporting and interpretation), floor management, evaluation of new consultations and presenting to attendings, operating room participation at an intern level, and outpatient clinic experience. This rotation does include heavy operating room exposure, but the focus is on preparation for intern and junior resident responsibility rather than on observation. Students will spend their time 50/50 on cardiac and thoracic rotations. Students can rotate for up to one week on Congenital CT upon approval from the instructor. Patient Population: adult

Services: 50% cardiac surgery, 50% thoracic surgery

Duties:

Rounding on inpatients

Presenting patients to senior residents/fellows and attendings

Work in close collaboration with (not under supervision) of mid-level providers, to enhance communication skills and teamwork

Participating in service and division education conference

Bedside procedures with direct supervision (chest tube removal, pacing wire removal)

Participating in preoperative planning, following up and evaluation of radiologic and imaging studies

Active participation as a team player in operating rooms (transfer patient, indwelling catheters, prepping and positioning patients) including supervised assistance with closures.

Seeing and evaluating new and established preoperative patients in the inpatient and outpatient settings. This will be done under the supervision of attending surgeons, fellows and residents.

Credit 4 units.

Typical periods offered: Medicine Year

SURGERY 9200 Plastic and Reconstructive Surgery Advanced Clinical Rotation (ACR)

The period on Plastic Surgery may either be spent as a clinical clerkship or conducting a research project. The purpose of the clinical clerkship is to familiarize the student with the basic principles of Plastic Surgery. The student will have successive assignments to each of the attending staff and the ward resident services during the four weeks. This will expose the student to the breadth and depth of plastic surgery. Alternatively, if the student has identified a focus of interest, the student may participate on those services of special interest, such as hand or pediatric plastic surgery. The student will assume an active role on the plastic surgery service and will participate in the total management of a wide variety of surgical problems including congenital anomalies, microvascular surgery, surgery of the upper extremity, peripheral nerve surgery, cosmetic surgery, and general reconstructive plastic surgery.

Credit 4 units.

Typical periods offered: Medicine Year

SURGERY 9250 Urologic Surgery Advanced Clinical Rotation (ACR)

The Phase 3 Urology ACR will be a clinical sub-internship. The purpose of the 4 week rotation is to provide students with exposure to the full spectrum of clinical urology and to prepare them for Internship as a Urology Resident.

The student will play an active role in patient management and is expected to demonstrate progressive understanding of:

- The basic evaluation of the urologic patient, including performing a focused urologic history and physical examination
- The work-up of the urologic patient, including ordering and interpreting diagnostic tests/imaging/procedures
- The management (both surgical and non-surgical) of urologic conditions
- Basic procedural skills, including suturing and bedside procedures like Foley catheter placement

Throughout the Urology ACR, the student will be under the supervision of the attending staff and house staff.

Note that students have the opportunity for exposure to the spectrum of subspecialties within Urology, including Urologic Oncology, Reconstructive Urology, Endourology/Minimally Invasive Urology, Men's Health/Infertility, Female Urology, and Pediatric Urology. If a student has a specific request for distinct exposure to one or more of these subspecialties, they should reach out to the Course Director in advance, and efforts will be made to accommodate those requests.

Credit 4 units.

Typical periods offered: Medicine Year

People of the School of Medicine

Faculty & Staff

Staff

For staff contact information, please visit the Washington University online directory.

For access to online directories for Washington University, Washington University Physicians and BJC HealthCare, please visit the Washington University School of Medicine's online directories.

Please note that the *Bulletin* is published annually on July 1. Any updates to a faculty listing will only be reflected here if they are made in Workday within the editing period of December through June.

Faculty

The All Faculty List of the online Bulletin is drawn from Washington University human resources data and provides academic appointments and education details. To update or change a faculty member's Bulletin listing, please contact the business office for the department, division, or program or email hr4u@wustl.edu.

Students

For student contact information, please visit the Washington University online directory.

Faculty Committees

Committees and Committee Members

This section of the *Bulletin* presents faculty committees, which govern various aspects of School of Medicine activities related to research, patient care and education. Their purpose is to help ensure that the school's activities are carried out in compliance with university policies as well as with state and federal law.

Executive Faculty Members

Voting Members

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Executive Vice Chancellor for Medical Affairs
George and Carol Bauer Dean of the School of Medicine
Chair, Executive Faculty

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Victoria J. Fraser
Benjamin A. Garcia
Andrew K. Groves
Padma Gulur
Eric J. Huang
Sana D. Karam
Dineo Khabele
Aaron Y. Lee
Jin-Moo Lee
Eric J. Lenze
Mark E. Lowe (Interim)
Regis J. O'Keefe
John A. Olson
David W. Piston
Sidharth V. Puram
Linda J. Richards
Ting Wang
Sean P. J. Whelan
Pamela K. Woodard
Gregory J. Zipfel

Timothy J. Eberlein
Director, Siteman Cancer Center

Douglas Char
Chair, Executive Committee of the Faculty Council

Suzanne Thibodeaux
Vice Chair, Executive Committee of the Faculty Council

Adam Eaton

Voluntary Faculty Representative

Ex Officio

Andrew D. Martin

Chancellor

Mark D. West

Provost

Faculty Council

The Faculty Council consists of all full-time and certain part-time (employed by the School of Medicine at greater than or equal to 0.5 FTE) members of the faculty with the rank of professor, associate professor or assistant professor as well as those instructors (full-time or part-time if employed by the School of Medicine at greater than or equal to 0.5 FTE) who have been on the faculty for at least three years.

Executive Committee of the Faculty Council (ECFC)

Douglas Char

Chair

Suzanne Thibodeaux

Vice Chair

For a full list of committee members, please visit the Executive Committee of the Faculty Council website.

Institutional Animal Care and Use Committee

Dr. Stephen Sykes

Chair

Please visit the Institutional Animal Care and Use Committee website for more information.

Committee on Admissions

Valerie S. Ratts, MD

Chair

For a full list of committee members, please visit the Medical Student Admissions website.

Committee on Fellowships and Awards

Jeffrey Miner, PhD, Department of Medicine

Chair

Sharon Cresci, MD, Department of Medicine

Mohamed Zayed, MD, Department of Surgery

Committee on Student Financial Aid

Bridget O'Neal

Chair

Valerie S. Ratts, MD

Greg Polites, MD

Conflicts of Interest Review Committee

Robert Gropler, MD

Chair

For a full list of committee members, please visit the Office of the Vice Chancellor for Research website.

Human Research Protection Office (HRPO)

Washington University Institutional Review Board (IRB)

Derek E. Byers, MD, PhD

Executive Chair of the IRB

Human Research Protection Office (HRPO)

Jeanne Velders, JD, CIP

Executive Director

For more information, please visit the Human Research Protection Office website.

Human Research Quality Assurance/Quality Improvement Committee

Beau Ances

Chair

Catherine Lang

Vice Chair

For a full list of committee members, please visit the Human Research Quality Assurance Program webpage.

Institutional Biological and Chemical Safety Committee

Michael Diamond, MD, PhD

Co-Chair

Scott Handley, PhD
Co-Chair

Gaya Amarasinghe, PhD
Matthew Cain, PhD
Ed Casabar, PharmD
Barbara Joy Snider, MD, PhD
Michael Vahey, PhD
Ezequiel Valguarnera, PhD
David Wang, PhD

Ex Officio

Ken Boschert, DVM
Lance Franklin, PhD, PE, CHMM
Susan Cook, PhD, CBSP(ABSA), SM(NRCM)
Susan Farr, PhD

Alternates

Bridget Clancy, DVM, DACLAM
Angela Hall, PhD

Community Members

Melinda Darnell
Robert Koehler

Medical School Faculty Rights Committee

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Co-Chair (2027)

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Co-Chair (2027)

Corey Woldenberg (2027)
Steve Brennan (2027)
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Program Director

Milan G. Chheda, MD
Associate Director

Stacey L. Rentschler, MD, PhD
Associate Director

Nathan O. Stitzel, MD, PhD
Associate Director

For a full list of committee members, please visit the Medical Scientist Training Program website.

Radiation Safety Committee

Barry A. Siegel, MD
Chair

Buck E. Rogers, PhD
Vice Chair

Daniel Doenges
Radiation Safety Officer and Executive Secretary

For a full list of committee members, please visit the Department of Radiation Safety website.

Radioactive Drug Research Committee

Manu S. Goyal, MD, MSc
Chair

Barry A. Siegel, MD
Vice Chair

For a full list of committee members, please visit the Department of Radiation Safety website.

Alvin J. Siteman Cancer Center Protocol Review and Monitoring Committee (PRMC)

Co-Chairs

- Meagan Jacoby, MD, PhD
- Brad Kahl, MD
- Julie Margenthaler, MD
- Amy McQueen, PhD
- Cliff Robinson, MD

For a full list of committee members, please visit the PRMC website.

Alvin J. Siteman Cancer Center Quality Assurance and Safety Monitoring Committee (QASMC)

Nancy L. Bartlett, MD
Chair

For a full list of committee members, please visit the QASMC website.

Officers

Board of Trustees

Please visit the Board of Trustees website for the list of current trustees and other information concerning the board.

Emeritus Trustees

Please visit the Board of Trustees website for the list of emeritus trustees and other information concerning the board.

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Assistant Dean for Career Counseling

Michael Donlan, PhD
Registrar, Assistant Dean for Academic Affairs

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and Executive Director of the Center for Clinical Studies*

TBA
Associate Dean for Faculty Promotions and Career Development

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Sam Hanser
Medical Education Representative (MER)

Jacklyn Luu
Representative to the Organization of Student Representatives (OSR Rep)

Trent Rothell
Community Engagement Representative (CER)

Policies & Guidelines of the School of Medicine

The policies and guidelines listed here relate to Washington University's and the medical school's educational mission. These policies, procedures and guidelines exist to assist Washington University students, faculty and administrators with doing the business of Washington University in St. Louis in ways that are effective, consistent and compliant and to provide a safe, effective and supportive environment in which to learn, teach and work.

Washington University Policies & Guidelines

Some universitywide policies are available on the University Policies page (p. 7) of this *Bulletin*. A more complete list is available on the Washington University Compliance and Policies page.

School of Medicine Policies & Guidelines

Washington University School of Medicine is committed to providing a safe, professional and supportive environment in which to learn.* These policies and guidelines pertain to professionalism, appropriate conduct and student rights. They exist to protect students and employees as they conduct their daily responsibilities.

* Except as otherwise expressly authorized by the instructor or the university, students may not record, stream, reproduce, display, publish, or further distribute any classroom activities or course materials. This includes lectures, class discussions, advising meetings, office hours, assessments, problems, answers, presentations, slides, screenshots, or other materials presented as part of the course. If a student with a disability wishes to request the use of assistive technology as a reasonable accommodation, the student must first contact the Office of Disability Resources to seek approval. If recording is permitted, unauthorized use or distribution of recordings is also prohibited.

- Demonstrations and Disruption (p. 416)
- Liability Insurance (p. 417)
- Needle Stick and Blood and Body Fluid Policy and Procedure (p. 417)
- Outdoor/Indoor Sign Guidelines (p. 418)
- Policy Against Abusive Conduct (p. 418)
- Policy for Student Volunteer Engagement in Providing Health Care Services and Education (p. 419)
- Policy on Student Rights Under the Family Educational Rights and Privacy Act (p. 420)

Definition of the Academic Record for MD Students: *This policy is designed to comply with the provisions of the Family Educational Rights and Privacy Act (FERPA) of 1974. Student academic records at Washington University School of Medicine consist of the following: AMCAS application (including personal statement, experience history, MCAT scores, transcripts from previously attended institutions); documents signed by the student (including the WUSTL confidentiality non-disclosure agreement and the BJC Healthcare third-party electronic information access confidentiality agreement); criminal background check information; student biographic and demographic information; transcripts of all medical school course work, program(s) of study, and dates of enrollment in*

medical school (including matriculation date, start and end of each academic period, dates of leaves of absence, withdrawal, dismissal, and/or graduation); USMLE scores (including exam date and notation of pass/fail); final performance evaluations (final end-of-clerkship patient care narratives, competency determination notification letters of the Competency Attainment Committee, and promotion notification letters from the Committee for Academic Promotion); documentation of determination appeals; change of status forms (related to leaves of absence, participation in joint degree programs, academic remediation requiring delay, name change, and documentation of dismissal or withdrawal); final disposition of disciplinary action records; the Medical Student Performance Evaluation (MSPE); a copy of the medical school diploma and an English translation; awards and prizes; and residency specialty and placement.

- Research Integrity Policy (p. 421)
- Social Media Policy (p. 421)
- Student Mistreatment Reporting and Monitoring Policy (p. 421)
- Student Organization Alcohol Guidelines (p. 423)
- Voluntary Teaching Faculty Policy (p. 427)

MD Program Policies & Guidelines

These policies and guidelines pertain to the four- and five-year medical degree programs as well as to the MD portion of joint degree programs. Full information about the Student Constitution and Bylaws can be found in Canvas.

Please note that the MD Program Policies & Guidelines are subject to change as needed; effective dates will be noted.

Academics

- Academic and Professional Integrity Policy (p. 428)
- Clinical Supervision Policy (p. 429)
- Credit Hour Definition (p. 431)
- Duty Hour Policy (p. 431)
- Monitoring of Student Time (p. 432)
- Phase 1 Attendance Policy (p. 433)
- Phase 2 Attendance Policy (p. 434)
- Phase 3 Attendance Policy (p. 435)
- Policy for the Preparation of the Medical Student Performance Evaluation (p. 436)
- Procedure to Request an Alternate Educational Site or Clinical Assignment (p. 436)
- Transportation Policy (p. 437)
- USMLE Policy for Students Entering the Match (p. 437)



Assessment, Promotion, and Appeals for the Gateway Curriculum

- Policy for Review of Student Attainment of Competency (p. 438)
- Policy on Appealing Committee for Academic Promotion and Competency Attainment Committee Decisions (p. 439)
 - Procedures for Appealing a Committee for Academic Promotion Decision (p. 439)
 - Procedures for Appealing Decisions of Phase 2 Competence Without Distinction (p. 441)
 - Contesting Individual Assessments Procedure (p. 441)
 - Course Credit Procedures (p. 442)
- Challenging the Medical Student Performance Evaluation (MSPE) (p. 442)
- Conflict of Interest During Student Assessment Policy (p. 443)
- Formative Assessment and Feedback (p. 443)
- Grading System (p. 444)
- Grade Notification Policy (p. 444)
- Narrative Assessment (p. 445)
- Policy for Non-Involvement of Providers of Student Health Services in Student Assessment (p. 445)
- Policy on Time to Graduation for Medical Students (p. 446)

Financing Your Education

- Policy for Tuition Refund for the MD Program (p. 447)

Student Health, Professionalism, and Support

- Access to Healthcare Services Policy (p. 447)
- Leave of Absence Policy for Medical Students (p. 448)
- Parental Leave Policy for Medical Students (p. 450)
- Professional Behaviors for Medical Students (p. 450)
- Technical Standards for the Medical Program (p. 451)

Non-Curricular-Related Policies

- Advanced Standing Transfers Policy for Medical Students (p. 453)
- Demonstration of English Language Proficiency (p. 453)
- Non-University-Affiliated Speaker Compensation (p. 453)
- Policy on External Factors (p. 454)
- Policy on the Final Authority of the Committee on Admissions (p. 454)

- Policy on Non-Employee Voluntary Faculty Appointments (p. 454)
- Policy on the Selection of Students (p. 455)
- Preparation of Non-Faculty Instructors for the MD Program (p. 456)

Health Professions Policies & Guidelines

For information regarding the policies and guidelines of the following degrees and programs, please visit these sites:

- Audiology and Communication Sciences
- Biology and Biomedical Sciences
- Clinical Investigation
- Genetic Counseling
- Informatics, Data Science & Biostatistics
- Medical Physics (PDF)
- Occupational Therapy
- Physical Therapy
- Population Health Sciences

PhD & Joint Degree Program Policies & Guidelines

For policies and guidelines relating to any joint degree program, please refer to the MD program section of this page and the policies and guidelines for the respective program areas.

- Doctor of Medicine (Five-Year Program) (p. 414)
- Doctor of Medicine and Master of Science in Biomedical Informatics
- Doctor of Medicine and Master of Science in Clinical Investigation
- Doctor of Medicine and Master of Population Health Sciences
- Doctor of Medicine and Master of Public Health
- Doctor of Medicine and Doctor of Philosophy
- PhD Program Policies & Guidelines (p. 456)

School of Medicine Policies and Guidelines

Demonstrations and Disruption

Washington University and School of Medicine Policy on Demonstrations and Disruption

The Washington University School of Medicine follows the Washington University Policy on Demonstrations and Disruption.

Please note that the medical school campus is a private institution. However, our campus serves members of the public as part of our critical patient care function, and accordingly demonstrations and activities that are disruptive to that patient care function or to patient and visitor access to the medical campus are strictly prohibited. Other areas of the medical campus may be restricted as well.

It is highly recommended that individuals or groups who intend to demonstrate or otherwise peacefully assemble to share opinions or debate issues at the School of Medicine campus contact the School of Medicine Protective Services at a minimum of one week before the event is planned so that the individuals or groups are aware of any such restrictions.

Failure to follow these policies may result in disciplinary action as appropriate to the violation and in accordance with the policies and procedures within the respective Washington University or School of Medicine programs.

Procedures for Monitoring and Managing Demonstrations and Disruption on the Washington University Medical Campus

When a faculty member, administrator, or staff member becomes aware of a protest or demonstration on campus, they should immediately notify the Senior Associate Dean and Vice Chancellor for Medical Education. The Senior Associate Dean will then follow the following procedure:

1. Notify the following individuals:
 - a. Protective Services
 - b. One or more senior administrators within the program(s)/group(s) involved in the planned demonstration
 - c. The Dean of the School of Medicine
 - d. The Chancellor of Washington University
 - e. The Vice Chancellor for Student Affairs on the Danforth Campus
2. One or more senior administrators/staff and members of the Protective Services team will be assigned to closely monitor and be present at all demonstrations/events. If a member of the School of Medicine senior administration/staff is unable to serve in this role or if advice/support is needed, the Vice Chancellor for Student Affairs on the Danforth Campus should be engaged.
3. Attempts will be made by the senior administrator/staff and Protective Services to meet with and review the policies and procedures for demonstrations and disruptions prior to the planned event whenever possible.
4. The senior administrator/staff member and Protective Services will be present primarily to ensure that all policies are followed and to ensure the safety and well-being of all involved
5. If members of the demonstration/event violate the policy or if there is concern at any time for the safety and well-being of the campus community, the senior administrator will read the following script(s):

First:

I am (Position and Name) at Washington University. At this time, I am directing you to stop (specific behavior) that is in violation of university policy. Your actions are in violation of the university's Policy on Demonstrations and Disruption. Please take the appropriate action so you are no longer in violation. If you do not do this now, I will be referring this matter to the Washington University School of Medicine Protective Services, which may engage the City of St. Louis police department.

Second:

I am (Position and Name) at Washington University. I asked you a few minutes ago to stop (specific behavior) that is in violation of university policy. Your actions are in violation of the university's Policy on Demonstrations and Disruption. Since you have not complied with my request, I am now referring this matter to the Washington University School of Medicine Protective Services, which may engage the City of St. Louis police department.

If this fails, Protective Services will step in to manage the situation.

Liability Insurance

Washington University provides professional liability insurance for all students or practicums while participating in required clinical experiences. In addition, Washington University provides a defense and indemnification benefit for matriculated students who are candidates for the MD degree at WashU Medicine.

The benefit is provided to WashU Medicine students for the defense and indemnification of claims arising out of activities that are part of academic programs and only while a student is acting in their capacity as a medical student enrolled in the undergraduate medical program at WashU Medicine. This policy is subject to terms, conditions, limitations, and exclusions, and each request for defense/indemnification will be decided on a case-by-case basis at the sole discretion of the university.

Defense/indemnification will not be provided for any criminal acts, acts committed while under the influence, acts in violation of law, acts in which the injury or damage results from intentional malicious conduct or wrongdoing, or acts for which the action or proceeding is brought by or on behalf of Washington University. This indemnification does not cover any liability that is insured elsewhere, but it may be in excess of any amount payable under any other such insurance.

Reporting An Incident

Any incident — either actual or alleged — involving patient injury that could lead to a claim, of which a student has knowledge, must be reported immediately to the Risk Management Office of WashU Medicine at 314-362-6956.

Needle Stick and Blood and Body Fluid Policy and Procedure

Background

In keeping with Liaison Committee on Medical Education (LCME) element 12.8, this document outlines the education of medical students about exposure prevention; the procedures for care and treatment after exposure; the definition of financial responsibility in care and treatment; and the effects of infectious and environmental disease or disability on learning.

Policy

1. Students are introduced to the concept of infection control and work-related exposure during their first year of medical school. Education and training regarding exposures will be updated annually throughout the School of Medicine.
2. All exposures to human blood and body fluids are to be reported immediately to the School of Medicine's Student Health Services, which maintains a 24-hour reporting system. Students, including visiting students, must contact Student Health Services between 8 a.m. and 4 p.m., Monday through Friday, to report an exposure to blood and/or bodily fluid.
3. There are standardized protocols for exposures at the School of Medicine that involve HIV, HBV and HCV (please see below).
4. The financial coverage of the evaluation and treatment is fully covered by Student Health Services.
5. Students who are infected with any other potentially transmissible disease will not be excluded from participating in patient care activities or restricted in their access to patient care services or facilities because of their health status, unless medically based judgments in individual cases establish that exclusion or restriction is appropriate for the welfare of patients, the welfare of other members of the patient care community, or the welfare of the individual. Please refer to the School of Medicine Technical Standards for the Medical Program (p. 451) for additional information.

Procedures

Always Wear Personal Protective Equipment!

Needle Stick Procedure

1. Cleanse the wound immediately with soap and water. If a mucous membrane has been exposed, rinse with copious amounts of water.
2. Identify the source of exposure.
3. Call Student Health Services for further instructions. The source patient will be evaluated for HIV, HBV and HCV. The physician in charge of the case is responsible for acquiring patient consent for testing. The employee or student will notify the physician. All source patient charges will be the responsibility of Student Health Services.
4. Complete the Injury/Exposure Report form.
5. Students will report to Student Health Services for follow-up treatment. Individuals will be evaluated for the following:

- a. HIV or serum sample save
- b. HBV vaccination
- c. Hepatitis B surface antibody testing (a positive test in the past eliminates the need for further testing)
- d. HCV testing
- e. Tetanus and diphtheria vaccination
- f. Post-exposure prophylaxis

Exposure to Blood or Body Fluid Procedure

1. Clean the area with soap and water.
 - a. Wash needle sticks and cut areas with soap and water.
 - b. Flush splashes to the nose, mouth or skin with water.
 - c. Irrigate the eyes with clean water or saline for 15 minutes.
2. Identify the source of exposure. Keep the source or patient available for HIV, HBV antigen and HCV testing.
3. Call Student Health Services for further instructions.
4. Follow the instructions given by Student Health Services. Complete an incident report.

Last approved on October 3, 2022

Outdoor/Indoor Sign Guidelines

1. Signs, banners, and flags are not allowed to be posted on the exterior of any School of Medicine buildings or any garages, fences, grounds, or flagpoles without the review and approval of the joint leadership on campus. All requests are vetted through the Office of the Associate Vice Chancellor, Associate Dean of Operations and Facilities Management, and the signs that are posted are usually related to construction efforts to maintain a safe environment throughout campus.
2. Interior posting on windows, walls, and doors is also prohibited on campus.
3. Bulletin boards are located in the Farrell Learning & Teaching Center on Floors 3 and 4 and outside of Moore Auditorium for flyers. The WashU Medicine Marketing and Communications website has flyer templates available.
4. Signs, flyers, and leaflets are not allowed to be taped to any of the doors, walls, furniture, wood, or painted surfaces on campus.
5. Poster rails are available throughout campus to display campus-related information and activities.
 - Freestanding easels with posters are not permitted in any of the link and lobby areas to maintain a safe environment.
 - Poster rails are available on a first-come, first-served basis. Due to high volume of posters in some locations, poster space is not guaranteed.

- Posters may not be displayed for more than 14 days, including weekends and holidays. Posters left beyond 14 days will be removed and held for five business days at the Farrell Learning & Teaching Center front desk for pick up and thereafter will be discarded. Please be courteous and do not remove any posters except your own. WashU Medicine is not responsible for lost or stolen items.
 - No more than eight posters for a single event can be displayed during the same time frame throughout the entire poster rail system.
 - Posters must be related to an activity sponsored by a WashU Medicine department or part of the campus community. Any non-WashU Medicine community-related posters will be removed and discarded.
 - Posters should be 32" high and 24" wide and mounted on foam board. Posters covered with construction paper do not hold up well in our environment, and their use is discouraged. Each poster should include the date it was added to the rail system in either the lower right-hand corner or on the back of the poster.
6. The Office of Human Resources manages the digital signage throughout campus. There are monitors located throughout campus for the dissemination of information. For more information, contact Human Resources at 314-935-1136.

Resources

- Campus Signage Information
- Guide to Facilities Services
- WashU Medicine Marketing and Communications
- Education & Campus Support Services Space Use Guidelines

Policy Against Abusive Conduct

Please visit the Human Resources website for the Policy Against Abusive Conduct.



Policy for Student Volunteer Engagement in Providing Health Care Services and Education

One of the fundamental components of the Washington University School of Medicine's (WUSM's) mission is to "advance and enhance health care in a way that ensures access, compassion, high value, equity, and evidence-based care for all people in our community, including those who are underserved and uninsured to support the broader St. Louis community." In furtherance of that mission, many of our WUSM students and recognized student organizations seek out opportunities to volunteer their services and support to community partners and persons in need. These opportunities have been largely beneficial to our community partners, persons in need, and our students, and the interest and demand for such opportunities continues to grow. It is important to recognize, however, that the participation of students in the provision of certain activities for which they lack adequate education, training, or supervision can lead to potential harm to a patient, to the student, to the community partner, and to the university, among others. To facilitate coordination with community partners and to ensure the appropriate involvement of students and student organizations across all WUSM programs in these opportunities, the following guidelines are expected to be followed.

I. Required Requests and Proposals to Provide Volunteer Health Care Services and Education

Any WUSM student or WUSM-recognized student organization that wishes to volunteer their services by providing clinically oriented diagnostic or therapeutic care (e.g., screenings, physical exams, tests, distribution of medical supplies, interventions) or health-related education either directly to patients or in conjunction with a community partner must submit to the Office of Medical Student Affairs or their program's designee the following:

1. If the student or student organization plans to work with a new community partner, they must first submit a request to contact the community partner, prior to initiating any communication or outreach;

2. The WUSM student or recognized student organization must submit a proposal to the Office of Medical Student Affairs or their program's designee *and receive approval* from the School of Medicine no less than three weeks prior to any scheduled volunteer event or activity. Please note that, depending upon the nature of the event, the WUSM approval process may take two weeks or longer to review, and if needed, seek input from various WUSM and university departments such as Insurance and Risk Management; the Privacy Office; the WUSM Office of Diversity, Equity and Inclusion; WUSM Protective Services; the Office of General Counsel; and relevant clinical experts at WUSM.

In the proposal form, student organizations will be expected to provide the following details:

- Scope of volunteer activities
- Student/student organization contact information
- Faculty advisor contact information
- Community partner contact information
- On-site supervisor qualification(s) and contact information
- Consenting procedures and privacy notifications, if performed by the student/student organization. If the student/student organization is planning to use the community partner's procedures and notifications, they should note that in the proposal.
- If solely providing general health-related education, an outline of the information to be conveyed and a copy of materials to be provided to participants.
- Documentation practices for clinically oriented diagnostic or therapeutic care, if performed by student/student organization. If the student/student organization is planning to use the community partner's documentation procedures, they should note that in the proposal.

II. Memorandum of Understanding or Volunteer Contract with Community Partner

If a WUSM-recognized student organization wishes to provide volunteer services with a community partner or organization that involves engagement with patients in a clinical setting or another setting in which students would be offering health-related education or clinically-oriented care, a standard Memorandum of Understanding (MOU) may be required to be signed by the University and the community partner organization outlining the responsibilities of the university, the student organization and its participating students, and the community partner, as well as insurance and indemnification provisions, confidentiality, and informed consenting procedures, among other provisions. In some situations that do not involve clinically-oriented diagnostic or therapeutic care but where the student/student organization may be providing screenings (e.g., at health fairs), a volunteer contract may be necessary. The student/

student organization will be notified by the Office of Medical Student Affairs or their program's designee if there is a need to initiate the MOU process or have a volunteer contract signed before engaging in any volunteer activities.

III. Supervision of Students

All students must be appropriately supervised by WUSM clinical faculty or a qualified, licensed health care provider practicing within their scope of practice when participating in clinically-oriented care at any community partner site or at a student organization event.

1. The required level of supervision will be determined by the Office of Medical Student Affairs or their program's designee in consultation with a relevant clinical faculty member and the community partner organization and should take into consideration the level of training of the student, the clinical abilities of the student as observed and confirmed by the supervisor, the risk to the patient(s), acuity of the patient(s), and the nature and complexity of the clinical activity required. The supervisor is expected to actively oversee the student if the student is performing clinically-oriented care.
2. In addition, the supervisor is expected to review and independently verify key findings initially taken or made by the student. The supervisor should be interpreting any data, results or findings and conducting their own assessment and recommended treatment and care plan for the patient(s), as this would exceed the scope of the student's volunteer services.
3. Concerns regarding inappropriate supervision should be reported immediately to the Office of Medical Student Affairs or their program's designee.

IV. Insurance and Risk Management

For community partners and organizations with which WUSM does not already have a MOU that addresses medical malpractice and general liability insurance coverage, students and student organizations are required to provide confirmation of medical malpractice and general liability coverage from WUSM prior to participating as a volunteer in any clinically-oriented care at a community partner site or student organization event.

V. Violations of this Policy

Concerns regarding potential violations of this policy should be reported immediately to the Office of Medical Student Affairs or the program's designee. Violations may result in a professionalism behavior report and further disciplinary action depending upon the nature of the violation.

Last approved on June 5, 2024

Policy on Student Rights Under the Family Educational Rights and Privacy Act

The Family Educational Rights and Privacy Act (FERPA) is a federal law that protects student information.

The law also gives individual students certain rights:

- The right to inspect and review education records
- The right to seek the amendment of education records
- The right to consent to the disclosure of education records
- The right to obtain a copy of the school's FERPA policy
- The right to file a complaint with the FERPA office in Washington, D.C.

Student Directory Information

Although most information about a student is considered private and no one other than school officials (i.e., faculty and staff) with a legitimate educational interest may have access to it without the written consent of the student, certain categories of information designated as "directory information" may be disclosed by Washington University without obtaining the prior consent of the student.

Through WebSTAC, Washington University students have control over the release of their directory information.

Information with the "directory information" designation is as follows:

- Full name
- Home and local addresses and telephone numbers
- Email address
- Photographic, video or electronic image (picture)
- Academic division and major field of study
- Dates of attendance
- Previous schools attended
- Graduation dates and degrees received at Washington University
- Class (affiliated degree year)
- Academic awards
- Participation in intercollegiate activities
- Height and weight (National Collegiate Athletic Association Division III athletes only)

Refer to the full text of the Washington University FERPA Policy for more information.

Privacy Information for Parents

In accordance with federal law under the FERPA, the university may choose to release information about a student's academic performance to a parent if the student is claimed as a legal dependent on that parent's most recent federal income tax return. However, the university is not required to do so and prefers that students take the initiative to disclose and discuss academic goals and progress with their parents.

Research Integrity Policy

Allegations of breach of the Research Integrity Policy are the primary responsibility of the Research Integrity Committee of the School of Medicine. Complaints regarding students enrolled for the MD degree will be directed promptly to that committee. The Research Integrity Committee will promptly investigate the charges and report its conclusions and recommendations to the dean, who will refer the issue to the Committee on the Academic and Professional Evaluation of Students (CAPES) as a breach of professional integrity if further action is warranted.

For further information, visit the Research Integrity Policy posted on the Washington University website.

Social Media Policy

Students accepted to Washington University School of Medicine (WUSM) and current WUSM should be vigilant in their use of social networking (e.g., Facebook, Twitter, blogging). The profession of medicine requires the highest standards of conduct because of the level of trust patients place in medical professionals. When students are admitted to WUSM, enrollment remains contingent on their demonstration of this high standard of conduct through sound judgment, accountability and integrity. Written, voice, email and other electronic communications — including those used in blogs, social media sites and smart phone apps, as well as in published writing — should be thoughtful, and all individuals in the learning environment should be treated with mutual respect and understanding. Posting items that represent unprofessional behavior, releasing patient health information or other HIPAA violations, or violating Washington University in St. Louis policies on social networking sites will result in disciplinary action by the medical school.

The following two Washington University policies are incorporated into this policy and apply to accepted and current students:

- Washington University Social Media Policy
- WUSM Social Media Guidelines

School of Medicine Programs Student Mistreatment Reporting and Monitoring Policy

I. Student Mistreatment Definition

As explained in our Abusive Conduct and Discrimination and Harassment policies, the School of Medicine is committed to maintaining an environment free from behavior that is abusive, discriminatory, or harassing (including sexual) or that involves the mistreatment (including retaliation) of students or others in the learning and working environment. For definitions and examples of conduct that would be considered mistreatment prohibited by the university, please refer to these policies. Please also be aware that some behaviors require mandatory reporting by certain members of the university community.

This document identifies the mechanisms and protocols for all School of Medicine students, including DBBS students on either campus or at partner institutions, to report mistreatment against them. It identifies mechanisms for bystanders to report student mistreatment they have observed. This document also outlines the systems in place aimed at monitoring, addressing, and preventing the mistreatment of students in the learning environment.

II. Steps for Reporting Student Mistreatment

The School of Medicine strongly encourages students who feel they have experienced mistreatment — and those who feel they have witnessed the mistreatment of a student — to report it immediately, without fear of retaliation, using the following resources:

1. WashU Learner Mistreatment Incident Report

Students and other community members may submit a report through the WashU Learner Mistreatment Form, which can also be found on the Supporting a Fair Environment (SAFE) website. Washington University Human Resources receives all reports and will direct the report to the appropriate university or hospital administrator(s) for a prompt response. The reporting

portal allows for individuals to submit concerns anonymously if preferred and allows for bidirectional communication through the portal via a password, even if the report is submitted anonymously.

2. Any of the following administrators:

- Program Directors (see the respective program website or handbook for details)
- Relevant Associate Dean
- Senior Associate Dean and Vice Chancellor for Medical Education

Confidentiality and Anonymous Reporting

When receiving a confidential report, the university will strive to protect, to the greatest extent feasible, the confidentiality of persons reporting mistreatment and of those accused of mistreatment. Because of legal obligations, the university cannot guarantee complete confidentiality where it would conflict with the university's obligation to investigate meaningfully or, where warranted, take corrective action. For example, if a report identifies conduct that would fall within Title IX, the university may have an obligation to investigate and take further action that requires disclosure of all or part of the information contained in the report to the person accused as well as to the appropriate administrators. In addition, if a report identifies conduct that poses a significant threat to the health or safety of an individual, the university may also need to investigate and take further action that requires the disclosure of information contained in the report.

Even when some disclosure of the university's information or sources is necessary, it will be limited to the extent possible. The university will keep confidential all records of complaints, responses and investigations to the extent permitted by law.

Anonymous reports may be submitted through the reporting portal. If a reporter wishes to remain anonymous, the university may be limited in its ability to respond and take action with respect to the report.

III. Options for Possible Resolution

Students who believe they have been subjected to mistreatment or other reporters who believe they have witnessed student mistreatment have several options available if they wish to seek resolution of a situation. At any time, they may consult with a Discrimination and Harassment Response Coordinator (see below), whose responsibilities include assisting students, faculty and staff with questions regarding university policies and options for addressing concerns about mistreatment.

If a student or observer feels comfortable dealing with a situation that does not violate university policy without assistance, they can communicate either orally or in writing with the person whose behavior is of concern. The most useful communication clearly describes the conduct of concern and its impact on the student, and it includes a request that the behavior should stop. Frequently, such a communication will cause the behavior to stop, particularly when the person may not be aware of its impact.

If a student or reporter would like to discuss a situation and possible options for resolution with the assistance of someone else, they may also consider the following:

1. Asking a trained WUSM Supporting A Fair Environment (SAFE) Committee member to meet with them or to speak to the person whose behavior is of concern; or
2. Consulting with one of the Student Advisors listed below about other potential options to remedy the situation.

As previously mentioned, these individuals may be obligated to report the incident or conduct disclosed to the university for further review (e.g., sexual assault or harassment, threat of harm to self or others).

Students may also initiate a more formal complaint process, which could involve a committee hearing, by contacting a Discrimination and Harassment Response Coordinator. If it has not already done so, the university will initiate an investigation into the allegations under the appropriate policy and, if substantiated, take disciplinary action as contemplated by the applicable procedures. For example, if a student asserts that a faculty member has engaged in mistreatment in the form of sexual harassment, the university's Discrimination and Harassment Policy would be followed.

