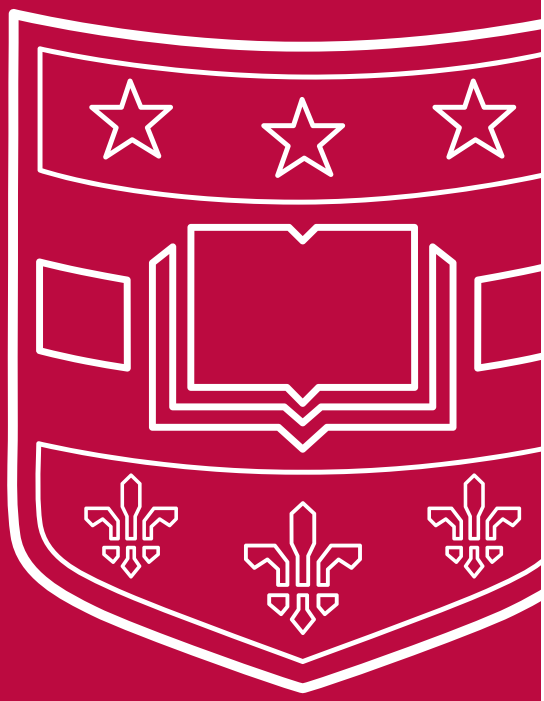
# 2020–21 Bulletin

School of Medicine

Washington University in St. Louis



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# About This Bulletin

The graduate and professional *Bulletins* are the catalogs of programs, degree requirements and policies of the following schools of Washington University in St. Louis: Architecture & Urban Design; Art; Arts & Sciences; Business; Engineering; Law; Medicine; and Social Work & Public Health.

The *University College Bulletin* is the catalog of University College, the professional and continuing education division of Arts & Sciences at Washington University in St. Louis. The catalog includes programs, degree requirements, course descriptions and pertinent university policies for students earning a degree through University College.

The *2020-21 Bulletin* is entirely online but may be downloaded in PDF format for printing. Individual pages may be downloaded in PDF format using the "Download This Page as a PDF" option on each page. To download the full PDF, please choose from the following:

- Architecture & Urban Design Bulletin (PDF) (http://bulletin.wustl.edu/grad/Bulletin_2020-21_Grad_Arch.pdf)
- Art Bulletin (PDF) (http://bulletin.wustl.edu/grad/Bulletin_2020-21_Grad_Art.pdf)
- Arts & Sciences Bulletin (PDF) (http://bulletin.wustl.edu/grad/Bulletin_2020-21_Grad_School.pdf)*
- Business Bulletin (PDF) (http://bulletin.wustl.edu/grad/Bulletin_2020-21_Grad_Business.pdf)
- Engineering Bulletin (PDF) (http://bulletin.wustl.edu/grad/Bulletin_2020-21_Grad_Engineering.pdf)
- Law Bulletin (PDF) (http://bulletin.wustl.edu/grad/Bulletin_2020-21_Law.pdf)
- Medicine Bulletin (PDF)** (http://bulletin.wustl.edu/grad/Bulletin_2020-21_Medicine.pdf)
- Social Work & Public Health Bulletin (PDF) (http://bulletin.wustl.edu/grad/Bulletin_2020-21_Brown.pdf)
- University College Bulletin (undergraduate & graduate) (PDF) (http://bulletin.wustl.edu/grad/Bulletin_2020-21_UCollege.pdf)

* A final PDF of the Graduate School *Bulletin* was created on August 10, 2021, to include a reduction in credit units for the PhD in Nursing Science program.

** An additional PDF of the School of Medicine *Bulletin* was created on June 22, 2021, to include the Policy for Monitoring of Student Time, which was added to the online *Bulletin* in February 2021. The final PDF of the School of Medicine *Bulletin* was created in November 2022 to include information that was part of the HTML version but that had been inadvertently excluded from the PDF.

The degree requirements and policies in the *2020-21 Bulletin* apply to students entering Washington University during the 2020-21 academic year.

Every effort is made to ensure that the information, applicable policies and other materials presented in the *Bulletin* are accurate and correct as of the date of publication (January 15, 2021). Washington University reserves the right to make changes at any time without prior notice. Therefore, the electronic version of the *Bulletin* 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*.

For the most current information about available courses and class scheduling, visit WebSTAC (https://acadinfo.wustl.edu). Please email the Bulletin editor (bulletin_editor@wustl.edu) with any questions concerning the *Bulletin.*

# 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 University Facts (http://wustl.edu/about/facts/) page of our website.

### Enrollment by School

For enrollment information (https://wustl.edu/about/university-facts/#students), please visit the University Facts page of our website.

### Committed to Our Students: Mission Statement

Washington University's mission is to discover and disseminate knowledge and to protect the freedom of inquiry through research, teaching and learning.

Washington University creates an environment that encourages and supports an ethos of wide-ranging exploration. Washington University's faculty and staff strive to enhance the lives and livelihoods of students, of the people of the greater St. Louis community, of the country and of the world.

Our goals are as follows:

- to welcome students, faculty and staff from all backgrounds to create an inclusive community that is welcoming, nurturing and intellectually rigorous;
- to foster excellence in our teaching, research, scholarship and service;
- to prepare students with the attitudes, skills and habits of lifelong learning and leadership, thereby enabling them to be productive members of a global society; and
- to be an institution that excels by its accomplishments in our home community of St. Louis as well as in the nation and the world.

To this end, we intend to do the following:

- to judge ourselves by the most exacting standards;
- to attract people of great ability from diverse backgrounds;
- to encourage faculty and students to be bold, independent and creative thinkers;
- to provide an exemplary, respectful and responsive environment for living, teaching, learning and working for present and future generations; and
- to focus on meaningful, measurable results for all of our endeavors.

# Trustees & Administration

## Board of Trustees

Please visit the Board of Trustees website (http://boardoftrustees.wustl.edu) for more information.

## University Administration

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

Led by the chancellor, the officers of the university administration (http://wustl.edu/about/leadership/) are detailed on the university website.

# 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. Individual schools — particularly our graduate and professional schools — may have varying calendars due to the nature of particular fields of study. Please refer to each school’s website for more information.

## Fall Semester 2020

**College of Arts & Sciences, McKelvey School of Engineering, Olin Business School, Sam Fox School of Design & Visual Arts, and University College**

| Date | Day | Description |
|---|---|---|
| September 14 | Monday | First day of classes |
| November 26-27 | Thursday-Friday | Thanksgiving break (no classes) |
| December 18 | Friday | Last day of classes |
| January 4-10, 2021 | Monday-Sunday | Final exams (remote) |

**Brown School at Washington University**

| Date | Day | Description |
|---|---|---|
| August 24 | Monday | First day of classes |
| September 7 | Monday | Labor Day holiday (no classes) |
| November 26-27 | Thursday-Friday | Thanksgiving break (no classes) |
| December 16 | Wednesday | Last day of classes |

**Washington University Law**

| Date | Day | Description |
|---|---|---|
| August 24 | Monday | First day of classes |
| September 7 | Monday | Labor Day holiday (no classes) |
| November 20 | Friday | Last day of classes |
| November 30-December 11 | Monday-Friday | Final exams (remote) |

## Spring Semester 2021

**College of Arts & Sciences, McKelvey School of Engineering, Olin Business School, Sam Fox School of Design & Visual Arts, and University College**

| Date | Day | Description |
|---|---|---|
| January 25 | Monday | First day of classes |
| March 2-3 | Tuesday-Wednesday | Wellness days (no classes) |
| April 12 | Monday | Wellness day (no classes) |
| May 4 | Tuesday | Last day of classes |
| May 5-6 | Wednesday-Thursday | Reading days |
| May 7-13 | Friday-Thursday | Final exams |

**Brown School at Washington University**

| Date | Day | Description |
|---|---|---|
| January 19 | Tuesday | First day of classes |
| February 11 | Thursday | Wellness day (no classes) |
| March 9 | Tuesday | Wellness day (no classes) |
| April 7 | Wednesday | Wellness day (no classes) |
| May 6 | Thursday | Last day of classes |

**Washington University Law**

| Date | Day | Description |
|---|---|---|
| January 19 | Tuesday | First day of classes |
| February 15-16 | Monday-Tuesday | Spring break I (no classes) |
| March 24-26 | Wednesday-Friday | Spring break II (no classes) |
| April 23 | Friday | Last day of classes |
| April 28-May 11 | Wednesday-Tuesday | Final exams |

**Commencement Ceremonies**

| Date | Day | Description |
|---|---|---|
| May 21 | Friday | Class of 2021 Commencement |
| May 30 | Sunday | Class of 2020 Commencement |

## Summer Semester 2021

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

Washington University recognizes the individual student's choice in observing religious holidays that occur during periods when classes are scheduled. Students are encouraged to arrange with their instructors to make up work missed as a result of religious observance, and instructors are asked to make every reasonable effort to accommodate such requests.

# Campus Resources

## Student Support Services

**The Learning Center** is located on the ground floor of Gregg House on the South 40, and it is the hub of academic support at Washington University in St. Louis. We provide undergraduate students with assistance in a variety of forms. Most services are free, and each year more than 2,000 students participate in one or more of our programs. For more information, visit the Learning Center website (https://learningcenter.wustl.edu/) or call 314-935-5970. There are three types of services housed within the Learning Center:

- **Academic Mentoring Programs** offer academic support in partnership with the academic departments in a variety of forms. Academic mentoring 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. Programs include course-specific weekly structured study groups facilitated by highly trained peer leaders as well as course-specific weekly walk-in sessions facilitated by academic mentors in locations, at times and in formats convenient for the students. The Learning Center also offers individual consulting/coaching for academic skills such as time management, study skills, note taking, accessing resources and so on. Other services include fee-based graduate and professional school entrance preparation courses.
- **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 (https://students.wustl.edu/disability-resources/) or contact the Learning Center at 314-935-5970 for more information.
- **TRIO: Student Support Services** 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 (https://students.wustl.edu/trio-program/).

**Medical Student Support Services.** For information about Medical Student Support Services, please visit the School of Medicine website (https://medicine.wustl.edu).

**Office for International Students and Scholars.** If a student is joining the university from a country other than the United States, this office can assist that individual through their orientation programs, issue certificates of eligibility (visa documents), and provide visa and immigration information. In addition, the office provides personal and cross-cultural counseling and arranges social, cultural and recreational activities that foster international understanding on campus.

The Office for International Students and Scholars is located on the Danforth Campus in the Danforth University Center at 6475 Forsyth Boulevard, Room 330. The office can be found on the Medical Campus in the Mid Campus Center (MCC Building) at 4590 Children's Place, Room 2043. For more information, visit the Office for International Students and Scholars website (http://oiss.wustl.edu) or call 314-935-5910.

**Office of Military and Veteran Services** is located in Umrath Hall on the Danforth Campus. 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 (https://veterans.wustl.edu/policies/policy-for-military-students/) 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 (https://veterans.wustl.edu/policies/policy-for-va-students/) applies to students using VA education benefits when payments to the institution and the individual are delayed through no fault of the student.

Please visit the Military and Veteran Services website (https://veterans.wustl.edu/) 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 (https://rsvpcenter.wustl.edu/).

**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 (https://washucares.wustl.edu/) to file a report.

**The Writing Center.** The Writing Center, a free service, offers writing advice 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 Mallinkrodt Center on the lower level. Appointments (http://writingcenter.wustl.edu) are preferred and can be made online.

## Student Health Services, Danforth Campus

Habif Health and Wellness Center, formerly known as Student Health Services, provides medical and mental health care for undergraduate and graduate students. Habif staff members include licensed professionals in Medical Services, Mental Health Services and Health Promotion Services. Please visit Dardick House on the South 40 or the Habif Health and Wellness Center website (http://shs.wustl.edu) for more information about Habif's services and staff members.

**Hours:**
Monday, Tuesday and Thursday 8 a.m.-6 p.m.
Wednesday 10 a.m.-6 p.m.
Friday 8 a.m.-5 p.m.
Saturday 9 a.m.-1 p.m.

A nurse answer line and after hours mental health crisis line are available to answer any medical or mental health questions a student may have when Habif is closed. For after-hours care, please call 314-935-6666.

***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, physical therapy, and travel medicine and sexual health services. Habif Health and Wellness 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. Habif accepts most health insurance plans 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 Habif (except in an emergency). Call 314-935-6666 or visit the Habif website to schedule an appointment (http://shs.wustl.edu).

Appointments are also available for the assessment, treatment, and referral of students who are struggling with substance abuse.

The Habif Health and Wellness Center pharmacy is available to all Washington University students and their dependents who participate in the student health insurance plan. The pharmacy accepts most prescription insurance plans; students should check with the pharmacist to see if their prescription plan is accepted at the pharmacy.

The Habif Health and Wellness Center lab provides full laboratory services. Approximately 20 tests can be performed in the lab. The remainder of all testing that is ordered by Habif is completed by LabCorp. LabCorp serves as Habif's reference lab, and it is a preferred provider on the student health insurance plan. This lab can perform any test ordered by Habif 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 is required for all incoming undergraduate students. A PPD skin test in the past six months is required for students entering the university from certain countries; this list of countries may be found on the Habif website. It is also recommended that, during the five years before beginning their studies at Washington University, all students will have received the tetanus diphtheria immunization, the hepatitis A vaccine series, the hepatitis B vaccine series, and the varicella vaccine. Medical History Forms (http://shs.wustl.edu) are available online. Failure to complete the required forms will delay a student's registration and prevent their entrance into housing assignments. Please visit the Habif website for complete information about requirements and deadlines (http://shs.wustl.edu).

***Mental Health Services*** staff members work with students to resolve personal and interpersonal difficulties, including conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. Staff members help each person figure out their own situation. Services include individual, group and couples counseling; crisis counseling; psychiatric consultation; and referral for off-campus counseling. Call 314-935-6666 or visit the Habif website to schedule an appointment (http://shs.wustl.edu).

***Health Promotion Services*** provides free programs and risk reduction information related to issues such as stress, sleep, sexual health and alcohol/other drugs. For more information, visit the Zenker Wellness Suite in Sumers Recreation Center to learn about the programs on campus led by student peer health educators. Call 314-935-7139 or send an email to wellness@wustl.edu for more information.

In 2018, this department launched the **WashU Recover Group** to provide an opportunity for students in recovery from substance use to connect with other students with similar experiences. The group provides local resources, support, meetings and activities. Members have 24/7 access to a private facility to study, meet and socialize. The group is not a recovery program; it is a confidential resource that students can add to their support system. For more information, send an email to recovery@wustl.edu.

## Important Information About Health Insurance, Danforth Campus

Washington University has a student health fee that was designed to improve the health and wellness of the entire Washington University community. This fee supports health and wellness services and programs on campus. In addition, all full-time, degree-seeking Washington University students are automatically enrolled in the Student Health Insurance Plan upon completion of registration. Students may opt out of this coverage if they provide proof of existing comprehensive insurance coverage. Information concerning opting out of the student health insurance plan (http://shs.wustl.edu) can be found online after June 1 of each year. Habif provides billing services to many of the major insurance companies in the United States. Specific fees and co-pays apply to students using Medical Services and Mental Health Services; these fees may be billable to the students' insurance plan. More information is available on the Habif Health and Wellness Center website (http://shs.wustl.edu).

## Student Health Services, Medical Campus

For information about student health services on the Medical Campus, please visit the Student & Occupational Health Services page (https://wusmhealth.wustl.edu/students/) 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. Your personal safety and the security of your 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, good lighting, 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 your experience here a safe and secure one. 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 your exact location. In addition to the regular shuttle service, an evening walking escort service 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 — from 6:00 p.m. to 4:00 a.m. seven days a week. The shuttle leaves from the Mallinckrodt Center every 30 minutes and 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. Community members can track the shuttle in real time using the WUSTL Mobile App. The app can be downloaded free of charge from the Apple App Store or the Google Play Store.

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, free personal-safety whistles, computer security tags, personal safety classes for women and men, and security surveys. Community members are encouraged to download and install the personal safety app Noonlight on their phones; this app allows users to call for help during emergencies. For more information about these programs, visit the Washington University Police Department website (https://police.wustl.edu/Pages/Home.aspx).

In compliance with the Campus Crime Awareness and Security Act of 1990, Washington University publishes an annual report (http://police.wustl.edu/clerylogsandreports/Pages/default.aspx) 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, CB 1038, One Brookings Drive, St. Louis, MO 63130-4899, 314-935-9011.

For information regarding protective services at the School of Medicine, please visit the Security page (https://facilities.med.wustl.edu/security/) of the Washington University Operations & Facilities Management Department.

# 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 (http://registrar.wustl.edu) and on the university's Compliance and Policies page (http://wustl.edu/policies/). 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.

## 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 or treatment or employment in its programs and activities on the basis of race, color, age, religion, sex, sexual orientation, gender identity or expression, national origin, 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, 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 Policy on Discrimination and Harassment (http://hr.wustl.edu/policies/Pages/DiscriminationAndHarassment.aspx) is available on the Human Resources website.

#### 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 Coordinator**

Apryle Cotton, Assistant Vice Chancellor for Human Resources
Section 504 Coordinator
Phone: 314-362-6774
apryle.cotton@wustl.edu

**Title IX Coordinator**

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

You may also submit inquiries or a complaint regarding civil rights 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 (https://www.ed.gov/); or by calling 800-421-3481.

## 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 (http://hr.wustl.edu/policies/Pages/DrugandAlcoholPolicy.aspx) or Alcohol Service Policy (http://pages.wustl.edu/prograds/alcohol-service-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 Policy (http://hr.wustl.edu/policies/Pages/tobaccofreepolicy.aspx) is available on the Human Resources website.

## Medical Examinations

Entering students must provide medical information to the Habif Health and Wellness Center. 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 will be required to obtain vaccinations for measles, mumps and rubella at the Habif Health and Wellness Center, if there is no evidence of immunity. In addition, undergraduate students will be required to obtain meningitis vaccinations. Students will be assessed the cost of the vaccinations. 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 Habif Health and Wellness Center (http://shs.wustl.edu) website. All students who have completed the registration process should access the website and create a student profile by using their WUSTL Key. Creating a student profile enables a student to securely access the medical history form. Students should fill out the form and follow the instructions for transmitting it to the Habif Health and Wellness Center. Student information is treated securely and confidentially.

# Student Conduct

The Student Conduct Code sets forth community standards and expectations for Washington University students. These community standards and expectations are intended to foster an environment conducive to learning and inquiry. Freedom of thought and expression is essential to the university's academic mission.

Disciplinary proceedings are meant to be informal, fair and expeditious. Charges of non-serious misconduct are generally heard by the student conduct officer. With limited exceptions, serious or repeated allegations are heard by the campuswide Student Conduct Board or the University Sexual Assault Investigation Board where applicable.