The university will remain in communication with the student throughout the university's investigation and response. The university may be limited in its ability to disclose personnel or other action taken in response to a complaint. The university will only be able to return communication made by anonymous reporters if the reporter creates a password and logs back into the reporting portal to access information about the incident.

IV. Monitoring and Education

The School of Medicine will provide ongoing education to promote a respectful and positive learning environment. The purpose of this education will be to communicate the School's standards of behavior and professionalism for an optimal learning environment and commit to informing students and educators about policies around behavioral expectations and processes for reporting mistreatment. The policies and reporting protocols will be posted in the *Bulletin* and in the course syllabi, and they will be reviewed with students during orientations.

Data from the reports submitted to the portal and to the Deans identified above will be aggregated for review by the SAFE Committee. The SAFE Committee will systematically review on a regular basis these data in addition to internal and external survey data when doing the following:

1. Assessing trends and the overall climate in learning areas at the School of Medicine;
2. Making any recommendations for changes to the policies and the reporting and response mechanisms in place; and
3. Developing action plans to implement targeted educational interventions based upon the data received.

The SAFE Committee will regularly report its findings and recommendations to the Academic Affairs Committee. Aggregate reports will also be regularly forwarded to program and/or department chairs for monitoring purposes.

V. Student Advisors

The following is a list of offices and advisors who may provide guidance when addressing some of the potential issues discussed in the above guidelines:

- Gender Equity and Title IX Compliance Office
- Discrimination and Harassment Response Coordinator
- School of Medicine Office of Diversity, Equity and Inclusion
- Program-specific advisors (see the respective program website or handbook for details)
- Relevant Associate Dean
- Senior Associate Dean and Vice Chancellor for Medical Education

VI. Additional Resources

- School of Medicine Student Ombudsperson (confidential resource)
- Ombudsperson for Graduate Students (confidential resource)
- Medical Student Peer Advocates (medical students only)
- Relationship and Sexual Violence Prevention Center (confidential resource)

Last approved on May 19, 2023

Student Organization Alcohol Guidelines

Guidelines Governing Alcohol Service at Events Sponsored by Student Organizations at the Washington University School of Medicine

I. General Principle on Alcohol Service at Events Sponsored by Graduate and Professional Students and Organizations at Washington University in St. Louis

Washington University in St. Louis (WashU) has adopted a Drug and Alcohol Policy reinforcing our commitment to an education, work, living and patient care environment that is free of alcohol and drug abuse. Given our mission to support personal and public health, students of the School of Medicine (WUSM) have a particular responsibility to recognize alcohol impairment and the potentially dire social, physiological and psychological consequences of substance use and abuse. For information regarding the effects of alcohol and drug use and abuse and to learn about available counseling services, please consult the School of Medicine's Student and Occupational Health Services.

As adults, students are expected to know and abide by all applicable state and federal laws and university policies and procedures. State law makes it illegal for a person under the age of 21 years old to purchase, attempt to purchase, or possess any intoxicating liquor. Violation can subject an individual to a fine between \$50 and \$1,000 and/or imprisonment for a maximum term of one year. County and municipality ordinances contain similar prohibitions and sanctions.

WashU expects its students and community members to exercise responsible decision making if they choose to include alcohol as part of their activities, including making sound judgments about whether, when, and how much to drink. Individual students are responsible for their own behavior and will be held to university and school policies should their behavior not conform to standards of conduct. Individuals may also be referred for criminal prosecution.

If a student organization provides alcohol as part of an event, student organizers share in the responsibility of providing a safe environment for all attendees and must prioritize the safety, health, and well-being of participants when planning and hosting an event. Student organizations may also be held accountable for the actions of their members through university and school policies.

Student organizations are expected to follow the guidelines below when hosting events with alcohol. Individual schools and certain venues retain the discretion to impose additional guidelines on student organizations and events. For more information, contact the Office of Medical Student Affairs or the student services office of the applicable WUSM program.

II. Event Protocols

A. Registration

1. Any on- or off-campus event sponsored by a recognized student organization of the school or the university as a whole must comply with the Drug and Alcohol Policy of Washington University in St. Louis, the procedures set forth in these guidelines, and all other applicable university policies.
2. Any on-campus event involving alcohol funded in part by the Office of Medical Student Affairs or by the applicable WUSM student services office and not sponsored by the school itself must be sponsored by a recognized student organization.
3. All events with alcohol need to be registered with and approved by the Office of Medical Student Affairs or the student services office of the applicable WUSM program. Depending on the nature and location of the event, approval from multiple departments within the university or school may be required. Approval for the event should be obtained no less than one week before the event is scheduled to take place. Failure to obtain approval for an event with alcohol during this time frame will likely lead to the event being rescheduled or cancelled. An event may not be publicized until it is approved by the Office of Medical Student Affairs or the student services office of the applicable WUSM program and any other applicable department (e.g., Protective Services).
4. To register an event, an event registration form must be submitted to the Office of Medical Student Affairs or the student services office of the applicable WUSM program no less than two weeks before the proposed event.

B. Marketing

1. Organizations may not plan events that promote or encourage the consumption of alcohol as the main focus of the event. The theme of all events at which alcohol is served must be primarily social, cultural or educational. Alcohol may be implied in campus advertising of the event to graduate and professional students using conventional phrases such as "happy hour" or "cocktail reception."
2. Student organization events marketed and open to the general public or to undergraduate students are not permitted to include alcohol.
3. Persons planning events should remember that the vast majority of events at WashU take place without alcohol, that most members of the undergraduate community are not of legal drinking age, and that many members of our community do not drink alcohol beverages at all.
4. The following are examples of prohibited depictions of excessive alcohol consumption in the advertisement or promotion of events:
 - Excessive or underage consumption or use of alcoholic beverages
 - All-you-can-drink activities
 - Drinking games
 - Price specials on alcohol
 - Promotions or prizes featuring alcohol

C. Event Location

1. Student organizations should check in advance with the Office of Medical Student Affairs or the student services office of the applicable WUSM program, the WUSM Operations & Facilities Management Department, Danforth Event Management, or the appropriate WashU office for the reservation of specific event locations and any separate guidelines (including reservation deadlines) applicable to that space. Where separate guidelines are applicable and may conflict with the guidelines herein, the more restrictive guidelines should be followed.
2. When alcohol is permitted, the space must be secured (or, for outdoor locations, roped off as necessary) to ensure that proper admittance and alcohol distribution can be regulated easily and effectively.

D. Alcohol Types

1. Only beer and wine are permitted.
2. Hard liquor — including (but not limited to) grain alcohol, punches and mixed drinks — is not permitted at events.
3. Glass bottles are not permitted on campus and are discouraged at off-campus venues.
4. Kegs or other bulk containers of alcoholic beverages are not permitted.



E. Food and Alternative Beverages

1. Food must be provided at all events where alcohol is served.
The food options must include plentiful and appetizing nonsalty foods that are readily available, free, and displayed in an attractive manner.
2. Nonalcoholic beverages, including water, should also be readily available and free.
3. The food and nonalcoholic beverages should be replenished several times throughout the event so that they are continuously available.

F. Distribution of Alcohol

1. In compliance with Missouri law and university policy, alcohol must be served in a controlled manner and may not be freely accessible. A central point of distribution must be designated to allow for proper identification.
2. Alcohol must not leave the confines of the event. The “responsible contacts” and security staff are responsible for ensuring that alcohol does not leave the event.
3. Under the law, no one who is under the age of 21 years or who is disorderly, disruptive, visibly intoxicated, or known to be a “habitual drunkard” may be served.
4. Regardless of who is managing distribution, the age of all attendees must be verified. Acceptable forms of identification are limited to the following: (1) a current driver’s license from any U.S. state; (2) a U.S. military identification card; (3) a state of Missouri special identification card; or (4) a passport. Please note that a foreign driver’s license and a special identification card from a state other than Missouri are not acceptable forms of identification.
5. If the server is not checking identification before serving each drink and if persons under 21 years old are permitted at the event, those guests who are 21 years old or older must be designated with a wristband or otherwise in a clear manner that is not easily replicated. For example, it is not permissible to mark hands with a marker or pen.
6. Those who serve alcohol and those who check proof of age and identification for any event may not consume or be under the influence of alcohol during the event.
7. Only one drink at a time may be served to each person. Each drink is not to exceed 12 ounces of beer or 5 ounces of wine. Guests are limited to a total maximum of one drink for each hour of the event (e.g., if the event lasts three hours, a guest may be served three drinks over the entirety of the event).
8. Alcohol distribution must conclude 30 minutes before the event ends.
9. Options for distribution must be discussed with and approved by the Office of Medical Student Affairs or the student services office of the applicable WUSM program. Depending on the nature and location of the event, options may include the following:

a. *Student organization servers*: Student organization members may order, set up, and control distribution of the alcohol at the event independently in compliance with these guidelines if attendance is less than 40 guests, including members of the sponsoring organization(s). Prior to the event, the student organization must designate which member(s) will act as server(s). Servers must always be present at the location where the alcohol is provided in order to monitor guests’ consumption and to ensure that no persons under the age of 21 years receive alcohol. The practice of “self-serve,” in which individual guests serve themselves from a common container or source, is prohibited.

b. *Third-party bartenders*: Student organization members may purchase alcohol, and a third-party bartending company with the requisite liquor license or permit may set up and control distribution of the alcohol at the event. Bartenders will be responsible for checking the identification of the guests.

c. *Third-party caterers*: Student organizations may contract with a third-party vendor with the requisite insurance and liquor license or permit (e.g., Bon Appetit, Aramark) to acquire, set up, and control distribution of the alcohol at the event, including checking the identification of the guests.

- Some university event spaces require a third-party caterer to be used for the service of alcohol or food. Student organizers must check policies and guidelines in advance with the Office of Medical Student Affairs or the student services office of the applicable WUSM program, WUSM Facilities, Danforth Event Management, or the appropriate WashU office.
- If there is any possibility that event attendees may be less than 21 years old, student organizers must use option b or c to distribute alcohol.
- If alcohol is offered for sale (e.g., cash bar), if admission is charged, if donations are solicited to attend the event, or if money is otherwise changing hands between the guests and the organization for the event (e.g., charge for cups or glasses, charge for tickets), then the distribution of alcohol may only be provided through option c.

10. Off-campus events: If an event is held at an off-campus venue and alcohol is being provided by the student organization, the student organization must use option c, unless such service is provided by the venue. The owner of the event space must assume liability for the event, and the owner or caterer must have the requisite liquor permit and acceptable liability insurance. Organizations should check with the Office of Medical Student Affairs or the student services office of the applicable WUSM program to ensure that all requirements are understood.
11. The selling of alcohol may not be used as a fundraiser for the sponsoring organization.

G. Drinking Games and Other Games of Chance

1. There may be no games of chance, drinking games, contests, or other similar activities that induce, encourage, or result in the consumption of alcohol. Examples include but are not limited to beer pong, flip cup, kings, caps, Jenga, quarters, or other games in which binge drinking is encouraged.

H. Responsible Contacts

1. At least one individual from the student organization per 25 attendees must be designated as a "responsible contact" for the event. More responsible contacts may be required based on the size, type and location of the event. Training for those wanting to serve as responsible contacts is available through the Office of Medical Student Affairs or the student services office of the applicable WUSM program.
2. Responsible contacts are not to consume or be under the influence of any alcohol prior to or during any portion of the event, including setup and cleanup. The responsible contacts must remain the same individuals throughout the entire event. These individuals are responsible for overseeing and ensuring the safety of the event, the distribution of alcohol, and the implementation of this policy throughout the entire event.
3. Responsible contacts are required to introduce themselves to the security guards, the venue representatives and WashU Protective Services. One responsible contact should serve as the primary liaison with these individuals/agencies.
4. Responsible contacts should monitor the consumption of alcohol by guests and take appropriate action by calling the police for emergency medical services if any guest displays signs of intoxication and is in need of medical attention.
5. The responsible contacts must end an event during which these guidelines are not being followed or other significant problems arise that jeopardize the security of the event or the safety of students. Security staff or Protective Services should be available to assist with closing down an event per the contacts' request. University staff may close an event at any time if the security of the event is jeopardized or if the safety of students is at risk. A university staff representative may be required to attend large-scale events.

I. Attendance and Proper Identification

1. Participants who intend to consume alcohol must show proof of minimum drinking age by presenting a government-issued photo identification. Washington University identification, driver's licenses, and state or federally issued identification cards may be

checked for validity at the point of entrance. Fake identification cards will be confiscated; students risk disciplinary action and/or referral to off-campus law enforcement authorities if they present false identification.

2. A line for admission should be in a well-lit area and well organized. A security guard may be responsible for checking proof of legal age and affixing wristbands.

J. Guest Policy

1. For events at which guests are permitted, each WashU student is allowed to bring one guest. Students are responsible for the conduct of their guests, and guests must enter with their hosts.
2. Guest misconduct could lead to disciplinary action for the WashU student, and the guest could be subject to prosecution off campus. Verification of age and identity (i.e., driver's license or state or federally issued identification card) will be required of all attendees at the entrance to the event.

K. WashU Police Department and WUSM Protective Services

1. The WashU Police Department (WUPD) or WUSM Protective Services should be notified of all on-campus programs for which alcohol has been requested. Such events may require the presence of officers or security guards or the implementation of other security measures. Costs associated with security will be the responsibility of the sponsoring organization.

L. Security

1. Private security guards may be required to assist with the safety of participants and the security of the facility when total attendance involves more than 100 attendees, as determined by WUPD or WUSM Protective Services. For all events that require security, student organizations should anticipate that a minimum ratio of three guards plus one additional guard for every 50 attendees may be required. The sponsoring organization is responsible for contacting and arranging for guards or for ensuring that the venue provides appropriate security staff.
2. WUPD or WUSM Protective Services should be involved in planning for the most effective use of the contract security contingent prior to the event. An example of how guards may be stationed is as follows:
 - At least one guard would be stationed at the main entrance of the event to check for WashU student identification, to monitor the guest policy, and to help determine if anyone who appears to be intoxicated should be refused entry.
 - A second guard would be assigned to the point of alcohol distribution and, depending on the security services provided, could monitor or check identification for proof of legal age and assist with pulling drink tabs from wristbands, if applicable.



- Other guard(s) would serve as roamer(s) and be responsible for monitoring legal drinking, access to event space, and all entrances.
- Additional guards may be required based on the nature of the event and the expected attendance. Security costs are the responsibility of the sponsoring organization.

3. Security staff must come from a licensed and bonded security company. However, some off-campus venues may prefer to have their own staff serve in this capacity. The security guards, bartenders, caterers or designated organization members (depending on the nature of the event) are required to verify the age of each participant with identification that provides the date of birth. If the event is held outdoors or in an unsecured area, distinct identification (e.g., wristband, stamp) is required to identify attendees who are 21 years old and older; this is to ensure that those passing through the event do not receive alcohol.

M. Post-Event Cleanup

1. For any event on campus at which alcohol is being served, the student organization planning the event must make arrangements for custodial services when the space reservation is made. Service requests should include additional trash cans and recycling bins. Large events must have cleaning staff during the hours of the event to remove trash and clean restroom facilities. All expenses are the responsibility of the sponsoring organization.

Voluntary Teaching Faculty Policy

Background

Washington University School of Medicine (WUSM) is committed to providing the highest level of training for students and residents, which requires exposure to different clinical settings, career types, and care delivery systems. Providing broad and high-quality experiences requires the involvement of not only full-/part-time university faculty but also community-based voluntary educators. Such individuals perform a valuable service to WUSM and, as such, should be prepared, supported, and recognized for the work they do to educate our learners. This policy applies only to School of Medicine Voluntary Teaching Faculty and *specifically excludes full-/part-time faculty and other voluntary faculty appointments.*

In accordance with *LCME Element 9.2*, WUSM must ensure that medical student clinical learning experiences are supervised by members of the school's faculty. Therefore, community-based voluntary educators for medical students and/or residents/fellows will

be appointed as Voluntary Teaching Faculty. Voluntary Teaching Faculty are neither employed nor compensated by WUSM. They are expected to participate in the education of medical students and/or residents in order to maintain the Voluntary Teaching Faculty appointment.

In keeping with *LCME Element 4.4*, all medical school faculty must receive regularly scheduled and timely feedback on their academic performance and progress toward promotion. This includes Voluntary Teaching Faculty.

Policies

1. *Department heads may appoint Voluntary Teaching Faculty* for the specific purpose of participation in the education and training of medical students and/or residents/fellows.
2. *Voluntary Teaching Faculty may be appointed at the following ranks.* The initial rank shall be commensurate with the level of professional/teaching accomplishment relative to other individuals within their relevant peer group.
 - Voluntary Teaching Instructor
 - Voluntary Teaching Assistant Professor
 - Voluntary Teaching Associate Professor
 - Voluntary Teaching Professor
3. Voluntary Teaching Faculty may simultaneously hold Voluntary Clinical or Research Faculty positions. The appointment, review, and termination process for Voluntary Clinical or Research Faculty positions lies solely with the department.
4. All Voluntary Teaching Faculty shall have a *biannual (every 2 years) management review* performed by the appropriate course/program leader or other designated administrative faculty member, which shall include an assessment of continuing participation, available learner feedback, adherence to teaching/assessment/faculty development requirements and policies, and progress toward promotion. Should issues or other needs arise, a review may occur at any time.
5. Voluntary Teaching Faculty may be *considered for promotion* after 6 years of annual participation with at least satisfactory teaching evaluations and compliance with policies, procedures, and practices relevant to their teaching role.
6. Two consecutive years of nonparticipation in an educational program may result in forfeiture of the Voluntary Teaching Faculty appointment.
7. In all activities carried out in connection with their appointment, Voluntary Teaching Faculty members must comply with the standards of conduct contained in all WUSM policies (including but not limited to the Code of Conduct and policies concerning abusive conduct, discrimination and harassment, mistreatment reporting and monitoring, and clinical supervision), except insofar as those policies apply only to employed faculty.
8. Voluntary Teaching Faculty must notify the Office of Education immediately if they voluntarily or involuntarily relinquish their license, Drug Enforcement Administration (DEA) registration, clinical privileges, or malpractice insurance.

9. Voluntary Teaching Faculty appointments may be terminated by the department head or designee or by the Office of Education in collaboration with the department before the end date of the appointment for any reason at any time. The Voluntary Teaching Faculty will ordinarily be notified in writing 30 calendar days before the effective date. Termination of a Voluntary Teaching Faculty appointment will not necessarily result in termination of a simultaneously held Voluntary Clinical or Research Faculty appointment. A Voluntary Teaching Faculty member whose appointment is terminated may appeal the decision to the Dean of the School of Medicine or their designee.

Procedures

1. Voluntary Teaching Faculty are recruited by course/program leaders who will oversee their work with learners and ensure their readiness for the role.
2. Course/program leaders propose Voluntary Teaching Faculty to the Office of Education.
3. The Office of Education will collect the required data (a Proposed Voluntary Teaching Faculty Appointment form and a curriculum vitae) and present the proposals to the appropriate department head or their designee. Failure of the proposed Voluntary Teaching Faculty to submit required information will result in a delay or denial of the Voluntary Teaching Faculty appointment. The Office of Education will propose Voluntary Teaching Faculty as soon as practical after recruitment.
4. The Office of Education will conduct biannual (every 2 years) reviews of all Voluntary Teaching Faculty and provide summaries to department heads. The reviews will be conducted in collaboration with course/program leads. These reviews will include consideration for promotion and discussion of criteria for promotion.
5. The appropriate department head or their designee must approve or decline all Voluntary Teaching Faculty appointments and recommended promotions.
6. After receiving final approval from the department head or their designee, the Office of Education shall formally offer the appointment or promotion to the proposed and approved Voluntary Teaching Faculty by sending, as appropriate, a Voluntary Teaching Faculty Appointment (or Promotion) Letter. The appointment or promotion will not be official until the candidate returns to the Office of Education a countersigned copy of the letter accepting its terms and conditions. The Office of Education must forward the countersigned letter to Human Resources and the respective department.
7. When terminating the Voluntary Teaching Faculty appointment of an individual who also holds a Voluntary Clinical or Research Faculty appointment, the department chair will decide whether the latter will be terminated along with the former. This information will be included in the letter of termination provided to the individual.

Last approved February 2024

MD Program Policies and Guidelines Academics Academic and Professional Integrity Policy

Background

This document on academic and professional integrity applies to all Washington University School of Medicine (WUSM) students participating in the MD program. The policies, procedures, and guidelines contained within were established to address instances of academic and/or professional misconduct by students and are in keeping with relevant university-wide policies and procedures as well as with relevant state and federal laws. Such university-wide policies include, but are not limited to, the Washington University Student Conduct Code, the Policy Against Abusive Conduct (p. 418), the Discrimination and Harassment Policy, and the Research Integrity Policy (p. 421).

Policy

The Academic and Professional Integrity Policy is meant to clarify WUSM's expectations with regard to student behaviors related to professional integrity and to provide specific examples of misconduct. These examples are meant to be illustrative and should not be taken as exhaustive. Students are encouraged to seek clarification from the appropriate representatives in the Office of Medical Student Education (OMSE) or the Office of Medical Student Affairs (OMSA) in any situation of uncertainty. Violations of professional integrity include but are not limited to the following:

1. Any act of plagiarism, which would consist of taking someone else's ideas, words, or other types of work and presenting them as one's own. This includes the use of material from the internet or other material generated by an artificial intelligence without citation.
2. Cheating on an assessment or any other violation of rules or conditions of assessment, including the unauthorized use of artificial intelligence.
3. Copying or collaborating on assignments without permission.
4. Unauthorized use of materials, including the use of artificial intelligence, as specified by the relevant course leadership.



5. Fabrication or falsification of data or records.
6. Other forms of deceit, dishonesty, or inappropriate conduct, including but not limited to the following:
 - a. Submission of the same work, or essentially the same work, for more than one assignment or course without explicitly obtaining permission from all instructors/course masters/thread leads.
 - b. Requesting an academic benefit based on false information or deception.
 - c. Willfully damaging the efforts or work of other students.
 - d. Stealing, defacing, or damaging academic facilities or materials.
 - e. Submitting any academic work under someone else's name other than their own.
 - f. Collaborating with other students planning or engaging in any form of academic misconduct.
 - g. Engaging in any behaviors or activities that, upon review, are deemed consistent with academic misconduct and not explicitly described here.
7. Abuse, harassment, or any other seriously improper conduct in relation to instructors, students, educational and clinical staff, patients, or other members of the Washington University and/or Barnes Jewish Hospital communities.
8. Breaches of confidentiality (e.g., public posting of proprietary educational material, HIPAA violations).
9. Participation in illegal activities and/or substance misuse.
10. Misrepresentations of one's credentials or status or failure to correct others' inaccuracies or misrepresentation of one's credentials.
11. Aiding or abetting any individual in the violation of the professional integrity policy.

All faculty, staff, and students are responsible for reporting incidents of student misconduct in a timely manner, which can be done through the completion of a Professional Behavior Form (PBF) or submitting a Supporting a Fair Environment (SAFE) report, when applicable. Failure to report incidents of misconduct may be considered a separate act of academic and/or professional misconduct.

Reported incidents of misconduct will be reviewed by the Student Success Team (SST), the Competency Attainment Committee (CAC), and/or the Committee for Academic Promotions (CAP), depending on the particular circumstances of the incident in question and in a way that is in keeping with relevant university-wide policies as well as federal and state law. Incidents that occur within the scope of the MD program will generally be reviewed by the SST and referred to the CAC for review alongside other performance information aligned with the medical education program objective "exhibit high standards of professional integrity" to support competency decisions and promotion recommendations in keeping with standard CAC operations and policies. Incidents involving behaviors that do not clearly occur within the scope of the MD program (e.g., extracurricular activities like student groups, illegal activities, abusive conduct that occurs off-campus) will generally be reviewed by the SST and referred for adjudication by the CAP, the Office of Student Conduct and Community

Standards, or another university office responsible for the investigation and adjudication of certain university policy violations (e.g., the Office of Institutional Equity, Human Resources, or the Gender Equity and Title IX Office). Students accused of misconduct will be given notice of the alleged violation and an opportunity to respond in accordance with the relevant procedures of the office investigating and adjudicating the complaint. For sake of clarity, even if another university office adjudicates a professionalism complaint involving a medical student, WUSM retains jurisdiction to make additional decisions regarding a student's status if the student is found in violation.

Guidelines

Students who observe incidents of academic and/or professional misconduct may seek advice on reporting from their coach, the Associate Dean for Educational Strategy, the Assistant Dean for Student Assessment, a Dean of Student Affairs, or the WUSM ombuds. Students are reminded that university policies preclude the use of medical or recreational cannabis on campus or at off-campus events and activities sponsored by the university. In keeping with these policies, students who present to classroom, lab, or clinical responsibilities appearing to be impaired may be subject to for-cause testing and additional action as specified in these policies.

Clinical Supervision Policy for Medical Students on Clinical Rotations

Background

Part of Washington University School of Medicine's mission is to develop and maintain excellent clinical programs that provide outstanding care. To fulfill this mission and ensure the safety of both learners and patients, we have created this clinical supervision policy to direct our clinical health care teams on the required oversight of medical students.

Liaison Committee on Medical Education Standards 9.2 and 9.3 require that a medical school ensures that the members of the school's faculty provide appropriate supervision of medical students in clinical learning situations involving patient care to ensure patient and student safety. We must also ensure that the level of responsibility delegated to the student is appropriate to their level of training and supervised by an individual within the scope of their practice.

For the purposes of this policy, the following definitions will be used:

- *Direct supervision* means that the supervising provider is physically present (or continually present on virtual telehealth visits) with both the student and the patient.
- *Indirect supervision* means that the supervising provider is not physically (or continually on virtual telehealth visits) present with both the student and the patient but is immediately available to provide direct supervision (or to join the telehealth visit) upon request, thus requiring that the supervising provider remain physically present within the hospital or other site of patient care. The supervising provider may include any member of the health care team including residents, fellows, and attending physicians. There are also some situations in which it is appropriate that direct supervision be provided by other health care providers (e.g., registered nurses, advanced practice nurses, physician assistants, certified registered nurse anesthetists) if the specific clinical activity falls within their defined scope of practice.
- *Independent practice* is defined as a licensed practitioner providing medical care that is within their scope of practice.
- A *medical procedure* is defined as a noninvasive or minimally invasive action intended to measure, diagnose, evaluate, or treat a medical condition. It is inclusive of but not limited to breast/pelvic/bimanual/rectal exams, venipuncture, peripheral intravenous catheter placement, peripheral arterial puncture, urinary catheter placement, nasogastric tube placement, suturing, simple incision and drainage, lumbar puncture, thoracentesis, paracentesis, arthrocentesis, and central venous catheter placement.
- A *surgery* is a more invasive form of a medical procedure. It most often involves some form of incision, and it occurs only in specified environments such as an operating room or a procedure suite.
- Participate in the review of medical records, history-taking, physical examination (excluding sensitive portions of the exam; see "Physical Examination" below), and the analysis of clinical data with indirect supervision when deemed capable of doing so by the supervising provider.
- Document in the medical student section of the electronic health record. All medical student clinical documentation requires review and co-signature by a licensed physician who will be directly responsible for the documentation. The supervising physician must independently confirm the documented findings.
- Enter patient care orders into the electronic health record in a pending state that requires review and co-signature by a licensed physician who will be directly responsible for the orders.
- Observe/assist in procedures under continuous direct supervision and only when deemed capable of doing so by the supervisor.
- Observe/assist surgeries under continuous direct supervision when deemed capable of doing so by the supervisor.

Phase 2 and 3 medical students may do the following:

- Participate in the review of medical records, history-taking, physical examination (excluding sensitive portions of the exam; see "Physical Examination" below), the analysis of clinical data, patient counseling, shared decision making, and frontline communication with consulting services with indirect supervision when deemed capable of doing so by the supervising provider.
- Document in the medical student section of the electronic health record. All medical student clinical documentation requires review and co-signature by a licensed physician who will be directly responsible for the documentation. The supervising physician must independently confirm the documented findings.
- Enter patient care orders into the electronic health record in a pending state that requires review and co-signature by a licensed physician who will be directly responsible for the orders.
- Perform patient written and verbal handoffs with direct supervision and, in the case of Phase 3 medical students, with indirect supervision when deemed capable of doing so by the supervising provider.
- Assist/perform procedures under continuous direct supervision only when deemed capable of doing so by the supervising provider.
- Observe/assist surgeries under continuous direct supervision when deemed capable of doing so by the supervising provider.

Policies

Medical students are *not* permitted to independently practice at any time. *Medical students may not under any circumstances assist or perform procedures or any portion of a surgery without continuous direct supervision.*

The oversight of medical student learning experiences involving patient care (e.g., immersions, clerkships, clinical electives) is provided by members of the school's faculty serving in course, clerkship, or other leadership roles. These leaders must set expectations regarding the level of student supervision required during the patient care activities that occur during the clinical experience, and they are responsible for communicating that information to all supervising providers. Specifically, these leaders are responsible for making any required skills/procedures and patient types/clinical conditions known to medical students and the supervising provider teams, including the required levels of supervision. This information must also be specified in any required clinical experience logs and syllabi.

Phase 1 medical students may do the following:



Physical Examination

At the discretion of the physician health care team and in accordance with course-specific guidelines, students are able to perform general physical examination techniques under indirect supervision, excluding portions defined as “sensitive.” Sensitive portions of the physical examination must always be performed under continuous direct supervision, even if the supervising provider determines the student capable of performing these examinations under indirect supervision. These include but are not restricted to external genitalia, rectal, breast, and pelvic examinations. Infant (<24 months of age) external genital examinations can be performed under indirect supervision at the discretion of the supervising provider.

Guidelines

For the sake of patient safety and personal growth, medical students are expected to request assistance in all circumstances beyond their level of skill and comfort, regardless of concerns regarding assessment or reprisal. If a student has concerns about the lack of clinical supervision, they are encouraged to discuss this with either the course director or the Office of Medical Student Education. If the issue is not resolved to satisfaction, students can then approach the Associate Dean for Student Affairs or Medical Education, the Senior Associate Dean for Education, or the Office of the Ombuds for Washington University School of Medicine.

If any member of the health care team has concerns about violations of the Clinical Supervision Policy, they are to contact the course director for immediate investigation of the situation. The course director is responsible for notifying the Office of Medical Student Education of any suspected violations of the Clinical Supervision Policy.

Last approved October 30, 2023

Credit Hour Definition

Courses in the Washington University School of Medicine MD Program are scheduled in weeks, and credit is awarded as credit hours such that each week of instruction is valued as 1 unit of credit. A week of instruction represents at least 45 hours of direct instruction and out-of-class related academic work.

The creation of courses is done at the program level. As part of the review process, the creation of courses is monitored by the School of Medicine Office of the Registrar. The length of the academic period along with the academic activity determines the credit hours assigned for each course.

Courses and credit hours are then entered into the Washington University course listings system. Changes are monitored and deadlines are provided to ensure compliance.

Duty Hour Policy for Medical Students on Clerkships and Other Clinical Rotations

Background

Washington University School of Medicine (WUSM) is committed to the creation of effective learning environments that balance the importance of meaningful participation in clinical activities with the need to support equilibrium among student clinical responsibilities, learning, and personal health and well-being. The following policies and guidelines are set taking into account the effects of fatigue and sleep deprivation on learning and patient care.

In keeping with Standard 8.8 of the Liaison Committee on Medical Education, clinical course directors, directors of clinical electives, and the Office of Medical Student Education are responsible for monitoring duty hours and ensuring that these are adjusted as necessary. Duty hours are defined as all clinical and required academic activities related to medical student education, including patient care (both inpatient and outpatient), administrative duties (e.g., completion of paperwork, dictation of charts), the provision of the transfer of patient care (e.g., check-in, check-out), time spent in-house while on call, and scheduled academic activities (i.e., required academic conferences). Time spent in self-directed study or practice performed after the student has left the hospital (or after the student has been told that they can leave) does not count toward duty hours.

Policies

- Students must not be scheduled for more than 80 clinical duty hours during a seven-day week, averaged over a four-week period.
- Students must have a minimum of four periods of 24 consecutive hours off over four weeks. **Note:** Official WUSM school breaks and holidays should not be counted toward this minimum time-off requirement. Weekends that are adjacent to holidays (e.g., Labor Day) are not considered official holidays.
- Students must not be on overnight call more frequently than every third night. Overnight shifts that do not extend a student's duty hours during the workday, such as those that might occur in Emergency Medicine or Obstetrics, are not included.
 - Students must have access to call room facilities during overnight call shifts that extend a student's duty hours during the workday.

- Students cannot be on call for more than 24 successive hours, with an added period of up to 4 hours for continuity, educational debriefing, and didactic activities. No new patients should be assigned to students after the 24-hour call limit.
- Students must have at least 14 hours off from clinical work and required educational activities following 24 hours of in-house call.
- Students will have at least 10 hours off between scheduled work periods, including all activities within the definition of duty hours above.
- All students on clinical rotations will have all official Washington University holidays off, regardless of whether the student's team is on-call or post-call the day of the holiday. On the workday immediately preceding the holiday, students will be dismissed by 5 p.m. and will not be assigned call duties or regular clinical duties until the day immediately following the holiday at the time set forth by the clerkship director, chief resident, or clinical elective director. In the case of clerkships/rotations with evening or night shifts, an equivalent amount of time off will be provided in as immediate proximity to the holiday as is possible to minimize additional loss of clinical exposure.
- All clerkship students are to be excused from clinical duties by 5 p.m. on the evening before they are scheduled to take an assigned National Board of Medical Examiners subject exam.
- Please refer to the relevant attendance policy for additional details regarding excused time off from clinical duties.
- Individual clinical course directors and directors of clinical electives may choose to implement duty hour guidelines that are more restrictive than the above. However, duty hours may not exceed the above regulations.
- If a student has concerns about duty hour violations, they should discuss it first with the clinical course director. If the issue is not resolved to the student's satisfaction, they may approach the Associate Dean for Medical Student Education, the Associate Dean for Student Affairs, or the Office of the Ombuds for Washington University School of Medicine.

Guidelines

- It is strongly suggested that clerkship directors and directors of clinical electives take into consideration additional student workload created by required assignments or other required learning activities when monitoring student duty hours. Examples include but are not limited to e-learning activities, required writing assignments, and quizzes.
- Duty hours data will be collected via end-of-clerkship course evaluations and clinical elective course evaluations, which are completed by students after each clerkship and clinical elective.
- Clinical course directors will review duty hours data after each rotation to address any concerns and to adjust requirements as necessary.

- The Office of Medical Student Education will review the data quarterly to address any concerns and to adjust requirements as necessary. Data will be presented periodically to the Committee on Oversight of Medical Student Education and its subcommittees, which will charge the appropriate individuals or offices with improvement plans, when necessary.

Last approved on November 5, 2019

Washington University School of Medicine Policy for Monitoring of Student Time

Background

Washington University School of Medicine (WUSM) is committed to providing our students with an excellent education that is balanced with the need for learners to have sufficient time for self-directed learning and overall well-being. In keeping with Liaison Committee on Medical Education (LCME) standard 8.8, WUSM is responsible for monitoring the amount of time medical students spend in required learning activities in the Gateway Curriculum. This monitoring includes the total number of hours medical students are required to spend in clinical and educational activities during clerkships, the latter being accounted for in WUSM's Duty Hour Policy for Medical Students on Clerkships and Other Clinical Rotations (p. 431). For the purposes of this policy, required learning activities include clinical duty hours, all scheduled didactic activities, required preparatory work for didactic activities, scheduled clinical skills exercises, required community engagement, required coaching sessions, and summative assessments during Phase 1 of the Gateway Curriculum.

Policies

Please see WUSM's Duty Hour Policy for Medical Students on Clerkships and Other Clinical Rotations (p. 431) for policies and guidelines regarding the monitoring of student time on clinical courses within the legacy curriculum of WUSM.

All students will be excused from required learning activities during all official Washington University holidays. All students will also be excused to access health services as described in WUSM's Medical Student Access to Healthcare Services Policy (p. 447).

Time spent on all required learning activities will be accounted for in the learning management system.

Students spend no more than 35 hours per week on all required learning activities, including required preparatory work for said learning activities, while enrolled in any of the nonclinical courses of Phase 1 of the Gateway Curriculum.

All students are to spend no more than 50 hours per week on all required learning activities during their enrollment in the Clinical Immersions of Phase 1, inclusive of clinical experiences, course-specific classroom-based activities, coaching and online work.

Student workload during the required elements of the Gateway Curriculum will be monitored by the Office of Medical Student Education (OMSE) for each Phase 1 element through canvassing of the learning management system and through internal and external surveys of students. In the event that there are concerns regarding the adherence of an element to the WUSM Policy for Monitoring Student Time, data substantiating said concerns will be presented by OMSE to the appropriate curriculum lead. If not corrected, information will be sent forth to the appropriate governance structure for evaluation, monitoring and change management. The Committee on Oversight of Medical Student Education and any relevant subcommittees will charge the appropriate individuals or offices with improvement plans as indicated.