Complaints against students that include allegations of sexual assault or certain complaints that include allegations of sexual harassment in violation of the Student Conduct Code are governed by the procedures found in the University Sexual Assault Investigation Board Policy (https://wustl.edu/about/compliance-policies/governance/usaib-procedures-complaints-sexual-assault-filed-students/), which is available online or in hard copy from the Title IX coordinator or the director 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 (https://wustl.edu/about/compliance-policies/academic-policies/university-student-judicial-code/), visit the university website.

# Undergraduate Student Academic Integrity Policy

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 work 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.

## Scope and Purpose

This statement on academic integrity applies to all undergraduate students at Washington University. Graduate students are governed by policies in each graduate school or division. 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 dishonest conduct. The examples are only illustrative, *not* exhaustive.

## 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 acknowledgment. To avoid even the suspicion of plagiarism, a student must always do the following:

   - 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 (i.e., the name of the speaker, the occasion, the place and the date).
- Cite material from the internet 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 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, or 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 do any of the following:

   - Use, copy or paraphrase the results of another person's work and represent that work as one's own, regardless of the circumstances.
   - Refer to, study from or copy archival files (e.g., old tests, homework, solutions manuals, backfiles) that were not approved by the instructor.
   - Copy another's work or permit another student to copy one's 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 or 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 the following:

   - 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 one's own.

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

   Under no circumstances is it acceptable for a student to do any of the following:

   - 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 one's own. This includes but is not limited to sitting for another person's exam; both parties will be held responsible.
   - 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 the assistant in instruction for guidance.

## Reporting Misconduct

### Faculty Responsibility

Faculty and instructors are strongly encouraged to report incidents of student academic misconduct to the academic integrity officer in their school or college in a timely manner so that the incident may be handled fairly and consistently across schools and departments. 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 dishonesty in their courses.

### Student Responsibility

If a student observes others violating this policy, the student is strongly encouraged to report the misconduct to the instructor, to seek advice from the academic integrity officer of the school or college that offers the course in question, 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 Resource Center, if applicable.

## Procedure

### Jurisdiction

This policy covers all undergraduate students, regardless of their college of enrollment. Cases will be heard by school-specific committees according to the school in which the class is listed rather than the school in which the student is enrolled. All violations and sanctions will be reported to the student's college of enrollment.

### Administrative Procedures

Individual undergraduate colleges and schools may design specific procedures to resolve allegations of academic misconduct by students in courses offered by that school, so long as the procedures are consistent with this policy and with the Student Conduct Code.

### Student Rights and Responsibilities in a Hearing

A student accused of an academic integrity violation — whether by a professor, an assistant in instruction, an academic integrity officer or another student — is entitled to do the following:

- Review the written evidence in support of the charge
- Ask any questions
- Offer an explanation as to what occurred
- Present any material that would cast doubt on the correctness of the charge
- Receive a determination of the validity of the charge without reference to any past record of misconduct

When responding to a charge of academic misconduct, a student may do the following:

- Deny the charges and request a hearing in front of the appropriate academic integrity officer or committee
- Admit the charges and request a hearing to determine sanction(s)
- Admit the charges and accept the imposition of sanctions without a hearing
- Request a leave of absence from the university (however, the academic integrity matter must be resolved prior to re-enrollment)
- 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 with regard to 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 Conduct 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 to have acted dishonestly or if a student has admitted to the charges prior to a hearing, the school's academic integrity officer or committee 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 given 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.
- In cases serious enough to warrant suspension or expulsion from the university, refer the matter to the Student Conduct Board for consideration.

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

Withdrawing from the course will not prevent the academic integrity officer 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.

## Appeals

If a student believes the academic integrity officer or the committee did not conduct a fair hearing or if a student believes the sanction imposed for misconduct is excessive, they may appeal to the Student Conduct Board within 14 days of the original decision. Appeals are governed by Section VII C of the Student Conduct Code.

## Records

### Administrative Record-Keeping Responsibilities

It is the responsibility of the academic integrity officer in each school to keep accurate, confidential records concerning academic integrity violations. When a student has been found to have acted dishonestly, a letter summarizing the allegation, the outcome and the sanction shall be placed in the student's official file in the office of the school or college in which the student is enrolled.

In addition, each school's academic integrity officer shall make a report of the outcome of every formal accusation of student academic misconduct to the director of Student Conduct and Community Standards, 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 by an academic integrity officer, a committee, or the Office of Student Conduct and Community Standards, the person in charge of administering the hearing shall query the Office of Student Conduct and Community Standards about the student(s) accused of misconduct. The director shall provide any information in the records concerning that student to the integrity officer. Such information will be used in determining sanctions *only* if the student is found to have acted dishonestly in the present case. Evidence of past misconduct may not be used to resolve the issue of whether a student has acted dishonestly in a subsequent case.

### Reports to Faculty and Student Body

School and college academic integrity officers are encouraged to make periodic (at least annual) reports 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.

## Graduate Student Academic Integrity Policies

For graduate student academic integrity policies, please refer to each individual graduate school.

## Statement of Intent to Graduate

Students are required to file an Intent to Graduate at WebSTAC (https://acadinfo.wustl.edu/) prior to the semester in which they intend to graduate. Additional information is available in the dean's offices of each school and in the Office of the University Registrar (http://registrar.wustl.edu).

## Student Academic Records and Transcripts

The Family Educational Rights and Privacy Act of 1974 (FERPA) — Title 20 of the United States Code, Section 1232g, as amended — provides current and former students of the university with specific rights of access to and control over their student record information. In compliance with the statute, appropriate federal regulations, and guidelines recommended by the American Association of Collegiate Registrars and Admissions Officers, the university has adopted procedures that implement these rights.

A copy of the university policies regarding educational records and the release of student record information is available from the Office of the University Registrar (http://registrar.wustl.edu) and the university website (https://wustl.edu/).

Transcript requests for Danforth Campus students may be submitted to the Office of the University Registrar through WebSTAC. The School of Medicine registrar (http://registrar.med.wustl.edu/services/transcripts-and-certification/) accepts requests for transcripts and certification records for students and alumni of Audiology and Communication Sciences, Biomedical Informatics, Biostatistics, Clinical Investigation, Genetic Epidemiology, Health Administration, Health Behavior Research, Nurse Anesthesia, Occupational Therapy, Pediatric Nurse Practitioner, Physical Therapy, Population Health Sciences, Psychiatric Epidemiology, the School of Dentistry and the School of Medicine. Instructions and additional information are available on the University Registrar website (http://registrar.wustl.edu).

# University Affiliations

Washington University is accredited by the Higher Learning Commission (https://www.hlcommission.org/) (800-621-7440). Washington University is a member of the American Academy of Arts & Sciences, the American Association of University Women (AAUW), the American Council of Learned Societies (ACLS), the American Council on Education (ACE), the Association of American Colleges & Universities (AACU), the Association of American Universities

(AAU), the College Board, the Hispanic Association of Colleges & Universities (HACU), the Independent Colleges and Universities of Missouri (ICUM), the National Association of Independent Colleges and Universities (NAICU), the National Council for State Authorization Reciprocity Agreements (NC-SARA), the Oak Ridge Associated Universities (ORAU), and the University Research Association (URA).

The College of Arts & Sciences is a member of the American Association of Collegiate Registrars and Admissions Officers (AACRAO), the International Center for Academic Integrity (ICAI), the National Association of Fellowship Advisors (NAFA), the National Association of Advisors for Health Professions (NAAHP), and the Midwest Associate of Pre-Law Advisors (MAPLA).

The College of Architecture was one of the eight founding members of the Association of Collegiate Schools of Architecture (ACSA) in 1912.

The Graduate School is a founding member of both the Association of Graduate Schools and the Council of Graduate Schools.

The Graduate School of Architecture & Urban Design's Master of Architecture degree is accredited by the National Architectural Accreditation Board (NAAB), and its Master of Landscape Architecture degree is accredited by the Landscape Architecture Accrediting Board (LLAB).

The Sam Fox School of Design & Visual Arts is a founding member of and accredited by the National Association of Schools of Art and Design (NASAD).

The Olin Business School is a charter member (1921) of and accredited by the Association to Advance Collegiate Schools of Business International (AACSB). Olin Business School is also accredited by the Association of MBAs (AMBA).

In the McKelvey School of Engineering, many of the professional degrees are accredited by the Engineering Accreditation Commission of ABET (http://abet.org).

University College is a member of the University Professional and Continuing Education Association, the North American Association of Summer Sessions, the Association of University Summer Sessions, and the Center for Academic Integrity. Business-related programs in University College are not accredited by the Association to Advance Collegiate Schools of Business International (AACSB).

The School of Law is accredited by the American Bar Association. The School of Law is a member of the Association of American Law Schools, the American Society of Comparative Law, the Clinical Legal Education Association, the Southeastern Association of Law Schools, the Central Law Schools Association, the Mid-America Law Library Consortium, the American Association of Law Libraries, and the American Society of International Law.

The School of Medicine is a member of the Liaison Committee on Medical Education.

The Brown School at Washington University is accredited by the Council on Social Work Education and the Council on Education for Public Health.

The University Libraries are a member of the Association of Research Libraries.

The Mildred Lane Kemper Art Museum is nationally accredited by the American Alliance of Museums.

# School of Medicine

Washington University School of Medicine is a world leader in medical education, research and patient care. Its graduate programs in medical education (p. 40), occupational therapy (http://www.ot.wustl.edu/) , physical therapy (https://pt.wustl.edu/) and audiology (https://pacs.wustl.edu/) are perennially ranked among the nation's best by *U.S. News & World Report*. Faculty lead a robust research enterprise, supported by $485.7 million from the National Institutes of Health during the fiscal year ending June 30, 2019. The school's physicians provide care in partnership with the nationally ranked Barnes-Jewish Hospital (http://www.barnesjewish.org) and St. Louis Children's Hospital (http://www.stlouischildrens.org).

## 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 Mission

Washington University School of Medicine will lead in advancing human health through the best clinical care, innovative research, and education of tomorrow’s leaders in biomedicine in a culture that supports diversity, inclusion, critical thinking and creativity.

## Our Vision

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

- Cultivate excellence and collegiality within an inclusive community
- Attract and develop a diverse, talented, academic workforce
- Lead the revolution in biomedicine
- Enhance our intellectual and technological environment to foster exceptionally creative research and education
- Develop and maintain excellent clinical programs to provide outstanding care
- Observe the highest standards of ethics, integrity and compassionate care
- Apply advances in research and medicine to the betterment of the human condition locally and globally

*The School of Medicine mission and vision were approved by the Executive Faculty at their September 4, 2013, meeting.*

# Areas of Study



# Applied Health Behavior Research

Health behavior research is a multidisciplinary field that applies psychology, public health, behavioral medicine, communication science and statistics to promote health and prevent disease. Researchers in this area do the following: (1) study the broad range of factors that influence health behaviors and their impact on health outcomes and quality of life; (2) design and test innovative interventions to promote health and reduce disparities; and (3) disseminate evidence-based programs in diverse settings globally. Health behavior research is an important component of clinical research involving human participants, because benefits from medical care are dependent on health behaviors such as clear doctor-patient communication, patient adherence, self-management and risk avoidance.

Applied research seeks to solve practical, real-world problems; to develop innovative treatments, interventions and methods; and to immediately and practically apply its findings in clinical and community settings.

The skills-based graduate programs in Applied Health Behavior Research (AHBR) (https://crtc.wustl.edu/programs/degrees/ahbr/) offered through the Washington University School of Medicine are sponsored by the Clinical Research Training Center (https://crtc.wustl.edu/) and the Institute of Clinical and Translational Sciences (http://icts.wustl.edu/). The AHBR

program provides a strong foundation for graduates to contribute to the development and evaluation of programs and research trials to improve health behaviors, health care quality, health outcomes and quality of life.

## Location

All 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.

## Additional Information

Request Information (https://www.applyweb.com/fixie/form/s/T8Z1hqu/)

**Project Manager**
Email: ahbr@wustl.edu

**Amy McQueen, PhD**
Program Director
Phone: 314-286-2016
Email: amcqueen@wustl.edu

Washington University School of Medicine
Applied Health Behavior Research Program
Clinical Research Training Center (https://crtc.wustl.edu/)
660 South Euclid Avenue, CB 8051
St. Louis, MO 63110

| | |
|---|---|
| **Email:** | ahbr@wustl.edu |
| **Website:** | https://crtc.wustl.edu/programs/degrees/ahbr |

## Degrees & Offerings

- Master of Science in Applied Health Behavior Research (p. 61)
- Graduate Certificate in Health Behavior Planning and Evaluation (p. 62)

## Research

The graduate programs in Applied Health Behavior Research (AHBR) (https://crtc.wustl.edu/programs/degrees/ahbr/) provide a deeper understanding of the growing fields of health behavior research and behavioral medicine, which conduct research and disseminate findings across a variety of academic and hospital settings, nonprofit organizations, government agencies and private industry.

For professionals currently working in health-related fields, the skills-based curriculum provides hands-on methods and resources to enhance the knowledge and practical skills needed for career advancement. Courses (https://crtc.wustl.edu/courses/class-list/ahbr-courses/) prepare students for project management, leadership, research design and evaluation, data management, and analysis, and they increase students' content expertise in health behavior theory and methods.

For recent graduates planning for their future, the one-year research-intensive master's degree option (https://crtc.wustl.edu/programs/degrees/ahbr/one-year-ahbr/) provides opportunities for students to fulfill specific medical and graduate school core competencies and to enhance the competitiveness of their applications, making the program an ideal gap-year option. Through the mentored research experience provided, students develop theoretical knowledge and gain practical experience to pursue careers in medicine, allied health, psychology, public health, and other research or health-related fields.

AHBR graduates (https://crtc.wustl.edu/programs/degrees/ahbr/ahbr-student-experiences/) are prepared to conduct all phases of research: intervention design and implementation, survey development and administration, participant recruitment and tracking, data collection, data management and data analysis. In academic settings, graduates work for MD or PhD researchers in labs or research centers. In industry, graduates work for health insurance companies, managed care organizations and corporate wellness programs. For nonprofit and community organizations, graduates may lead the design, implementation, evaluation and dissemination of health and wellness programs; contribute to grant applications; and develop partnerships across agencies.

## Faculty

**Patricia Cavazos-Rehg, PhD (https://psychiatry.wustl.edu/people/patricia-cavazos-rehg-phd/)**
Associate Professor of Psychiatry
Department: Psychiatry

**Melissa Chapnick, RD, MS, MPH (https://crtc.wustl.edu/people/melissa-chapnick-rd-ms-mph/)**
Clinical Research Study Assistant II
Department: Obstetrics & Gynecology – Research & Operations, Washington University

**Robert Culverhouse, PhD (https://generalmedicalsciences.wustl.edu/directory/robert-culverhouse-phd/)**
Assistant Professor of Medicine
Department: General Medical Sciences, Washington University

**Michael Elliott, PhD (https://www.slu.edu/public-health-social-justice/faculty/elliot-michael.php)**
Lecturer, AHBR
Department: Biostatistics, School of Public Health, Saint Louis University

**Matthew Ellis, MPE (https://crtc.wustl.edu/people/matthew-ellis-mpe/)**
Clinical Lab Manager; Lecturer, AHBR
Department: Psychiatry

**Robert Fitzgerald, PhD, MPH (https://psychiatry.wustl.edu/people/robert-fitzgerald-phd-mph/)**
Research Instructor
Department: Psychiatry (Child)

**Shannon Lenze, PhD (https://psychiatry.wustl.edu/people/shannon-lenze-phd/)**
Assistant Professor of Medicine
Department: Psychiatry

**Julia López, PhD, MPH, LCSW (https://publichealth.wustl.edu/scholars/julia-d-lopez/)**
Research Instructor
Department: Obstetrics & Gynecology

**Amy McQueen, PhD (https://generalmedicalsciences.wustl.edu/directory/amy-mcqueen-phd/)**
Assistant Professor of Medicine
Department: Internal Medicine
Division: General Medical Sciences

**Don Rickert, PhD (https://crtc.wustl.edu/people/don-rickert-phd/)**
Lecturer, AHBR
Department: Pharmacy Administration, St. Louis College of Pharmacy

**Enbal Shacham, PhD (https://crtc.wustl.edu/people/enbal-shacham-phd/)**
Lecturer, AHBR
Department: Public Health & Social Justice, Saint Louis University

**Amaris Tippey, PhD (https://crtc.wustl.edu/people/amaris-tippey-phd/)**
Lecturer, AHBR
Department: Alvin J. Siteman Cancer Center, Barnes-Jewish Hospital

## Courses

Visit online course listings to view offerings for M88 AHBR (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M88).

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**M88 AHBR 505 Mentored Research**
Students are paired with faculty researchers to obtain hands-on experience and exposure to directed research. (*Not offered for Graduate Certificate*).
Credit 3 units.

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**M88 AHBR 508 Project Management in Clinical and Community Settings**
This course trains students in the day-to-day management of research projects and/or health behavior programs in clinical and community settings, including a review of ethics, data collection and management. Students develop skills for managing and coordinating all aspects of health behavior projects, including recruitment and retention of participants, developing and maintaining various databases for study/program tracking and analysis, writing reports, managing a project team, and using basic statistical tools for project reporting. Successful completion of this course enables students to better manage health-related studies and programs.
Credit 3 units.

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**M88 AHBR 514 Health Behavior Theory**
This course features analysis and application of behavior theories to health promotion/education planning, implementation, and evaluation in a variety of settings. Primary emphasis is on research related to determinants of health behavior such as personal, family and sociocultural factors that influence health, and lifestyle issues related to behavior change and adherence. Strategies and techniques used by professionals to foster human health are also featured.
Credit 3 units.

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**M88 AHBR 515 Health Psychology**
This course explores the complex interactions between biological, psychological and social factors as they influence health, health behaviors and coping with illness. In a seminar format, students read, present and discuss empirical literature related to health psychology. Specific class topics include the history and current roles of health psychology as a professional discipline, theoretical models of health and illness prevention with an emphasis on the biopsychosocial model, stress, pain, and the role of biopsychosocial factors in several specific medical illnesses including diabetes, asthma, heart disease and cancer. Developmental issues related to health knowledge and perception, disease management and coping with illness are also discussed.
Credit 3 units.

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**M88 AHBR 524 Foundations of Health Care Research**
This course provides an introduction to the basic scientific concepts and methods of investigation used in health care, social science and behavioral science. Students develop an advanced understanding of all phases and components of the research process. Topics include generating research questions and hypotheses, designing a study, selecting a study sample, measuring variables and constructs, collecting data, and planning data analysis and presentation. Prerequisite: M88-525 Introduction to Biostatistics.
Credit 3 units.