Guidelines

The above restrictions on student workload represent the upper limits of time that students can spend on required learning activities. Curriculum leads are encouraged to use only the time that is necessary.

All curriculum leads are encouraged to proactively communicate to students the expectations for required preparatory time for all learning activities (including immersions). These expectations can be informed through the use of course workload estimators. To ensure that the time devoted to scheduled instructional activities is accurately reflected in course plans, curriculum leads are encouraged to use best practices, applicable Academy of Educator workshops, and/or consultation with the Instructional Design Studio.

Curriculum leads are strongly encouraged to be considerate of the periodic need for breaks during scheduled required learning activities.

Last approved on January 4, 2021

Phase 1 Attendance Policy

Background

The profession of medicine requires the utmost commitment of time and energy to learning/education, patient care, and, when appropriate, other scholarly activities. Teaching, learning, and assessment in both clinical and nonclinical settings are dependent on the student's presence and active participation. Time spent away from educational experiences, in both clinical and nonclinical settings, may substantially decrease learning and impede effective assessment.

The development of this commitment begins during Phase 1 of the Gateway Curriculum which consists of 7 modules, 3 clinical immersions, an EXPLORE immersion for non MSTP students, and an end of phase capstone.

This document outlines the attendance policies and expectations for Phase 1 of the Gateway Curriculum while also recognizing that students may have legitimate reasons for absences. In keeping with Liaison Committee on Medical Education (LCME) standard 12.4, all students requiring access to necessary diagnostic, preventive, and therapeutic care for both acute and chronic health concerns are to be excused from required learning activities. Please refer to the Access to Healthcare Services Policy (p. 447) for details.

Policies

Students are expected to attend all required sessions within Phase 1 of the Gateway Curriculum as specified within the learning management system (LMS) and expressed or directed by the Clinical Immersion leadership. In the rare circumstance that a student finds themselves unable to attend a required session or clinical experience due to illness or a personal emergency, the student must complete an Absence Notification Form (ANF) in the LMS that will be sent to faculty leads, with a copy sent to the Office of Medical Student Education (OMSE), Office of Medical Student Affairs (OMSA), and other individuals as appropriate. This form must be completed prior to the session that the student must miss or as soon as possible after the session as allowed by the illness or emergency.

In addition to completing an ANF, students unable to attend a team activity should also notify their team members with as much advance notice as can reasonably be expected under the circumstances. This obligation also applies to correspondence with clinical teams for absences that occur during the clinical portion of the phase. If the unavoidable absence occurs during any scheduled competency-contributing assessment, the student must also complete the Request to Change an Assessment/Assignment/Exam form (please reference the Policies/Guidelines page in Keystone for the link).

Students will remain accountable for meeting all course requirements. Any absences that compromise a student's ability to meet these requirements and/or other Phase 1 requirements may result in the need for additional time to sufficiently meet the learning and

assessment goals. Students will work with the faculty leads to develop a remediation plan for the missed session(s). All required assignments associated with a missed session must be completed and faculty directors may require additional makeup work. Within the clinical portions of Phase 1, owing to the experiential learning that can only occur when present in the clinical space, absences that compromise a student's ability to meet clerkship requirements are defined as the following:

- Missing ≥25% of an individual learning experience (as defined by the immersion leadership) and/or
- Impacting the ability for clinical assessors to provide credible performance information

In addition to personal emergencies, it is recognized that a student may, on a rare occasion, desire to be absent for significant professional or significant personal events, including religious holidays (PDF). For the rare circumstances in which these anticipated absences exist, students are expected to contact leadership in OMSE and OMSA in advance of the event to discuss options that may minimize the impact on educational experiences. **Note:** Travel prior to or following observed university holidays and breaks that occur outside of the officially designated times/dates on the MD Program Academic Calendar as well as extracurricular and/or research events or experiences do not constitute a significant personal or professional event or unavoidable absence.

Attendance data will be tracked longitudinally by OMSE, OMSA, and other individuals as appropriate within the LMS for all phases of the curriculum. An absence will be recorded even when makeup work for a missed session is completed. Data will be monitored by the Assistant Dean for Assessment in collaboration with OMSE and will be reviewed by the Competency Attainment Committee (CAC) as evidence contributing to the attainment of competency in PROF-2: Exhibit high standards of professional integrity.

Guidelines

Failure to adhere to the above policy requirements (e.g., failure to file an ANF and/or appropriately notify leadership and clinical team members) may result in the submission of a Professional Behavior Form.

A trend of absences may result in the need for informal or formal remediation and/or comment in the Medical Student Performance Evaluation (MSPE) in accordance with PROF-2.

For questions related to when one should be absent for medical reasons versus attend with increased personal protection equipment, please refer to the FAQ document in Student Commons.

Last approved on August 5, 2024

Phase 2 Attendance Policy Background

The profession of medicine requires the utmost commitment of time and energy to learning/education, patient care, and, when appropriate, other scholarly activities. Teaching, learning, and assessment in both clinical and nonclinical settings are dependent on the student's presence and active participation. Time spent away from educational experiences, in both clinical and nonclinical settings, may substantially decrease learning and impede effective assessment.

The clerkships in Phase 2 of the Gateway Curriculum consist of a foundational week, 6 weeks of clinical experiences divided into individual rotations based on the specific clerkship, and a final week of assessment, reflection, coaching, and community (ARCC).

This document outlines the attendance policies and expectations for Phase 2 of the Gateway Curriculum while also recognizing that students may have legitimate reasons for absences. In keeping with Liaison Committee on Medical Education (LCME) element 12.4, all students requiring access to necessary diagnostic, preventive, and therapeutic care for both acute and chronic health concerns are to be excused from required learning activities. Please refer to the Access to Healthcare Services Policy (p. 447) for details.

Policies

Students are expected to attend all required sessions within Phase 2 of the Gateway Curriculum as specified within the learning management system (LMS) and expressed or directed by the clerkship leadership. In the rare circumstance that a student finds themselves unable to attend a required session or clinical experience due to illness or a personal emergency, the student must have a discussion with the clerkship director or associate clerkship director and then complete an Absence Notification Form (ANF) in the LMS that will be sent to faculty leads, with a copy sent to the Office of Medical Student Education (OMSE), Office of Medical Student Affairs (OMSA), and other individuals, as appropriate. The student needs to have documented that this discussion has occurred in the form of an email between the student and the clerkship director or associate clerkship director. This form must be completed prior to the session that the student must miss or as soon as possible after the session as allowed by the illness or emergency. In addition to completing an ANF, students unable to attend a team activity should also notify their team members with as much advance notice as can reasonably be expected under the circumstances. This obligation also applies to correspondence with clinical teams for absences that occur during the clinical portion of the clerkship. If the unavoidable absence occurs during any scheduled competency-contributing assessment, the student must also complete the Request to Change an Assessment/Assignment/Exam form (please reference the Policies/Guidelines page in Keystone for the link).



When students encounter an unavoidable absence for required events within the foundational or ARCC weeks of a clerkship, students will work with the clerkship directors and/or other responsible parties to develop a plan for the missed session. All required assignments associated with a missed session must be completed, and clerkship directors may require additional makeup work for missed sessions.

Students will remain accountable for meeting all clerkship requirements. Any absences that compromise a student's ability to meet these requirements and/or other Phase 2 requirements may result in the need for additional clinical time to sufficiently meet the learning and assessment goals. Absences that compromise a student's ability to meet clerkship requirements are defined as the following:

- Missing $\geq 25\%$ of an individual learning experience (as defined by the clerkship leadership) and/or
- Impacting the ability for assessors to provide credible performance information to support competency decisions

In addition to illness and personal emergencies, it is recognized that a student may, on a rare occasion, desire to be absent for required clinical or instructional activities for professional or significant personal events, including religious holidays (PDF). For the rare circumstances in which these anticipated absences exist, students are expected to contact the clerkship leadership team in advance of the clerkship calendar release or student scheduling to determine if scheduling options exist that may minimize the impact on clinical experiences. **Note:** Travel prior to or following observed university holidays and breaks that occur outside of the officially designated times/dates on the MD Program Academic Calendar as well as extracurricular and/or research events or experiences do not constitute a significant personal or professional event or unavoidable absence.

Attendance data will be tracked longitudinally by OMSE, OMSA, and other individuals as appropriate within the LMS for all phases of the curriculum. An absence will be recorded even when makeup work for a missed session is completed. Data will be monitored by the Assistant Dean for Assessment in collaboration with OMSE and reviewed by the Competency Attainment Committee (CAC) as evidence contributing to the attainment of competency in PROF-2: Exhibit high standards of professional integrity.

Guidelines

Failure to adhere to the above policy requirements (e.g., failure to file an ANF and/or appropriately notify clerkship leadership and clinical team members) may result in the submission of a Professional Behavior Form.

A trend of absences may result in the need for informal or formal remediation and/or comment in the Medical Student Performance Evaluation (MSPE) in accordance with competency attainment in PROF-2.

For questions related to when one should be absent for medical reasons versus attend with increased personal protection equipment, please refer to the FAQ document in Student Commons.

Last approved on August 5, 2024

Phase 3 Attendance Policy

Background

The profession of medicine requires the utmost commitment of time and energy to learning/education, patient care, and, when appropriate, other scholarly activities. Teaching, learning, and assessment in both clinical and nonclinical settings are dependent on the student's presence and active participation. Time spent away from educational experiences, in both clinical and nonclinical settings, may substantially decrease learning and impede effective assessment.

Phase 3 of the Gateway Curriculum consists of a variety of types of courses that include a range of clinical and nonclinical educational strategies. It is also recognized that students in Phase 3 of the Gateway Curriculum will also be participating in residency interviews which requires careful planning to minimize the impact on educational activities.

This document outlines the attendance policies and expectations for Phase 3 of the Gateway Curriculum while also recognizing that students may have legitimate reasons for absences. In keeping with Liaison Committee on Medical Education (LCME) element 12.4, all students requiring access to necessary diagnostic, preventive, and therapeutic care for both acute and chronic health concerns are to be excused from required learning activities. Please refer to the Access to Healthcare Services Policy (p. 447) for details.

Policies

Students are expected to attend all required sessions within Phase 3 of the Gateway Curriculum as specified within the learning management system (LMS) and expressed or directed by course leadership. In the rare circumstance that a student finds themselves unable to attend a required session or clinical experience due to illness or a personal emergency, the student must complete an Absence Notification Form (ANF) in the LMS that will be sent to faculty leads, with a copy sent to the Office of Medical Student Education (OMSE), Office of Medical Student Affairs (OMSA), and other individuals, as appropriate. This form must be completed prior to the session that the student must miss or as soon as possible after the session as allowed by the illness or emergency. In addition to completing the ANF, students unable to attend a team activity should also notify their team members with as much advance notice as can reasonably be expected under the circumstances. This obligation also applies to correspondence with clinical teams for absences that occur during the clinical portion of any course. If the unavoidable absence occurs during any scheduled competency-contributing assessment, the student must also complete the Request to Change an Assessment/Assignment/Exam form (please reference the Policies/Guidelines page in Keystone for the link).

Students will remain accountable for meeting all course requirements. Any absences that compromise a student's ability to meet these requirements and/or other Phase 3 requirements may result in the need for additional time to sufficiently meet the learning and assessment goals. Students will work with faculty leads to develop a remediation plan for any missed session(s). All required assignments associated with a missed session must be completed and faculty directors may require additional makeup work. Within the clinical courses of Phase 3, absences that compromise a student's ability to meet course requirements are defined as the following:

- Missing $\geq 25\%$ of an individual learning experience (as defined by the course leadership) and/or
- Impacting the ability for clinical assessors to provide credible performance information

In addition to personal emergencies, it is recognized that a student may, on a rare occasion, desire to be absent from required clinical or instructional activities for significant professional (including residency interviews) or significant personal events, including religious holidays (PDF). For the rare circumstances in which these anticipated absences exist, students are expected to contact leadership in OMSE, OMSA, and course leadership in advance of the event (when possible, prior to calendar or schedule releases for the course) to discuss options that may minimize the impact on educational experiences. Students are discouraged from scheduling required Phase 3 courses (e.g. ACRs, KISCs) during periods of time when planned absences are likely.

Note: Travel prior to or following observed university holidays and breaks that occur outside of the officially designated times/dates on the MD Program Academic Calendar as well as extracurricular and/or research events or experiences do not constitute a significant personal or professional event or unavoidable absence.

Attendance data will be tracked longitudinally by OMSE, OMSA, and other individuals as appropriate within the LMS for all phases of the curriculum. An absence will be recorded even when makeup work for a missed session is completed. Data will be monitored by the Assistant Dean for Assessment in collaboration with OMSE and reviewed by the Competency Attainment Committee (CAC) as evidence contributing to attainment of competency in PROF-2: Exhibit high standards of professional integrity.

Guidelines

Failure to adhere to the above policy requirements (e.g., failure to file an ANF and/or appropriately notify leadership and clinical team members) may result in the submission of a Professional Behavior Form.

A trend of absences may result in the need for informal or formal remediation and/or comment in the Medical Student Performance Evaluation (MSPE) in accordance with competency attainment in PROF-2.

For questions related to when one should be absent for medical reasons versus attend with increased personal protection equipment, please refer to the FAQ document in Student Commons.

Last approved on August 5, 2024

Policy for the Preparation of the Medical Student Performance Evaluation

Background

The Medical Student Performance Evaluation (MSPE) is a letter that is submitted to the residency programs to which a student has applied and that is meant to capture a summary evaluation of that student's performance in medical school. The Assistant Dean for Career Counseling typically prepares these letters of evaluation. In keeping with LCME element 11.2, we recognize the importance of opportunities for medical students to request another MSPE writer.

Policy

Medical students may request to have an alternative MSPE writer. Requests must be submitted in writing to the Associate Dean for Student Affairs (ADSA) by the end of July prior to the student's expected graduation. Requests will be considered on a case-by-case basis by the ADSA.

Last approved on September 12, 2022

Procedure to Request an Alternate Educational Site or Clinical Assignment

In compliance with LCME Standard 10.9, students may formally request an alternate educational site or clinical assignment. Such requests must be made in writing (email) to the Registrar's Office within two weeks of the release of the clinical assignment. Team assignments within individual clinical rotations or specific site concerns should be discussed with the appropriate Clerkship, ACR, Elective or Immersion Director. Students are also encouraged to contact Student Affairs at any time to help navigate unique circumstances or hardships. When necessary and appropriate, an alternate site will be assigned.



Transportation Policy for Medical Students on Clinical Assignments

Background

The primary goal of the medical program at Washington University School of Medicine is to provide the highest quality education possible to its students resulting in the development of competent and caring physicians. Among the core curricular activities necessary to accomplish this are intensive and meaningful patient care rotations. Though most clinical assignments will be located on the Barnes-Jewish Hospital/Washington University campus, some required clinical assignments are located off campus. In keeping with LCME elements 5.5 and 6.4, this is to ensure appropriate resources for clinical instruction in both ambulatory and inpatient settings with adequate numbers and types of patients.

Policies

A listing of clinical rotations requiring transportation will be available to students. This list will be updated annually by the Office of Medical Student Education (OMSE). All students are required to make themselves aware of these rotations well in advance so that they are familiar with travel requirements. Gas, mileage, parking fees, and ride or public transportation fares are not reimbursed by the school.

In an effort to fairly distribute clinical assignments, a system for centrally monitoring students' cumulative travel for off-campus clinical assignments will be available to clinical course directors and will be overseen by the OMSE. When applicable, students will have the opportunity to submit their ranked choices for clinical assignments in advance.

Medical students will be required to travel to off-campus clinical rotations when these are assigned by the clinical rotation course director. In order to avoid inequitable distributions of these assignments, a student's stated lack of access to a private vehicle should not be considered in and of itself when creating these assignments. Students who do not have access to a private vehicle will consult the "Guidelines" section of this policy item for recommended options.

If a student believes that they have been unfairly assigned, they should discuss it first with the clinical course director. If the issue is not resolved to satisfaction, they may approach the Assistant Dean for Curriculum with their concerns.

Guidelines

Clinical course directors should consider a student's cumulative travel burden and current choice for assignment in the context of the degree to which their prior choices aligned with prior assignments.

Clinical courses that require a subset of enrolled students to travel to off-campus assignments are encouraged to consider changes in scheduling that compensate for the lost travel time.

Students without direct access to a car are advised of the following options for travel. These may include carpooling, ride services (e.g., taxi, Uber, Lyft), public transportation, rental car service, or biking/walking.

Mutually acceptable trades in clinical assignments between peers can be considered at the discretion of the clinical course director, although there are no guarantees that these can always be accommodated.

Last approved on April 6, 2020

Revised June 24, 2025

USMLE Policy for Students Entering the Match

Background

Washington University School of Medicine states that all students are required to take the first and second steps of the United States Medical Licensing Exams (USMLE) prior to graduation. For students planning to enter the residency Match, the timing of when USMLE Steps 1 and 2 CK are completed is an important consideration to be a competitive applicant. Students are advised that failure to pass these exams in time substantially increases the risk of an unsuccessful Match.

This document outlines the policies related to timing of USMLE Step 1 and USMLE Step 2 CK completion by students intending to enter residency training after graduation.

Policies

All students are required to meet with the Assistant Dean of Career Counseling by the last business day of June of the year that they plan to enter the Match. Students are expected to schedule and complete Step 1 and Step 2 CK of the USMLE by September 1 of the fall prior to the year that they plan to graduate so that scores are available for residency program review prior to interview release. Exceptions to these requirements may be made only with the expressed guidance of the Assistant Dean of Career Counseling.

Students must take USMLE Step 1 and Step 2 CK and have passing score reports by the end of January of the year they plan to graduate in order to be certified for the Match. Students who do not intend to participate in the Match prior to graduation must still take Step 1 and Step 2 CK in order to graduate. Passing is not required to graduate, but it is required to be certified for the Match.

Guidelines

Students are encouraged to engage with the Office of Career Counseling to help guide decisions of specific USMLE Step 1 and Step 2 CK scheduling to ensure optimal success with the residency application and interview process.

Students are encouraged to engage with the Student Success Team should they have concerns about USMLE preparation and successful completion.

Last approved on 12/4/2023

Assessment, Promotion, and Appeals for the Gateway Curriculum Washington University School of Medicine Policy for Review of Student Attainment of Competency

Background

In collaboration with the Office of Medical Student Education, the Office of Medical Student Affairs, and the Office of the Registrar and charged by the Committee for Academic Promotion, the Competency Attainment Committee (CAC) and the Clerkship Competency Committees (CCCs) at Washington University School of Medicine

regularly review and render decisions of competency attainment and recommendations about the academic progress of all medical students in the Gateway Curriculum. This policy is in line with LCME element 9.9: Student Advancement and Appeals Process.

Policy

Students for whom this policy applies include students enrolled in any phase of the Gateway Curriculum and students enrolled in dual and joint degree programs currently participating in the Gateway Curriculum.

In order to successfully complete their studies at the Washington University School of Medicine (WUSM), students must demonstrate the ability to become a safe and effective physician by demonstrating competence in the WUSM Medical Student Program Objectives (p. 160). Attainment of competence in these educational program objectives is determined by the CAC in partnership with the individual CCCs in Phase 2 of the curriculum based on the totality and sufficiency of evidence regarding a student's performance.

Competency decisions of not competent, competent, and competent with distinction (where applicable) and the subsequent promotion recommendations are presented to the Committee for Academic Promotion, which is the committee charged with ratifying final competency decisions and promotion recommendations. Promotion recommendations include one of the following for each student:

1. Promotion, with or without ongoing remediation
2. Remediation without promotion
3. Dismissal or other sanctions, including but not limited to probation or suspension, which may occur throughout the enrollment of a student
4. Qualification to receive the Doctor of Medicine degree

Students considering an appeal of any of the above decisions and/or recommendations are referred to the WUSM Policy for Student Promotion and Appeals and the Formal Appeal Procedures for Competency Attainment and Promotion Decisions.

Situations may exist in which a committee member has a conflict of interest such that the committee member is unable to perform their duties to objectively render a decision about a particular student. In such a case, the committee member must recuse themselves from participation in deliberations and decisions regarding that student. Please see the conflict of interest policy for full details.

The responsibility for maintaining and overseeing this policy resides with the Committee on the Oversight of Medical Student Education.

Last approved on May 12, 2022

Policy on Appealing Committee for Academic Promotion and Competency Attainment Committee Decisions

The following policy describes which decisions by the Committee for Academic Promotion (CAP) and the Competency Attainment Committee (CAC) can be appealed by students in the WashU Medicine MD program. This policy aligns with LCME Element 9.9: Student Advancement and Appeals Process.

Policy

This policy applies to all students who have matriculated into the WashU Medicine MD curriculum.

CAP Decisions

Students wishing to appeal any of the following CAP decisions are required to follow the steps outlined in the Procedures for Appealing a Committee for Academic Promotion Decision (p. 439).

- Students have the right to appeal CAP decisions about the following:
 - Adverse outcomes*
 - The inclusion of language related to the decisions for adverse outcomes (determined by CAP) in the MSPE letter

* The term *adverse outcomes* refers to any decision by the CAP that negatively impacts a student's progression toward the MD degree and that usually occurs after a review of academic performance or professionalism concerns.

CAC Decisions

Students wishing to appeal this decision are required to follow the steps outlined in Procedures for Appealing Decisions of Phase 2 Competence Without Distinction (p. 441).

- Students have the right to appeal CAC decisions regarding Phase 2 competence without distinction.
- All appeals of CAP and CAC decisions must be based on one or more of the following grounds:
 - *New Evidence*: Information that was unavailable to the student and could not reasonably have been obtained or submitted to CAP at the time of CAP's meeting with the student and significant enough to potentially alter the original outcome. (**Note**: Evidence that existed but that was intentionally withheld by the student does not qualify as new evidence.)
 - *Procedural Error*: A failure by CAP to follow its established processes, where such deviation had a material impact on the decision.
 - *Bias or Conflict of Interest*: Evidence exists that suggests a decision maker demonstrated bias or had a conflict of interest that materially influenced the decision and was not disclosed. Consult the Conflict of Interest During Student Assessment Policy (p. 443) for more information.

Last approved June 2026

Procedures for Appealing a Committee for Academic Promotion (CAP) Decision

I. Pre-CAP Procedures When a Student is Recommended for an Adverse Outcome or MSPE Inclusion

1. Students will have the opportunity to meet with CAP to provide information and ask or answer questions. Students must also submit a written statement before the CAP meeting during which the decision will be made. This written statement may include information and/or statements from up to two other sources.

2. Students may be accompanied by a support person who is a WashU Medicine faculty member, staff member, or student, excluding situations in which such persons are also family members of the student. In this context, the term *family member* refers to any member of the student's immediate or extended family. The support person may not present information or make comments during the CAP meeting.
3. **Restrictions on Participation:** No representatives from outside the School of Medicine, family members, or individuals with conflicts of interest may participate in, communicate with, or otherwise attempt to influence any member of the CAP regarding the process or decision.

II. Post-Decision Procedures When a Student is Recommended for an Adverse Outcome or MSPE Inclusion

Once a decision is reached, the CAP Chair or their designee will notify the student and the ADSA or their designee, which will occur in writing generally within 14 calendar days of the decision.

III. Appeal Process When a Decision for an Adverse Outcome or MSPE Inclusion is Made

1. **Notification of Intent:** Within seven calendar days of receiving the CAP decision, the student must notify the ADSA or the ADSA's designee of their intent to appeal in writing through the designated Qualtrics^{XM} Competency and/or Promotion Appeal Form.
2. **Policy Review and Submission Requirements:** The ADSA or their designee will review the appeal policy and procedures with the student. In this capacity, the ADSA or their designee serves as a resource for procedural clarity, while the student remains responsible for the development of the specific case.
3. **Formation of Appeal Committee:** The ADSA or their designee will convene a three-member ad-hoc appeal committee. Committee members involved in the original decision are excluded, as are all CAP, Competency Attainment Committee (CAC), and Clerkship Competency Committee (CCC) members. Committee members must meet all inclusion criteria for CAC and CAP membership.
4. **Submission of Appeal:** Within 14 calendar days of receiving the CAP decision, the student must submit the appeal letter and documentation to the chair of the appeal committee and the ADSA or their designee. The appeal letter must include a detailed description of the reason for appeal, clearly stating the grounds, and all relevant supporting documentation. Appeals that fail to articulate the grounds for appeal as specified in the Appeals Policy and in Step II above may be dismissed by the ad-hoc committee.
5. **Documentation and Support:** The ADSA or their designee will assist the appeal committee with any additional documentation requests. All documentation will generally be accessible to both the student and the committee.
6. **Student Presentation:** The student may present their case to the appeal committee in writing, in person, or via video conferencing, as determined by the committee chair. The student may have a support person present during this meeting with the same restrictions that apply in step I.2 above.
7. **Restrictions on Participation:** No representatives from outside the School of Medicine, family members, or individuals with conflicts of interest may participate in, communicate with, or otherwise attempt to influence any member of the appeal committee regarding the process or decision. Violations of these restrictions may result in the dismissal of the appeal.
8. **Committee Decision Options:** After review, the appeal committee may do one of the following:
 - a. Deny the appeal and uphold the CAP decision;
 - b. Grant the appeal and remand the case to the CAP for reconsideration; or
 - c. Grant the appeal and substitute its judgment for the CAP decision in cases in which perceived bias or conflict of interest influenced the original outcome.
9. **Notification of Outcome:** The appeal committee will communicate its final decision to the student, the ADSA, the CAP Chair, the Registrar, and other necessary parties, generally within 14 calendar days of the final appeal meeting. In cases of dismissal, the decision will be forwarded to the Dean or the Dean's designee for final review and approval.



Procedures for Appealing Decisions of Phase 2 Competence Without Distinction

When students receive a decision for competence without distinction made by the Competency Attainment Committee (CAC) in their Phase 2 Clerkships, they may file a formal appeal based on grounds for appeals as spelled out in the Policy on Appealing CAP and CAC Decisions (p. 439). This is the final level of appeal for a decision of competence without distinction. The procedure for appeals in these circumstances is as follows:

1. Students complete the designated Qualtrics^{XM} Competency and/or Promotion Appeal Form within seven calendar days of notification of the decision of competence without distinction. The form, which will be sent to the Registrar, the Associate Dean of Student Affairs (ADSA), and Chair of the CAP, with a copy also sent to the student, will require the student to complete the following details:
 - a. The decision being appealed
 - b. The reason for the appeal
2. The ADSA or their designee will review the appeal policy and procedures with the student. In this capacity, the ADSA or their designee serves as a resource for procedural clarity, while the student remains responsible for the development of the specific case.
3. Completed appeal documentation must be received by the Chair of the Committee for Academic Promotion (CAP) within 14 calendar days of the original notification of a decision for competence without distinction.
4. The ADSA or their designee will provide the request and documentation (i.e., the documentation submitted by the student and the materials related to the original CAC recommendations/decisions) to the CAP for review. The CAP will reserve the right to meet with the student in the event that they have further questions.
5. Following their review, the CAP may make any of the following recommendations:
 - a. Ratify and uphold the original decision;
 - b. Remand the case back to the original committee for re-review; or
 - c. Overturn the decision if the committee perceives that bias or conflict of interest influenced the original outcome.

Contesting Individual Assessments Procedure

Students wishing to dispute a specific assessment, not a competency decision, do so using the Qualtrics^{XM} Assessment Dispute Form within 14 calendar days of assessment outcomes being posted to the electronic learning management system (Keystone). Disputes of exams, standardized patient/OSCEs, or patient safety simulations can only occur if a proctored review is completed. The form will require the student to complete the following details:

- The phase, course, and assessment being disputed
- The date of the proctored review, where applicable
- The reason for or a description of the dispute

Dispute forms will be sent to the Assistant Dean for Assessment and the OMSE, who will then forward them to the appropriate party (consult the list below), who has final authority to make determinations on changes at the individual assessment or assessment item level.

The appropriate parties with whom dispute forms will be shared are as follows:

1. Observed Structured Clinical Examination (OSCE) and Standardized Patient disputes are directed to the Clinical Skills and Communication Thread Leaders.
2. Exam and Team-Based Learning readiness assurance test disputes are directed to the specific course leadership.
3. Individual writing assignment disputes are directed to the appropriate Thread Leaders.
4. Individual patient care assessment disputes, including patient care assessments involving standardized patients, are directed to the appropriate course leadership.
5. End-of-course narratives disputes are directed to the specific course/clerkship leadership.
6. Disputes for all other individual phase assessments are directed to the Chair of the Competency Attainment Committee, who will direct them to the appropriate responsible parties as needed.

Students will be notified of the final outcome of the dispute no later than six weeks after the conclusion of the course.

Additional Guidelines

- Students are advised that feedback from any one individual frontline assessor does not guarantee a specific competency outcome. Frontline assessors are not in a position to render such decisions.

- Students are advised *not* to engage directly with individual assessors or instructors when concerns about an assessment arise. Instead, they should discuss the issue with the appropriate party as identified above in this document.
- The perceived absence of formative or constructive feedback does not guarantee a specific outcome.
- Receiving insufficient feedback cannot be the basis for an appeal. If a student feels that they are not receiving sufficient feedback, even after asking for it, they are encouraged to discuss this with the appropriate course director before the end of the curricular period.
- Mid-clerkship feedback is not a guarantee of any specific final outcome.
- Clinical performance assessments returned more than 21 calendar days after the conclusion of a clerkship will not be considered credible sources of assessment information/evidence.

Course Credit Procedures

In the Gateway Curriculum, students attain competency based on the totality and sufficiency of evidence regarding their performance in each of the Washington University School of Medicine Medical Education Program Objectives in each of the six Competency Domains. The School of Medicine also has a requirement to provide transcript evidence of the successful completion of each course. This document describes the procedures for the determination and documentation of course credit that is independent of the Competency Attainment Committee (CAC) and Clerkship Competency Committee (CCC) decisions of competency attainment.

For each Gateway course, a determination of "credit/no credit" will be made based on the full completion of required course elements as outlined in the syllabus via the learning management platform for each course. Determinations of "credit/no credit" will be submitted to the Registrar within 6 weeks of the completion of the final course requirement in line with LCME element 9.8, Fair and Timely Summative Assessments. In Phase 2, clerkships are required to provide competency decisions in patient care, rather than "credit/no credit," to the Registrar within 6 weeks of clerkship completion in line with LCME element 9.8, Fair and Timely Summative Assessments.

Students who have not completed a required element of any Phase 1 and 3 course will receive a "no credit" (NC) and in the clerkships will receive an "incomplete" (I) on the transcript until all required elements are completed. "No credit" or "incomplete" will be recorded on the transcript until such time as a student has completed all required elements; at that time, the Registrar will replace that original determination with "credit."

End-of-course "no credit" or "incomplete" determinations and the circumstances, when known, will be monitored and brought forward during CAC deliberations.

Challenging the Medical Student Performance Evaluation (MSPE)

Background

In accordance with LCME Element 11.6, all medical students have the right to challenge their educational records with regard to the accuracy of the content. This policy addresses this right for students in the MD program wishing to challenge the accuracy of content within the Medical Student Performance Evaluation (MSPE).

Policies

Challenges to the accuracy of the biographical section of the MSPE or the information about research, leadership, and extracurricular activities are made directly to the Assistant Dean of Career Counseling.

Challenges to the narrative comments and competency determinations included in the MSPE are addressed by the procedures for Contesting Individual Assessments.

A student who has substantive concerns regarding the tone and/or accuracy of their MSPE may submit a written request for review to the Associate Dean for Student Affairs, with the specific concerns noted. The request must be submitted by September 1 of the academic year of graduation, or seven calendar days from the point at which the MSPE becomes available, whichever comes later. An ad hoc committee will review the draft MSPE with the noted concerns and, if warranted, revise the MSPE. The review committee's decision and any MSPE revisions will be conveyed in writing to the student. The decision of the review committee is final.

Last approved on November 7, 2022

Conflict of Interest During Student Assessment Policy for Washington University School of Medicine

Background

Washington University School of Medicine is committed to ensuring that individuals who directly assess and remediate students and/or make decisions about the competence and promotion of students do so without a conflict of interest that compromises the objectivity and integrity of our student assessment process. In keeping with Liaison Committee on Medical Education (LCME) element 12.5, health professionals who provide a medical student with health-care services, including psychiatric/psychological counseling, should generally be precluded from making decisions regarding that student's academic assessment or promotion and from certain teaching roles that include assessment or remediation as detailed below.

For the purposes of this policy, the term *conflict of interest* (COI) will refer to any set of circumstances in which a person's ability to assess, remediate and/or make competency decisions about a student objectively is compromised by personal, social, financial or other interests. Potential examples are included below.

Policy

Persons assessing or making decisions about the competence or promotion of a student, including engagement in remediation, shall do so free of COIs that may bias their decision making about a student in a positive or negative manner. In situations where persons in the role of student assessment, promotion and/or remediation have a COI involving a particular student, such persons should recuse themselves from their roles in the assessment, promotion and/or remediation of that student.

Examples of potential COIs include but are not limited to the following:

- Individual treatment providers of health and/or psychiatric/psychological services to a medical student
- Faculty previously engaged in adverse action against the student, including personally filing a professionalism concern form or serving on a clerkship competency committee where previous adverse actions were submitted for that student. Serving on the competency attainment committee where the totality of data is reviewed for all students longitudinally is not considered a COI.
- Having significant personal, social or business relationships with the student or a member of the student's immediate or extended family
- Serving as that student's assigned academic advisor in their administrative capacity for Washington University School of Medicine (e.g., coaches, associate/assistant deans for student affairs, director of the student success team)

Faculty and students must recognize that the appearance of a COI may interfere with the learning environment for both the involved student as well as the student's peers and should also be considered, regardless of whether an actual COI is truly present. Should uncertainty arise as to whether an instructor's interactions or relationship with a student presents a COI, it is the expectation that the instructor take responsibility for managing the relationship based on the best interest of the student and disclose the COI to the relevant course or clerkship director and/or the appropriate administrative leader (i.e., committee lead, assistant or associate dean).

Last approved on October 3, 2022

Formative Assessment and Feedback for Medical Students Policy

Background

Formative assessment and feedback are critical to high-quality medical education, and, as such, central to the educational mission of Washington University School of Medicine. In keeping with Liaison Committee on Medical Education (LCME) element 9.7, WashU Medicine is committed to ensuring that each medical student is provided with formative assessment and feedback on their performance, including knowledge, skills, behaviors, and attitudes, early enough in required courses and clerkships to allow sufficient time for improvement.

Policies

All students must receive formative assessment and feedback by the midpoint of all required courses and required clinical rotations four or more weeks to allow sufficient time for remediation.

1. All required courses and clerkships which are four or more weeks must provide formative assessment and feedback to each student by the midpoint of the course or clerkship.
2. The Committee on Medical Student Education will monitor compliance with the delivery of formative assessment and feedback annually on courses and quarterly for required clinical rotations.

Last approved on October 3, 2022

Grading System

I. Phase 1

Courses in the first-phase curriculum are evaluated on a Credit (Cr) and No-Credit (NCr) basis. For purposes of the final competency outcomes, Competent (C) and Not-Competent (NC) will be recorded for each competency domain (Foundational Knowledge for Practice, Patient Care, Interpersonal and Communication Skills, Professionalism, Systems-Based Practice, Practice-Based Learning and Improvement) on the transcript in a course titled "Phase 1 Competency Course."

No-Credit and Not-Competent outcomes can be updated upon successful completion of course requirements or attainment of competency, respectively.

II. Phase 2

For purposes of the final official grade records of the School of Medicine, the clerkships will be evaluated on a Competent/Not-Competent system in the Patient Care domain.

All competency domains will have one of the following outcomes recorded on the transcript in the "Phase 2 Competency Course":

- Foundational Knowledge for Practice = C/NC/Cd
- Patient Care = C/Nc/Cd
- Interpersonal and Communication Skills = C/NC/Cd
- Professionalism = C/NC
- Systems-Based Practice = C/NC
- Practice-Based Learning and Improvement = C/NC

Not-Competent outcomes can be updated upon successful attainment of competency.

III. Phase 3

Courses in the third-phase curriculum are evaluated on a Credit (Cr) and No-Credit (NCr) basis. For purposes of the final competency outcomes, competency domains will appear on the transcript in a course titled "Phase 3 Competency Course" with one of the following outcomes:

- Foundational Knowledge for Practice = C/NC
- Patient Care = C/NC
- Interpersonal and Communication Skills = C/NC
- Professionalism = C/NC
- Systems-Based Practice = C/NC/Cd
- Practice-Based Learning and Improvement = C/NC/Cd

No-Credit and Not-Competent outcomes can be updated upon successful completion of course requirements or attainment of competency, respectively.

Grade Notification Policy

Background

The Liaison Committee on Medical Education (LCME) element 9.8 requires that all final grades be recorded and available to students within 6 weeks of the end of a course, clerkship, and phase. At Washington University School of Medicine (WUSM), final grades are defined as the competent/not competent and the credit/no credit decisions made at the end of every course, clerkship, and phase. The Gateway Curriculum of WUSM is a competency-based curriculum in which students do not receive tiered grades. Summative decisions regarding competency are made at the level of each phase and, in Phase 2, each clerkship in patient care only. Decisions of course credit, which are based on the completion of required elements in a course, are made at the completion of each course in Phases 1 and 3. The purpose of this policy is to ensure that no summative assessment or course credit decision is delayed beyond 6 weeks from the end of or final requirement due date for any course, clerkship, and phase as mandated by our accrediting body.

Policies

- The Medical School Registrar is responsible for monitoring and reporting that all competency or credit decisions for WUSM courses, clerkships, and phases are submitted and available to students within 6 weeks of the end of the course, clerkship, and phase.
- Failure to submit 100% of decisions within this 6-week period will result in corrective action(s) as appropriate.

Guidelines

- Communication: The expectations for the return of competency and credit decisions should be shared with course, clerkship, and Competency Attainment Committee (CAC) members at least annually. All course and clerkship directors and the CAC should be encouraged to create a streamlined process for the completion and integration of student assessments in order to meet submission deadlines.

Last approved on January 9, 2023

Narrative Assessment Policy

Background

Washington University School of Medicine is committed to providing the highest quality education to medical students preparing to lead the future of health and medicine. Narrative assessment provides students with the critical guidance needed to improve performance. Acknowledging the importance of narrative assessment, Liaison Committee on Medical Education (LCME) element 9.5 requires that students receive narrative assessment as a component of assessment in each required course and clerkship of the medical education program whenever student/teacher interactions permit this form of assessment. Narrative assessment is defined as written comments from faculty that assess student performance and achievement in meeting specific objectives of a course or clerkship including knowledge, skills, behaviors, and attitudes including but not limited to professionalism and clinical reasoning to support students in meeting the Washington University School of Medicine Educational Program Objectives.

Policy

Narrative assessment is a required component of the assessment of each student in the Gateway Curriculum at Washington University School of Medicine. Narrative assessments of a medical student's performance will be provided when the following curricular conditions are met:

- Students work in small groups of 12 members or fewer and small groups of the same composition are observed longitudinally by the same faculty member for at least three sessions, with a ratio of one faculty member to one student team.

or

- The student is observed performing duties in the clinical setting.

Guidelines

In the Gateway Curriculum, small group teaching with 12 or fewer students with a longitudinal faculty member meeting with the same students over more than three sessions primarily occurs in the coaching small groups. While coaching does involve 1:1 review of the student assessment portfolio and general progress, these small groups are also where content related to ethics, health equity and justice, personal and professional identity, community engagement, and patient, student and clinical experiences are taught, discussed and debriefed. Based on these interactions, coaches regularly provide a narrative description of a medical student's performance to the medical student, including knowledge, skills, behaviors, and attitudes. For central tracking, coaches attest bi-annually to giving this feedback to the students. Because of the unique teaching and coaching roles of these faculty/student interactions, all assessment done by and with coaches must be purely formative in nature. The content of the narrative assessments performed by the coaches are not collected centrally as they are strictly for formative purposes. We do track the attestation of completion centrally to ensure that all students receive this important narrative assessment.

Last approved on October 3, 2022

Policy for Non-Involvement of Providers of Student Health Services in Student Assessment

Background

In keeping with Liaison Committee on Medical Education (LCME) element 12.5, every medical student has the right to keep any and all health professionals who provide health services, including psychiatric/psychological counseling, from involvement in their academic assessment or promotion. Washington University School of Medicine is committed to ensuring that medical student health records are maintained in accordance with legal requirements for security, privacy, confidentiality, and accessibility.



Policies/Requirement

All providers of health and psychiatric/psychological services to a medical student will have no role in directly assessing that student nor have a direct role in decisions about the competence and promotion of that student, excluding exceptional circumstances.

All student health services will ensure the security of confidential health information in accordance with legal requirements.

Last approved on January 10, 2022

Policy on Time to Graduation for Medical Students

Background

Washington University School of Medicine (WashU SOM) aims to ensure that medical students progress through their educational programs in a timely, structured, and supported manner, demonstrating sustained progress toward graduation competency while maintaining the highest standards of academic and professional excellence. This policy is in keeping with LCME standard 10.3, requiring policies and procedures regarding student promotion and graduation within the educational program. The Time to Graduation policy is intended to be in the best interest of the student and the school, both of whom are spending time and resources on a student's progression through medical school.

The standard WashU SOM MD program is a four-year curriculum with optional opportunities to be combined with other degree-based or year-long scholarly activities that would extend the time to graduation by a defined period. Students may also require additional time due to leaves of absence for medical or personal issues. Please refer to the Leave of Absence Policy for Medical Students (p. 448) for details. The Time to Graduation policy identifies the maximum completion time allowed for successful completion of the MD program.

Policies

1. Students enrolled in the standard four-year MD curriculum program must complete their MD degree within six years from their matriculation date.
2. WashU SOM offers several opportunities to augment the MD program with other degree-based or year-long scholarly activities. For students enrolled in one of these approved programs, the maximum time permitted for completion of the MD degree is as follows:

- For approved dual degree programs, the total time to graduation shall be the allowed maximum of 6 years for the MD program plus the standard number of years allowed for completion of the dual/second degree by their respective program.
- For approved year-long research programs or other scholarly activities, the total time to graduation shall be the allowed maximum of 6 years for the MD program plus one additional year for the approved research program or scholarly activity.

The table below summarizes the maximum time to graduation for common WashU SOM degree-based programs and year-long scholarly activities. This list is not meant to provide a comprehensive account of all WashU SOM degree-based programs.

WashU SOM Program	MD Component	Additional Component	Maximum Time to Graduation
MD	4 years	0 years	6 years
Advocacy Program	4 years	1 year	7 years
Extramural Research Year	4 years	1 year	7 years
Master of Science in Clinical Investigation	4 years	1 year	7 years
Master of Science in Biomedical Engineering	4 years	1 year	7 years
Master of Population Health Sciences	4 years	1 year	7 years
Master of Public Health	4 years	1 year	7 years
Master of Business Administration	4 years	1 year	7 years
Master of Biomedical Informatics	4 years	1 year	7 years
MD5 (year-long research)	4 years	1 year	7 years
MSTP	4 years	3-7 years	9-13 years

3. Leaves of absence from the MD or other degree-based or year-long scholarly activities count toward the time to graduation. Students requiring a leave of absence must follow the Leave of Absence Policy for Medical Students (p. 448).
4. Students who are unable to or for whom there is an anticipated inability to complete their degree requirements within the approved time will be subject to review by the Committee for Academic Promotion (CAP). The committee may recommend additional support resources, further extensions, or dismissal from the program if satisfactory progress cannot be achieved.

Under exceptional circumstances, a student may request an extension in the maximum time to graduation by submitting a statement in writing to the Office of Medical Student Affairs (OMSA) detailing the reasons for the request and a proposed plan and timeline for completing their degree requirements. The OMSA will refer the request to CAP, which will render a decision on the request based on the student's academic performance, personal circumstances, and progress toward degree completion. At their discretion, the CAP

may stipulate certain requirements based on the student's individual circumstances in keeping with the aforementioned Leave of Absence Policy for Medical Students (p. 448). Each extension may only be approved for a maximum of 12 months. Additional extensions may be considered and will require re-petition by the student through the same mechanisms detailed above. Additional academic and personal support resources may be provided to assist students in meeting their educational goals within the extended time frame.

Last approved December 2, 2024

Financing Your Education

Policy for Tuition Refund for the MD Program

Background

Pursuant to LCME element 12.2, Washington University School of Medicine (WUSM) is to have clear policies for the refund of a medical student's tuition, fees, and other allowable payments.

Policies

A student who withdraws or takes a leave of absence from WUSM will receive a pro rata refund of tuition, other payments made for health benefits and disability insurance, and for other fees. For situations in which students elect to continue to receive student health benefits, they will not receive a refund for payments made for health benefits and disability insurance for the term in which they are enrolled. The refund will be based on the ratio of the number of weeks enrolled in the MD program (from the first day of classes to the termination date) to the total number of class weeks in the MD program in the term for which tuition and fees were paid. There is no point in the semester at which a student would have \$0 refunded in tuition. It is understood that the date on which a student formally notifies the Registrar's Office in writing of the decision to withdraw or take a leave of absence from WUSM shall be regarded as the termination date, with no retroactive clause to be accepted. A prospective date will be accepted, however. If tuition and fees were paid entirely or in part by financial aid from WUSM, the refund will be applied first to the total repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the costs of tuition and fees must be refunded by the student to WUSM on the same pro rata basis as calculated for the tuition refund outlined elsewhere, per "Return of Title IV" federal guidelines. Any questions about these policies may be directed to either the Registrar's Office or Student Financial Planning.

Guidelines

Any student who withdraws or takes a leave of absence must formally notify the Registrar's Office in writing.

Last approved on July 11, 2022

Student Health, Professionalism, and Support

Medical Student Access to Healthcare Services Policy

Background

The Liaison Committee on Medical Education (LCME), per element 12.4, expects that a medical school provides its medical students with timely access to needed diagnostic, preventive, and therapeutic health services at sites in reasonable proximity to the locations of their required educational activities and has policies and procedures in place that permit students to be excused from educational activities to seek needed care.

This LCME requirement is aligned with Washington University School of Medicine's (WashU Medicine) dedication to providing access to support high-quality care for the physical, emotional and mental well-being of its students. To achieve this, the Student Health Services team provides students at WashU Medicine with efficient, accessible, high-quality care, without undue financial burden, in order to prevent and treat health problems that may interfere with a student's educational and professional goals while attending WashU Medicine.

Policies

In order to access these health services, medical students will be excused from classes or clinical activities. The following procedures will be followed:

A. Student responsibility

1. The student is responsible for notifying the office of the relevant lead of the educational activity (e.g., module lead, clerkship director) completing an absence notification form (located in the Learning Management System) and, if applicable, the supervising clinician of their clinical team as soon as possible. This applies to both routine preventative appointments and acute incidents.
 2. For additional details regarding student responsibilities in the event of a planned or unplanned absence for students on clinical courses, please refer to the relevant phase attendance policy.
- B. Responsibility of lead of required educational activities (e.g., module lead, clerkship director)
1. Curriculum leads will work with students to ensure that students can access healthcare services in a timely manner and as needed.
 2. If a student encounters any barrier to timely access to necessary health services, they are to notify the Associate Dean for Student Affairs or Ombuds. The Associate Dean for Student Affairs will address the concern with the curriculum lead and take appropriate action.

Last approved on March 2, 2020

Revised on June 24, 2025

Leave of Absence Policy for Medical Students

Background

LCME element 12.2 states that a medical school is to have clear policies for the refund of a medical student's tuition, fees, and other allowable payments. Although there is a separate and distinct tuition refund policy (p. 447), the Leave of Absence (LOA) Policy does include language that directly relates to the impact on tuition. In addition, LCME element 12.4 states that a medical school provides its students with access to health care services. The LOA policy details student eligibility for student healthcare services (p. 447).

The LOA policy revision was necessitated by the implementation of the Gateway Curriculum and the entities that provide oversight on student progress. Within the Gateway Curriculum, the Competency Attainment Committee (CAC) and the Committee for Academic Promotion (CAP) are tasked with student promotion and remediation.

Policies

Leave of Absence Policy

Voluntary Leave of Absence

A student may request a separation for academic or personal reasons by submitting a statement in writing to the Office of Student Affairs (OSA). Such a request should include an indication of the beginning and anticipated ending dates and a brief statement of the reason. The OSA will forward the separation request to the Student Success Team (SST). Separations of 1 year or less will be considered by the SST and may be referred to the CAP at the discretion of the SST. Depending on length of the proposed separation, the SST will recommend an official LOA or an absence in accordance with the Attendance Policy. A separation request of greater than 1 year, at the discretion of the SST, may require approval from the CAP.

Students requesting a personal LOA for medical reasons must submit a supporting letter from the Director of Student Health Services with their request. The university may condition its approval of a request for an LOA on the student meeting certain requirements that the university deems appropriate based on the student's individual circumstances. The goal of such conditions is to prepare the student for a successful return to the School of Medicine. For example, any student who requests an LOA for medical reasons is required to obtain a written statement of medical clearance from the Director of Student Health Services before the student may return from leave. Such a statement and a request for return from leave should be provided to the Office of Student Affairs no more than 4 weeks before the student's anticipated return.

Involuntary Leave of Absence

In the rare circumstances in which a student's behavior is of such a serious nature that the university determines that the continued presence of the student on campus or in clinical rotations poses a substantial threat to the safety, well-being, or health of that student, patients, and/or others in the Washington University community or to the ability of that student or others to engage in their customary functions and activities at the university, the School of Medicine may place a student on an involuntary LOA. The School of Medicine will follow the policy and procedures outlined in the university's Involuntary Leave Policy for Undergraduate and Graduate Students.

Leave of Absence Impact on Financial Aid

Student status is not maintained during the LOA, although the benefits of student health coverage and disability insurance are optional throughout an approved leave. Costs are payable by the MD program students. MD/PhD students may request support for these costs from



the Division of Biology & Biomedical Sciences if funds are available. The Office of Student Financial Planning should be consulted for information regarding loan repayment and grace periods when on an LOA.

Students granted an LOA, whether voluntary or involuntary, are not considered to be enrolled and are therefore not eligible for federal or institutional financial aid. Federal regulations require a Return to Title Four (R2TIV) calculation be completed for any student who has a break in attendance and who is not considered to be enrolled. Recipients of federal aid who are granted an LOA must complete exit counseling within 30 days of their last date of attendance.

All students with institutional and/or federal aid contemplating or granted an LOA must have a meeting with the Assistant Dean and Director of Financial Aid within 15 days of the start of any LOA. Please note that extenuating circumstances may preclude a student from contacting the Director of Financial Aid. If that is the case, the student should do so as soon as possible.

Leave of Absence Impact on Tuition

Students will benefit from a tuition stabilization plan, which provides that the tuition rate at matriculation will remain constant for up to 10 consecutive years. The stabilized rate will expire 10 academic years after matriculation. Therefore, students whose medical education is interrupted for any reason for more than 6 years will be charged at the rate of the class they rejoin. Appeals of this policy should be submitted in writing to the Medical School Registrar prior to the 10-year limit and thus any required increase in tuition. Appeals will be considered on a case-by-case basis, with the ultimate decision resting with the Registrar/Assistant Dean for Academic Affairs. Please refer to the Financial Information section on Registration, Payments, and Withdrawal & Refunds Policy (p. 465) for more information about the effect of an LOA on tuition and other financially related matters.

Policy on Student Status and Benefits During Research Years or Leaves of Absence

MD/PhD

Student status is maintained while the student is in the research phase of the MD/PhD programs. During their research years, students are registered under the program granting the master's degree or PhD. Both student health and disability coverage are provided by the Division of Biology & Biomedical Sciences.

Five-Year MD Program

Research Year at Washington University School of Medicine

Student status is maintained throughout the approved research year. In exceptional circumstances, a second research year may be permitted. The student may receive a stipend, but they may not be considered an employee of the university. Students are registered in the School of Medicine. Both disability and student health coverage are required and are payable by the student. Outside funding often covers such fees.

Approved Research Year Away

Student status is not maintained throughout the approved research year away; students are no longer registered in the School of Medicine. Both disability and student health coverage are optional with proof of like coverage. The cost of either elected coverage is payable by the student. Outside funding often allows these costs.

Leave of Absence

Leave of Absence Year at Washington University School of Medicine

Student status is not maintained during the LOA, although the benefits of student health coverage and disability insurance are optional throughout an approved LOA. Costs are payable by the MD program students. MD/PhD students may request support for these costs from the Division of Biology & Biomedical Sciences if funds are available. The Office of Student Financial Planning should be consulted for information regarding loan repayment and grace periods when on an LOA.

Leave of Absence Year Away

Student status is not maintained during the LOA away from Washington University School of Medicine. Both disability and student health coverage are optional with proof of like coverage. The cost of either elected coverage is payable by the student. The Office of Student Financial Planning should be consulted for information regarding loan repayment and grace periods when on an LOA.

Last approved on August 28, 2023

Parental Leave Policy for Medical Students

Background

Washington University School of Medicine is committed to offering MD students, who experience the birth or adoption of a child, the opportunity for parental leave ("Parental Leave") while enrolled in the MD program.

Policy

This policy addresses the student's need to care for a new child following the birth or adoption of the child. The policy aims to provide flexibility to our students specific to their academic year to ideally maintain student status and maintain financial aid, if applicable. Parental Leave must be taken within the first 12 months after the child's birth or adoption. Parental Leave may require a change in the student's anticipated graduation date, as students are expected to complete their full curriculum and degree program requirements.

Depending on the length of Parental Leave taken, a student's full-time status may be impacted, which may in turn impact financial aid. Parental Leave may appear on the student's transcript and/or MSPE. Our goal is to mitigate these impacts as much as possible, and this necessitates early engagement with the Student Success Team (SST).

Since the requirements of the Gateway curriculum vary across the Phases, the specifics of the Parental Leave approved, including duration, may differ depending on the phase of the program in which the Parental Leave occurs. In no event would Parental Leave exceed 8 continuous weeks. Non-continuous leave may also be considered but cannot exceed a total of 8 weeks. If a student wishes to take additional time away beyond 8 weeks, they should request an additional leave of absence (p. 448) (LOA) from the MD program.

Given the structure of the course offerings, students taking Parental Leave during Phase 1 may require a one-year gap from Phase 1 as determined by the specific circumstances of the leave and in consultation with the Office of Medical Student Education (OMSE) leadership and the SST. If a student takes a one-year gap, the student must decide if they wish to take an LOA (p. 448) beyond the Parental Leave, or they may choose to develop a scholarly pursuit to work on during the remaining interim-year period, during which time the student would remain enrolled in the MD program.

During Phases 2 and 3, the student may be approved for an 8-week Parental Leave. Return to Phase 2 or 3 would generally be approved at the start of a clerkship or elective block.

MSTP students are guaranteed 60 calendar days under the New Child Leave Policy (p. 35) of the Office of Graduate Studies. MSTP students should notify the MSTP Executive Director of anticipated leave dates. The MSTP stipend may be affected if the student extends their parental leave past 8 weeks. Students with active NIH fellowships will need to notify the NIH if they extend their parental leave past 8 weeks.

Students who are recipients of financial aid must also meet with the Assistant Dean for Student Affairs and Director of Financial Service in Office of Student Financial Planning.

International students holding a visa must also meet with the Office for International Students and Scholars.

A written Parental Leave Plan should be developed by the student in conjunction with the OMSE and the SST and submitted at least 3 months before the anticipated effective date of the Parental Leave via the Curriculum Modification Form. The plan should take into account the student's current and anticipated academic standing at the time of the Parental Leave.

Guidelines

This Parental Leave Policy is distinct from excused absences or medical leave due to pregnancy, childbirth, or pregnancy-related conditions that may be available to pregnant or parenting students as reasonable modifications under Title IX. If a student wishes to seek a reasonable modification due to parenting, pregnancy, childbirth, or other pregnancy-related conditions, they should contact the Gender Equity and Title IX Office at 314-935-3393.

No policy can cover all circumstances, and we encourage all students to have early and frequent communication with the SST.

Professional Behaviors for MD Students in the Gateway Curriculum

Professional behaviors consist of fundamentally important qualities including altruism, compassion and empathy, respect for patients and health care workers, commitment to ongoing excellence, honesty, trustworthiness, integrity, accountability, recognition of limits, collaboration, and duty to society.

WUSM Objectives Related to Professional Behaviors

The WUSM Educational Program Objectives (p. 160) related to professional behaviors include the following:

Interpersonal and Communication Skills

1. Demonstrate respectful and effective verbal and nonverbal interpersonal and communication skills with patients, families, colleagues, and all members of the educational and health care teams.

Professionalism

1. Maintain a professionally appropriate demeanor.
2. Exhibit high standards of professional integrity.
3. Apply legal and ethical principles governing the physician–patient relationship.
4. Act in the patient’s best interest, and serve as a patient advocate.

Specific Professional Behaviors

Specific professional behaviors include the following:

- Respectful and inclusive verbal and nonverbal communication and interactions
- Demonstrating respect and inclusion for all members of the educational and health care teams
- Resolving conflicts in a manner that maintains professional composure and respects the dignity of every person involved
- Maintaining professional manner in language, deportment, and appearance
- Respecting the confidentiality of others
- Establishing and maintaining appropriate boundaries in educational and work situations
- Professional use of social media
- Maintaining accountability by being punctual, meeting deadlines, and providing appropriate notification of absences
- Acceptance of feedback
- Recognition of limitations and willingness to seek help
- Adaptability to change
- Balancing the needs of others with personal needs
- Maintaining honesty and integrity
- Submitting personally performed and/or original work

The Professional Behavior Form may be completed by students, staff, or faculty to highlight specific strengths or areas in which a student may need further support to successfully demonstrate competency in professional behaviors. Reported areas for further support will be reviewed by the Student Success Team to determine the appropriate next steps.

Washington University School of Medicine Technical Standards for the Medical Program

Washington University School of Medicine (WashU Medicine) graduates physicians poised to be leaders in the advancement of human health. We welcome applicants from all backgrounds and are committed to being leaders in accessibility and inclusion.

Our competency-based educational program instills a robust foundational understanding of the basic, clinical, health systems, and behavioral/social sciences. Additionally, our curriculum develops exceptional clinical and leadership skills tailored to various medical career pathways while fostering the highest standards of professional behavior. Instruction occurs through a variety of modalities, including but not limited to the following:

- Classroom instruction
- Laboratory activities (including gross anatomy lab)
- Physical examination demonstration and practice
- Small group, team, and collaborative activities
- Individual study
- Preparation and presentation of reports and writing assignments
- Computer-based technology, including online modules and remote education
- Workplace instruction in the clinical setting
- Simulations, demonstrations, and standardized-patient experiences

To effectively engage in all aspects of the curriculum, individuals pursuing a Doctor of Medicine degree at WashU Medicine are expected to meet our Technical Standards, either with or without reasonable accommodations. Technical Standards are the skills, abilities, attributes, and characteristics that WashU Medicine deems essential for achieving competency in the practice of medicine, as outlined in the school’s medical education program objectives.

The ability to meet WashU Medicine Technical Standards is a requirement for admission and, along with the attainment of the medical education program objectives, for promotion and graduation. Upon application, matriculation, and at the start of each phase of the curriculum, students must attest that they can meet WashU Medicine Technical Standards with or without reasonable accommodations. This attestation also offers students a formal opportunity to proactively seek support in meeting the evolving demands of their education.

The Technical Standards are as follows:

1. Candidates and current students must exhibit the maturity and emotional regulation to be able to meet established professional expectations and, as they progress, provide patient-centered care.
 - a. *Professional Responsibility and Integrity:* Exercise good judgment and display ethical and legal behavior commensurate with their role and aligned with the WashU Medicine Professional Behaviors for MD Students in the Gateway Curriculum (p. 450); reliably fulfill all academic and clinical responsibilities, including adhering to attendance expectations and completing clinical and educational assignments within deadlines.
 - b. *Communication and Interpersonal Skills:* Maintain mature, culturally sensitive, and effective interactions with others.
 - c. *Adaptability and Collaboration:* Exhibit flexibility and adaptability to various learning and clinical environments, demonstrate the necessary skills to function effectively in the face of uncertainties, respond effectively to changing and/or demanding situations, and actively participate in and contribute to collaborative, constructive environments in clinical and academic settings.
 - d. *Personal Development and Well-Being:* Take personal responsibility for learning; seek, receive, and incorporate feedback; and promptly make appropriate changes. Proactively monitor well-being and seek help in a timely manner.
2. Candidates and current students must be able to develop, refine, and demonstrate the skills, behaviors, and attitudes necessary to gather, synthesize, and integrate information in support of clinical reasoning.
 - a. *Information Gathering and Observation:* Navigate clinical spaces to collect comprehensive information about patients through observation, physical examination, appropriate diagnostic tests, and effective communication strategies.
 - b. *Critical Thinking and Problem Solving:* Synthesize, interpret, analyze, and apply information to support decision-making; utilize skills such as memorization, calculation, data retrieval, and formulation and testing of hypotheses.
 - c. *Communication and Documentation:* Effectively convey findings, decisions, and reasoning by utilizing a variety of communication techniques (including verbal, non-verbal, and written, or the functional equivalents).

- d. *Safety and Emergency Response:* Identify and respond to emergent or urgent situations promptly by providing, directing, or assisting in care commensurate with their role; adhere to universal precautions and maintain safety standards.

In alignment with our commitments to supporting student success and access, we appreciate that some students may require resources, support, and/or assistance to meet WashU Medicine Technical Standards and engage with the curriculum.

WashU Disability Resources provides students the opportunity to confidentially discuss disability-related needs and engage in an interactive process to determine reasonable accommodations, designed to address access across didactic, clinical, and practical learning environments. As accommodations take time to implement and are not applied retroactively, we encourage students to contact WashU Disability Resources as soon as they suspect they may need accommodations, whether or not they have formal disability documentation. Decisions on admission, retention, and graduation will not be affected by a student's request for accommodations or engagement with WashU Disability Resources. For questions about disability/accommodations, technical standards, or the interactive accommodation request process, students should reach out to disabilityresources@wustl.edu or visit the WashU Disability Resources website.

In addition to Disability Resources, WashU Medicine offers a variety of resources for students who may need support throughout their undergraduate medical education. Students who have questions or concerns about non-disability-related personal circumstances (e.g., pregnancy, family emergency) should contact the Associate Dean of Student Affairs (MDStudentLife@wustl.edu).

Last approved May 5, 2025

Non-Curricular-Related Policies

Advanced Standing Transfers Policy for Medical Students

Background

LCME Standard 10.7 calls upon accredited schools to ensure that any student accepted for transfer demonstrates characteristics comparable to the other students in the class that they will join. Further, the school must accept transfers into the final year only in rare and extraordinary circumstances. Washington University School of Medicine has historically offered a third-year advanced standing (transfer) program that conformed to the LCME standard. Curricular reform has led us to re-examine this policy.

Unlike the Legacy curriculum, which had a 2+2 structure that mapped readily onto other schools' curricula, the Gateway Curriculum is both unique and integrated. A transfer student would not have an experience substantially equivalent to that of their classmates. Designing custom alternative programs for each transfer student would be impractical and contrary to the program's philosophy. The Gateway Curriculum involves continuous benchmarking of progress against competencies and program objectives. A transfer student would not have this continuous benchmarking. It is therefore not possible to offer transfers into the Gateway Curriculum.

Policies/Requirements

Washington University School of Medicine does not accept advanced standing (transfer) students from other medical schools.

Guidelines

It is not possible to transfer into the MD degree program at Washington University, either as an MD-only candidate or as an MD-PhD. This policy does not preclude Washington University medical students from transferring internally into the Medical Scientist Training Program.

Last approved on May 13, 2021

Demonstration of English Language Proficiency

Applicants to the School of Medicine for whom English is not the native language must provide verification that they have sufficient English language proficiency to succeed in the academic program. Options and procedures for demonstrating English language proficiency are outlined in detail on the WashU Office for International Students & Scholars webpage.

Non-University-Affiliated Speaker Compensation

Background

Washington University School of Medicine (WUSM) recognizes the importance of having individuals from outside of the WUSM community contribute to the educational goals of students in the MD program. The following policies apply to the financial compensation of individuals who do not have formal ties to Washington University in St. Louis and who function as speakers to medical students in the core curriculum of the MD program. In keeping with element 9.1, WUSM ensures that all non-university-affiliated instructors are familiar with the relevant learning objectives of the course or clerkship and that they are prepared for their roles in teaching.

Policies/Requirements

All requests for external speakers should be presented for review by the Senior Manager in the Office of Medical Student Education at least 21 days prior to their inclusion in learning sessions. The Office of Medical Student Education may exercise discretion in accepting late requests made under rare extenuating circumstances.

Speakers who require little to no advanced preparation for their involvement (e.g., someone sharing their lived experience as a patient) will be compensated \$50 per session in addition to reimbursement for parking or public transportation.

Speakers who will have a leadership role in an instructional session (e.g., via a lecture or facilitated discussion) that will require substantive advanced preparation of more than 5 hours will be compensated \$200 per session in addition to reimbursement for parking or public transportation.

For situations in which the requested speaker compensation exceeds the rates established above, requests should be submitted for review by the Office of Medical Student Education; final approval will be given by the Executive Director for Education Administration and Finance in

the Office of Education Administration & Finance unit at least 60 days prior to the speaker engaging in any session-related activities. In all cases, a narrative explaining the need for a higher rate — along with supporting documentation demonstrating that an effort to negotiate the speaker's rates to remain within the WUSM policy parameters has occurred — must be submitted.

For any guest speaker sessions to be recorded and any other artifacts captured (e.g., photos) and to be later made available through the WUSM Office of Medical Student Education, explicit permission from the guest speaker must be provided, with details on where these materials will be housed and how they will be used in the future.

Last approved on September 13, 2021

Policy on External Factors

Background

LCME Element 10.2 requires that the final responsibility for selecting medical students must reside with a formally constituted faculty committee and that the selection of individual medical students for admission is not influenced by any political or financial factors. This policy, together with the Policy on the Final Authority of the Admission Committee, is intended to clarify the role that external factors may play.

Policy

Persons or groups external to the Committee on Admissions may assist with the identification of applicants, but they do not have decision-making authority. The selection of individual students at WUSM must not be influenced by factors exogenous to the admissions process, such as political or financial factors.

Last approved on August 12, 2021

Policy on the Final Authority of the Committee on Admissions

Background

LCME Element 10.2 requires that the "final responsibility for accepting medical students" rest with a formally constituted admission committee, with specified authority, composition, and rules of operation.

Policy

The Committee on Admissions (COA) has final authority for determining the acceptance of all candidates for the MD degree at Washington University School of Medicine. The COA is assembled by the Associate Dean for Admissions and is drawn from the faculty and staff of the School of Medicine, with the majority drawn from the full-time faculty.

Final decisions for acceptance of an applicant during the regular season (prior to May 1) are made at the Steering meeting of the COA. Eleven voting COA members representing the faculty who hold non-decanal positions with at least one member from each region must be present at the Steering meeting. The majority of voting members present must be members of the faculty for a quorum to be reached. After May 1 during the waitlist phase, final decisions are made by the Leadership Subcommittee on behalf of the COA.

The selection of individual medical students is not influenced by political or financial factors, in accordance with our Policies on External Factors and on Conflict of Interest.

Last approved on October 12, 2023

Policy on Non-Employee Voluntary Faculty Appointments

The Washington University Policy on Academic Freedom, Responsibility, and Tenure authorizes "grants of academic rank as a courtesy to persons not regular members of the University faculty." In the School of Medicine (WUSM), such academic appointments are classified as "Voluntary appointments" and involve neither employment status nor financial compensation.* This policy defines the nature and scope of Voluntary appointments and establishes standards and procedures for such appointments.

A. *Types of Voluntary Appointments.* There are two categories of Voluntary appointments: Clinical and Research.

- Clinical Voluntary Appointments (e.g., Voluntary Clinical Professor of Medicine, Voluntary Clinical Assistant Professor of Physical Therapy) are Voluntary appointments conferred on clinicians or other professionals who work in WUSM-affiliated hospitals or with WUSM-affiliated physician networks and who have roles in patient care, medical or health profession education, or administrative functions.
- Research Voluntary Appointments (e.g., Voluntary Research Associate Professor of Neuroscience, Voluntary Research Instructor of Radiology) are Voluntary appointments conferred on colleagues who collaborate on research or research-based education with employed members of the WUSM faculty.



B. *Roles of Voluntary Faculty.* Voluntary faculty members are expected to make valuable contributions to WUSM, as prescribed by their department or program. Voluntary faculty members may serve as mentors and advisors to students, residents, fellows, and postdoctoral trainees, but they should not be the only mentor or advisor for such individuals. Voluntary faculty members are encouraged to offer guest lectures, but they may not teach full-term courses or serve as course masters. ** Voluntary faculty members generally may serve on committees, but any such committee must also include employed faculty members. Voluntary faculty members may participate in clinical and basic research consistent with Washington University and WUSM policies relating to such activities.

C. *Procedures and Criteria for Appointing and Promoting Voluntary Faculty.*

1. Voluntary appointments may be made to the ranks of Voluntary (Clinical or Research) Instructor, Assistant Professor, Associate Professor, or Professor. Initial rank should be commensurate with the level of professional accomplishment relative to other individuals within the relevant peer group. Promotions within the Voluntary appointment ranks may be made based on criteria such as professional accomplishments, contributions to the department/program, and length of service. If an individual who has served as a Voluntary faculty member is subsequently hired as an employed faculty member, their rank as a regular faculty member will not necessarily be at the same rank it was while they were serving on the Voluntary faculty.
2. Voluntary appointments are initiated by department heads and program directors. At the outset of the process, department heads and program directors ordinarily should consult with their unit's internal appointments and promotions committee.
3. Voluntary appointments must be approved by the dean or their designee. Review of proposed Voluntary faculty appointments and promotions is obtained by submitting a Proposed Voluntary Appointment packet consisting of a Proposed Voluntary Faculty Appointment/Promotion form (Form A [PDF]) and a curriculum vitae in the approved Voluntary Appointment format (Form B [PDF]). The packet must be submitted to Human Resources, which will route it to the dean or their designee for review and approval.
4. After receiving approval from the dean or their designee, the department head or program director shall formally offer the appointment to the candidate by sending, as appropriate, a Voluntary Faculty Appointment Letter (Form C [PDF]) or a Voluntary Faculty Promotion Letter (Form D [PDF]). The appointment or promotion will not be official until the candidate returns to the department or program a countersigned copy of the letter accepting its terms and conditions. The department must forward the countersigned letter to Human Resources.

D. *Termination of Voluntary Appointments.* Voluntary appointments do not have a defined duration. They should be reviewed periodically by the department head or program director. A Voluntary appointment shall presumptively be terminated

when there is a change of status such as the discontinuation of the hospital privileges or affiliation on which the appointment was based, unless the department head or program director determines that continuation of the appointment would be appropriate on some other basis. Voluntary appointments may be terminated for any reason at any time, with or without advance notice by the department head or program director. A Voluntary faculty member whose appointment is terminated may appeal the decision to the Dean of the School of Medicine. Voluntary appointments are not subject to Washington University or WUSM policies governing the nonrenewal or termination of employed faculty members.

E. *Compliance with Policies.* In all activities carried out in connection with their appointment, Voluntary faculty members must comply with the standards of conduct contained in all Washington University and WUSM policies (including but not limited to the Code of Conduct and policies concerning compliance, patient care, research, discrimination and harassment, and abusive conduct), except insofar as those policies apply only to employed faculty.

F. *Representation of Faculty Status.* In representing their status at Washington University/WUSM, Voluntary faculty shall use their full title (including the "Voluntary Clinical" or "Voluntary Research" modifier to their rank) and shall not represent themselves to be regular or employed members of the faculty.

* This policy does not apply to joint or additional academic appointments granted as a courtesy to persons who are employed by Washington University (commonly known as *courtesy appointments*) or to emeritus faculty appointments. An individual may not concurrently hold Voluntary and employed faculty appointments at WUSM.

**If a department or program wishes to ask a Voluntary faculty member to take on the role of course master or to teach full-term courses, the individual must receive a part-time, compensated employee position to perform those duties.

Last approved June 2021

Policy on the Selection of Students

Background

LCME Element 10.3 calls upon the faculty to establish criteria for student selection and to develop and implement effective policies and procedures regarding medical student application, selection, and admission and to make available to all interested parties its criteria, standards, policies, and procedures.

Policy

The selection process that has been developed by the Committee on Admissions identifies applicants whose life experiences, personal attributes, academic achievement, and career goals align with the mission and vision of WashU Medicine and the guiding principles of the Gateway Curriculum. The purpose is to identify candidates who will contribute to the medical profession and who are most likely to enrich and benefit from our learning environment. Our process follows the AAMC principles of mission-aligned selection. Furthermore, the AAMC Core Competencies for Entering Medical Students are the overall dimensions on which students are evaluated. All of the committee's rubrics and forms have been linked to these Core Competencies.

Last approved on August 12, 2021

Policy for the Preparation of Non-Faculty Instructors for the WashU School of Medicine MD Program

Background

Washington University School of Medicine (WUSM) is proud to provide students with extensive training opportunities offered by a diverse community of educators. At the same time, we recognize that this privilege comes with the responsibility to ensure rigor and fairness throughout our students' curricular experiences. The Liaison Committee on Medical Education (LCME) element 9.1 requires that all residents, graduate students, postdoctoral fellows, and other non-faculty instructors in the medical education program who supervise or teach medical students be familiar with the learning objectives of the course or clerkship and that they are prepared for their roles in teaching and assessment. In keeping with this, WUSM is committed to ensuring that all parties who are assigned to supervise and/or assess medical students participate in orientation or other faculty development programs related to teaching and/or assessment.

Policies

All residents and other non-faculty instructors who are assigned to supervise and/or assess medical students are required to participate in orientation or other faculty development programs related to teaching and/or assessment.

All residents and other non-faculty instructors will receive relevant course/clerkship objectives and other requirements. They will also review and abide by key policies related to the teaching, supervision, and assessment of medical students.