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**M88 AHBR 525 Introduction to Biostatistics**
This course introduces the basic principles and methods of biostatistics, providing a sound methodological foundation for applications in health care, medicine, public health and epidemiology. Basic statistics, including probability, descriptive statistics, inference for means and proportions, and regression methods are presented. Course work and assignments are designed to provide regular feedback, require repetition of core techniques necessary for mastery of statistical thinking and analysis, challenge students to tackle both straightforward and difficult applications of descriptive and analytic statistics to practical public health problems, and incorporate statistical tools and results into oral and written presentations, emphasizing proper use of language and effective communication.
Credit 3 units.

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**M88 AHBR 535 Health Disparities: Applications in Clinical Settings**
This course explores how membership in a diverse/special group can impact health and health care, the identification of barriers to research participation, and effective strategies for improving recruitment efforts of minority and underserved populations. Exploration of health care services and policies governing these services is also included. Students are encouraged to give critical thought to the question of what it means to deliver culturally competent care. The goal of this course is to understand what it means to create environments (social and otherwise) that help to make individuals and communities healthy.
Credit 3 units.

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**M88 AHBR 536 Health Education: Methods, Planning, and Evaluation**
This course provides the basic concepts of learning theory as they relate to health behavior. Students become familiar with teaching/learning processes, teaching methods, community resources, and selection of appropriate evaluation strategies. Focus is on the role played by individual and community behavior as well as environmental and policy factors in preventing chronic and communicable diseases. Students attain the knowledge and skills to plan, develop, implement, monitor and evaluate behavior change programs for improving health status, as well as how to assess the health needs of communities and organizations. Prerequisite: M88-514 Health Behavior Theory.
Credit 3 units.

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**M88 AHBR 540 Community Health Promotion**
In this course students explore concepts in health promotion including community assessment, resource identification, intervention strategies and evaluation. State and national interventions for lifestyle change and model school and work site programs are featured Prerequisite: M88-514 Health Behavior Theory.
Credit 3 units.

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**M88 AHBR 547 Power and Sample Size**
Students learn the theoretical and practical aspects of how to calculate sample size for common study designs under various restraints (time, resources, etc.). An overview of statistical power computations for a variety of experimental and epidemiological study designs is provided. These include single sample designs, two-sample designs, cohort designs, case-control designs and various other experimental designs based on the Analysis of Variance model. The concepts of statistical power, statistical precision, sample size and effect size are also reviewed. Prerequisite: M88-525 Introduction to Biostatistics.
Credit 1 unit.

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**M88 AHBR 548 Applied Data Management**
This class is designed as an advanced seminar intended for students in the health and social sciences who plan to engage in applied research and includes a survey of important data management topics and techniques including: data programming and manipulation, data storage and security, data cleaning, relational database theory, and legal and ethical issues of data management. Students develop skills in data programming and manipulation, data storage and security, data cleaning, and relational database theory using software such as SPSS, SAS, Excel and Microsoft Access. Prerequisite: M88-525 Introduction to Biostatistics.
Credit 3 units.

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**M88 AHBR 550 Introduction to Using REDCap for Research**
Students will learn the purpose and benefits of using sophisticated software platforms such as REDCap for conducting research. Through in-class demonstrations and exercises, students will gain critical hands-on experience using various features of REDCap software, including creating new projects and assigning user rights; development vs. production mode; participant tracking; project calendars and scheduling features; data collection and management; customizable survey design and administration mode; database design; data import and export functions; default and custom reporting tools; audit trails; file sharing; interoperability with other data systems (EMR) and software, including common reporting tools (Excel) and statistical packages (SPSS, SAS, R); and more. Students will learn about the HIPAA compliance standards of REDCap and how the same databases can be used across sites in a multisite study. Students will apply their skills to a proposal for using REDCap to address a specific research objective of their choosing.
Credit 1 unit.

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**M88 AHBR 560 Survey Methods: Design and Evaluation**
This applied course focuses on methodological issues regarding the design, implementation, analysis, and interpretation of surveys and questionnaires in public health research. Essential theoretical concepts are addressed, and practical applications are emphasized. Survey design and planning, sampling, and data collection procedures are three of the major topic areas covered.
Credit 3 units.

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**M88 AHBR 562 Leadership and Change in Health Care Services**
Students engage in the advanced study of leadership, integrating theory, research and application in a diagnostic approach. Leadership skills for managing planned organizational change are developed through group discussions, class exercises, case studies, and the application of organizational approaches to change and innovation. Topics include personal effectiveness, team building, and creating learning environments in organizations.
Credit 3 units.

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**M88 AHBR 582 Evaluation of Health Services Programs**
This course introduces students to the fundamentals of program evaluation methodology, methods of data collection and related measurement reliability and validity. The curriculum features practical applications and illustrations. Topics include the link between program planning and program evaluation; evaluation research designs and their limitations; integrating process and outcome approaches; methods of data collection and utilization of evaluation results. Prerequisite: M88-536 Health Education: Methods, Planning and Evaluation.
Credit 3 units.

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**M88 AHBR 584 Internship**
Provides an opportunity to participate in health promotion through various health promotion agencies. Students work with agency site supervisor for 42 contact hours developing, implementing and evaluating a health promotion project. Also, students meet monthly for 2.5-hour seminars with HCS internship adviser. Students must submit an application (to be obtained in Health Care Services office) and résumé. Approved applicants will be interviewed by agency site supervisor. Deadline for application: one month before registration deadline of intended semester.
Credit 3 units.

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**M88 AHBR 588 Epidemiology for Clinical Research**
The purpose of this course is to provide an understanding of the use of epidemiological concepts and methods in clinical research. Two primary foci are included: 1) common applications of epidemiologic principles and analytic tools in evaluating clinical research questions; and 2) student development of skills to review and interpret the medical literature and utilize publicly available datasets to address clinical research questions.
Credit 3 units.

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# Audiology and Communication Sciences

The Program in Audiology and Communication Sciences (PACS) offers exceptional graduate education programs in clinical audiology, deaf education, and speech and hearing sciences as well as an undergraduate minor in speech and hearing. As a member of a consortium of programs known as the Central Institute for the Deaf at Washington University School of Medicine, PACS is closely affiliated with the clinical and research programs of the Department of Otolaryngology (https://oto.wustl.edu/), including adult audiology clinics, the cochlear implant clinic, the dizziness and balance center, basic research centers, clinical research efforts and applied research centers. PACS offers the following graduate degree programs:

## Doctor of Audiology (AuD)

The AuD is a four-year course of study that prepares students as independent clinical audiologists. Established in 1947, this audiology program is among the oldest and most prestigious of its kind. Today, its curriculum serves as a national model, immersing students in academic course work, clinical experiences and research opportunities.The AuD program welcomes students from all undergraduate backgrounds, and no specific prerequisite course work is required to apply. The AuD program is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association.

## Master of Science in Deaf Education (MSDE)

The MSDE is a two-year course of study that prepares students as teachers of children who are deaf or hard of hearing from birth to grade 12. With origins dating back to 1914, the program is recognized internationally as one of the most prestigious of its kind. The program's intensive curriculum, emphasis on immersion in practice teaching, and experienced faculty attract students nationally from a wide variety of backgrounds. The MSDE program welcomes students from all undergraduate backgrounds, and no specific prerequisite course work is required to apply. The MSDE program is accredited by the Missouri Department of Elementary and Secondary Education and the Council on Education of the Deaf.

## Speech and Hearing Sciences (PhD)

The PhD program prepares students for academic and research careers in the speech and hearing sciences. Established in 1947, the program is dedicated to fostering scientific inquiry in the speech and hearing sciences and related disciplines. PhD students complete required course work, mentored teaching experiences, and research — including the dissertation — under the close mentorship of a faculty member. General areas of emphasis include audiology, deaf education, sensory neuroscience, and speech and language. An academic background in the field and research experience are required to be considered for admission to the PhD program.

## Additional Information

Application and admission information (https://pacs.wustl.edu/admissions/) can be found on the PACS website. Additional information about the degrees offered by PACS can be found via links on the Degrees & Offerings (p. 20) tab of this page. For complete information, please visit the PACS website (https://pacs.wustl.edu/).

Washington University School of Medicine
Program in Audiology and Communication Sciences
CB 8042, 660 S. Euclid Ave.
St. Louis, MO 63110

| | |
|---|---|
| **Phone:** | 314-747-0104 |
| **Email:** | pacs@wustl.edu |
| **Website:** | https://pacs.wustl.edu |

## Degrees & Offerings

# 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, auditory brain stem implants, age-related and noise-induced hearing loss, and the education of children who are deaf and hard of hearing.

# Faculty

## Director of Deaf Education Studies

**Heather Grantham, PhD (https://pacs.wustl.edu/people/heather-hayes-phd/)**
Associate Professor of Otolaryngology
Associate Professor of Audiology and Communication Sciences

## Director of Audiology Studies

**Amanda Ortmann, PhD (https://pacs.wustl.edu/people/amanda-j-ortmann-phd/)**
Assistant Professor of Otolaryngology
Assistant Professor of Audiology and Communication Sciences

## Faculty and Staff List

For a full list of participating faculty and staff, please visit the PACS website (https://pacs.wustl.edu/our-faculty-2/).

# Courses

Visit online course listings to view offerings for M89 PACS (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M89).

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**M89 PACS 401 Anatomy and Physiology of Speech and Hearing**
Introduction to anatomy and physiology of the peripheral hearing system and central nervous system, including functional descriptions of the systems and processes underlying speech and hearing function and dysfunction.
Credit variable, maximum 3 units.

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**M89 PACS 4011 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. Prerequisite: Permission of department required.
Credit 2 units.

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**M89 PACS 416 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. Prerequisite: Permission of department required.
Credit 3 units.

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**M89 PACS 421 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.

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**M89 PACS 424 Speech and Hearing Sciences**
Surveys a broad array of speech and hearing science topics. Focus is on how speech and hearing science research findings can be applied to the practice of deaf education.
Credit 1 unit.

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**M89 PACS 4301 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

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**M89 PACS 4302 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. Prerequisite: PACS 4301-Sign Language I.
Credit 2 units. EN: H

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**M89 PACS 434 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.

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**M89 PACS 438 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. Permission of department required.
Credit 3 units.

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**M89 PACS 444 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 videotapes, live demonstrations and in-class activities. Direct contact with children and technological devices will also be used to support lectures and discussions. Prerequisite: Permission of department required.
Credit 2 units.

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**M89 PACS 4511 Practicum in Deaf Education**
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. Prerequisite: Permission of department required.
Credit 7 units.

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**M89 PACS 4512 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. Prerequisite: Permission of department required.
Credit 7 units.

---

**M89 PACS 4515 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. Prerequisite: Permission of department required.
Credit 3 units.

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**M89 PACS 4525 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. Prerequisite: Permission of department required.
Credit 4 units.

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**M89 PACS 4526 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. Prerequisite: Permission of department required.
Credit 2 units.

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**M89 PACS 454 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. Prerequisite: Permission of department required.
Credit 3 units.

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**M89 PACS 455 Mathematics and Content-Area Instruction for Children Who Are Deaf or Hard of Hearing II**
A continuation of PACS 454. 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. Prerequisites: PACS 454 and permission of department required.
Credit 3 units.

**M89 PACS 457 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. Prerequisite: Permission of department required.
Credit 3 units.

**M89 PACS 458 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. Prerequisite: Permission of department required.
Credit 3 units.

**M89 PACS 460 Audiology Staffing**
Discussion and presentations of clinical cases and issues related to practice in clinical audiology. Prerequisite: Permission of department required.
Credit 1 unit.

**M89 PACS 4611 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 1 unit.

**M89 PACS 4612 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 1 unit.

**M89 PACS 4613 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 3 units.

**M89 PACS 4621 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 2 units.

**M89 PACS 4622 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 2 units.

**M89 PACS 4623 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 4 units.

**M89 PACS 4631 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 2 units.

**M89 PACS 4632 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 2 units.

**M89 PACS 4633 Practicum in Audiology**
Supervised practicum in audiology. Prerequisite: permission of department required.
Credit 6 units.

**M89 PACS 4641 Clinical Externship in Audiology**
Clinical externship in audiology (on campus). Prerequisite: permission of department required.
Credit 9 units.

**M89 PACS 4642 Clinical Externship in Audiology**
Clinical externship in audiology (on campus). Prerequisite: permission of department required.
Credit 9 units.

**M89 PACS 4651 Clinical Externship in Audiology**
Clinical externship in audiology (off campus). Prerequisite: permission of department required.
Credit 9 units.

**M89 PACS 4652 Clinical Externship in Audiology**
Clinical externship in audiology (off campus). Prerequisite: permission of department required.
Credit 9 units.

**M89 PACS 466 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. Prerequisite: permission of department required.
Credit 3 units.

**M89 PACS 468 Pediatric Audiology**
Fundamentals of audiologic assessment for infants and children. Behavioral and electrophysiologic procedures, and assessment of auditory processing abilities, are presented. Prerequisite: permission of department required.
Credit 3 units.

**M89 PACS 470 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. Prerequisite: permission of department required.
Credit 2 units.

**M89 PACS 5001 Electrophysiologic Techniques I**
Introduces basic concepts in administration and interpretation of physiologic and electrophysiologic measures, with focus on auditory evoked potentials (AEP). Content covers basic instrumentation, parameters and variables affecting the AEP, auditory brainstem response (ABR), middle (MLR) and late (LLR) evoked potentials, auditory steady state response (ASSR) and otoacoustic emissions (OAE). Prerequisite: permission of department required.
Credit 3 units.

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**M89 PACS 5002 Electrophysiologic Techniques II**
Advanced concepts related to the administration and interpretation of physiologic and electrophysiologic measures. Content includes in-depth study of ABR and other auditory evoked potentials, and the clinical application of these for the audiologist. Additional topics include study of electrocochleography (ECochG), 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. Prerequisites: permission of department required.
Credit 1 unit.

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**M89 PACS 502 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. Prerequisites: permission of department required.
Credit 1 unit.

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**M89 PACS 505 Auditory Neuroscience**
Development of an in-depth understanding of issues related to auditory neurophysiology from the auditory nerve to the cortex. Prerequisites: permission of department required.
Credit 2 units.

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**M89 PACS 506 Genetics in Hearing Loss**
Study of the genetic causes of hearing loss and balance disorders, and syndromes affecting the auditory and vestibular systems. Prerequisites: Permission of department required.
Credit 1 unit.

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**M89 PACS 507 Vestibular Disorders**
Comprehensive course covering the assessment, diagnosis and treatment of vestibular disorders. Prerequisites: Permission of department required.
Credit variable, maximum 3 units.

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**M89 PACS 510 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. Prerequisites: Permission of department required.
Credit 3 units.

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**M89 PACS 511 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. Prerequisites: Permission of department required.
Credit 3 units.

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**M89 PACS 517 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. Prerequisites: Permission of department required.
Credit 2 units.

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**M89 PACS 519 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. Prerequisite: Permission of department required.
Credit 2 units.

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**M89 PACS 543 Survey of Speech and Language Disorders**
Surveys a broad range of speech and language disorders in terms of associated characteristics, assessment techniques and treatment considerations. Prerequisites: Permission of department required.
Credit 2 units.

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**M89 PACS 544 Clinical Observation and Methods in Speech-Language Pathology**
Provides students with an introduction to clinical methods and observation experiences in speech-language pathology. Prerequisites: Permission of department required.
Credit 3 units.

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**M89 PACS 551 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. Refer to section description for information on specific topics by section. Prerequisite: Permission of department required.
Credit variable, maximum 3 units.

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**M89 PACS 554 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. Prerequisites: Permission of department required.
Credit 1 unit.

**M89 PACS 555 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. Prerequisite: Permission of department required.
Credit 3 units.

**M89 PACS 558 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. Prerequisite: permission of department required.
Credit 1 unit.

**M89 PACS 5601 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. Prerequisites: Permission of department required.
Credit 3 units.

**M89 PACS 5602 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. Prerequisites: Permission of department required.
Credit 3 units.

**M89 PACS 5651 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.

**M89 PACS 5652 Hearing Devices in Audiology II**
Advanced issues related to the selection and evaluation of hearing aids. Means of adjusting hearing aids and measuring their function and benefit. Prerequisite: permission of department required.
Credit 3 units.

**M89 PACS 5653 Hearing Devices in Audiology III**
Course covers a variety of topics related to selection, fitting and rehabilitation of cochlear implant patients. Lectures and practical experience in psychophysical testing, programming of the cochlear implant, and auditory training. Prerequisite: permission of department required.
Credit 3 units.

**M89 PACS 569 Hearing Disorders**
This course covers the nature and causes of hearing disorders, including outer and middle ear, cochlear, retrocochlear and central nervous system. Prerequisites: Permission of department required.
Credit 2 units.

**M89 PACS 570 Independent Study**
Students engage in independent work on the Independent Study, which demonstrates advanced critical thinking and writing skills. Prerequisites: Permission of department required.
Credit variable, maximum 6 units.

**M89 PACS 5700 Capstone Project**
Independent work on the Capstone Project. Prerequisites: Permission of department required.
Credit variable, maximum 6 units.

**M89 PACS 5701 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. Prerequisites: Permission of department required.
Credit 1 unit.

**M89 PACS 574 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. Prerequisites: Permission of department required.
Credit 3 units.

**M89 PACS 575 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. Prerequisites: Permission of department required.
Credit variable, maximum 4 units.

**M89 PACS 577 Research in Speech and Hearing**
Prerequisites: Permission of department required.
Credit variable, maximum 12 units.

**M89 PACS 587 Dissertation Research**
Prerequisites: Permission of department required.
Credit variable, maximum 12 units.

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**M89 PACS 597 Mentored Teaching Experience in Speech and Hearing**
Mentored teaching experience as a graduate teaching assistant. Under faculty supervision, credit may be earned through instruction of undergraduate or graduate students in courses offered by PACS. (Taken concurrently with LGS 600-48.)
Credit variable, maximum 12 units.

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**M89 PACS 886 Doctoral Nonresident**
This course option is a placeholder that may be used when a doctoral student needs to maintain enrollment but is not registered for any course, teaching, or research hours for the semester. Doctoral students on an approved leave of absence should also be registered under this course option. Prerequisite: permission of department required.

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# Biology and Biomedical Sciences

The 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 12 doctoral programs:

- Biochemistry, Biophysics and Structural Biology
- Cancer Biology
- Computational and Systems Biology
- Developmental, Regenerative and Stem Cell Biology
- Evolution, Ecology and Population Biology
- Human and Statistical Genetics
- Immunology
- Molecular Cell Biology
- Molecular Genetics and Genomics
- Molecular Microbiology and Microbial Pathogenesis
- Neurosciences
- Plant and Microbial Biosciences

A collaborative, interdisciplinary approach to research and education is a hallmark of Washington University and the Division. As a universitywide 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 approximately 690 PhD and MD PhD students, with more than 500 faculty members from 38 departments.