Guidelines

Instructors are referred to WUSM's Office of Education Teaching Resources for a listing of offices and facilities that provide teaching and classroom support.

Last approved on July 11, 2022

PhD and Joint Degree Program Policies and Guidelines

PhD Program Policies & Guidelines

The following policies apply to the PhD programs offered by Washington University School of Medicine:

Confidentiality & Records Retention Policy (Leaves of Absence)

The university will strive to protect, to the greatest extent possible, the confidentiality of students involved in matters of voluntary or involuntary leave. Because the university has an obligation to preserve the security of its community, the university cannot guarantee confidentiality where it would conflict with the university's obligation to investigate meaningfully matters that may threaten a student's health or safety or the safety and security of the university community. When some disclosure of the university's information or sources is necessary, that disclosure will be limited to the extent possible.



Medical records of a student will be protected in accordance with the Washington University School of Medicine Student Health Services Notice of Privacy Practices. The university will, to the extent permitted by law, keep confidential all records of committee reviews. The records maintained by the Case Conference Committee will be available only to the administrator and other university officials in accordance with the Family Educational Rights and Privacy Act (FERPA). All records will be destroyed after a period of 10 years from the date of the final decision on involuntary leave or the student's decision to take voluntary leave or 10 years from the date of graduation or the last semester of enrollment.

More general university policies on records retention can be found on the Records Management Policy page of the Washington University Financial Services website.

Course Level Policy

Undergraduate courses (3999 and below), School of Continuing & Professional Studies courses, and courses taken for pass/fail or audit grade options do not count in cumulative units toward any graduate degree. Graduate courses (4000 and above) taken in other graduate divisions of the university will count in cumulative units unless specified otherwise by the student's home department or program.

Dissenting Vote(s) at a Dissertation

Faculty members of the Dissertation Examination Committee will normally examine the student candidate and vote to approve the dissertation. In the vast majority of cases, these votes are unanimously for approval. In the rare case that there are faculty concerns that cannot be resolved through subsequent revisions and therefore result in dissenting (negative) vote(s), the Committee Chair will refer the case to the Graduate Program Council (GPC) for resolution.

In the case of a single dissenting vote, the Committee Chair and the dissenting voter will be asked to explain the reasons for the dissent in a letter to the GPC. After consulting with these and other members of the committee, the GPC may then decide to accept the majority opinion and approve the dissertation, or they may seek the opinion of an additional reader. After considering this additional evidence, the GPC may approve or decline to approve the dissertation.

In the case of two or more dissenting votes, the Committee Chair and the dissenting voters will again be asked to explain the reasons for the dissent. The GPC may then decide to decline to approve the dissertation or to ask the department or graduate program to name a Resolution Committee. This committee will consist of three faculty members who will reexamine the dissertation and the candidate; members must be authorized to supervise PhD students, have appropriate expertise in the proposed field of study at Washington University or elsewhere, and have not served on the candidate's original committee. A unanimous positive recommendation from

this committee will be required in order for the GPC to approve the dissertation. The failure of a department or graduate program to identify three faculty members to serve on this Resolution Committee will be tantamount to a rejection of the dissertation.

English Proficiency

International students considering application to Washington University School of Medicine for graduate study should have a general familiarity with academic practices and university customs in the United States. All international students are required to present evidence of their ability to support themselves financially during graduate study. International students whose native language is not English must submit score reports from the TOEFL offered by ETS or the International English Language Testing System (IELTS) Academic. The test should be taken in time for results to reach Washington University directly from ETS before the application deadline. Each PhD program within the School of Medicine must follow the guidelines for minimum score requirements established by the Office for International Students and Scholars. Interested applicants should refer to each specific program's handbook for the minimum scores required for consideration of admission.

To be eligible for a TOEFL waiver, the applicant must have completed at least three years of study toward their degree from a regionally accredited university located in an English-speaking country. Please also note that the entire length of study must have been completed at the institution.

Enrollment Extension

Students may be permitted to register for one additional year beyond their program length limit. When recommended by their department and approved by the School of Medicine Graduate Program Council, these students will be registered in a 0-unit, 9000-level course that confers full-time enrollment status. Students registered for that 0-unit course may or may not receive stipend support, but they are eligible to receive other benefits available to full-time PhD students, including health insurance and wellness fee subsidies.

Students may be registered for this extension for a maximum of two semesters. There will be no exceptions to this limit. Students who do not complete their programs within this time limit must withdraw from the program.

Grading Option Policy

Grades for students in the School of Medicine are as follows: A, B, C, and D, which can also include a plus or minus sign. Other grades are F (Failing), I (Incomplete), L (Successful Audit), N (No Grade Reported), Pass, No Pass, Withdraw, and Z (Unsuccessful Audit). An incomplete grade will lapse to a F after one semester.

Graduate Student Vacation and Time Off Policy

Students working toward School of Medicine graduate degrees are entitled to all official University holidays. To the extent that responsibilities essential to the maintenance of research, such as managing the care of laboratory animals, must be done on university holidays, graduate students may be required to share in this responsibility.

Faculty mentors should approve other planned absences, and unplanned absences should be reported to them. "Faculty mentors" during the graduate years are program directors and research rotation or dissertation advisors, as appropriate.

The total amount of excused absence should be consistent with that of academic employees in the same area. (Assistantship or stipend payments are not subject to reduction as they represent agreed-upon financial aid.) Decisions regarding the granting of time off will not be based upon the existence of or source(s) of funding.

The program director should address disagreements between faculty mentors and students over absences. If the director cannot resolve the dispute, the Vice Chancellor for Medical Education or their designee will serve as the final arbiter.

Health Fees

The Student Health Service is a mandatory program of services available to full-time students enrolled in the medical or allied professional schools of Washington University in St. Louis School of Medicine. Students do not have the option to decline the Student Health Plan. The service is supported solely by the fees paid by full-time students of the School of Medicine. The health care coverage is in accordance with the minimum essential coverage mandate under the Affordable Care Act. The School of Medicine subsidizes costs for all full-time students, including disability insurance. All current medical and allied professional programs as well as all new incoming students receive long-term disability insurance. Details can be found on the Student Health Services website.

In Absentia Registration

During a student's period of regular registration, they may have a need or opportunity to study away from Washington University. Requests for registration in absentia will be considered on a case-by-case basis by the student's designated faculty graduate program director. If approved, the student will be registered in a program-specific 9000-level course indicating full-time graduate study in absentia. Students may be allowed to register for that program-specific 9000-level course for up to four consecutive or nonconsecutive fall/spring semesters. Semesters in which a student is registered in absentia are counted as part of the student's program length.

Leaves of Absence

A student may request and be approved for a leave of absence during their regular registration period if they are not registered in absentia. Leaves of absence must be endorsed by the degree program and approved by the School of Medicine for up to one year. Extensions must be reapproved.

Approved leaves of absence are not counted as part of a student's program length and will not be approved for semesters beyond the program length, including enrollment extension. While on a leave of absence, the student is not registered and has no student status at Washington University. Students who begin a leave during any semester will be dropped from all course registration for that semester and will receive no course credit for work completed during that semester prior to the leave.

Leaves of absence may be personal or medical. In the case of a medical leave, the student must present authorization from Student Health Services at the beginning and again at the end of the leave. At the end of any leave of absence, a student is reinstated into the School of Medicine under the conditions prevailing at the time the leave was granted. Being on leave suspends student status and financial support from the university. Taking a leave may therefore adversely affect loan deferment, visa status, the right to rent university-owned housing, and so on. Most visa types would prevent international students from remaining in the United States while taking a leave of absence; such students should consult the Office for International Students and Scholars as well as their faculty advisor, their program's director of graduate studies, and perhaps a dean.

Prior to taking a leave of absence, students should consider their need for health insurance coverage. The continuation of access to Student Health Services depends on such factors as the kind of leave (medical or personal) and the student's location during the leave. Students should consult their program leads, Student Health Services, and the School of Medicine registrar and financial aid office before making a decision regarding leave whenever possible.

Part-Time Employment of Full-Time PhD Graduate Students

If a full-time supported PhD graduate student in the School of Medicine accepts part-time employment within Washington University or outside of the university, the following guidelines must be followed. The Internal Revenue Service, the Washington University Human Resources Office, and US Citizenship and Immigration Services all make important distinctions between students and employees. These guidelines are designed to assist graduate students in retaining their status as students.

Fall & Spring Semesters: During a semester in which a School of Medicine PhD graduate student receives, as a student, any form of full-time fellowship or assistantship, that student may, as an employee, obtain employment up to a maximum of 220 total hours during the



fall semester (Aug. 1-Dec. 31) and 220 total hours during the spring semester (Jan. 1-May 31) (i.e., 10 hours per week for 22 weeks). International students on F-1 and J-1 visa status must further limit their employment to a maximum of 6 hours during any individual week.

Summers: Restrictions on summer employment depend on whether the student retains their status as a Washington University student during this time. Students on 12-month awards are limited to 80 total hours of employment for the period from June 1-July 31 (equivalent to 10 hours per week for 8 weeks).

The number of additional hours refers to the time engaged in discretionary employment. It does not include time spent as a research assistant (RA) during the fall or spring semesters. A short list of some types of work to which these limitations do apply include the following: instructor in the School of Continuing & Professional Studies; part-time lecturer; employment by university libraries, museums, computer centers or the Alumni and Development Office; and tutoring, paid research assistance to a faculty member outside of a full-semester RA award, summer RA awards to students on 10-month support, or paid hourly work assisting at department events. The maximum number of hours may be further restricted (but may not be expanded) by external granting agencies, by department policies, or by individual dissertation advisors and dissertation committees. International students on F-1 and J-1 visas may not teach in the School of Continuing & Professional Studies during the fall or spring semesters or during summers if they are on 12-month support.

Probation and Dismissal for Academic Reasons

This policy describes guidelines and procedures for probation and dismissal because of poor academic performance (Academic Dismissal) for students enrolled in PhD programs in the School of Medicine.

Academic Dismissal is distinct from withdrawal (initiated by the student), deactivation of a student's record by a failure to register, and dismissal or other sanctions associated with the Academic and Professional Integrity Policy for PhD Students or the University Student Conduct Code. Dismissals are recommended by the degree program and are not final until approved by the Dean of the School of Medicine or their designee.

Students may be dismissed immediately for extreme academic underperformance. Examples of extreme underperformance might be two grades of C or below in one semester or three unfinished courses (I, X or N) in one semester. Students who encounter personal situations that contribute to academic underperformance during a semester should be informed of the option to request a leave of absence rather than continuing enrollment with poor performance. The ability to complete mentored teaching responsibilities is not a sufficient basis for remaining enrolled.

Most academic difficulties are not of the severity associated with immediate dismissal. The School of Medicine's explicit criteria for maintaining minimal standards for satisfactory academic progress are as follows: (1) a cumulative grade-point average of 3.0 or greater; (2)

no more than 9 units of incomplete (I), final examination missed (X) and/or not yet submitted (N) on the transcript at any one time; and (3) submission of a dissertation proposal. A completed Title, Scope, and Procedure Form, signed by the Research Advisory Committee members and by the Program Chair, must be submitted to the School of Medicine Registrar or the appropriate record custodian at least 6 months before the degree is expected to be conferred or before beginning the ninth semester (fifth year) of continuous enrollment, whichever is earlier. A program may add requirements for good standing (e.g., the completion of comprehensive or qualifying examinations by a certain time) but may not relax the School of Medicine or university-wide requirements. Faculty are also responsible for evaluating the ability of the student to identify and undertake an original scholarly project at the level of excellence expected for a Washington University PhD as well as whether the student is making timely progress toward completion of the degree. The program may place a high value on the quality of performance in mentored teaching and or other professional activities. The judgment of the faculty on these issues can lead to Academic Dismissal for students who meet other criteria for good academic standing. Programs are expected to maintain written guidelines that help students understand the major categories of expectations for satisfactory progress. Such guidelines should be provided to students at the beginning of their academic program and reviewed with students on a regular basis.

Guidelines for Academic Probation and Dismissal

Except for circumstances justifying immediate dismissal, a student cannot be dismissed on the basis of academic performance without the opportunity to return to good standing during an identified period of probation. The purposes of probation are as follows: (1) to explicitly warn the student of their status; (2) to provide the student with clear guidelines regarding the performance that will be necessary to return to good standing; and (3) to provide the student with reasonable time to meet these expectations. To meet these objectives, probation normally should be designated for a minimum of 3 months. When the probation criteria involve coursework, then the probation period would normally correspond to a semester's duration. A student on probation must receive a detailed letter from the director of their program stating the reasons for the probation and explicitly identifying the steps necessary for the student to return to good standing by the end of the probation period. A copy of this letter should be sent to the registrar and to the chair of the School of Medicine Graduate Program Council. If a student does not meet all criteria for good academic standing but the department does not wish to place the student on probation, an appeal for this exception can be made to the chair of the School of Medicine Graduate Program Council.

At the end of a first probation, one of three things will occur: (1) the student will be returned to good standing; (2) the student will be placed on a second consecutive probation, which generally will be for a full semester; or (3) the student will be dismissed from the program. A second consecutive probation must be accompanied by a new letter

identifying the steps required to return to good standing. While the purpose of the probationary period is to provide the student with time to improve, the decision of the program at the end of a probationary period could involve immediate notification of dismissal.

At the end of a second continuous probation, the student will be either returned to good standing or dismissed. A third probation will be allowed only if it is not continuous. A fourth probation will not be allowed. A student whose performance would result in a fourth probation will be dismissed immediately. A leave of absence cannot be used by a student to delay or nullify the consequences of a third consecutive or fourth probation.

Each program must have a standard procedure (e.g., a Graduate Advisory Committee or similar) to manage decisions regarding placement on probation, removal from probation, recommendations for dismissal after a probationary period, and recommendations for immediate dismissal due to extreme underperformance. The procedure for managing such decisions must be applied to all students in the program and cannot be managed solely by an individual faculty member, including the student's research mentor, although input provided by the research mentor may play a key role in the process.

Stipend support should continue during a probationary period unless the student is failing to meet the basic expectations of their position (e.g., repeatedly misses classes, repeatedly absent from the lab and fails to carry out lab assignments). If a program or school decides to suspend stipend support under these circumstances, the student must be given a minimum of 2 weeks' notice prior to the withholding of such support. If the student's performance improves and they begin meeting the basic expectations of the program, stipend support should resume at that time. During all probationary semesters, tuition remission will remain as offered at initial enrollment.

Notification Procedures for Academic Probation

1. The explanation of academic performance issues leading to probation should be specific (e.g., low grade-point average, failed exam) and contain a clear statement of what must be done within a specified period of time for the student to return to good standing. This includes probation associated with faculty judgments of research potential, timely progress toward the degree, teaching performance or professional activities. The expectations will be consistent with those held for all students in the program. They must be communicated in writing, accompanied by the opportunity to meet with the program director or designated departmental faculty representatives for a clarifying discussion, and copied to the chair of the Graduate Program Council and the registrar.
2. If the student does satisfactorily meet the requirements of the probation, a written notice of reinstatement, including the date that the student has returned to good standing, will be provided to the student. Students may be reinstated before the end of the probation period if they have met the requirements for reinstatement.

3. Copies of any letter or e-mail to the student or summary notes of discussions with the student regarding the student's placement on probation should be placed in the student's file in the School of Medicine with the registrar, which the student has the right to review.

Notification Procedures for Academic Dismissal

1. If the student does not meet the requirements of the probation by the specified time and the program recommends dismissal, the program will send a request for dismissal and a draft of the dismissal letter to the Graduate Program Council and the registrar, along with copies of all previous communications and/or warnings. The draft dismissal letter will include the grounds for dismissal, the effective date of dismissal, and advice to the student that voluntary withdrawal from the program is an option. All academic dismissals require approval by the Dean of the School of Medicine or their designee.
2. If the student is an international student on a visa, the program should consult with the Office of International Students and Scholars prior to drafting the dismissal letter. It is often advisable for an international student to withdraw ahead of a dismissal to avoid an adverse impact on future entry into the United States.

Appeal Procedures

In cases of probation or dismissal, a student may appeal within 14 calendar days to the School of Medicine Graduate Program Council.

Probation

Appeals of probation end with the Graduate Program Council (i.e., placement on probation cannot be appealed to the Dean of the School of Medicine). For cases in which there is a conflict of interest with a member of the Graduate Program Council, the chair of the Council can identify an appropriate designee to serve on the Council to consider the appeal. If the chair has a conflict of interest, the Dean of the School of Medicine or their designee may identify appropriate persons to serve on the Council and to serve as chair of the Council for purposes of addressing the appeal.

Dismissal

For academic dismissal decisions, a graduate student in the School of Medicine may submit a final appeal of the dismissal to the Dean of the School of Medicine or their designee. Appeal requests to the Dean must be submitted within 14 calendar days of formal notification of dismissal from the Graduate Program Council. Responses to appeals generally occur within the next 14 calendar days after the appeal is requested. Stipend support is discontinued at the time the student is notified of dismissal. The student is not eligible to receive stipend support during an appeal of dismissal; however, if the appeal is upheld,



the student is eligible for stipend support covering the period of the dismissal appeal process. Students who have chosen to withdraw from their program (as opposed to taking an authorized leave) cannot appeal or seek reconsideration of this decision.

Refunds

A student who withdraws or takes a leave of absence from the school will receive a pro rata refund of tuition, of other payments made for health and disability insurance, and of other fees that they themselves have paid. For situations in which students elect to continue to receive student health benefits, they will not receive a refund for payments made for health and disability insurance for the term in which they are enrolled. The refund will be based on the ratio of the number of weeks enrolled (from the first day of classes to the termination date) to the total number of class weeks in the term for which tuition and fees were paid. There is no point in the semester at which a student would have \$0 refunded in tuition. It is understood that the date on which a student formally notifies the Office of the Registrar in writing of the decision to withdraw or to take a leave of absence from the School of Medicine shall be regarded as the termination date, with no retroactive clause to be accepted. A prospective date will be accepted, however. If tuition and fees were paid entirely or in part by financial aid from the school, the refund will be applied first to the total repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the costs of tuition and fees must be refunded by the student to the school on the same pro rata basis as calculated for the tuition refund outlined above, per federal guidelines regarding the return of Title IV funds. Any questions about these policies may be directed to either the Office of the Registrar or the Office of Student Financial Planning.

Reinstatement

A student who has left the School of Medicine for a period of time or who has neglected to register for more than two semesters must apply for reinstatement. The reinstatement form must be endorsed by the student's department or program, signed by the department chair, and submitted four weeks prior to the start of the term. A reinstatement fee will be charged based on the length of time the student was absent.

A reinstatement from an approved medical leave of absence requires clearance from Student Health Services before it can be processed.

Satisfactory Academic Progress

Satisfactory academic progress for students in PhD programs is monitored by the School of Medicine as well as by the degree program. Failure to maintain satisfactory academic progress may result in a student's immediate dismissal or in their placement on academic probation for the ensuing year. Most financial awards — and all federally funded awards — are contingent on the maintenance of satisfactory academic progress. Moreover, satisfactory academic

progress is a prerequisite for service on any committee authorized by the School of Medicine or the Graduate Council. The following are minimal standards of satisfactory academic progress for PhD students; degree programs may set stricter standards but must not relax these.

1. Students are expected to proceed at a pace appropriate to enable them to finish within the time limits set forth by the program. Students are expected to have completed all PhD requirements except for the dissertation by no later than the end of the fourth year of full-time graduate study.
2. Students are expected to maintain a cumulative grade-point average of at least 3.0 on a 4.0 scale. Note that plus and minus marks alter the numerical value of a letter grade.
3. Students are expected not to carry at one time any more than 9 credit units for which the grades of I (incomplete), X (final examination missed), or N (not yet submitted) are recorded. The School of Medicine may deny a student with more than 9 unfinished credits permission to register.
4. After four years of full-time graduate study, doctoral students who cannot identify three faculty members who are willing to serve on their Research Advisory Committee are not considered to be making satisfactory academic progress. The Title, Scope and Procedure form (PDF) must be filed before the fifth year in order to identify the membership of the student's Research Advisory Committee.

Student Grievance

Students with complaints regarding academic matters should initially seek resolution from their faculty advisor, then from their program director, and finally from the director of their degree program or department/program head, if applicable. The final court of appeal for all students in School of Medicine areas of study (p. 44) is the Senior Associate Dean for Education. The Senior Associate Dean may follow up with the complainant, with faculty in the student's degree program, or with other stakeholders on campus or within the university to review and investigate the grievance and work toward a resolution. Faculty involved in the process of receiving or reviewing a complaint should treat the information and relevant conversations as highly confidential.

Students with complaints regarding nonacademic matters (including but not limited to unprofessional behavior, a hostile learning environment, and abusive or offensive language and/or behavior) — whether by faculty, staff, or fellow students — should refer to the Student Mistreatment Reporting and Monitoring Policy (p. 421). That policy contains mechanisms and protocols for students to report mistreatment against them or for other individuals to report student mistreatment they have observed.

All complaints regarding academic and professional integrity should be first addressed with the graduate program director or the respective program head(s). The program, with the counsel of the Senior Associate Dean for Education, can submit a report of academic and professional integrity through the appropriate mechanism (i.e., the Vice Provost for Graduate Education Academic and Professional

Integrity Officer; see the Academic and Professional Integrity Policy for PhD Students (PDF) for more information). It is recommended that all grievances be reviewed and monitored by the Senior Associate Dean for Education to ensure the consistency of the process.

Transfer Credit

Credit for previous courses will be transferred to a student's Washington University record only to fulfill departmental course/credit requirements. Departments may request transfer credit from official transcripts after a student's admission to a PhD program.

Tuition Remission

The School of Medicine will approve tuition remission for up to 72 course units. The 72-unit calculation includes courses transferred from other graduate programs.

Students pursuing a certificate or an unrelated master's degree in addition to their PhD must consult the departments and advisors about credit sharing between the programs. Tuition remission for units in excess of 72 will not be provided by the School of Medicine.

To be eligible for tuition remission, courses must be offered at the graduate level, taken for a grade, and approved in advance by the student's advisor and program as necessary for the student's degree. Depending on the program, graduate-level courses begin with courses numbered in the 4000s or 5000s. Audited courses and courses taken pass/fail are not eligible for tuition remission. Students should consult their advisors regarding course selection.

When certain conditions apply, graduate students may be permitted to register for courses numbered below 4000, but they may not ordinarily be covered by tuition remission unless approved by the program director. Full-time students in the School of Medicine who wish to take graduate courses in the School of Continuing & Professional Studies or Summer School must obtain the approval of both their academic advisor and the program director. Tuition remission may be available for such approved courses.

Resources

The School of Medicine is fully dedicated to providing an outstanding learning environment in which students are supported in meeting their individual professional goals. Services include the following:

- Academic Assistance (p. 462)
- Academic Calendars
- Advising and Career Counseling
- Diversity, Equity & Inclusion, Office of
- Diversity Programs, Office of
- Housing
- Education, Office of
- Medical Student Affairs, Office of
- Medical Student Education, Office of
- Medical Student Research, Office of

- Student Financial Planning, Office of
- Protective Services
- Registrar, Office of the
- Student Health Services

Academic Assistance

Tutorial Assistance Program

Students experiencing difficulty in any course may request tutorial assistance. Such requests should initially be directed toward the course directors and thereafter to the associate dean for student affairs. Students who are repeating courses will be offered the opportunity for tutorial assistance. The Committee on the Academic and Professional Evaluation of Students (CAPES) or the Competency Attainment Committee may also require it. There is no charge to the student for tutorial assistance.

Tutoring

Phase 1 Students

Tutoring for individual content areas is available, and it is offered either in small groups or one-on-one from teaching assistants or other graduate students. Interested students should contact the appropriate course lead or the Office of Medical Student Education (OMSE).

Phase 2 and Clerkship

Residents and interns are available to tutor students one-on-one to develop clinical skills, including talking with patients, team communication, physical examination, and solidifying core clinical concepts in preparation for the NBME Subject Exams (Shelf). Interested students should contact their clerkship director or the Office of Medical Student Education (OMSE).

Learning Specialist

Professional learning specialists can meet with students privately to assess and improve upon individual learning styles. Specialists also conduct lunchtime learning sessions. Contact Sarah Fowler-Dixon, PhD, Education Consultant and Learning Specialist, by phone at 314-503-5169 or by email at sbahdixon@gmail.com.



Exam Preparation

Becker Medical Library Resources

Visit the Becker Medical Library website for free online exam preparation tools. For more information, contact the Becker Library at askbecker@wustl.edu or 314-362-7080. For subject-specific preparation in clinical neurology, medicine, obstetrics/gynecology, pediatrics, psychiatry and surgery, please visit the National Board of Medical Examiners (NBME) website.

USMLE Resources

UWorld access is provided to students as a resource to prepare for USMLE Step 1, Step 2, and subject exams. For questions about this resource, please contact the Office of Medical Student Education at omsecurriculum@wustl.edu.

Financial Information for the School of Medicine

This page presents financial information for the programs and degrees offered by the School of Medicine. Refer to the tabbed sections for specific financial information about individual programs.

Medical Students

Financial Assistance

The ability to finance a medical education at Washington University does not influence the student selection process. As all students accepted for admission have proven scholastic ability, financial assistance is offered to qualifying U.S. citizens and permanent residents solely on the basis of documented financial need that cannot be met by student and family resources. Students who consider themselves financially independent of their parents must arrange for loans to replace the amount of support parents are analyzed to have the potential to contribute. The School of Medicine's Office of Student Financial Planning will assist students with making these arrangements.

In responding to the Admissions Committee's offer of admission, an accepted student will be directed to the student financial aid portal, Net Partner, to indicate what type of aid they are applying. The Office of Student Financial Planning acknowledges the student's intent and provides instructions for completing the Free Application for Federal Student Aid (FAFSA). Everyone applying for financial aid must complete

a FAFSA and designate Washington University School of Medicine, School Code #G24620, as a recipient. Medical school financial aid application documents and detailed instructions are made available after January 1.

The financial aid application materials, including the CSS Profile, solicit information about the applicant and their parents, including a detailed description of resources and liabilities. If an applicant's parents are separated, divorced or never married, the financial information is required from both biological, custodial, or adoptive parents, excluding the income and assets of their spouses, if remarried. If the applicant is married, similar information is required of the spouse. The school expects the applicant to complete and submit the financial aid documents within two weeks from the date the applicant receives them. Official copies of both parents' individual U.S. income tax returns complete the data required for financial aid consideration.

While "permanent residents" of the United States are eligible for most federal financial aid programs, need-based financial aid from Washington University is only awarded if the applicant and both parents can provide official, audited documents with the same detailed information as provided on a U.S. income tax return. All information is held in strict confidence.

Financial aid is credited toward the payment of tuition and fees. If there is an excess of funds on a student's account after tuition and other charges, the Registrar's Office will issue a refund check. The loan portion of an aid offer will be funded through the resources of the School of Medicine or through the Federal Direct Loan program. Financial aid offers are made for a given academic year. Beginning with the 2019-20 academic year, any need-based scholarship offered will roll forward in future years towards the four total years when tuition is charged. Students may reapply for federal loans in succeeding years if they remain in good academic and personal standing.

The committee holds that students receiving assistance have an obligation to notify the committee in writing if their financial situation changes, for example, through employment or the receipt of a scholarship not anticipated at the time the application was submitted.

First- and second-year students are urged not to accept employment during the academic year. A number of fourth-year students find employment in hospitals within the Medical Center. The personnel office may provide assistance to students' spouses seeking employment.

Tuition Stabilization Policy for Medical Students

Background

LCME standard 3.2 indicates that the medical program should offer sufficient opportunities, encouragement, and support for medical student participation in research and other scholarly activities. The proposed policy aligns with standard 3.2 and a student-centered learning environment. The School of Medicine encourages student research and participation in additional study outside of the traditional medical curriculum.

Policies

As of July 1, 2020, all matriculating students will benefit from a tuition stabilization plan, which provides that the tuition rate at matriculation will remain constant for up to 10 consecutive years. The stabilized rate will expire ten academic years after matriculation. Therefore, students whose medical education is interrupted for any reason for more than six years will be charged at the rate of the class they rejoin. Appeals of this policy should be submitted in writing to the Medical School Registrar prior to the 10-year limit and any required increase in tuition. Appeals will be considered on a case-by-case basis, with the ultimate decision resting with the Registrar/Assistant Dean for Academic Affairs.

The Washington University School of Medicine Tuition Stabilization Policy for Medical Students was last approved by the Academic Affairs Committee on April 9, 2020. All substantive edits to this policy require approval by the Academic Affairs Committee.

Standards for Satisfactory Academic Progress for Financial Aid Eligibility

When a student is enrolled in the curriculum of the MD program, the following policy applies regarding standards for Satisfactory Academic Progress (SAP). Federal regulations require that students receiving Title IV financial aid maintain SAP.

The minimum GPA requirements needed to maintain eligibility for Satisfactory Academic Progress are dictated by the specific program of study. In each case, per the requirements of 34 C.F.R. 668.34(a)(4)(ii), the federal student aid program requires a minimum of a C average to maintain eligibility for aid, but an individual degree or certificate program may have a higher minimum GPA for federal Satisfactory Academic Progress.

This policy presents the standards adopted by the Washington University School of Medicine and applies to all MD students.

SAP is evaluated annually, at the end of each academic year. If a student is not maintaining progress, they will be notified by the Committee for Academic and Promotion (CAP) and the Office of Student Financial Planning via their WUSM email, and they will be ineligible, or "suspended," for federal aid for future terms unless they appeal their status and it is approved by CAP and the director of financial aid. An appeal must contain the extenuating circumstances surrounding the failure to meet SAP, such as illness, injury, or other circumstances beyond the student's control.

In order to be compliant in maintaining SAP and thus eligible for federal financial aid, students must be satisfactorily progressing toward their academic objectives. Federal regulations require the following measurements for determining SAP: time frame and quantitative/qualitative requirements.

Time Frame Requirement

The maximum time frame of full-time enrollment for the completion of each program is as follows:

- Four-year MD program: 6 years
- Five-year MD program: 7.5 years

Periods of non-enrollment are *not* counted in the measurement of satisfactory academic progress; however, all periods of attendance, regardless of whether or not the student received Title IV aid, are counted.

This policy is applied in the context of each individual student's enrollment status in order to accommodate the student who does not enroll on a full-time basis. For example, if a student enrolls in a four-year program, the full-time student would meet the 150% maximum rule (as per Title IV guidelines) after six years of full-time enrollment, and the half-time student is expected to complete the program within 12 years. If a student vacillates between full-time and half-time enrollment, that student would have a maximum time frame of between six and 12 years, and the maximum time frame for that student would be continuously adjusted.

If a student reaches a point where they cannot complete their program within the 150% maximum, that student becomes ineligible for federal aid for all future semesters.

Quantitative/Qualitative Requirement

Academic requirements for the MD degree include the satisfactory completion of the curriculum designated by the faculty. The progress of each student working toward an MD degree is monitored carefully by the Committee for Academic Promotion (CAP). Refer to the Assessing Academic Achievement section of this *Bulletin* for more information.

A student failing to meet the standards of satisfactory progress as determined by CAP shall be placed on financial aid suspension. The student will be eligible for aid when they achieve SAP, or the student may appeal. Students who choose to appeal must state the reasons for failing to meet SAP (e.g., injury/illness of the student, death in



the family or other special circumstance) and what has changed in the student's situation so that they can now make SAP. If the student successfully appeals, the student will be placed on financial aid probation and may receive financial assistance for one term. At the conclusion of this period, the student must have achieved compliance with each standard or be progressing per their individual academic plan to receive additional aid. A student who does not achieve compliance with each standard by the conclusion of the probationary period is suspended from financial aid eligibility.

The Office of Student Financial Aid must notify a student of implementation of probationary status and/or suspension.

The Director of Student Financial Aid shall have primary responsibility for enforcement of this policy. The Office of Student Financial Planning shall ascertain at the time of each disbursement of funds and prior to certification of a financial aid application that the student is in compliance with the policy.

Cost of Education

For the first-year class matriculant, tuition and estimated expenses for the 2025-26 academic year are listed below. Students will benefit from a tuition stabilization plan, which provides that their annual tuition of \$67,968 will be constant for up to 10 consecutive years. The stabilized rate will expire 10 academic years after matriculation. The items listed below provide an estimate of the expenses for a single student in the 42-week first-year class. The total of these figures suggests a basic minimum budget of approximately \$100,069. Allowances for entertainment, travel, clothing, and other miscellaneous items must be added to this estimate.

- **Tuition and fees:** \$69,468
- **Student Health:** \$5,225
- **Books and supplies:** \$500
- **Medical instruments:** \$250
- **Housing and food:** \$18,756
- **Miscellaneous:** \$3,192
- **Travel and personal:** \$2,678

Policy for International Students

The admission decision at Washington University School of Medicine is based on academic and personal merit and not on the ability of the student to pay the costs of education. However, individuals who are not citizens of the United States of America or who do not hold U.S. Permanent Resident Visa status, including DACA students, are not eligible for financial aid due to regulations covering many programs used by the school to fund financial assistance. Therefore, in order for the school to complete the required documents which are necessary for issuance of a visa, the student must document, by a date and in a manner designated by the school, that the necessary amount of funds, as established by the school, is available to pay the costs of

education (tuition and living expenses) for the anticipated period of enrollment, normally four years. Documentation of the required amount of financial resources may be by a letter of credit or by deposit of funds in an escrow account with a bank designated by the school.

Registration, Payments, and Withdrawal and Refunds Policy

The university billing system provides a central financial account against which most student expenses incurred at the university will be posted, including but not limited to tuition, housing charges, parking and library fines. This policy, when referring to tuition and other charges, includes any and all charges posted to this account.

Students are responsible for paying all tuition, fees, and other associated charges assessed as a result of their registration and/or receipt of services such as housing, dining, and other university-provided items that exceed financial support provided by the university, university payment plan, or other third party by the scheduled due dates shown on their Workday Student account.

If a student fails to pay their student account balance by the scheduled due date, the university will place a financial hold on their account, preventing them from registering for future classes. Failure to pay will result in a Delinquent Student Receivable Account. This delinquent account may be passed to Collection Services within three months of the student's separation from the university.

Federal financial aid funds for the next academic year cannot be disbursed until all prior year balances are paid in full.

Students who rely on financial aid funds to meet their obligations should submit their applications for processing according to application deadlines published by the Office of Student Financial Planning. Deadlines allow for receipt of financial aid funds by payment due dates if applications are filed by the deadline. The Office of Student Financial Planning will assist students with loan applications and financial planning upon request.

A student who withdraws or takes a leave of absence from the school will receive a pro rata refund of tuition and appropriate fees. The refund will be based on the ratio of the class days enrolled (from the first day of classes to the termination date) to the total number of class days in the term for which tuition and fees were paid. It is understood that the date on which a student formally notifies the Registrar's Office in writing of the decision to withdraw or take a leave of absence from the School of Medicine shall be regarded as the termination date, with no retroactive clause to be accepted. A prospective date will be accepted, however. If tuition and fees were paid entirely or in part by financial aid from the school, the refund will be applied first to the total repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the costs of tuition and fees must be refunded

by the student to the school on the same pro rata basis as calculated for the tuition refund outlined above, per "Return of Title IV" federal guidelines. Any questions about these policies may be directed to either the Office of the Registrar or Student Financial Planning.

Merit-Based Scholarships

In 1978, the School of Medicine established a scholarship program that based selection on merit rather than financial need. As one of the first merit scholarship programs for medical students, the Distinguished Student Scholarship Program has recognized and rewarded academic excellence and personal achievement for 33 years. And, to honor outstanding alumni of Washington University, the Medical Center Alumni Association created in 1989 the Distinguished Alumni Scholarship Program. In 1998, the Barnes-Jewish Hospital Medical Staff Association committed to funding one full-tuition, four-year scholarship to a student in each entering class. Beginning with the 2002-03 academic year, one additional "named" scholarship was made available through the generosity of a donor.

Most merit-based scholarships are awarded to students in the first-year class and are subject to annual renewal. Recipients of these scholarships are expected to maintain academic excellence. If a scholarship is not renewed, the student may file for financial aid from the school. For scholarship recipients who document financial need above the full-tuition scholarship, additional funds are available to provide support up to the total cost of education. Scholarship that exceeds tuition may be considered taxable and the student would be responsible for filing and paying taxes on any taxable scholarship. Scholarship recipients may not concurrently participate in the school's Medical Scientist Training Program, the Armed Forces Health Professions Scholarship Program, or the National Health Service Corps Scholarship Program.

Now known collectively as the Distinguished Scholars Program, its aim is to attract and enroll the most outstanding students in the School of Medicine, thus enriching the scholarly environment and broadening the scope of learning for all students. Scholarship recipients are selected on intelligence, character, personal accomplishments and goals, motivation for medicine, aptitude for science, leadership potential, communication skills and diversity of life experience. Scholarships awarded under this program include the Barnes-Jewish Hospital Scholars, Danforth Scholars in Medicine, Distinguished Alumni Scholars (DAS), and Distinguished Student Scholars (DSS).

Barnes-Jewish Hospital Medical Staff Association Scholarship

One full-tuition, four-year scholarship will be awarded to a student in each entering class beginning in 1999. Selection of the Barnes-Jewish Hospital Medical Staff Association Scholar is the same as for the Distinguished Student Scholarship.

Danforth Scholars in Medicine

Named in honor of William H. and Elizabeth Gray Danforth, the chancellor and first lady of the university from 1971 to 1995, the Danforth Scholars Program is a tribute to their legacy of exemplary leadership and service.

Distinguished Alumni Scholarships

Since 1989, up to four full-tuition scholarships have been awarded annually to members of the entering first-year class. The application procedure and selection process are the same as for the Distinguished Student Scholarships.

Distinguished Student Scholarships are awarded annually (up to full tuition for four years) to selected members of the entering first-year class based on meritorious academic and personal accomplishments. Final selection of scholarship recipients is made by a committee of the faculty based on demonstrated superior intellectual achievement as well as an assessment of the applicant's character, attitude, motivation and maturity.

Health Professions

The following policy applies to students pursuing graduate/professional training in Applied Health Behavior Research (p. 468), Audiology and Communication Sciences (p. 468), Biology and Biomedical Sciences (p. 468), Biomedical Engineering (p. 468), Biostatistics (p. 468), Clinical Investigation (p. 468), Medical Physics, Occupational Therapy (p. 468), Physical Therapy (p. 468), Population Health Sciences (p. 468), Public Health (p. 468), and Reproductive Sciences (p. 469).

General Information

Registration, Payments, and Withdrawal & Refunds Policy

The university billing system provides a central financial account against which most student expenses incurred at the university will be posted, including but not limited to tuition, housing charges, parking and library fines. This policy, when referring to tuition and other charges, includes any and all charges posted to this account.

All payments of tuition and other university charges are due and payable on the dates specified in the published calendars of the programs in the School of Medicine. Failure of a student to register when required and pay tuition and other charges incurred on or before the date specified in the published calendar, may result in a late fee of \$50 to be added to the amount due. The late fee may be imposed



seven days after the due date if full payment has not been received. Tuition and other charges are usually payable twice a year, at the start of the academic year, and again at the middle of the academic year, as listed on the schedule on the academic calendar.

In addition to the \$50 late fee, any payment due from the student and not paid by the specified date will accrue interest at the current market rate in effect on the first business day of the month in which the payment is due. This fee will be imposed on any accounts not paid in full within 30 days of the due date. Any amount not paid when due (plus accrued interest thereon) must be paid in full within three months of the due date to avoid potential suspension from classes, unless a deferred payment is approved by the registrar due to extenuating circumstances.

If a student fails to make payments within three months of the original due date, the school will not release the student's academic record, grade reports or transcript, pending settlement of the unpaid account. A student who has not satisfied all of their delinquent financial obligations to Washington University (e.g., tuition, university housing, parking) one month before the end of the academic year will not be allowed to progress to the next academic year, nor can they be issued a diploma.

Federal financial aid funds for the next academic year cannot be disbursed until all prior year balances are paid in full.

Students who rely on financial aid funds to meet their obligations should submit their applications for processing according to application deadlines published by the Office of Student Financial Planning. Deadlines allow for receipt of financial aid funds by payment due dates if applications are filed by the deadline. The Office of Student Financial Planning will assist students with loan applications and financial planning upon request.

A student who withdraws or takes a leave of absence from the school will receive a pro rata refund of tuition and appropriate fees. The refund will be based on the ratio of the class days enrolled (from the first day of classes to the termination date) to the total number of class days in the term for which tuition and fees were paid. It is understood that the date on which a student formally notifies the Registrar's Office in writing of the decision to withdraw or take a leave of absence from the School of Medicine shall be regarded as the termination date, with no retroactive clause to be accepted. A prospective date will be accepted, however. If tuition and fees were paid entirely or in part by financial aid from the school, the refund will be applied first to the total repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the costs of tuition and fees must be refunded by the student to the school on the same pro rata basis as calculated for the tuition refund outlined above, per "Return of Title IV" federal guidelines. Any questions about these policies may be directed to either the Office of the Registrar or Student Financial Planning.

Standards for Satisfactory Academic Progress for Financial Aid Eligibility

All Non-MD Students: The minimum GPA requirements needed to maintain eligibility for Satisfactory Academic Progress (SAP) are dictated by the specific program of study. In each case, per the requirements of 34 C.F.R. 668.34(a)(4)(ii), the federal student aid program requires a minimum of a C average to maintain eligibility for aid, but an individual degree or certificate program may have a higher minimum GPA for federal Satisfactory Academic Progress. If a student's grades fall below the required GPA for the program when the SAP review is performed, the student is not considered to be maintaining SAP. Students enrolled in various School of Medicine degree programs should refer to the specific policies of their primary program: Applied Health Behavior Research, Audiology and Communication Sciences, Biology and Biomedical Sciences (p. 468), Biomedical Engineering (p. 468), Biostatistics, Clinical Investigation, Medical Physics, Genetic Epidemiology, Occupational Therapy, Physical Therapy, Population Health Sciences, and Reproductive Sciences.

SAP is evaluated annually at the end of the academic year. To be considered to be maintaining SAP and thus be eligible for federal financial aid, a student must maintain the program's minimum program requirements for cumulative GPA and pace (i.e., credit earned for at least 67% of the credits attempted). The degree must also be completed within the maximum time frame allowed for the program (i.e., no more than 150% of the credits required). For example, if the program requires 120 credits to complete, the student must be able to complete the program by attempting no more than 180 credits. To determine how many credits are required to complete the program, the student should consult the school's *Bulletin*. If the student cannot complete the program without attempting more than 150% of the credits required, the student is not considered to be maintaining SAP.

Students who fail to meet SAP requirements at the end of the academic year in spring will be placed on a financial aid "suspension."

Students on a suspension will not be eligible to receive aid for the following semester or term and will be notified of their loss of aid eligibility by the Office of Student Financial Planning via their Washington University email address. A student who becomes ineligible for aid by failure to meet SAP requirements may appeal to reestablish aid eligibility. The student's appeal will be reviewed by the school's dean's office and the Office of Student Financial Planning. An appeal must contain the extenuating circumstances surrounding the failure to meet SAP, such as illness, injury, or other circumstances beyond the student's control.

Program Information

Applied Health Behavior

The Applied Health Behavior programs follow the standard tuition rate for graduate programs offered through the School of Medicine, which increases incrementally each year. Additional information may be obtained by contacting the Applied Health Behavior program manager (ahbr@email.wustl.edu).

Audiology and Communication Sciences

For more information about the Audiology and Communication Sciences program, including tuition and fees, please visit the Audiology and Communication Sciences website.

Biological and Biomedical Sciences

Students admitted to the Roy and Diana Vagelos Division of Biology & Biomedical Sciences (DBBS) graduate programs are guaranteed full stipend and tuition support contingent upon satisfactory performance. The stipend for the 2026-27 academic year is \$41,000. In addition, health coverage and disability insurance are also provided. Please visit the DBBS website for additional information.

Biomedical Engineering

For more information about the Biomedical Engineering program, including tuition and fees, please visit the McKelvey School of Engineering *Bulletin*.

Biostatistics

For tuition information, please visit our Biostatistics website, contact the program manager at 314-362-1384, send an email to biostat-msibs@email.wustl.edu, or write to the following address:

MSIBS Program
Division of Biostatistics
CB 8067
660 S. Euclid Ave.
St. Louis, MO 63110-1093
Fax: 314-362-2693

Clinical Investigation

MSCI programs follow the standard tuition rate for graduate programs offered through the School of Medicine, which increases incrementally each year. MSCI courses are eligible for the Washington University Human Resources Tuition Assistance Program for qualifying staff and faculty. Visit the Clinical Research Training Center website for additional tuition information.

Doctor of Philosophy

For more information about the Doctor of Philosophy program, including tuition and fees, please visit the website of the Office of Graduate Studies, Arts & Sciences.

Genetic Epidemiology

For tuition information, please visit the Division of Biostatistics website, contact the program manager at 314-362-1384, send an email to biostat-msibs@email.wustl.edu, or write to the following address:

MSIBS Program
Division of Biostatistics
CB 8067
660 S. Euclid Ave.
St. Louis, MO 63110-1093
Fax: 314-362-2693

Occupational Therapy

The total cost of tuition for the incoming MSOT class in fall 2026 is \$110,000. This breaks down to \$18,333 × five semesters and \$9,168 × two fieldwork experiences.

The total cost of tuition for the incoming OTD class in fall 2026 is \$145,750. This breaks down to \$18,333 × six semesters, \$9,168 × two fieldwork experiences, and \$17,416 for one doctoral capstone.

Part-time tuition is \$1,375 per credit unit.

Physical Therapy

- Professional DPT Curriculum: The total cost of tuition and clinical fees is \$144,669. This breaks down to \$25,043 × five semesters plus \$19,454 (for four clinical experiences). There is an additional \$5,330 fee each year for Student Health Insurance. The Student Health Fee may increase each year.
- PhD in Movement Science Curriculum: \$33,425/semester (\$66,850/year)

Population Health Sciences

For more information about the Population Health Sciences program, including tuition and fees, please visit the Population Health Sciences website.

Public Health

For more information about the Public Health program — including tuition, fees, and financial aid — please visit the website of the Office of Graduate Studies, Arts & Sciences.



Reproductive Sciences

For more information about the Reproductive Sciences program, please visit the Master of Science in Reproductive Sciences website.

Dual Programs

The following policy applies to students pursuing graduate/professional training in the following dual degree programs: MD/PhD (p. 469), MD/MSCI (p. 469), MD/MPHS (p. 470) and MD/MPH (p. 470).

General Information

Registration, Payments, and Withdrawal & Refunds Policy

The university billing system provides a central financial account against which most student expenses incurred at the university will be posted, including but not limited to tuition, housing charges, parking and library fines. This policy, when referring to tuition and other charges, includes any and all charges posted to this account.

All payments of tuition and other university charges are due and payable on the dates specified in the published calendars of the programs in the School of Medicine. Failure of a student to register when required, and pay tuition and other charges incurred on or before the date specified in the published calendar, may result in a late fee of \$50 to be added to the amount due. The late fee may be imposed seven days after the due date if full payment has not been received. Tuition and other charges are usually payable twice a year, at the start of the academic year, and again at the middle of the academic year, as listed on the schedule on the academic calendar.

In addition to the \$50 late fee, any payment due from the student and not paid by the specified date will accrue interest at the current market rate in effect on the first business day of the month in which the payment is due. This fee may be imposed on any accounts not paid in full within 30 days of the due date. Any amount not paid when due (plus accrued interest thereon) must be paid in full within three months of the due date to avoid potential suspension from classes, unless a deferred payment is approved by the registrar due to extenuating circumstances.

If a student fails to make payments within three months of the original due date, the school will not release the student's academic record, grade reports or transcript, pending settlement of the unpaid account. A student who has not satisfied all of their delinquent financial obligations to Washington University (e.g., tuition, university housing, parking) one month before the end of the academic year will not be allowed to progress to the next academic year, nor can they be issued a diploma.

Federal financial aid funds for the next academic year cannot be disbursed until all prior year balances are paid in full.

Students who rely on financial aid funds to meet their obligations should submit their applications for processing according to application deadlines published by the Office of Financial Aid. Deadlines allow for receipt of financial aid funds by payment due dates if applications are filed by the deadline. The Office of Student Financial Aid will assist students with loan applications and financial planning upon request.

A student who withdraws or takes a leave of absence from the school will receive a pro rata refund of tuition and appropriate fees. The refund will be based on the ratio of the class days enrolled (from the first day of classes to the termination date) to the total number of class days in the term for which tuition and fees were paid. It is understood that the date on which a student formally notifies the Registrar's Office in writing of the decision to withdraw or take a leave of absence from the School of Medicine shall be regarded as the termination date, with no retroactive clause to be accepted. A prospective date will be accepted, however. If tuition and fees were paid entirely or in part by financial aid from the school, the refund will be applied first to the total repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the costs of tuition and fees must be refunded by the student to the school on the same pro rata basis as calculated for the tuition refund outlined above, per "Return of Title IV" federal guidelines. Any questions about these policies may be directed to either the Office of the Registrar or Financial Aid.

Program Information

Doctor of Medicine and Doctor of Philosophy: MD/PhD (MSTP)

All MSTP students receive financial support in the form of a stipend (currently \$41,000 per year), health coverage, disability and life insurance, subsidization of qualifying daycare expenses, and full tuition remission for both the MD and PhD phases of their training. Individuals who are awarded an NIH National Research Service Award individual fellowship receive an additional \$5,000 per year for the duration of the award. Please visit the MSTP website for more information.

Doctor of Medicine and Master of Science in Clinical Investigation: MD/MSCI

MSCI programs follow the standard tuition rate for graduate programs offered through the School of Medicine, which increases incrementally each year. MSCI courses are eligible for the Washington University Human Resources Tuition Assistance Program for qualifying staff and faculty. Visit the Clinical Research Training Center website for additional tuition information.

For information about tuition for the Medicine program, please visit the Medical Students section (p. 463) of this page.



Doctor of Medicine and Master of Population Health Sciences: MD/MPHS

For more information about the Population Health Sciences program, including tuition and fees, please visit the Master of Population Health Sciences website.

For information about tuition for the Medicine program, please visit the Medical Students section (p. 463) of this page.

Doctor of Medicine and Master of Public Health: MD/MPH

For more information about the MD/MPH program, including tuition and fees, please visit the Brown School *Bulletin*.

For information about tuition for the Medicine program, please visit the Medical Students section (p. 463) of this page.

Postdoctoral Training

Postdoctoral appointments at WashU are full-time academic positions focused on mentored research and professional development under the guidance of faculty mentors. They are supported through research grants, individual fellowships, or institutional training programs. Their primary purpose is to help highly trained individuals acquire the professional skills needed for their chosen career path.

Because of this focus, postdoctoral appointments are inherently time-limited; they are capped at five years including any experience at other institutions following the doctoral degree. All postdoctoral appointees are eligible for university-sponsored benefits, and the postdoctoral experience is regulated by postdoc-specific policies and institutional normative.

WashU is proud to be an institutional member of the National Postdoctoral Association, which reflects our commitment to excellence in postdoctoral education.

Postdoc Categories

At WashU, there are two categories of postdocs:

1. *Postdoctoral Research Scholars* receive external funding in the form of a stipend and are considered non-employees.
2. *Postdoctoral Research Associates* receive a salary from the university and are considered employees.

Office of Postdoctoral Affairs

The Office of Postdoctoral Affairs (OPA), under the Office of the Vice Chancellor for Research, serves postdoctoral research associates and scholars across both the Danforth and Medical campuses. The OPA provides comprehensive resources to help postdocs achieve their career and professional development goals, advocates for postdoctoral issues, and offers guidance on recruitment and postdoctoral life. It also fosters a vibrant and inclusive postdoctoral community through networking, social events, and peer support.

The OPA postdoc curriculum includes signature programs in the following areas:

- *A career development series* to equip postdocs with essential skills for navigating diverse career pathways and achieving success in both academic and industry settings;
- *Leadership and communication training* to advance leadership capabilities while strengthening grant writing, publishing, and science communication skills;
- *Wellness and community engagement* that promotes holistic development, well-being, and meaningful integration into the WashU community;

- *Fellowships and awards* that recognize excellence and provide competitive opportunities for research and professional growth; and
- *An annual postdoc symposium and research seminars* that showcase innovative research and foster interdisciplinary collaboration across campuses.

Postdoc Organizations

The OPA supports recognized postdoc-led groups, including three major organizations:

1. WashU Postdoc Society (WUPS)
2. WashU Black Postdoctoral Association
3. Postdoc Peer Mentoring Program

Additional Information

For more information about programs, resources, and upcoming events, visit the OPA website.

Cross-School Interdisciplinary PhD Programs

There are certain graduate programs that span more than one school at Washington University. Please visit the following pages to learn more about these programs:

- Division of Biology & Biomedical Sciences (p. 472)
- Division of Computational & Data Sciences (p. 485)
- Institute of Materials Science & Engineering (p. 488)

Division of Biology & Biomedical Sciences

The Roy and Diana Vagelos Division of Biology & Biomedical Sciences at Washington University offers exceptional doctoral education at one of the nation's preeminent biomedical research centers. The Division includes 11 doctoral programs:

- Biochemistry, Biophysics, & Structural Biology
- Biomedical Informatics & Data Science
- Cancer Biology
- Computational & Systems Biology
- Developmental, Regenerative, & Stem Cell Biology
- Immunology
- Molecular Cell Biology
- Molecular Genetics & Genomics
- Molecular Microbiology & Microbial Pathogenesis
- Neurosciences
- Plant & Microbial Biosciences

A collaborative, interdisciplinary approach to research and education is a hallmark of Washington University and the Division. As a university-wide consortium, the Division transcends departmental lines and removes traditional boundaries of scientific fields. Faculty and graduate students regularly cross disciplines, devising novel questions and approaches that might otherwise go unexplored. The Division consists of over 700 PhD and MD/PhD students, with more than 700 faculty members from 39 departments.

Washington University in St. Louis provides unique opportunities for translating basic science into practical application. In addition, the Division's associations with internationally prominent local institutions provide exciting opportunities. Students in the biomedical sciences enrich their work with the clinical perspective of our outstanding

medical school; students also benefit from our close affiliation with the internationally renowned Missouri Botanical Garden, as well as the Saint Louis Zoo, the Tyson Research Center, the National Great Rivers Research & Education Center, and the Donald Danforth Plant Science Center.

To help prepare graduates for careers in academia, government, industry or another field of their choice, educational opportunities are offered for skill development and career exploration. The Division offers a career-planning curriculum where students can pursue noncredit elective credentials to build transferable professional skills in four areas that apply to a wide variety of scientific careers: leadership, entrepreneurship, science communication, and teaching. Through the Next Generation of Science Scholars, students are provided networking and community-building events, professional development seminars, and scientific community outreach opportunities. Professionals from a variety of fields (e.g., biotech startups, patent law) provide presentations and Q&A sessions to students throughout the year. In addition, the DBBS holds partnerships with groups such as the Center for Teaching and Learning, the Center for Career Engagement, and student organizations such as ProSPER, InPrint, the BALSAs Group, and the Young Scientist Program. Students have multiple opportunities to develop experiences relevant to their future career goals.

DBBS students can reference the DBBS Student Handbook for student guidelines across all Division programs.

Email: DBBS-Info@email.wustl.edu

Website: <http://dbbs.wustl.edu>

Faculty

Associate Dean for Graduate Education

Steven Mennerick

John P. Feighner Professor of Neuropsychopharmacology, Professor of Psychiatry, Associate Dean for Biology and Biomedical Sciences, Professor of Neuroscience
PhD, Washington University in St. Louis

Associate Directors

Eric Herzog

Professor of Biology, Professor of Neuroscience, Viktor Hamburger Distinguished Professor
PhD, Syracuse University

Heather True

Professor of Cell Biology and Physiology, David English Smith Professorship in Medicine
PhD, University of Illinois-Urbana-Champaign

Faculty Program Directors: Biochemistry, Biophysics, & Structural Biology

Thomas Brett

Associate Professor of Medicine, Associate Professor of Biochemistry and Molecular Biophysics, Associate Professor of Cell Biology and Physiology

PhD, University of Nebraska – Lincoln

Eric Galburt

Associate Professor of Biochemistry and Molecular Biophysics
PhD, University of Washington

Faculty Program Directors: Biomedical Informatics & Data Science

Philip Payne

Professor of Medicine, Director, Institute for Informatics, Professor, Professor of Computer Science and Engineering, Associate Dean for Health Information and Data Science for the School of Medicine, Chief Scientist for the School of Medicine, Janet and Bernard Becker Professor of Medicine

PhD, Columbia University

Po-Yin Yen

Associate Professor of Medicine, Division of General Medicine & Geriatrics, Associate Professor, Goldfarb School of Nursing, Barnes Jewish College

PhD, Columbia University

Faculty Program Directors: Cancer Biology

Grant Challen

Professor, Division of Oncology, Department of Medicine
PhD, University of Queensland, Brisbane, Australia

Jason Weber

Professor, Departments of Medicine, Cell Biology & Physiology, and Biology

PhD, Saint Louis University

Faculty Program Directors: Computational & Systems Biology

Gautam Dantas

Professor of Pathology and Immunology, Co-Division Chief - Division of Laboratory and Genomic Medicine, Professor of Biomedical Engineering, Professor of Molecular Microbiology, Professor of Pediatrics, Conan Professorship in Laboratory and Genomic Medicine
PhD, University of Washington – Seattle

Nancy Saccone

Associate Professor of Genetics
PhD, Brown University

Faculty Program Directors: Developmental, Regenerative, & Stem Cell Biology

Mayssa Mokalled

Associate Professor of Developmental Biology
PhD, UT Southwestern Medical Center at Dallas

Andrew Yoo

Phil and Sima Needleman Distinguished Professor of Developmental Biology

PhD, Columbia University

Faculty Program Director: Immunology

Eynav Klechevsky

Associate Professor of Pathology and Immunology
PhD, Israel Institute of Technology, Haifa, Israel and The Baylor Institute for Immunology Research

Faculty Program Directors: Molecular Cell Biology

Ben Major

Alan A. and Edith L. Wolff Professorship in Cell Biology and Physiology, Professor of Cell Biology and Physiology, Professor of Otolaryngology
PhD, University of Utah

Maria Remedi

Professor of Medicine and Cell Biology & Physiology
PhD, National University of Cordoba, Argentina

Faculty Program Directors: Molecular Genetics & Genomics

John Edwards

Associate Professor of Medicine
PhD, Columbia University

Jim Skeath

Professor of Genetics, Assistant Dean Academic Pathway Programs
PhD, University of Wisconsin – Madison

Faculty Program Directors: Molecular Microbiology & Microbial Pathogenesis

Megan Baldrige

Associate Professor of Medicine, Associate Professor of Molecular
Microbiology
MD/PhD, Baylor College of Medicine

Andrew Kau

Associate Professor, Division of Allergy and Immunology, Associate
Division Chief - Research
MD/PhD, Washington University in St. Louis

Faculty Program Directors: Neurosciences

Martha Bagnall

Associate Professor of Neuroscience
PhD, University of California – San Diego

Alexxai Kravitz

Associate Professor of Psychiatry, Interim Division Director for
Basic Neuroscience, Associate Professor of Neuroscience, Associate
Professor of Anesthesiology
PhD, University of Pennsylvania

Faculty Program Directors: Plant & Microbial Biosciences

Barbara Kunkel

Professor of Biology, Associate Chair of Undergraduate Education
PhD, Harvard University

Xuehua Zhong

Professor of Biology, Dean's Distinguish Professorial Scholar
PhD, The Ohio State University

DBBS mentors and educators are key to our training mission. Those who serve as primary mentors are DBBS Program Members, and others who participate in the educational mission are General Members.

Visit the DBBS website to learn about DBBS Faculty Membership or to search DBBS Faculty by last name, program, or expertise.

Degree Requirements

- Biochemistry, Biophysics, & Structural Biology, PhD (p. 117)
- Biomedical Informatics & Data Science, PhD (p. 120)
- Cancer Biology, PhD (p. 123)
- Computational & Systems Biology, PhD (p. 126)
- Developmental, Regenerative, & Stem Cell Biology, PhD (p. 129)
- Immunology, PhD (p. 132)
- Molecular Cell Biology, PhD (p. 135)
- Molecular Genetics & Genomics, PhD (p. 138)
- Molecular Microbiology & Microbial Pathogenesis, PhD (p. 141)
- Neurosciences, PhD (p. 144)
- Plant & Microbial Biosciences, PhD (p. 147)

Courses

For questions about course listings, please email
dbbscurriculum@wustl.edu.

BBS 5011 Ethics & Research Science

This course prepares DBBS graduate students to analyze and address ethical and professional issues across the range of their professional roles and responsibilities. The primary goals are for students to recognize complex situational dynamics and ethical issues and to develop professional and ethical problem-solving skills. The course examines ethical challenges related to research design and data collection, management, ownership, security, sharing, analysis, interpretation, and reporting while providing practical guidance on these issues. The course also examines the fundamentals of the broader research environment, including principles of ethics in genetics and human and animal subjects research, regulatory issues in biological and biomedical research, publication and authorship, and collaboration in science.

Credit 1 unit.

Typical periods offered: Spring Half B, Spring Half A, Spring, Spring Intersession, Summer

BBS 5014 Biotech Industry Innovators

Late one Friday afternoon in April 1976, the late venture capitalist Robert Swanson met with biochemist Herb Boyer, PhD, at his UCSF lab. Swanson had requested 10 minutes of Boyer's time; when the meeting ended, three hours later, the foundations had been laid for the formation of Genentech, the first biotechnology company, and the beginnings of the biotechnology industry. This course, The Basics of Bio-Entrepreneurship, investigates issues and choices that inventor/scientists encounter when considering the applications and commercialization of early stage scientific discoveries. This course is intended for anyone interested in working in the medical device, life-, bio-, or pharma-sciences industries as a founder, scientist, entrepreneur, manager, consultant, or investor. It focuses on the decision processes and issues that researchers and their business partners face when considering how a discovery might best be moved from academia to successful commercialization.

Credit 3 units.

Typical periods offered: Fall, Spring

BBS 5053 Immunobiology I

Immunobiology I is taught by the faculty members of the Immunology Program. This course covers in depth modern immunology and are based on Janeway's Immunobiology 10th Edition textbook. The topics include: basic concepts in immunology, innate immunity: the first lines of defense, the induce responses of innate immunity, antigen recognition by B-cell and T-cell receptors, the generation of lymphocyte antigen receptors, antigen presentation to T lymphocytes and signaling through immune system receptors.

Credit 4 units.

Typical periods offered: Fall

BBS 5054 Immunobiology II

Immunobiology II is taught by the faculty members of the Immunology Program. This course covers in depth modern immunology and are based on Janeway's Immunobiology 10th Edition textbook. The topics include: the development and survival of lymphocytes, T cell-mediated immunity, the humoral immune response, dynamics of adaptive immunity, the mucosal immune system, failures of host defense mechanisms, allergy and allergic diseases, autoimmunity and transplantation, and manipulation of the immune response.

Credit 4 units.

Typical periods offered: Spring

BBS 5068 Fundamentals of Molecular Cell Biology

This is a core course for incoming graduate students in Cell and Molecular Biology programs to learn about research and experimental strategies used to dissect molecular mechanisms that underlie cell structure and function, including techniques of protein biochemistry. Enrolling students should have backgrounds in cell biology and biochemistry. The format is two lectures and one small group discussion section per week. Discussion section focuses on original research articles.

Credit 4 units.

Typical periods offered: Fall

BBS 5075 Introduction to Coding and Statistical Thinking for Genetics and Genomics

This course is designed for first-year DBBS students who have had little to no prior experience in programming or statistics. The course will cover common statistical practices and concepts in the life sciences, such as error bars, summary statistics, probability and distributions,

and hypothesis testing. The class will also teach students basic programming skills for statistical computation, enabling them to retrieve and analyze small and large data sets from online databases and other sources.

Credit 2 units.

Typical periods offered: Fall

BBS 5084 Single Molecule Biophysics Journal Club

Molecular motors in the cell harness chemical energy to generate mechanical work in a host of processes including cell motility, DNA replication and repair, cell division, transcriptional regulation, and intracellular transport. The purpose of this course is to discuss recent advances in the field of molecular motors. Special emphasis will be placed on understanding and critically evaluating single molecule studies. The course will consist of both journal club presentations and small group discussions.

Credit 1 unit.

Typical periods offered: Spring

BBS 5098 Graduate Research Fundamentals

This course introduces first-year Ph.D. students to the foundational skills, knowledge, and habits of mind required of successful independent biological scientists: 1) Social dynamics in the scientific research enterprise 2) Epistemology and ethics of bio research methods 3) Development and communication of research questions and results 4) Interdisciplinary scientific thinking. Class sessions and homework introduce these topics; major assignments prompt student to connect them with the broader scope of graduate training in lab rotations, course work, and interdisciplinary scientific seminars. The interactive, student-driven class structure facilitates autodidactic development while integrating small group activities and peer mentoring from advanced DBBS students.

Credit 0.5 units.

Typical periods offered: Fall

BBS 5123 Experimental Hematopoiesis Journal Club

Journal club in which papers that describe significant advances in the field of experimental hematopoiesis are discussed. Students are expected to present one paper per semester and attend the weekly (1 hour) session.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5137 TriMED: Membrane Excitability and Disease

TriMED consists of seminars, work-in-progress talks and journal club presentations. It meets Monday lunchtime (1-2pm, with lunch provided) from Jan - end April and from Sept - end November (1 credit each semester). Any student signed up for credit has to attend regularly and make one half hour presentation (either of their own research, or of a paper). The attendees are a mix of students, post-docs and faculty, but the goal is for trainee experience. The course is designed to fulfil interest in membrane proteins or signaling, ion channels, electrophysiology, neurobiology or excitability more broadly.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5138 Journal Club for the Molecular Mechanism of Aging

Why do we age? What causes aging? How is our life span determined? This journal club will address such fundamental, but challenging questions of aging and longevity. Recent studies on aging and longevity are now unveiling regulatory mechanisms of the complex biological phenomenon. We'll cover the latest progress in this exciting field

and stimulate discussions on a variety of topics including aging-related diseases. One hour of paper presentation or research talk and discussion per every two weeks. Registered students are expected to have at least one presentation for 1 unit credit.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5146 Principles and Applications of Biological Imaging

Principles and Applications of Biological Imaging will introduce the interdisciplinary nature of the imaging sciences and conduct a comprehensive survey of the array of interrelated topics that define biological imaging. The course will cover the basics of the optical, magnetic resonance, CT, SPECT and PET imaging modalities, and microscopy, while focusing on applications of imaging to different disease states, such as oncology, neurology, cardiology and pulmonary diseases.

Credit 3 units.

Typical periods offered: Fall

BBS 5147 Contrast Agents for Biological Imaging

Contrast Agents in Biological Imaging will build the chemistry foundations for the design and use of contrast agents in imaging applications such as nuclear medicine, magnetic resonance imaging (MRI) and optical imaging. The course will include lectures on the design of radiopharmaceuticals for gamma scintigraphy and positron emission tomography, MRI contrast agents and agents for optical imaging, including bioluminescence and fluorescence microscopy. One year of general chemistry, one semester of organic chemistry required.

Credit 3 units.

Typical periods offered: Spring

BBS 5148 Metabolism Journal Club

The purpose of the Metabolism Journal Club is to introduce the graduate students to advanced topics spanning the biochemistry, cell biology and genetics of cellular and whole body metabolism. Under the guidance of the course directors, students will select recent topical articles for discussion in the weekly journal club. Students will be expected to provide a succinct introduction to the topic and lead discussion of the data presented in the journal article. Students will be evaluated on the basis of their presentation and their participation in the seminar throughout the semester.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5152 Rad Journal Club (Regeneration, Aging, and Development)

Focuses on developing a dialog around current topics in developmental and regenerative biology at the molecular, cellular and systems levels.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5191 Pathobiology of Human Disease States

Three human disease states will be discussed in detail. Topics will include background clinical and epidemiological information, followed by a detailed examination of the molecular and cellular events that underlie the disease state. Examples of pertinent topics include Alzheimer's disease, AIDS, leukemia, cystic fibrosis, sickle cell anemia, diabetes, etc.

Credit 2 units.

Typical periods offered: Fall

BBS 5192 Cancer Biology Journal Club

This journal club covers current papers in molecular oncology, cancer genetics and contemporary molecular biology. Presentations will be given by students, post-docs and faculty, then discussed.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5196 Special Emphasis Pathway in Cancer Biology

This course is designed to present pre- and postdoctoral trainees with an organized educational format to explore major contemporary topics in cancer biology. The elective will provide an integrated view of cancer research including basic science, translational science, and clinical investigation. Approximately 60 minutes will be devoted to a didactic presentation by a faculty member with interaction by the participants. The remaining 30 minutes will be used to discuss a pivotal research paper from this field, preselected by the faculty member. Outside reading (30-60 min/week) will be required.

Credit 2 units.

Typical periods offered: Spring

BBS 5201 Membrane Protein Biophysics Journal Club

Cells are encapsulated by lipid bilayers providing a physical barrier for the passage of charged molecules and ions in and out of the cell. The proteins that reside within this layer of oil are called membrane proteins, and they act as the molecular gatekeepers, controlling the passage of ions, nutrients, waste products and signaling elements, across cell membranes. This journal club focuses on examining key literature in the field that investigates how membrane proteins fold, adopt certain structures, and how they function inside of the strange environment of the lipid membrane. The papers will be selected from biophysical studies that combine new and notable research with key historical work, for a broad perspective of the science being conducted in this complex and emerging field. Special emphasis will be placed on emerging topics, such as regulation of protein function by lipid composition, membrane protein synthesis and folding, cutting-edge developments in membrane biophysics. The course will consist of both journal club presentations, as well as small group discussions in the form of chalk-talks.

Credit 1 unit.

Typical periods offered: Spring

BBS 5217 Special Topics in Microbial Pathogenesis

Primarily for graduate and MSTP students, this course involves oral presentation and discussion of current research articles on pathogenic microorganisms (bacteria, viruses, parasites, and fungi). Discussion will include design of specific aims for research proposals. Emphasis will be on literature that addresses the cellular and molecular basis of host-pathogen interactions. Students are expected to prepare all articles covered and to participate actively in each discussion. Class meets twice per week for 1.5 hours each.

Credit 2 units.

Typical periods offered: Spring

BBS 5224 Molecular, Cell and Organ Systems

This course will introduce Ph.D. and MSTP students to fundamental problems in cell and molecular biology at the systems level. The course is divided into 5 themes: 1) microbial systems; 2) organ development and repair; 3) cardiovascular system and disease; 4) tumor & host systems; and 5) metabolic systems and disease. Topics within each theme highlight current research concepts, questions, approaches and findings at the molecular, cellular and physiological levels. Students will write an original research grant proposal on a topic of their choosing in one of the 5 themes. Students will critique proposals anonymously in an NIH-like study section.

Credit 3 units.

Typical periods offered: Spring

BBS 5235 Genetics Journal Club

This journal club will be focused on the Genetics department seminar series. Students will present one or a few recent papers by the seminar speaker scheduled for that week. Students will provide a brief written evaluation (on a form that will be provided) of their peers' presentations, and the faculty advisors will meet with each student after the presentation to provide feedback.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5255 Experimental Skeletal Biology Journal Club

The journal club, which meets weekly, focuses on cellular and molecular biology of the skeleton. Emphasis is placed on gaining insights into normal skeletal homeostasis as well as systemic disorders of bone. Papers presented for review are selected from the most competitive journals. Participants are encouraged to think outside of the box and discuss novel molecular discoveries that may impact bone cell function.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5272 Advanced Topics in Immunology

This course uses a journal club format to discuss contemporary issues in the cell and molecular biology of the immune system. Discussions focus on the use of current approaches to analyze the cellular and molecular basis of immunity. Topics include mechanisms of antigenic specificity, diversity, cell communication, differentiation, activation, and effector activity.

Credit 2 units.

Typical periods offered: Fall

BBS 5282 Chromatin Structure and Gene Expression

This special topics course will use *Epigenetics* ed. by Allis, Jenuwein, Reinberg, and Caparros (2007, Cold Spring Harbor Laboratory Press) as the organizing text. Each week a faculty member will provide a background lecture on an important topic or model system, and a student will present and lead discussion of a paper from the current scientific literature related to the previous week's background lecture. Topics to be considered will include background on chromatin structure, histone modifications and histone variants; epigenetic regulation in yeast, other fungi, ciliates, flies, mammals and plants; dosage compensation in different systems; DNA methylation and imprinting in mammals; stem cells, nuclear transplantation and reprogramming; and the epigenetics of cancer and other human diseases (some variation in topics in different years). Students enrolled in the course will be required to present one paper and to come prepared to each session, with a question for discussion.

Credit 2 units.

Typical periods offered: Spring

BBS 5284 Current Research in Chromatin, Epigenetics and Nuclear Organization

This journal club considers papers from the current literature on chromatin structure and function, with an emphasis on regulation of transcription, epigenetics and genomics. Presentations are given by students, postdocs and faculty, with discussion by all. Students enrolled for credit are expected to attend regularly, and to present a minimum of one paper during the term, with consultation and critique from the faculty.

Credit 1 unit.

Typical periods offered: Spring

BBS 5285 Current Topics in Human and Mammalian Genetics

This course aims to provide both biologists and those with mathematical backgrounds with a basis in mammalian genetics. The course will include the following modules: Nucleic acid biochemistry; Gene and chromosome organization; Introduction to Human Genetics; Mutations and DNA repair; Cancer Genetics; Genomic methodologies; Biochemical genetics; Murine Genetics; Epigenetics; Neurodegenerative diseases; Mitochondrial disorders; Pharmacogenetics; Introduction to human population genetics; Applications of modern human genetics; Introduction to web-based informatics tools for molecular genetics. One of the required courses in the Quantitative Human Statistical Genetics graduate program.