Washington University in St. Louis provides unique opportunities for translating basic science to 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 in plant, population, evolutionary and ecological sciences benefit from our close affiliation with the internationally renowned Missouri Botanical Garden (http://www.missouribotanicalgarden.org/) and the Danforth Plant Science Center (http://www.danforthcenter.org/).

To help prepare graduates for careers in academia, government, industry or another field of their choice, educational opportunities are offered for skills development and career exploration. The DBBS offers career-planning curriculum, and 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 Initiative for Maximizing Student Development Career Pathway Talks program, 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 — through partnerships with groups such as the Teaching Center, the Career Center, and student organizations such as ProSPER, InPrint, Sling Health, the BALSA Group, and the Young Scientist Program — students have additional opportunities to develop experiences relevant to their future career goals.

## 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

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| **Email:** | dbbsphdadmissions@wustl.edu |
| **Website:** | http://dbbs.wustl.edu |

## Degrees & Offerings

- PhD Degrees in Biology & Biomedical Sciences (p. 63)

## Research

### Biochemistry, Biophysics and Structural Biology (http://dbbs.wustl.edu/divprograms/biophysics/Pages/BBSB.aspx)

*Areas of study:*

- Enzymology and allostery

• Mechanisms of neural degeneration
• Molecular signaling
• Biochemistry of host-pathogen interactions
• Mechanisms of microbial immune evasion
• Protein-nucleic acid interactions
• Cell cycle regulation
• Computational biophysics
• Cellular transport and trafficking
• Nanotechnology and chemical biology

Visit our website for information about our Biochemistry, Biophysics and Structural Biology faculty (http://dbbs.wustl.edu/divprograms/biophysics/Pages/Faculty.aspx).

## Cancer Biology (http://dbbs.wustl.edu/divprograms/cancerbiology/Pages/default.aspx)

*Areas of study:*

• Apoptosis and autophagy
• Tumor cell biology
• Chromosome stability and genome maintenance
• Cell motility and metastasis
• DNA repair, replication and recombination
• Transcriptional and translational regulation
• Metabolism
• Imaging technologies
• Receptor-ligand interactions
• Signal transduction molecules and pathways
• Biomarker studies
• Genomic mutation profiles and informatics
• Non-coding RNAs
• Tumor immunology and vaccines
• Tumor viruses
• Hematopoiesis
• Cancer disparities
• Small molecule and nanotechnology discoveries
• Tumor microenvironments
• Clinical trial research

Visit our website for information about our Cancer Biology Faculty (http://dbbs.wustl.edu/divprograms/cancerbiology/Pages/Faculty.aspx)

## Computational and Systems Biology (http://dbbs.wustl.edu/divprograms/compbio/Pages/default.aspx)

*Areas of study:*

• Large-scale genetic network analysis and reconstruction
• Technology development for high-throughput collection of genetic and biochemical data
• 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
• Metagenomics and microbiomes
• Epigenetics and epigenomics
• Functional genomic studies of population genetic variation
• Big-biodata integration and modeling

Visit our website for information about our Computational and Systems Biology faculty (http://dbbs.wustl.edu/divprograms/compbio/Pages/Faculty.aspx).

## Developmental, Regenerative and Stem Cell Biology (http://dbbs.wustl.edu/divprograms/devbio/Pages/default.aspx)

*Areas of study:*

• Regenerative and stem cell biology
• Organogenesis
• Animal models of human developmental disorders
• Aging and longevity
• Neuronal development, differentiation and plasticity
• Genetic/developmental basis of cancer
• Growth factors and cell signaling during development
• Establishment of cell and tissue polarity
• Circadian rhythms
• Growth control and nutrition
• Hormonal regulation
• Gene regulatory networks/systems biology
• Epigenetic control of development

Visit our website for information about our Developmental, Regenerative and Stem Cell Biology faculty (http://dbbs.wustl.edu/divprograms/devbio/Pages/Faculty.aspx).

## Evolution, Ecology and Population Biology (http://dbbs.wustl.edu/divprograms/eepb/Pages/default.aspx)

*Areas of study:*

• Levels and maintenance of genetic variation in natural plant and animal populations
• Variation at medically relevant genes and candidate loci
• Molecular evolution of genes
• Mechanisms of speciation and adaptation
• Factors that contribute to biodiversity across space and time
• Interaction of species and how such interactions affect biodiversity
• Restoration and conservation of species
• Biology of invasive species
• Role of species in the functioning of entire ecosystems
• Phylogenic relationships among populations, species and higher taxa

Visit our website for information about our Evolution, Ecology and Population Biology faculty (http://dbbs.wustl.edu/divprograms/eepb/Pages/Faculty.aspx).

## Human and Statistical Genetics (http://dbbs.wustl.edu/divprograms/hsg/Pages/default.aspx)

*Areas of study:*

• Detection of loci for simple and complex/quantitative traits in humans
• Association analyses for common and rare variants
• Development of novel statistical methods for gene discovery
• Mapping of simple and quantitative traits in model organisms
• Genomic approaches to gene expression, transcriptional regulation, and development
• Functional analysis of genes and variants for human disease

Visit our website for information about our Human and Statistical Genetics faculty (http://dbbs.wustl.edu/divprograms/hsg/Pages/Faculty.aspx).

## Immunology (http://dbbs.wustl.edu/divprograms/immunology/Pages/default.aspx)

*Areas of study:*

• Tumor immunobiology
• Autoimmune diseases
• Host-pathogen interactions
• Immune system development
• Lymphocyte function
• Molecular immunology
• Cytokine function
• Lymphocyte differentiation
• Lymphocyte signaling
• Computational modeling of immune responses

Visit our website for information about our Immunology faculty (http://dbbs.wustl.edu/divprograms/immunology/Pages/Faculty.aspx).

## Molecular Cell Biology (http://dbbs.wustl.edu/divprograms/cellbio/Pages/default.aspx)

*Areas of study:*

• Apoptosis
• Cancer cell biology
• Chromosome biology and genome maintenance
• Cytoskeleton assembly, cell motility and chemotaxis
• DNA repair, replication, and recombination
• Extracellular matrix and tissue mechanics
• Mechanisms of enzyme catalysis and inhibition
• Mechanisms of transcription and tissue-specific transcription regulation
• Membrane excitability
• Metabolism
• New imaging technologies for cells and whole animals
• Organelle biogenesis
• Prion diseases and neural degeneration
• Protein trafficking
• Receptor-ligand interactions in regulation of cell growth and cell phenotype
• Regulation of gene expression and translational control
• Signal transduction molecules and pathways
• Vascular biology and coagulation

Visit our website for information about our Molecular Cell Biology faculty (http://dbbs.wustl.edu/divprograms/cellbio/Pages/Faculty.aspx).

## Molecular Genetics and Genomics (http://dbbs.wustl.edu/divprograms/genetics/Pages/default.aspx)

*Areas of study:*

• Genetic basis of human disease
• Epigenetics
• Animal models of human disease
• Cancer genetics
• Model organism genetics
• Computational genomics and epigenomics
• Regulation of transcription and translation
• Population genetics
• Developmental genetics
• Gene therapy
• Gene regulatory networks/systems biology
• Genetic basis of microbial development and pathogenesis
• Functional genomics
• Sequence analysis and gene-structure prediction

Visit our website for information about our Molecular Genetics and Genomics faculty (http://dbbs.wustl.edu/divprograms/genetics/Pages/Faculty.aspx).

## Molecular Microbiology and Microbial Pathogenesis (http://dbbs.wustl.edu/divprograms/micro/Pages/default.aspx)

*Areas of study:*

• Microbial physiology
• Molecular genetics
• Genomics
• Structural biology
• Environmental microbiology
• Microbial bioenergy
• Bacteriology
• Mycology

• Parasitology
• Virology
• Host defense, allergy and inflammation
• Cell biology of host-pathogen interactions
• Imaging technologies for cells and whole animals
• Immune responses to pathogens

Visit our website for information about our Molecular Microbiology and Microbial Pathogenesis faculty (http://dbbs.wustl.edu/divprograms/micro/Pages/Faculty.aspx).

### Neurosciences (http://dbbs.wustl.edu/divprograms/neuro/Pages/default.aspx)

*Areas of study:*

• Neurobiology
• Neurology
• Functional imaging
• Behavior
• Cognition
• Computational neuroscience
• Electrophysiology
• Sensory systems
• Motor systems
• Neuroglia
• Neuronal development
• Learning
• Memory
• Language
• Synaptic plasticity
• Mind
• Consciousness
• Neurodegeneration
• Diseases of the nervous system
• Neuronal injury
• Clinical neuroscience
• Motor control
• Biological rhythms
• Connectivity mapping

Visit our website for information about our Neurosciences faculty (http://dbbs.wustl.edu/divprograms/neuro/Pages/Faculty.aspx).

### Plant and Microbial Biosciences (http://dbbs.wustl.edu/divprograms/PlantMicroBioSci/Pages/default.aspx)

*Areas of study:*

• Molecular mechanisms governing responses of microbes and plants to their environment
• Assembly and regulation of membrane-associated complexes
• Cytoskeleton organization and its role in morphology and cell division
• Structural biology and biochemistry
• Molecular mechanisms underlying cell and organelle size
• Plant-microbe interactions
• Metabolic engineering of natural products, biomaterials, and biofuels
• Microbial ecology and evolution
• Biogeochemical cycles and earth history
• Systems biology
• Astrobiology

Visit our website for information about our Plant and Microbial Biosciences faculty (http://dbbs.wustl.edu/divprograms/PlantMicroBioSci/Pages/Faculty.aspx).