Credit 3 units.

Typical periods offered: Fall

BBS 5288 Special Topics in Molecular Genetics

A special topics course with lectures and discussion on the molecular basis of cancer including cell cycle regulation, tumor suppressor genes, tumor invasion, angiogenesis, immune evasion, resistance to apoptosis, signaling, imaging, gene expression, chromosomal translocations, and viral oncology.

Credit 2 units.

Typical periods offered: Spring

BBS 5303 Protein NMR Journal Club

This journal club covers the recent literature on protein NMR with a focus on using NMR to study protein function, NMR dynamics, and novel methods that expand the range of systems accessible to solution NMR studies. Students, postdocs and faculty discuss a recent paper and present background information on the relevant technical aspects of NMR. Students receive 1 credit for participation and presenting one paper.

Credit 1 unit.

Typical periods offered: Fall

BBS 5311 Dynamics in Mesoscopic Molecular Systems

This course will provide a background in the theory of the dynamics of mesoscopic systems and introduction to methods for measuring the dynamics of these systems. It will include measurement methods, some of which are in common use and others that have only recently been introduced. This course would be useful for biophysics students and others that are interested in molecular processes and mechanisms in small systems such as cells.

Credit 3 units.

Typical periods offered: Spring

BBS 5312 Macromolecular Interactions

This course will cover equilibria, kinetics and mechanisms of macromolecular interactions from a quantitative perspective. Thermodynamics, multiple binding equilibria (binding polynomials), linkage phenomena, cooperativity, allostery, macromolecular assembly, analysis of binding isotherms, enzyme catalysis and mechanism, steady-state and pre-steady-state kinetics, kinetic simulation, and isotope effects.

Credit 3 units.

Typical periods offered: Spring

BBS 5318 DNA Repair

This course is an advanced graduate course that explores all aspects of DNA damage and the cellular responses to DNA damage. It is designed for graduate students who have a working knowledge of chemistry, molecular biology and cellular biology, and for interested postdocs and researchers. Specific topics that will be covered are: The chemical basis

of DNA damage, specific DNA repair mechanisms, cell cycle responses to damage, translesion DNA replication and mutagenesis, and human diseases related to defects in DNA damage response. The course consists of a lecture module, open to all, and a discussion module for registered students. In addition, several invited speakers in the field of DNA repair will give seminars and meet with registered students for discussion. Students will present and discuss research papers. Grades will be given based on student presentation and participation. Prerequisite; Permission of instructor.

Credit 2 units.

Typical periods offered: Spring

BBS 5319 Molecular Foundations of Medicine

This course will cover fundamental aspects of biochemistry and cell biology from a medical perspective. The course begins with a treatment of protein structure and the function of proteins in the cytoskeleton and cell motility. The principles of enzyme kinetics and regulation are then discussed and basic pathways for the synthesis and metabolism of carbohydrates and lipids are introduced. This leads in to a discussion of membrane structure and the function cellular organelles in biological processes including energy production, protein degradation and protein trafficking.

Credit 3 units.

Typical periods offered: Fall

BBS 5327 Optical Spectroscopy: Theory and Applications

Spectroscopic methods to be covered include fluorescence, both ensemble and single molecule, and absorption (circular dichroism); fluorescence correlation spectroscopy will also be discussed. The quantum chemistry /physics behind these methods will be reviewed.

Credit 2 units.

Typical periods offered: Fall

BBS 5328 Structural Biology Journal Club

Multi-laboratory research colloquia for DBBS graduate students focused on structural biology and complementary biophysical techniques. Course credit requires student presentation for credit.

Credit 1 unit.

Typical periods offered: Spring

BBS 5336 Computational Biophysics Journal Club

This course covers a combination of classic and recent publications on computational methods for studying biomolecules. Students participating for credit will be required to present at least once.

Credit 1 unit.

Typical periods offered: Spring

BBS 5357 Chemistry and Physics of Biomolecules

This course covers three major types of biomolecular structures: proteins, nucleic acids, and membranes. Basic structural chemistry is presented as well as the biophysical techniques used to probe each type of structure. Selected topics covered include protein folding, protein design, X-ray crystallography, NMR spectroscopy, nucleic acid bending and supercoiling, nucleic acid:protein interactions, RNA folding, membrane organization, fluidity, permeability and transport, and membrane channels. The weekly discussion section will cover problem sets and present current research papers. This is one of the required courses for the biochemistry and for the molecular biophysics graduate programs. Prior course work in biochemistry and physical chemistry is recommended but not required.

Credit 3 units.

Typical periods offered: Fall

BBS 5358 Biochemical and Biophysical Investigations of Infectious Diseases Journal Club

Biochemical and biophysical approaches continue to advance as powerful approaches to the understanding of human disease processes. This journal club covers recent papers in which these approaches address aspects of infectious diseases or inflammation. Students who enroll for credit will be expected to participate in weekly presentations and to present one to two papers along with accompanying background information.

Credit 1 unit.

Typical periods offered: Spring

BBS 5392 Molecular Microbiology & Pathogenesis

Course is devoted to studying microorganisms, particularly those that cause disease, with an emphasis on the molecular interactions between pathogens and hosts. First third of the course focuses on virology, second third on bacteriology and the last third on eukaryotic pathogens.

Credit 4 units.

Typical periods offered: Fall, Spring

BBS 5393 Molecular Virology Journal Club

Journal club covering a broad range of topics in virology with an emphasis on pathogenesis or molecular biology of medically important viruses. A minimum of one student presentation with faculty critique.

Credit 0.5 units.

Typical periods offered: Fall, Spring

BBS 5397 Current Literature in Microbiology

Presentations by students on a broad range of topics of current interest in microbiology. The course will emphasize presentations and discussion skills. Credit requires attendance and participation at all sessions and one presentation.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5412 Tropical and Molecular Parasitology

Graduate level seminar course focusing on current scientific literature in molecular parasitology. The journal club will meet biweekly during the Fall and Spring semesters. Students will attend both semesters in order to receive one credit. The seminar series will run jointly with a research conference in Tropical and Molecular Parasitology. Outside speakers will be invited for the seminar series to emphasize important developments in tropical medicine and molecular parasitology. In advance of the invited speakers, topics will focus on their previous research publications.

Credit 0.5 units.

Typical periods offered: Fall

BBS 5417 Hematology Division Journal Club: Current Topics in Cellular, Molecular, and Stem Cell Biology

This journal club covers a broad range of topics of current interest, including the fields of biochemistry, molecular biology, cell biology, developmental biology, and immunology. Speakers usually give a brief background to introduce the topic and then focus on one-two papers from the current literature. Presentations are given by graduate students, post-doctorates, and faculty. Each attendee presents two-three times per year. Participants are expected to attend all the sessions. This journal club was founded in 1966.

Credit 1 unit.

Typical periods offered: Fall, Spring



BBS 5425 Immunology of Infectious Diseases Journal Club

The goal of this Journal Club (JC) is to provide 2nd year students in MMMP program a platform to discuss new and emerging concepts on mechanisms by which host immune responses mediate protection against infectious diseases. This exercise will also enable the student who attend the fundamental Immunology course to apply their knowledge to understand the basis for immunology of infectious diseases. The format will include faculty who will select cutting-edge papers and head the discussion during the JC session.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5426 ID Gateway: Translational and Public Health Aspects of Basic Infectious Disease Research

This course provides an opportunity for students, postdoctoral fellows, infectious disease fellows and faculty to explore issues at the interface between patient care, public health and basic research in the area of microbial pathogenesis.

Credit 2 units.

Typical periods offered: Spring

BBS 5445 DNA Metabolism Journal Club

Presentation of current research papers in DNA replication, DNA repair, and DNA recombination, with an emphasis on basic biochemical and biophysical approaches.

Credit 1 unit.

Typical periods offered: Spring

BBS 5456 Advanced Crystallography

The advanced course in Protein Crystallography will address all aspects of modern protein crystallography including fundamentals of crystallography, the derivation of the structure factor and electron density equation, symmetry and space groups, direct methods, isomorphous replacement, molecular replacement, data collection, and crystal growing theory and techniques. Prerequisite, Physical Chemistry & Bio 5325 Protein Structure and Function. Two class hours per week.

Credit 2 units.

Typical periods offered: Spring

BBS 5469 Biochemistry, Biophysics, and Structural Biology Seminar

Student presentation of Biochemistry, Biophysics or Structural Biology topic. Second Year Students present from literature; senior students give formal research seminar. Attendance required of all BBSB Graduate Students.

Credit 0.5 units.

Typical periods offered: Fall, Spring

BBS 5480 Nucleic Acids & Protein Biosynthesis

Fundamental aspects of the structure, biosynthesis, and function of nucleic acids and the biosynthesis of proteins. Emphasis on mechanisms involved in the biosynthetic processes and the regulation thereof. Lecture course supplemented with student discussions of research papers.

Credit 3 units.

Typical periods offered: Fall

BBS 5483 Human Genetic Analysis

Basic Genetic concepts: meiosis, inheritance, Hardy-Weinberg Equilibrium, Linkage, segregation analysis; Linkage analysis: definition, crossing over, map functions, phase, LOD scores, penetrance, phenocopies, liability classes, multi-point analysis, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis,

determination of power for mendelian and complex trait analysis; Linkage Disequilibrium analyses: allelic association (case control designs and family based studies), QQ and Manhattan plots, whole genome association analysis; population stratification; Quantitative Trait Analysis: measured genotypes and variance components. Hands-on computer lab experience doing parametric linkage analysis with the program LINKAGE, model free linkage analyses with Genehunter and Merlin, power computations with SLINK, quantitative trait analyses with SOLAR, LD computations with Haploview and WGAViewer, and family-based and case-control association analyses with PLINK and SAS. The methods and exercises are coordinated with the lectures and students are expected to understand underlying assumptions and limitations and the basic calculations performed by these computer programs. Auditors will not have access to the computer lab sessions.

Credit 3 units.

Typical periods offered: Fall

BBS 5484 Genetics and Development of C. Elegans Journal Club

Students will present a research paper (or present their current thesis research) and the appropriate background material.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5487 Genetics and Genomics of Disease

The course will cover the use of genomic and genetic information in the diagnosis and treatment of disease, with an emphasis on current practice and existing gaps to be filled to achieve precision medicine. Areas of discussion include: bioinformatics methods; assessment of pathogenicity; use and curation of disease variant databases; discovery of incidental findings; genomics applications in Mendelian disease, complex traits, cancer, pharmacogenomics, and infectious disease; design of clinical trials with genetic data; ethical and policy issues.

Credit 2 units.

Typical periods offered: Fall, Spring

BBS 5488 Genomics

This course is designed for beginning graduate students who want to become familiar with the basic concepts and applications of genomics. The course covers a wide range of topics including how genomes are mapped and sequenced as well as the latest computational and experimental techniques for predicting genes, splice sites, and promoter elements. High throughput techniques for ascribing function to DNA, RNA, and protein sequences including microarrays, mass spectrometry, interspecies genome comparisons, and genome-wide knock-out collections will also be discussed. Finally, the use of genomic techniques and resources for studies of human disease will be discussed. A heavy emphasis will be put on students acquiring the basic skills needed to navigate databases that archive sequence data, expression data and other types of genome-wide data. Through problem sets, the students will learn to manipulate and analyze the large data sets that accompany genomic analyses by writing simple computer scripts. While students will become sophisticated users of computational tools and databases, programming and the theory behind it are not covered in this course.

Credit 4 units.

Typical periods offered: Spring

BBS 5489 Human Genetics Journal Club

In this biweekly journal club on Human Genetics we will present and discuss current cutting edge papers in human and mammalian molecular genetics. Students learn presentation skills, how to critique a paper and how to interact with a very active and critical audience. Any person interested in the current state of the art in Human

Genetics may attend this course. It is a requirement that all students wishing to earn credit in this course must present a 1.5 hour journal club talk and must regularly attend and participate in the journal club throughout the year.

Credit 0.5 units.

Typical periods offered: Fall, Spring

BBS 5491 Advanced Genetics

Fundamental aspects of organismal genetics with emphasis on experimental studies that have contributed to the molecular analysis of complex biological problems. Examples are drawn primarily from yeast, nematodes, fruit flies, mouse, and humans. Students will conceive and write an original research proposal with a substantial genetics component; the learning goal is to build skills in developing hypotheses from the literature and designing experimental approaches to test those hypotheses.

Credit 3 units.

Typical periods offered: Spring

BBS 5496 Seminar in Computational Molecular Biology

Students present current research papers and the appropriate background material in the field of Computational Biology. Arts & Sciences students must take this course for credit; Engineering students must take this course Pass/No Pass.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5499 Cancer Informatics Journal Club

This journal club will explore current topics in cancer informatics. Current literature will be reviewed for advanced cancer genome analysis methods, statistics, algorithms, tools, databases, and other informatics resources.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5500 Medical Genetics

A significant portion of the first-year course in basic medical genetics devoted to human and clinical genetics, with emphasis on how genomic information will transform the practice of medicine. Topics covered include population genetics; molecular basis of mutations; human functional genomics; mouse models of human disease; pharmacogenomics; metabolic defects. Lectures, small group discussions, patient information session.

Credit 2 units.

Typical periods offered: Spring

BBS 5501 Biology of the Visual System

The purpose of the course is to provide a fascinating view of vertebrate eye development, anatomy, physiology and pathology. Topics to be covered include the molecules that control eye formation, ocular stem cells, the physiology of transparency, hereditary ocular diseases, phototransduction, the neurobiology of the retina and central visual pathways, age-related eye diseases, and many others. The course is open to all second year graduates students and above. Ophthalmology residents and postdocs with an interest in vision are strongly encouraged to attend.

Credit 3 units.

Typical periods offered: Fall

BBS 5505 Independent Study in Fundamentals of Molecular and Microbial Genetics

This literature-based course will introduce students to seminal and current studies in molecular and microbial genetics. Students will read and present a minimum of 12 landmark papers that helped shape our understanding of molecular and microbial genetics. Emphasis will be placed on students' ability to comprehend and explain these studies via chalk talks. All presentations will be given by students.

Credit 2 units.

Typical periods offered: Fall, Spring

BBS 5507 Genome Engineering Methods and Applications

This course will cover the basic principles of genome engineering with emphasis on Cas9/CRISPR technology. It will consist of discussion sessions in which students will present assigned manuscripts followed by a general discussion of the topic directed by the instructor. The course will cover the mechanisms of genome editing using host DNA repair systems, the function of Cas9, and how Cas9 can be harnessed to introduce defined mutations into almost any genome. The use of Cas9 to activate or repress genes, alter chromatin modifications, and the application of these Cas9 systems to conducting genome-scale screens in mammalian cells as well as its use in studying cell fate will be highlighted. Finally, we will study how Cas9 methodologies can be used to introduce disease-associated variants into pluripotent stem cells (e.g. iPSCs) that can be differentiated into disease-relevant cell for use in functional genomic studies.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5512 Diseases of Membrane Transport & Excitability

Classes will consider the molecular basis of the disease as well as animal models and current clinical studies. Addressing studies from the level of basic biophysical and molecular properties of the underlying ion channels/transporters, to the cellular defects, to organ and animal outcomes and therapies., which will encourage and force students to develop their ability to integrate understanding at multiple levels. Students will be introduced to emerging ideas in clinical diagnosis, management and treatment, when appropriate, clinical specialists will allow student participants to directly observe and participate in the clinical experiences.

Credit 2 units.

Typical periods offered: Spring

BBS 5513 ITVS Project Building

The overall goal is to have intense guidance to construct a grant/fellowship application. Students should expect to have a near completed F30/F31 application by the end of this course. Students will study previous F30/F31 applications and sit on a mock panel to review real world grants from their peers. They will use this experience to understand the reviewers perspective when writing fellowships and grants in the future. Students will draft all portions of a research proposal with feedback from their peers, the course instructor and faculty mentors.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5540 Neural Sciences

An integrated course dealing with the structure, function and development of the nervous system. The course will be offered in the Spring of the first year Medical School calendar.

Credit 5 units.

Typical periods offered: Spring

BBS 5543 Oral Presentation of Scientific Data

Practical course on how to prepare and present scientific data to an audience. Meets once a week for 90 minutes.

Credit 1 unit.

Typical periods offered: Spring

BBS 5571 Cellular Neurobiology

This course will present a fully integrated overview of nerve cell structure, function and development at the molecular and cellular level. Broad topics to be covered include gene structure and regulation in the nervous system, basic neurophysiology, presynaptic and postsynaptic mechanisms of chemical neurotransmission, sensory transduction, neurogenesis and migration, axon guidance and synapse formation. Three 90 minute lectures plus one 75 minute paper discussion section per week. There will be four exams, as well as weekly quizzes.

Credit 6 units.

Typical periods offered: Fall

BBS 5572 Principles of Medicinal Chemistry

Overview of basic principles of medicinal chemistry covering drug targets and concepts of metabolism, efficacy and potency as relevant to drug design.

Credit 3 units.

Typical periods offered: Fall

BBS 5577 Synapses Journal Club

Synaptic function and malleability are fundamental to nervous system function and disease. This is an advanced seminar in the development, structure, and function of the synapse in health and disease. It is a natural extension of topics covered in Bio 5571. It may be primarily of interest to students in the Neurosciences Program, but also to students in MCB, Development, Biochemistry, Computational Biology, and Molecular Biophysics. Generally a topic for the semester helps focus the group; past topics have included Synapses and Disease, Neurotransmitter Transporters, Glutamate Receptors, Dendrites, GABA receptors. Participants (students, postdocs, and faculty) alternate responsibility for leading critical discussion of a current paper. Active participation offers the opportunity for students to hone their critical thinking and presentation skills. Students enrolling for credit will be expected to attend each week, to lead discussion once per semester and to provide written critiques (1-2 pages each) of two papers.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5617 Development Biology PhD Program Seminar

In response to student feedback for additional training in Developmental Biology obtained from surveys and group meetings, we propose a new seminar course in Developmental Biology. This once a week course will introduce student in the Developmental, Regenerative, and Stem Cell Biology PhD Program both to the classical embryological experiments that define key concepts in developmental biology, such as cellular fields, equivalence groups, cytoplasmic determinants, and the more modern experiments that uncovered the genetic and molecular basis of these processes. In general, the classes will be individual sessions on professional development, such as scientific presentation, how to navigate graduate school, etc.

Credit 1 unit.

Typical periods offered: Fall

BBS 5619 Advanced Cognitive, Computational, and Systems Neuroscience

This course will develop critical thinking and analysis skills with regard to topics in Cognitive, Computational and Systems Neuroscience. Course format will be a series of modules composed of intensive, faculty-led case studies on interdisciplinary topics at the intersection of psychology, computation and neuroscience. The goal will be to highlight the benefits of integrative, interdisciplinary approaches, by delving into a small set of topics from a variety of perspectives, rather than providing a survey-level introduction to a broader set of topic areas. Modules will involve a combination of lectures and student-led discussion groups, with students further expected to complete a multi-disciplinary integrative final review paper. Case-study topics will vary somewhat from year to year, but are likely to include some of the following: temporal coding as a mechanism for information processing, coordinate transformations in sensory-motor integration, mechanisms of cognitive control, motor control strategies including application to neural prosthetics, and memory systems in health and disease.

Credit 3 units.

Typical periods offered: Fall

BBS 5622 Cognitive, Computational, and Systems Neuroscience Project Building

The goal of this course is to help students in the CCSN Pathway develop the critical thinking skills necessary to develop and implement high quality, interdisciplinary research projects. Throughout the course of the semester, each student will develop a research plan in their chosen area of interest. The plan will be developed in consultation with at least two faculty members (from at least two different subdisciplines within the pathway) as well as the other students and faculty participating in the course. The culmination of this course will be for each student to produce an NIH-style grant proposal on the research project of their choosing. For most students, this will serve either as their thesis proposal or a solid precursor to the thesis proposal. The course will be designed to help facilitate the development of such a research plan through didactic work, class presentations, class discussion, and constructive feedback on written work. The course will begin with a review of written examples of outstanding research proposals, primarily in the form of grant submissions similar to those that the students are expected to develop (i.e., NRSA style proposals, R03 proposals). Review of these proposals will serve as a stimulus to promote discussion about the critical elements of good research proposals and designs in different areas. Each student will be expected to give three presentations throughout the semester that will provide opportunities to receive constructive feedback on the development and implementation of research aims. The first presentation (towards the beginning of the semester) will involve presentation of the student's general topic of interest and preliminary formulation of research questions. Feedback will emphasize ways to focus and develop the research hypotheses into well-formulated questions and experiments. The second presentation will involve a more detailed presentation of specific research questions (along the lines of NIH-style Specific Aims) and an initial outline of research methods. The final presentation will involve a fuller presentation of research questions and proposed methods. Feedback, didactic work, and group discussion throughout the semester will include guidance on critical components of the development of a research plan, including how to perform literature searches, formulate testable hypotheses, write critical literature summaries, and design experiments and analyses. The course will meet once a week, with faculty members from different tracks within the Pathway present at each meeting. This will allow students to receive feedback from several perspectives.

Credit 3 units.

Typical periods offered: Fall, Spring

BBS 5646 First-Year Fundamentals

This course will provide a two-part introduction to neuroscience research fundamentals. Namely, it will introduce elementary statistical analysis for neuroscience research as well as grant writing to support neuroscience-related research. Enrollment is limited to first-year neuroscience students.

Credit 0.5 units.

Typical periods offered: Spring

BBS 5648 Coding and Statistical Thinking in the Neurosciences

Students are introduced to scientific programming in Python. Students will learn common programming constructs and how to visualize and analyze data. Coding will be integrated into a statistics curriculum introducing summary statistics, probability distributions, simulation and hypothesis testing, and power analysis for experimental design.

Credit 3 units.

Typical periods offered: Fall, Spring

BBS 5651 Neural Systems

The course will consist of lectures and discussions of the sensory, motor and integrative systems of the brain and spinal cord, together with a weekly lab. The lectures will present aspects of most neural systems, and will be given by faculty members who have specific expertise on each topic. The discussions will include faculty led group discussions and papers presented and discussed by students. The labs will include human brain dissections, examination of histological slides, physiological recordings, behavioral methods, computational modeling, and functional neural imaging.

Credit 6 units.

Typical periods offered: Spring

BBS 5663 Neurobiology of Disease

This is an advanced graduate course on the pathology of nervous system disorders. This course is primarily intended to acquaint Neuroscience graduate students with a spectrum of neurological diseases, and to consider how advanced neuroscientific approaches may be applied to promoting recovery in the brain. Topics will be presented by Washington University faculty members and include: neurooncology, stroke, retinal disease, perinatal brain injury, neurodegenerative disorders, neuroinflammation, epilepsy, and psychiatric disorders. The class will meet for 2 hours each week. Each session will be led by a faculty guest with expertise in a specific neurological or psychiatric disease. In the first hour, the speaker will discuss clinical manifestations and pathophysiology. Where possible, the clinical presentation will be supplemented with a patient demonstration or videotape. After a 30 minute break for pizza and soda, the second hour will follow a journal club format. Two or three students will review current papers assigned by the speaker or course director. This course is offered in alternate years. Prerequisite: Introductory neuroscience course at the graduate or medical school level.

Credit 2 units.

Typical periods offered: Spring

BBS 5678 Clocksclub

Clocksclub focuses on recent advances in the study of biological timing including sleep and circadian rhythms. Participants discuss new publications and data on the molecules, cells and circuits underlying daily rhythms and their synchronization to the local environment. Students registered for this journal club will lead a discussion once during the semester.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5702 Current Approaches in Plant and Microbial Research

This course is designed to introduce graduate students and upper-division undergraduates to contemporary approaches and paradigms in plant and microbial biology. The course includes lectures, in-class discussions of primary literature and hands-on exploration of computational genomic and phylogenetic tools. Evaluations include short papers, quizzes, and oral presentations. Over the semester, each student works on conceptualizing and writing a short NIH-format research proposal. Particular emphasis is given to the articulation of specific aims and the design of experiments to test these aims, using the approaches taught in class. Students provide feedback to their classmates on their oral presentations and on their specific aims in a review panel.

Credit 4 units.

Typical periods offered: Spring

BBS 5703 Experimental Design and Analysis in Biological Research

In-depth exploration of landmark and current papers in genetics, molecular and cell biology, with an emphasis on prokaryotes and eukaryotic microbes. Class discussions will center on such key discoveries as the chemical nature of genetic material, the genetic code, oxygen producing light-spectrum, cell-cell signaling, transcriptional regulation, the random nature of mutation, and cell cycle regulation. Emphasis will be placed on what makes a good question or hypothesis, expedient ways to address scientific problems, and creative thinking. The last third of the course will consist of student-run seminars on selected topics to increase proficiency in the synthesis of new material and public presentation skills.

Credit 2 units.

Typical periods offered: Fall

BBS 5723 Seminar in Plant and Microbial Bioscience

This course emphasizing presentation skill and critical analysis counts towards the PMB Graduate Program's journal club course requirement. Students will be responsible for dividing and presenting 30 current research publications selected by the course masters. In addition to assembling brief PowerPoint presentations providing background and significance for their assigned articles, students are expected to provide classmates with a 1 page primer and short list of relevant references

Credit 2 units.

Typical periods offered: Fall, Spring

BBS 5801 Biochemistry & Molecular Biophysics Seminar Journal Club

This will be a journal club-based seminar course mirroring the topics covered by Biochemistry and Molecular Biophysics (BMB) seminar speakers during the concurrent semester. Students will present a paper published by one of the BMB seminar speakers one-week ahead of that speaker's seminar. This will allow students and faculty to become more familiar with the research programs of BMB invited speakers, likely stimulating discussion within the Q&A period after the seminar, as well as during informal meet-the-speaker lunch sessions. Students will be evaluated on their journal club presentation, attendance and class participation.

Credit 1 unit.

Typical periods offered: Spring

BBS 5840 Climate Change Reading Group

The Climate Change Reading Group is made up of multi-disciplinary faculty and students from multiple institutions in St Louis: WUSTL, UMSL, SLU, Missouri Botanical Garden, Danforth Center, and more. Many of us in different labs, departments, and institutions around STL are actively investigating aspects and effects of climate change; this reading group provides a venue for interacting with others in the community. Subject matter within the context of Climate Change will



be chosen each week by a different presenter. Students can join this reading group for 1 credit if they agree to read all papers, actively participate in discussions, find and present one high quality scientific paper on climate change in the field of their choice and moderate the discussion of this paper. The students will be evaluated on their participation, their understanding of the issues, and their presentation. Credit 1 unit.

Typical periods offered: Spring

BBS 5850 Seminar in Floristic Taxonomy

This weekly seminar provides an introduction to/overview of Plants, each semester progressively covering orders and families in a sequence derived from the Angiosperm Phylogeny Website (<http://www.mobot.org/MOBOT/Research/APweb/welcome.html>); in Spring 2015, the seminar will cover several crown orders of the monocots, including grasses and relatives. Weekly presentations include a summary of all relevant information (molecular, chemical, anatomical, embryological, morphological, ecological, geographical, historical/paleontological, etc.) about the plant group under consideration, review of the classification/phylogeny of the group, examination of fresh and/or preserved specimens, and discussion of relationships, human uses, and other relevant aspects of the biology of that group. Credit will be contingent on one (or two) seminar presentation(s) per student, regular attendance and active participation in group discussions.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5866 Communicating Science: Writing for Multiple Audiences

This course introduces strategies for writing effectively and communicating scientific research to a variety of audiences. Students will learn to reduce jargon, explain scientific concepts in common language, write clearly and concisely, and use sentence structure to maximum efficiency. Written assignments emphasize the significance and innovation in scientific research that appeal to broad audiences, including: the general public, students, policy makers, grant reviewers, and journal editors. This course meets biweekly and consists of lectures and small group sessions. You must enroll in both the lecture session (section 1) and a small group (section A, B, C, or D).

Credit 1 unit.

Typical periods offered: Spring

BBS 5867 Career Planning for Biological Scientists

This course will guide you through nationally recognized and evidence-based career exploration curricula. It is intended for DBBS Ph.D. students and bioscience postdocs who want to jump-start career planning and professional skills needed for a broad range of scientific careers. Topics include self-assessment, career exploration, and goal-setting for long-term success. You will work on a team to research the scientific career path of your choice. Each team will study the specific required knowledge, skills, and attributes of their career interest or employment sector. As part of this research project, you will complete a simulated job exercise and network with alumni or local leaders in your chosen field, gaining valuable real-world insights and creating essential professional connections.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5900 Research

Enrolled students will meet in-person with faculty for a minimum of 1 hour per week. Pass/No Pass Only.

Credit 12 units.

Typical periods offered: Fall, Spring, Summer

BBS 5902 Introduction to the Scholarship of Teaching and Learning

In this course, advanced graduate students and postdocs in STEM will 1) learn the fundamentals of the Scholarship of Teaching and Learning (SoTL)-which is the practice of developing, reflecting on, and evaluating teaching methods to improve student learning, 2) Develop a working knowledge of SoTL, which draws on research in education, STEM education, and cognitive science, 3) Understand how SoTL can lead to the dissemination of new knowledge to a broad audience of educators through publication and presentations., and 4) Develop the central elements of a SoTL project. These elements include articulating questions about classroom teaching that can be addressed in a SoTL research project; developing working hypotheses in response to the questions; designing an evaluative plan, including specific research methods, the type of data to be collected, and how the data will be analyzed in relation to the hypotheses; identifying and understanding necessary procedures to obtain IRB approval for the research.

Credit 1 unit.

Typical periods offered: Spring

BBS 5910 Nano Topics in Biology and Biomedical Sciences

This course will expose students to advanced topics, methods, and skills in biomedical sciences. The course will rapidly fill gaps in student knowledge in areas that are relevant to their research and or professional development. Each section of the course will be offered independently, sometimes in coordination with existing journal clubs and other seminars. Some sections will focus on technique; others will be theoretically or conceptually focused. Each section will be led by a faculty member drawn from DBBS in an area of their expertise. Objectives include deepening students knowledge and skill sets in critical thinking, experimental design, and technical prowess as related to the specific themes of each section.

Credit 0.5-1 units.

Typical periods offered: Fall, Spring

BBS 5911 Seminar in Biology & Biomedical Sciences

These seminars cover the recent literature in various areas not included in other courses, or in more depth than other courses. Credit to be arranged.

Credit 12 units.

Typical periods offered: Spring

BBS 5915 Teaching Practice in Biology & Biomedical Sciences

Students serve as teaching assistants for undergraduate and graduate level courses. Faculty-supervised activities include: lecture preparation and presentation; leading discussion and problem-solving sessions; laboratory instruction.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5922 Entering Mentoring

This course is a series of facilitated discussions aimed at developing and improving mentoring skills for those involved in supervising undergraduate research experiences. It is designed for postdocs and graduate students who are or will be 'bench mentors' for undergraduates doing Bio 500 and/or Summer Research. Participants will receive Entering Mentoring materials, including articles and worksheets to facilitate mentoring interactions with their mentee, plus several resource books relevant to mentoring. They will develop a mentoring philosophy statement, work on specific assignments designed to improve their relationship with their mentee and share their present and past experiences as mentors and mentees. Bench mentors will be eligible for a travel award to help defray expenses for attending a meeting with their mentee, if that student wins one of the HHMI SURF travel awards (4-5 awarded annually) or is otherwise being supported to present at a scientific meeting. Graduate students

and postdocs do NOT need to be mentoring a student at the time of the course; it is open to all with an interest in mentoring now or in the future. Note: The sessions will be held either at the beginning of the day or the end of the day at the Danforth campus. Once registration closes, an email will be sent to those registered to poll for the best days & times.

Credit 1 unit.

Typical periods offered: Fall, Spring

BBS 5923 Foundations in Cancer Biology

This basic cancer biology class is designed to provide a didactic foundation into cancer biology principles. These will include tumor suppressors & oncogenes, DNA damage pathways, protein modifications, tumor progression, metastasis, tumor microenvironment and numerous other topics relevant to cancer biology.

Credit 3 units.

Typical periods offered: Fall

BBS 5928 Experimental Cancer Biology

This basic cancer biology class is meant to coincide with the Foundation course. Topics will be discussed in parallel with Foundation course topics but from the perspective of the laboratory experimentalist. Experimental details will provide the basis for understanding how to ask and answer important questions in the cancer biology laboratory.

Credit 3 units.

Typical periods offered: Fall

BBS 5940 Foundations in Cancer Biology and Experimental Cancer Biology

This advanced course will teach the clinical perspective of cancer biology using topics from oncology, radiation biology, radiology, pathology, immunology and surgery. Students will learn to write a grant proposal that includes a clinical trial element while also shadowing physicians in a real cancer clinical setting.

Credit 3 units.

Typical periods offered: Spring

BBS 5989 Advanced Topics in Neuroscience

This course will expose upper-level and postdoctoral students to advanced topics and methods in neuroscience. The course will rapidly fill gaps in student knowledge in areas that may be relevant to new directions in thesis work or interest areas. Each section of the course will be offered asynchronously, sometimes in coordination with existing journal clubs and other seminars. Each section will meet for two hours per week for three weeks. Sections may start with a didactic component or a review paper, but they will quickly delve into the discussion of primary papers curated by faculty and covering a focused topic. It is expected that papers will cover both historical and current contexts. Some sections will focus on technique; others will be conceptually focused. Each section will be led by a faculty member drawn from the Neuroscience program in an area of their expertise. Objectives include deepening critical thinking, statistical knowledge, experimental design, and technical prowess.

Credit 0.5-1 units.

Typical periods offered: Fall, Spring

BBS 5999 Independent Work

This course is designed for individual students wishing to explore indepth specialized areas of literature or technology with one or more faculty members. Credit will vary with the amount of work and discussion, but cannot be more than 3 credits.

Credit 3 units.

Typical periods offered: Fall, Spring

BBS 9000 Full-Time Graduate Research/Study

Full-Time Graduate Research/Study

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

BBS 9001 Full-Time Graduate Study in Absentia

Full-Time Graduate Study in Absentia

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

BBS 9002 Full-Time Graduate Study Extension

Full-Time Graduate Study Extension

Credit 0 units.

Typical periods offered: Fall, Spring, Summer

Policies

The Vagelos Division of Biology & Biomedical Sciences has more than 700 students with access to over 700 faculty mentors with whom they may perform their dissertation work. This unparalleled flexibility results from the joint governance of DBBS by the Washington University School of Medicine and the School of Arts & Sciences — a 50-year-old model that fosters the most impactful science executed at the boundaries of fields, programs, disciplines, schools and departments. A hallmark of DBBS is our commitment to interdisciplinary collaboration. By transcending traditional academic boundaries, our programs consistently earn top-tier national and international rankings.

In this interdisciplinary environment, graduate students are governed by policies and guidelines established by the university, the School of Medicine, and DBBS. The policies identified here and elsewhere in this *Bulletin* are not to be considered a complete list. However, every attempt has been made to identify the location of those policies that affect most or all students in DBBS.

The University Policies (p. 21) page in this *Bulletin* outlines regulations for both graduate and undergraduate students. For further details, please consult the Office of the University Registrar website and the University Policies page of the WashU website. Graduate students are encouraged to review the specific policy categories relevant to their degree programs.

All DBBS students must follow the University PhD Policies & Requirements (p. 35) as set forth by the Provost's Office.

Degrees in DBBS are conferred by the School of Medicine; hence, students must follow the applicable policies (p. 413) as set forth by the school, including the relevant PhD Program Policies & Guidelines (p. 456).

DBBS students can reference the DBBS Student Handbook for student guidelines across all Division programs.

Division of Computational & Data Sciences

The Division of Computational & Data Sciences (DCDS) at Washington University in St. Louis trains students interested in problems from across a range of disciplines that share a common reliance on data and computing.

The introduction of now-standard tools from statistical analysis and hypothesis testing transformed the practice of natural and social science in the mid-20th century. Emerging tools from computational and data science have the potential to bring about an even larger transformation of scientific practice, especially in the social sciences. The questions raised by data generated by and about human behavior are engaging and profound. However, many if not most of these questions can only be tackled using a multidisciplinary approach that combines a deep knowledge of the capabilities and operation of data science techniques with the domain expertise needed to apply them effectively to the problems under consideration.

Doctoral students in Computational & Data Sciences receive strong methodological training in modern computational and statistical methods, and they also acquire expertise in a particular social science application area.

The program is inherently interdisciplinary and brings together leading experts from across the university who are using data to solve some of the greatest challenges that our world faces today. Faculty include both data and computing experts as well as domain experts from different application areas.

Faculty

Eunhye Ahn

Assistant Professor, Brown School
PhD, University of Southern California

Ruopeng An

Assistant Professor, Brown School
PhD, Pardee RAND Graduate School

Dennis Barbour

Associate Professor, Biomedical Engineering
MD, Johns Hopkins University
PhD, Johns Hopkins University

Deanna Barch

Professor and Chair, Psychological & Brain Sciences
PhD, University of Illinois

Janine Bijsterbosch

Assistant Professor, Radiology
PhD, University of Sheffield

Ryan Bogdan

Associate Professor, Psychological & Brain Sciences
PhD, Harvard University

Todd Braver

Professor, Psychological & Brain Sciences, Radiology, and Neuroscience
PhD, Carnegie Mellon University

Michael Brent

Henry Edwin Sever Professor of Engineering, Computer Science & Engineering
PhD, Massachusetts Institute of Technology

Derek Brown

Associate Professor, Brown School
PhD, Duke University

Sheretta Butler-Barnes

Associate Professor, Brown School
PhD, Wayne State University

David Carter

Associate Professor, Political Science
PhD, University of Rochester

Yixin Chen

Professor, Computer Science & Engineering
PhD, University of Illinois

Dino Christenson

Associate Professor, Political Science
PhD, Ohio State University

Brett Drake

Professor, Brown School
PhD, University of California, Los Angeles

Ted Enamorado

Assistant Professor, Political Science
PhD, Princeton University

Randi Foraker

Associate Professor of Public Health, Brown School
PhD, The University of North Carolina at Chapel Hill

Patrick Fowler

Track Chair, Social Work & Public Health
Associate Professor, Brown School
PhD, Wayne State University

Roman Garnett

Assistant Professor, Computer Science & Engineering
PhD, University of Oxford

Aimilia Gastounioti

Assistant Professor, Radiology
PhD, National Technical University of Athens

Chris Gill

Professor, Computer Science & Engineering
DSc, Washington University in St. Louis

Brian Gordon

Assistant Professor, Radiology
PhD, University of Illinois

Roch Guérin

Professor and Chair, Computer Science & Engineering
PhD, California Institute of Technology

Shenyang Guo

Professor, Brown School
PhD, University of Michigan–Ann Arbor

Ross Hammond

Associate Professor, Brown School
PhD, University of Michigan

Jenine Harris

Associate Professor, Brown School
PhD, Saint Louis University

Chien-Ju Ho

Assistant Professor, Computer Science & Engineering
PhD, University of California, Los Angeles

Josh Jackson

Associate Professor, Psychological & Brain Sciences
PhD, University of Illinois Urbana-Champaign

Nathan Jacobs

Professor, Computer Science & Engineering
PhD, Washington University in St. Louis

Kim Johnson

Associate Professor, Brown School
PhD, University of Minnesota

Melissa Jonson-Reid

Professor, Brown School
PhD, University of California, Berkeley

Brendan Juba

Assistant Professor, Computer Science & Engineering
PhD, Massachusetts Institute of Technology

Thomas Kannampallil

Assistant Professor, Anesthesiology
PhD, University of Illinois

Caitlin Kelleher

Associate Professor, Computer Science & Engineering
PhD, Carnegie Mellon University

Wouter Kool

Assistant Professor, Psychological & Brain Sciences
PhD, Princeton University

Matt Kreuter

Professor, Social Work & Public Health
PhD, The University of North Carolina at Chapel Hill

Albert Lai

Associate Professor and Deputy Director, Institute for Informatics
Associate Professor, Computer Science & Engineering
PhD, Columbia University

Calvin Lai

Assistant Professor, Psychological & Brain Sciences
PhD, University of Virginia

Matthew Lew

Assistant Professor, Electrical & Systems Engineering
PhD, Stanford University

Jr-Shin Li

Professor, Electrical & Systems Engineering
PhD, Harvard University

Fangqiong Ling

Assistant Professor, Energy, Environmental & Chemical Engineering
PhD, University of Illinois Urbana-Champaign

Chenyang Lu

Professor, Computer Science & Engineering
PhD, University of Virginia

Christopher Lucas

Assistant Professor, Political Science
PhD, Harvard University

Doug Luke

Professor, Brown School
PhD, University of Illinois

Phillip Marotta

Assistant Professor, Brown School
PhD, Columbia University

Andrew D. Martin

Professor, Political Science and Law
Chancellor, Washington University in St. Louis
PhD, Washington University in St. Louis

Timothy McBride

Professor, Brown School
PhD, University of Wisconsin–Madison

Jacob Montgomery

Track Chair, Political Science
Associate Professor, Political Science
PhD, Duke University

William Nomikos

Assistant Professor, Political Science
PhD, Yale University

Alvitta Ottley

Assistant Professor, Computer Science & Engineering
PhD, Tufts University

Neal Patwari

Professor, Electrical & Systems Engineering
Professor, Computer Science & Engineering
PhD, University of Michigan

Philip R.O. Payne

Professor and Director, Institute for Informatics
Professor, Computer Science & Engineering
PhD, Columbia University

Netanel Raviv

Assistant Professor, Computer Science & Engineering
PhD, Technion – Israel Institute of Technology

Zachariah Reagh

Assistant Professor, Psychological & Brain Sciences
PhD, University of California, Irvine

Andrew Reeves

Associate Professor, Political Science
PhD, Harvard University

Guillermo Rosas

Associate Professor, Political Science
PhD, Duke University

Betsy Sinclair

Professor, Political Science
PhD, California Institute of Technology

Bruno Sinopoli

Professor and Chair, Electrical & Systems Engineering
PhD, University of California, Berkeley

Aristeidis Sotiras

Assistant Professor, Radiology
PhD, École Centrale Paris

Fred Ssewamala

Associate Dean for Transdisciplinary Faculty Research, Brown School
PhD, Washington University in St. Louis

Joe Steensma

Professor of Practice, Brown School
EdD, Indiana Wesleyan University

Joshua Swamidass

Associate Professor, Pathology & Immunology
Associate Professor, Biomedical Engineering
MD, University of California, Irvine
PhD, University of California, Irvine

Jessie Sun

Assistant Professor, Psychological & Brain Sciences
PhD, University of California, Davis

Yevgeniy Vorobeychik

Associate Professor, Computer Science & Engineering
PhD, University of Michigan

Chenguang Wang

Assistant Professor, Computer Science & Engineering
PhD, Peking University

Yong Wang

Associate Professor, Electrical & Systems Engineering

Emily Willroth

Assistant Professor of Psychological & Brain Sciences
PhD, University of California, Berkeley

William Yeoh

Track Chair, Computational Methodologies
Associate Professor, Computer Science & Engineering
PhD, University of Southern California

Jeffrey Zacks

Track Chair, Psychological & Brain Sciences
Professor and Associate Chair, Psychological & Brain Sciences
PhD, Stanford University

Shen Zeng

Assistant Professor, Electrical & Systems Engineering
PhD, University of Stuttgart

Ning Zhang

Assistant Professor, Computer Science & Engineering
PhD, Virginia Polytechnic Institute and State University

Xuan Zhang

Assistant Professor, Electrical & Systems Engineering
PhD, Cornell University

Degree Requirements

Upon joining the PhD program, each student is assigned an initial advisor from the DCDS faculty. This advisor meets with the student to assess their background and to advise them on course selection.

All students complete a common core curriculum as well as a domain depth requirement in a social science area. The focus of the first year is on acquiring a common set of tools and an understanding of the ranges and types of problems students may work on as they progress through the program. The entire incoming cohort takes a unique two-semester seminar sequence solely for DCDS students, which includes both general topics and a series of data-driven dives into the types of research questions that may be encountered in each of the domain areas.

Curriculum

Required Core Courses

Please refer to the DCDS Doctoral Student Handbook for the most up-to-date core course requirements.

Domain Depth Tracks

Students will choose one of four focus tracks: Political Science, Psychological & Brain Sciences, Social Work & Public Health, or Computational Methodologies. Please refer to the DCDS Doctoral Student Handbook for the most up-to-date domain depth track requirements.

Further Requirements

Additional requirements for this program are as follows:

- A minimum of 72 credit units beyond the bachelor's level, with a minimum of 37 being course credits (including the core curriculum)
- A minimum of 24 credit units of doctoral dissertation research
- Students must maintain a cumulative average grade of B (3.0 grade-point average) for all 72 credit units.
- Required courses must be completed with no more than one grade below a B–.
- Up to 24 graduate credit units may be transferred with the approval of the Graduate Studies Committee, which is chaired by the director of graduate studies.

In addition to fulfilling the course and research credit requirements, students must do the following:

- Pass a qualifying exam.
- Successfully defend a thesis proposal.
- Present and successfully defend a dissertation.
- Complete a teaching requirement consisting of two semesters of mentored teaching experience.

Institute of Materials Science & Engineering

The Institute of Materials Science & Engineering (IMSE) at Washington University in St. Louis offers a unique, interdisciplinary PhD in Materials Science & Engineering that crosses traditional departmental and school boundaries. The field of materials science and engineering focuses on the study, development and application of new materials with desirable properties, with the goal of enabling new products and superior performance regimes. Disciplines in the physical sciences (e.g., chemistry, physics) play a central role in developing the fundamental knowledge that is needed to design materials for a variety of engineering applications (e.g., mechanical engineering, electrical engineering, biomedical engineering). Building on training that spans from fundamental to applied sciences, materials scientists and engineers integrate this fundamental knowledge to develop new materials and match them with appropriate technological needs.

The IMSE is well positioned to address the needs of a student seeking a truly interdisciplinary experience. The IMSE brings together a diverse group of faculty from departments in Arts & Sciences, the McKelvey School of Engineering, and the School of Medicine. The IMSE also oversees shared research and instrument facilities, develops partnerships with industry and national laboratories, and facilitates outreach activities.

Current focused areas of research and advanced graduate education within the IMSE include the following:

- Artificial intelligence in materials discovery and design
- Biomedical, bio-derived, and bio-inspired materials
- Materials for energy and environmental technologies
- Quantum and photonic materials and devices

Faculty

Director

Katharine M. Flores

Christopher I. Byrnes Professor, Mechanical Engineering & Materials Science
PhD, Stanford University

Professor Flores' primary research interest is the mechanical behavior of high-performance structural materials, with particular emphasis on understanding structure-processing-property relationships in bulk metallic glasses and their composites.

Professors

Jianjun Guan

Professor, Mechanical Engineering & Materials Science
PhD, Zhejiang University

Professor Guan's research interests are in biomimetic biomaterials synthesis and scaffold fabrication; bioinspired modification of biomaterials; injectable and highly flexible hydrogels; bioimageable polymers for MRI and EPR imaging and oxygen sensing; mathematical modeling of scaffold structural and mechanical properties; stem cell differentiation; neural stem cell transplantation for brain tissue regeneration; and bone and cardiovascular tissue engineering.

Marcus Foston

Professor, Energy, Environmental & Chemical Engineering
PhD, Georgia Institute of Technology

Professor Foston's research program seeks to develop innovative and novel routes to exploit and utilize lignocellulosic biomass by taking advantage of materials involved in industries such as agriculture, paper making, and forestry products.

Erik Henriksen

Professor, Physics
PhD, Columbia University

Professor Henriksen's lab research is centered on the properties of electrons confined to two dimensions. This remarkable system has yielded a tremendous amount of interesting and important physics over the past several decades, from the integer and fractional quantum Hall effects to the groundbreaking discoveries of graphene and other atomically thin crystals and especially to the recent realization of the topological nature of the electronic structure of a surprising number of materials both novel and familiar.

Song Hu

Professor, Biomedical Engineering
PhD, Washington University in St. Louis



Professor Hu's research focuses on the development of cutting-edge optical and photoacoustic technologies for high-resolution structural, functional, metabolic, and molecular imaging in vivo and their applications in neurovascular disorders, cardiovascular diseases, regenerative medicine, and cancer.

Vijay Ramani

Roma B. & Raymond H. Wittcoff Distinguished University Professor of Environment & Energy
PhD, University of Connecticut

Vijay Ramani's research interests lie at the confluence of electrochemical engineering, materials science and renewable and sustainable energy technologies. The National Science Foundation, Office of Naval Research, ARPA-E, and Department of Energy have funded his research, with mechanisms including an NSF CAREER award (2009) and an ONR Young Investigator Award (ONR-YIP; 2010).

Srikanth Singamaneni

The Lilyan & E. Lisle Hughes Professor, Mechanical Engineering & Materials Science
PhD, Georgia Institute of Technology

Professor Singamaneni's research interests include plasmonic engineering in nanomedicine (in vitro biosensing for point-of-care diagnostics, molecular bioimaging, nanotherapeutics); photovoltaics (plasmonically enhanced photovoltaic devices); surface-enhanced Raman scattering (SERS)-based chemical sensors, with particular emphasis on the design and fabrication of unconventional and highly efficient SERS substrates; hierarchical organic/inorganic nanohybrids as multifunctional materials; bioinspired structural and functional materials; polymer surfaces and interfaces; responsive and adaptive materials and scanning probe microscopy; and surface force spectroscopy of soft and biological materials.

Fuzhong Zhang

Professor, Energy, Environmental & Chemical Engineering
PhD, University of Toronto

Professor Zhang's research focuses on developing synthetic biology tools and systems for the sustainable production of structurally defined chemicals and high-performance materials. Current research projects include the following: (1) engineering microbial metabolic dynamics and heterogeneity; (2) engineering metabolic pathways to produce structure-defined biofuels and chemicals; and (3) developing microbial factories to produce high-performance materials.

Associate Professors

Peng Bai

Associate Professor, Energy, Environmental & Chemical Engineering
PhD, Tsinghua University, Beijing

Professor Bai's research focuses on the development of next-generation batteries. Knowledge and tools developed in the Bai Group also apply to and benefit the design of other electrochemical energy systems, like supercapacitors and fuel cells.

Mikhail Y. Berezin

Associate Professor, Radiology
PhD, Moscow Institute of Oil and Gas/Institute of Organic Chemistry

Dr. Berezin's lab focuses on the development of novel optically active probes ranging from small molecules to nanoparticles and the development of optical instrumentation for spectroscopy and imaging using knowledge of excited states. The lab's research interest lies in the investigation and application of molecular excited states and their reactions for medical imaging and clinical treatment.

Nathaniel Huebsch

Associate Professor, Biomedical Engineering
PhD, Harvard University

Professor Huebsch's research focus is in basic and translational stem cell mechanobiology, with specific focus on hydrogels to control cell-mediated tissue repair and three-dimensional, iPSC-based heart-in-a-dish models to study the influence of mechanical loading and genetics on arrhythmia and contractility.

Matthew Lew

Associate Professor, Electrical & Systems Engineering
PhD, Stanford University

Professor Lew and his students build advanced imaging systems to study biological and chemical systems at the nanoscale, leveraging innovations in applied optics, signal and image processing, design optimization, and physical chemistry. Their advanced nanoscopes (microscopes with nanometer resolution) visualize the activity of individual molecular machines inside and outside living cells. Examples of new technologies developed in the Lew Lab include (1) using tiny fluorescent molecules as sensors that can detect amyloid proteins; (2) designing new "lenses" to create imaging systems that can visualize how molecules move and tumble; and (3) new imaging software that minimizes artifacts in super-resolution images.

Xianglin Li

Associate Professor, Mechanical Engineering & Materials Science
PhD, University of Connecticut

Professor Li's research interests are in batteries and fuel cells, including direct methanol fuel cells, lithium-oxygen batteries and battery thermal management; transport phenomena in porous media; greenhouse gas emissions and full fuel cycle analysis of fossil fuels; and life cycle assessment and economic analysis of advanced energy techniques, among others.

Mark Meacham

Associate Professor, Mechanical Engineering & Materials Science
PhD, Georgia Institute of Technology

Professor Meacham's research interests include microfluidics, micro-electromechanical systems (MEMS) and associated transport phenomena, with application to design, development and testing of novel energy systems and life sciences tools, from scalable micro-/nanotechnologies for improved heat and mass exchangers to MEMS-based tools for manipulation and investigation of cellular processes.

He is also interested in the behavior of jets and/or droplets of complex fluids during ejection from microscopic orifices, which is critical to applications as disparate as biological sample preparation and additive manufacturing.

Rohan Mishra

Associate Professor, Mechanical Engineering & Materials Science
PhD, Ohio State University

Professor Mishra's research interest is to develop quantitative structure-property correlations in materials starting from the atomic scale. To develop such correlations, his group synergistically combines electronic structure calculations with atomic-resolution electron microscope imaging and spectroscopy. The end goal is the rational design of materials with properties tailored for electronic, optical, magnetic and energy applications. Current research topics include perovskite materials for photovoltaic and optoelectronic applications, novel electrocatalysts, oxidizers, and wide-bandgap semiconductors.

Jai Rudra

Associate Professor, Biomedical Engineering
PhD, Louisiana Tech University

Jai Rudra's lab is interested in the development of nanoscale biomaterials such as nanofibers, nanoparticles, virus-like particles, and hydrogels for engaging the immune system to induce protective antibody and cell-mediated immune responses against diseases such as tuberculosis, melanoma, and flavivirus infections (i.e., West Nile and Zika). He is also investigating the development of vaccines against drugs of addiction such as cocaine.

Chuan Wang

Associate Professor, Electrical & Systems Engineering
PhD, University of Southern California

Professor Wang's research focus is on two-dimensional semiconductor nanoelectronics and optoelectronics, stretchable electronics, printed electronics, and sensors and actuators.

Patricia Weisensee

Associate Professor, Mechanical Engineering & Materials Science
PhD, University of Illinois at Urbana-Champaign

Professor Weisensee's work focuses on understanding the interplay of fluid dynamics, heat transfer, and liquid-solid interactions of droplets and other multi-phase systems. Practical applications of interest are phase change heat transfer for thermal management, thermal storage, water harvesting, metallic additive manufacturing, and droplet interactions with biological and natural systems.

Assistant Professors

Sang-Hoon Bae

Assistant Professor, Mechanical Engineering & Materials Science
PhD, University of California, Los Angeles

Professor Bae's research group focuses on tackling the challenges in materials science with thermodynamics, kinetics, and solid-state physics.

Matthew Bersi**Christopher Cooper**

Assistant Professor, Energy, Environmental & Chemical Engineering
PhD, Stanford University

Christopher Cooper's research at WashU focuses on using dynamic polymers to create responsive, soft materials for applications in energy storage, environmental sustainability, and human health. Through advanced synthesis and characterization, his research group designs polymers with distinct molecular designs and reversible bonds for applications including wearable or implantable electronic devices, recyclable underwater adhesives, soft actuators, and upcycling of industrial plastics. Cooper has published more than 15 peer-reviewed journal articles and given numerous conference presentations and invited talks.

Francisco Lagunas Vargas**Mark Lawrence**

Assistant Professor, Electrical & Systems Engineering
PhD University of Birmingham

Professor Lawrence and his lab are harnessing breakthroughs in nanoscale engineering to push the limits of light-based technologies, targeting applications ranging from all-optical computing and quantum communication to metrology and biosensing.

Kelly Powderly

Assistant Professor of Chemistry
PhD, Princeton University

The Powderly Group seeks to develop and utilize new synthetic pathways to discover extended solids with magnetic, electronic, and non-trivial topological properties of interest in quantum information science and to explore new fundamental bonding in materials.

Sheng Ran

Assistant Professor, Physics
PhD, Iowa State University

Professor Ran's research aims to realize and understand exotic states of quantum materials using combined techniques of bulk crystal synthesis, electric and thermal transport measurements under extreme temperature, pressure and magnetic field conditions, and neutron and high-energy X-ray scattering.

Xi Wang

Assistant Professor, Physics
PhD, Florida State University

Xi Wang's lab utilizes cutting-edge magneto optical and optoelectronic microscopy and spectroscopy to probe and control excitons, electrons, phonons, magnons, and so on in quantum materials for applications in quantum simulation and quantum communication.

Chong Zu

Assistant Professor, Physics
PhD, Tsinghua University

Professor Zu's research interests lie at the interface between atomic, molecular, and optical physics; condensed matter physics; and quantum information.

Degree Requirements

To earn a PhD degree, students must complete the requirements of the McKelvey School of Engineering, along with program-specific requirements. Courses include the following:

- Four IMSE Core Courses (12 units)

Code	Title	Units
MEMS 5610	Quantitative Materials Science & Engineering	3
MEMS 5619	Thermodynamics of Materials *	3
<i>Hard Materials Track:</i>		
MEMS 5620	Kinetics of Materials	3
CHEM 5620	Solid-State and Materials Chemistry *	3
	or PHYSICS 5072 Solid State Physics	
<i>Soft Materials Track:</i>		
MEMS 5608	Introduction to Polymer Science and Engineering	3
MEMS 5614	Polymeric Materials Synthesis and Modification	3

* EECE 5020 Advanced Thermodynamics in EECE may be taken instead with permission of the Director of Graduate Studies.

- Three courses (9 units) from a preapproved list of Materials Science & Engineering electives
- IMSE 8991 IMSE First-Year Research Experience (6 units)
- A minimum of three graduate-level technical elective courses (9 units) in mathematics or any science or engineering department, to reach a total of at least 36 academic credit units
 - A maximum of 3 units of IMSE Journal Club will be permitted toward this requirement.
 - Any 4000-level courses not included on the preapproved list of Materials Science & Engineering electives must be approved by the Graduate Studies Committee.
- A maximum of 12 units of 4000-level courses may be applied toward the required 36 academic credit units. Undergraduate-only courses (below the 4000 level) are generally not permitted and may not be used to fulfill this requirement.
- IMSE 8997 IMSE Graduate Seminar every semester of full-time enrollment
- 18 to 36 units of IMSE 8998 Doctoral Research (Students must identify an IMSE faculty member willing and able to support their dissertation research on a materials-related topic.)
- Students must maintain a grade point average of at least 3.0 for all graded courses and have no more than one grade of B– or below in a core course or a Materials Science & Engineering elective.

Additional program requirements include the following:

- Pass the IMSE Qualifying Examination (oral and written components).
- Identify an IMSE graduate program faculty member willing and able to support the student's dissertation research on a materials-related topic.
- Maintain satisfactory research progress on a topic in materials science and engineering, as determined by the dissertation advisor and the mentoring committee.
- Successfully complete research ethics training by the end of the third semester.
- Successfully complete MTE requirements by the end of the third year.
- Successfully complete the dissertation proposal and presentation, with approval from the dissertation examination committee.
- Successfully complete and defend a PhD dissertation, with final approval from the dissertation examination committee.

Failure to meet these requirements will result in dismissal from the program.

Recommended Course Plan

Year 1

Fall Semester

- IMSE 8997 IMSE Graduate Seminar
- IMSE 8991 IMSE First-Year Research Experience
- MEMS 5610 Quantitative Materials Science & Engineering
- MEMS 5619 Thermodynamics of Materials
 - IMSE will allow EECE 5020 Advanced Thermodynamics in EECE in place of MEMS 5619 Thermodynamics of Materials with permission of the Director of Graduate Studies.
- Hard Materials Track: CHEM 5620 Solid-State and Materials Chemistry
 - An elective may be chosen if the student is taking PHYSICS 5072 Solid State Physics in the spring.
- Soft Materials Track: MEMS 5608 Introduction to Polymer Science and Engineering

Spring Semester

- Begin dissertation research
- IMSE 8997 IMSE Graduate Seminar
- IMSE 8991 IMSE First-Year Research Experience
- Hard Materials Track: MEMS 5620 Kinetics of Materials
- Soft Materials Track: MEMS 5614 Polymeric Materials Synthesis and Modification
- Elective

Summer

- Prepare for IMSE Qualifying Examination (typically taken in August):
 - Written document and oral presentation on research rotation
 - Oral examination on fundamentals from core courses

Years 2 and Beyond

- Complete remaining electives (discuss with dissertation advisor)
- IMSE 8997 IMSE Graduate Seminar
- IMSE 8998 Doctoral Research
- Teaching requirements (to be completed by the end of the third year):
 - Attend two McKelvey preparatory engagement workshops.
 - AI two times at 10 MER units for a total of 20 units.
- Regular meetings (at least once per year) with the mentoring committee
- Dissertation proposal and presentation (fifth semester)
- Dissertation and oral defense

Mentored Experience Implementation Plan

As part of their degree requirements, PhD students must complete a program-defined Mentored Experience Requirement (MER) as per these guidelines. The Mentored Experience Implementation Plan (MEIP) is the written articulation of a program-defined degree requirement for PhD students to engage in mentored teaching activities and/or mentored professional activities, collectively referred to as the *MER*.

Mentored Experience Requirement (MER)

Philosophy of Teaching

Materials scientists and engineers work at the interface between the fundamental physical sciences and application-oriented disciplines. As such, they often need to translate between underlying physical principles governing the performance of a material and the design requirements of a system or device. This translation is inherently two-way; the emergent properties of novel materials enable new, potentially transformative applications, and new devices often require materials with unique (and challenging) property profiles. To facilitate this two-way translation, our PhD graduates must be able to communicate both fundamental and applied concepts to a variety of audiences, including supervisors, subordinates, clients, and co-workers, whose familiarity with the MSE field may range from novice

to expert. Moreover, mentored teaching experiences instill a sense of responsibility, professionalism, and ethical conduct, preparing students to navigate the complex landscape of academia, industry, government, or other research-oriented sectors with confidence and integrity.

Preparatory Engagement

Preparatory Engagement activities are those that represent an introduction to the foundational skills associated with teaching or communication. Pedagogical preparation engagement activities are normally completed before students are permitted to engage in assisting or teaching in a classroom.

Two preparatory workshops are required:

1. McKelvey Teaching Orientation (Canvas Course)
2. McKelvey Teaching Workshop (Canvas Course)

Mentored Teaching Experiences (MTEs)

Assistant in Instruction (AI)

An Assistant in Instruction (AI) is a PhD student who is directly engaged in the organization, instruction, and/or support of a semester-long course *primarily taught by a faculty member*. An AI receives mentorship from a faculty member related to best practices in classroom engagement, instruction in the field, interpersonal engagement, and other relevant skills. Students and mentors complete a mentorship plan prior to the start of each AI experience. To complete each AI assignment and to ensure that it applies toward their degree requirements, students must register for the appropriate course number for each semester of engagement. Refer to the "Required Pathways for Completion" section below for course numbers and details.

Students will AI two times at 10 MER units for a total of 20 units. Students work with their graduate supervisor on the timing and content of those assignments.

Required Pathways for Completion

Students work with their faculty mentor and their Director of Graduate Studies to plan how and when they will complete their MER. Students register during the normal registration period for courses in accordance with one of these approved pathways.

- Preparatory Engagement

EGS 8010	Take two times



Interdisciplinary Opportunities

Washington University offers courses through interdisciplinary programs that include studies in a variety of disciplines that cross traditional academic boundaries and support academic areas outside of the schools.

- **Interdisciplinary Courses**

Graduate students can speak with their advisors with regard to enrolling in individual courses available outside of their school that may advance their research or professional goals. An internal tuition agreement valid across the university's graduate and professional schools enables interdisciplinary study by allowing enrollment in classes outside of the student's home school. Many undergraduate and graduate courses are available for graduate student enrollment, subject to the following eligibility guidelines:

- The student must be enrolled full-time in a graduate degree program and have the approval of their faculty advisor or administrative officer to take a course outside of their home school.
- Courses will be open to students outside of the discipline only if those students have met the required prerequisites and have the approval of both their department/advisor and the course instructor.
- Finally, courses and students in part-time or "continuing" programs, including WashU Continuing & Professional Studies, are not part of this agreement. Courses that require individualized instruction and/or additional fees (e.g., independent studies, individual music lessons) are also excluded.

- **Teaching Citation — Center for Teaching and Learning**

The Teaching Citation is a professional-development program open to Washington University graduate students. The purpose of the program is to provide formalized pedagogical training to help graduate students prepare for careers that involve teaching. Graduate students who complete the program will participate in a learning community in which they will 1) develop knowledge of effective pedagogy, including evidence-based teaching methods, by completing one Foundations in Teaching and five advanced-level CTL workshops, 2) gain expertise with varied teaching methods by documenting three qualifying teaching experiences, and 3) develop, reflect on, and refine on their teaching approach by writing an engaging teaching philosophy statement.

Documenting one's teaching experience includes demonstrating that the required number of teaching hours have been met, attaining faculty or CTL observation and student feedback on one's teaching activities, and writing a self-reflection. The qualifying teaching experiences that can be counted toward the Teaching Citation include, for example, include leading a weekly discussion or recitation subsection, leading regular review- or help-sessions, presenting course lectures, teaching a course independently, and mentoring a student in a research project. Teaching experiences must be approved by CTL staff.

- A limited opportunity for some Washington University students to enroll in courses at Saint Louis University and the University of Missouri–St. Louis is available through the Inter-University Exchange Program (p. 493).
- The Skandalaris Center (p. 494) offers cocurricular programming and practical, hands-on training and funding opportunities to students and faculty in all disciplines and schools.
- The McDonnell International Scholars Academy (p. 496) is an endowed fellowship program that offers generous financial support toward graduate and professional degree studies at Washington University in St. Louis.

Inter-University Exchange Program

The Inter-University Exchange (IE) program between Washington University, Saint Louis University (SLU), and the University of Missouri–St. Louis (UMSL) began in 1976 as an exchange agreement encouraging greater inter-institutional cooperation at the graduate level. Over time, this program has evolved to include undergraduate education. The basic provisions of the original agreement are still in place today, and participation continues to be at the discretion of each academic department or unit.

At Washington University, there are several schools that *do not participate* in this program (i.e., degree-seeking students in these schools are not eligible to participate in the IE program, and courses offered in these schools are not open to SLU and UMSL students attending Washington University through the IE program). They are the School of Law, the School of Medicine, the McKelvey School of Engineering, and the School of Continuing & Professional Studies. The Washington University schools that are open to participation in the IE program may have specific limitations or requirements for participation; details are available in those offices.

The following provisions apply to all coursework taken by Washington University students attending SLU or UMSL through the IE program:

- Such courses can be used for the fulfillment of degree or major requirements. (Students should consult with their dean's office for information about how IE coursework will count toward their grade-point average, units and major requirements.)
- Such courses are not regularly offered at Washington University.
- Registration for such courses requires preliminary approval of the student's major/department advisor, the student's division office or dean, and the academic department of the host university.
- Students at the host institution have first claim on course enrollment (i.e., a desired course at SLU or UMSL may be fully subscribed and unable to accept Washington University students).
- Academic credit earned in such courses will be considered as resident credit, not transfer credit.

- Tuition for such courses will be paid to Washington University at the prevailing Washington University rates; there is no additional tuition cost to the student who enrolls in IE coursework on another campus. However, students are responsible for any and all fees charged by the host school.
- Library privileges attendant on enrolling in a course on a host campus will be made available in the manner prescribed by the host campus.

Instructions

Washington University students must be enrolled full-time to participate in the IE program and have no holds, financial or otherwise, on their academic record at Washington University or at the host institution.

1. The student must complete the IE program application form. Forms are available from the Office of the University Registrar website.
2. The student must provide all information requested in the top portion of the form and indicate the course in which they wish to enroll.
3. The student must obtain the approval signature of the professor teaching the class or the department chair at SLU or UMSL, preferably in person.
4. The student also must obtain the approval signatures of their major advisor at Washington University and the appropriate individual in their dean's office.
5. Completed forms must be submitted to the Office of the University Registrar in the Women's Building a minimum of one week before the start of the term.

Course enrollment is handled administratively by the registrars of the home and host institutions. Washington University students registered for IE coursework will see these courses on their class schedule and academic record with the subject codes SLU and UMSL. Final grades are recorded when received from the host institution. The student does not need to obtain an official transcript from SLU or UMSL to receive academic credit for IE coursework at Washington University.

Contact: Office of the University Registrar
Phone: 314-935-5959
Email: registrar@wustl.edu
Website: <http://registrar.wustl.edu/student-records/registration/the-inter-university-exchange-program>

Skandalaris Center for Interdisciplinary Innovation and Entrepreneurship

The Skandalaris Center for Interdisciplinary Innovation and Entrepreneurship is the hub of creativity, innovation, and entrepreneurship at Washington University. We believe everyone can be entrepreneurial. Skandalaris provides programming where anyone can explore their creative and entrepreneurial interests, develop an entrepreneurial mindset, and go from ideation to launch.

Mission

The Skandalaris Center fosters and empowers an inclusive community that finds opportunities in problems and transforms ideas into action. We build an ecosystem of education, research, and resources that engages all WashU students, faculty, alumni, and staff as entrepreneurial leaders and collaborators.

Who We Serve

We work with the best and brightest at WashU — the change-makers, thought leaders, and visionaries — to solve the world's problems and meet local needs through innovation and entrepreneurship. As an interdisciplinary center, our initiatives serve students, faculty, staff, and alumni from all levels and disciplines.

Our Initiatives

We develop programs for WashU entrepreneurs, creatives, innovators, and scholars. Our commitment to interdisciplinary innovation and entrepreneurship is motivated by the following beliefs:

- *Everyone can be creative.* We provide hands-on experiences and the creative means to solve problems.
- *Innovation is the backbone of entrepreneurship.* Our opportunities are designed to develop and share new ideas while connecting with other WashU entrepreneurs and innovators.
- *Good ideas are one opportunity away from success.* Our programs are created to help WashU entrepreneurs and innovators access the resources they need to take their ideas to the next level.
- *Knowledge and skills are key to innovation and entrepreneurship.* Our Center offers events and opportunities to help our community of WashU entrepreneurs, creatives, and innovators learn the ins and outs of innovation and entrepreneurship.

Programs and Resources

- **Experts on Call**

This program provides an opportunity for the WashU community to connect with experts in the Skandalaris Center or remotely, free of charge.

- **Honors in Innovation & Entrepreneurship**

Students who have shown exemplary involvement in innovation and entrepreneurship during their time at Washington University are recognized through this program. Honors are earned by accumulating points through a combination of curricular and cocurricular activities.

- **In-Residence Program**

This program provides WashU students, faculty, staff, and alumni with the opportunity to learn from and work with professionals with extensive industry experience.

- **PhD Citation in Entrepreneurship**

This program provides opportunities for PhD students who are interested in developing skills and experiences in the areas of entrepreneurship and innovation.

- **Pivot 314 Fellowship**

The Pivot 314 Fellowship is a year-long program presented by the Office of the Provost and the Skandalaris Center for Interdisciplinary Innovation and Entrepreneurship. Pivot 314 offers graduate students curated programming focused on professional development and on strengthening leadership and communications skills, as well as internship opportunities.

- **Resources**

The Skandalaris Center, Washington University, and external services and resources are available to support innovators and entrepreneurs.

- **Skandalaris Spaces**

Our collaboration space is available for hosting meetings or events. Requests should be made a week in advance.

- **Skandalaris Startup Webinars, Panel Discussions, and Workshops**

These webinars provide an exciting way for alumni to reconnect and share their experiences with entrepreneurship. We also offer free, noncredit workshops designed to encourage creativity, innovation, and entrepreneurship.

- **Startup Venture Promotion**

The Skandalaris Center is happy to help Washington University in St. Louis students, faculty, staff, and alumni with promoting their startup ventures.

- **Student Enterprise Program (StEP)**

StEP provides a unique opportunity for students to own and operate a business on campus that serves the WashU community. Student owners can supplement the valuable business and entrepreneurial skills they learn in the classroom while gaining real-world experience as they manage and lead their own businesses.

- **Student Groups**

There are many organizations that allow students to gain experience and make valuable interdisciplinary connections in the areas of creativity, innovation, and entrepreneurship.

- **Venture Development**

The WashU community is invited to set an appointment with a member of our team for help with ideas and businesses at any stage. We will work with these individuals to brainstorm ideas, strengthen financial models, draft business plans, perfect pitches, and more.

- **Washington University Entrepreneurship Courses**

Courses in entrepreneurship offered across the university are available to students at all levels and in all disciplines.

Competitions

- **IdeaBounce[®]**

IdeaBounce[®] is both an online platform and an event for sharing venture ideas and making connections. This is an opportunity for participants to pitch their ideas (no matter how "fresh"), get feedback on them, and make connections. In-person events happen frequently throughout the fall and spring semesters.

- **Skandalaris Venture Competition (SVC)**

The SVC provides expert mentorship to new ventures and startups to ready them for commercializing their ideas, launching, and pitching to investors. Teams will develop materials focused on explaining the ideas that they are working on to a broad audience.

- **Who Can Apply:** Current Washington University students and alumni (within one year of graduation) with an early-stage venture or idea
- **Award:** Up to \$22,500

- **Global Impact Award (GIA)**

The GIA awards WashU-affiliated ventures with inventions, products, ideas, and business models that will have a broad and lasting impact on society.

- **Who Can Apply:** WashU students, postdocs, residents, and alumni who have graduated within the last 10 years
- **Award:** Up to \$50,000

Learn More

Please contact the Skandalaris Center to sign up for our newsletter and for additional information about all programs.

Phone:	314-935-9134
Email:	sc@wustl.edu
Website:	http://skandalaris.wustl.edu

McDonnell International Scholars Academy

The McDonnell International Scholars Academy graduate fellowship program at WashU is dedicated to fostering a dynamic community of scholars chosen based on their ability to emerge as leaders and experts in their fields. The McDonnell Academy offers curated programming that includes a leadership seminar, cohort trips, and presentation skills development. This multifaceted approach cultivates leaders who embrace a global outlook and help drive positive change in their communities and beyond.

The McDonnell Academy provides both financial and programmatic support to enrich the WashU graduate experience. Meaningful participation and engagement are key components of the program. For more information about program benefits, eligibility, and admissions, please visit the Admissions page of the McDonnell International Scholars Academy website.

Website: <https://mcdonnell.wustl.edu/>

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