## Faculty

For a list of divisions and their areas of study, including more information about program faculty members, please refer to the Research (p. 26) section of this page.

## Courses

For a full listing of courses offered through the Division of Biology and Biomedical Sciences, please visit the university's online course listings (https://courses.wustl.edu/CourseInfo.aspx?sch=L&dept=L41&crslvl=5:9).

# Biomedical Informatics

The mission of the Institute for Informatics ($I^2$) focuses on the informatics 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.

Our vision at $I^2$ is to serve as the academic and professional home for a preeminent interdisciplinary program of research, education and service in informatics at Washington University by enabling advances in biomedical research and improvements in the quality of health care.

The institute coordinates informatics efforts across the Medical Campus and the Danforth Campus while also developing partnerships with the Health Systems Innovation Laboratory at BJC HealthCare, the Cortex Innovation Community and other regional partners.

$I^2$ offers a Master of Science (MS) and a certificate program in biomedical informatics. The purpose of the MS and certificate courses is to provide comprehensive and competency-based training in core biomedical informatics theories and methods for the following individuals:

- Recent college graduates with backgrounds in the biological and/or computational sciences
- In-career learners with a broad range of experiences in biomedicine/biosciences, mathematics, physical or computer information sciences or engineering, and cognitive and/or social sciences

**Website:** https://informatics.wustl.edu/

## Degrees & Offerings

- Master of Science in Biomedical Informatics (p. 64)
- Certificate Program in Biomedical Informatics (p. 65)

## Research

**Joanna Abraham, PhD (https://informatics.wustl.edu/research-lab-joanna-abraham/)**, is focused on improving collaborative practices in health care using principles and techniques from informatics to promote patient safety, quality and care continuity.

**Research interests:** handoffs, care transitions, care coordination, decision making, health IT, medical errors, mixed methods, systematic reviews, evidence synthesis

**Chih-Hung Chang, PhD (https://informatics.wustl.edu/research-lab-chih-hung-chang/)**, is focused on the integration of methodology and technology to advance clinical care, research and education.

**Research interests:** item response theory, Rasch measurement, computerized adaptive testing, psychometrics, informatics, smart testing and smart learning, health-related quality of life, patient-reported outcomes, clinical outcomes, shared decision making, quality improvement

**Randi Foraker, PhD (https://informatics.wustl.edu/research-lab-randi-foraker/)**, is focused on applying epidemiology and informatics techniques to solve problems in the population health domain.

**Research interests:** approaches for the integration of socioeconomic and patient-reported outcome data with electronic health record data; interventional approaches to the use of electronic health records in order to address modifiable risk factors for disease and enable patient-centered decision making; study design methodology and data analysis

**Thomas Kannampallil, PhD (https://informatics.wustl.edu/research-lab-thomas-kannampallil/)**, is focused on integrating cognitive, behavioral and computational informatics techniques to develop health information technology solutions in the areas of clinical decision support, clinical reasoning and clinical workflow.

**Research interests:** clinical decision support applications for tracking, monitoring and evaluating electronic health record–based activities such as medication/lab orders, decision-making for chronic care, and opioid management; tracking and analysis of medical errors in a variety of situations (e.g., medication orders, transitions of care, clinical decision-making) and evaluating their impact on clinical outcomes and patient safety; use of cognitive and human factors approaches for identifying behavioral, collaborative and workflow challenges in the design and use of health information technology

**Albert M. Lai, PhD (https://informatics.wustl.edu/research-lab-albert-lai/)**, is focused on applying computer science and informatics techniques to solve problems in the clinical domain.

**Research interests:** clinical research informatics, clinical informatics, consumer health informatics, telemedicine, usability, natural language processing, mobile health

**Fuhai Li, PhD (https://informatics.wustl.edu/research-lab-fuhai-li/)**, is focused on applying statistical, machine learning, deep learning and data mining approaches to diverse biomedical dataset integration and interpretation to solve the challenges of bioinformatics, systems biology and image informatics.

**Research interests:** integrative large-scale pharmacogenomics analysis for target, signaling network, drug and drug combination discovery; genomics data driven tumor-stromal communication discovery and modeling

**Philip R.O. Payne, PhD, FACMI (https://informatics.wustl.edu/research-lab-philip-payne/)**, is the founding director of $I^2$ at Washington University in St. Louis, where he also serves as the Robert J. Terry Professor and Professor of Computer Science and Engineering. Previously, Dr. Payne was Professor and Chair of the Department of Biomedical Informatics at The Ohio State University.

**Research interests:** knowledge-based approaches to the discovery and analysis of biomolecular and clinical phenotypes and the ensuing identification of precision diagnostic and therapeutic strategies in cancer; interventional approaches to the use of electronic health records in order to address modifiable risk factors for disease and enable patient-centered decision making; the study of human factors and workflow issues surrounding the optimal use of health care information technology

**Po-Yin Yen, PhD, RN (https://informatics.wustl.edu/research-lab-po-yin-yen/)**, is focused on applied clinical informatics research to support clinicians adapting to health information technology.

**Research interests:** clinical informatics, usability, technology acceptance, human–computer interaction, literature mining, data visualization, workflow analysis, time motion study

## Faculty

**Philip R.O. Payne, PhD, FACMI (https://informatics.wustl.edu/research-lab-philip-payne/)**
Director, Institute for Informatics
Robert J. Terry Professor
Professor of Medicine, Division of General Medical Sciences, School of Medicine
Professor of Computer Science and Engineering, School of Engineering and Applied Science

**Joanna Abraham, PhD (https://informatics.wustl.edu/research-lab-joanna-abraham/)**
Assistant Professor of Anesthesiology, School of Medicine

**Chih-Hung Chang, PhD (https://informatics.wustl.edu/research-lab-chih-hung-chang/)**
Professor of Occupational Therapy and of Medicine, Division of General Medical Sciences, School of Medicine

**Randi Foraker, PhD, MA, FAHA (https://informatics.wustl.edu/research-lab-randi-foraker/)**
Associate Professor of Medicine, Division of General Medical Sciences, School of Medicine
Director, Center for Population Health Informatics

**Thomas Kannampallil, PhD (https://informatics.wustl.edu/research-lab-thomas-kannampallil/)**
Assistant Professor of Anesthesiology, School of Medicine
Associate Chief Research Information Officer, School of Medicine

**Albert M. Lai, PhD (https://informatics.wustl.edu/research-lab-albert-lai/)**
Deputy Director, Institute for Informatics
Chief Research Information Officer, School of Medicine
Associate Professor of Medicine, Division of General Medical Sciences, School of Medicine

**Fuhai Li, PhD (https://informatics.wustl.edu/research-lab-fuhai-li/)**
Assistant Professor of Pediatrics, School of Medicine

**Aristeidis Sotiras, PhD (https://informatics.wustl.edu/dr-aristeidis-sotiras/)**
Assistant Professor of Medicine, School of Medicine

**Po-Yin Yen, PhD, RN (https://informatics.wustl.edu/research-lab-po-yin-yen/)**
Assistant Professor of Medicine, Division of General Medical Sciences, School of Medicine
Assistant Professor, Goldfarb School of Nursing, Barnes-Jewish College

## Courses

**M18 BMI 5200 Biomedical Informatics Journal Club**
Trainees will attend weekly one-hour seminars and student-led journal club discussions in which current peer-reviewed publications relevant to biomedical informatics will be reviewed and discussed.
Credit 1 unit.

**M18 BMI 5201 Biomedical Informatics Rotation**
Students will be responsible for arranging two rotations to identify a thesis lab or capstone project site. Each rotation will last approximately one month, with the goal being to expose students to research and practical biomedical informatics opportunities in both academic and industry settings.
Credit 1 unit.

**M18 BMI 5204 Mixed Methods in Biomedical Informatics**
Building on the fundamentals of biomedical informatics in BMI I & II, this course will introduce students to the various research methods and underlying theories used to conduct biomedical informatics research studies. This course will cover research methods, including the systematic review of published research as well as qualitative, quantitative, and mixed methods. Under each topic, we will focus on the formulation of research questions/hypotheses, the selection of appropriate study design, data collection and analysis methods, and methods to ensure rigor and reproducibility of research. The course will encompass several hands-on components for students to practice and apply their learned skills.
Credit 3 units.

**M18 BMI 5302 Introduction to Biomedical Informatics I**
This survey and methods course provides an overview of the theories and methods that comprise the field of biomedical informatics. Topics to be covered include the following: (1) information architecture as applied to the biomedical computing domain; (2) data and interoperability standards; (3) biological, clinical, and population health relevant data analytics; (4) healthcare information systems; (5) human factors and cognitive science; (6) evaluation of biomedical computing applications; and (7) ethical, legal, and social implications of technology solutions as applied to the field of biomedicine. The course will consist of both didactic lectures and experiential learning opportunities, including hands-on laboratory sessions and journal club-style discussions. The course will culminate with a capstone project requiring the in-depth examination, critique and presentation of a student-selected topic related to the broad field of biomedical informatics. Biomedical Informatics I is designed primarily for individuals with a background in the health and/or life sciences who have completed a course in introductory statistics (e.g., Math 1011). No assumptions are made about computer science or clinical background; however, some experience with computers and a high-level familiarity with health care will be useful. This course does not require any programming knowledge, and it will not teach students how to program.
Credit 3 units.

**M18 BMI 5303 Introduction to Biomedical Informatics II**
This course introduces students to the methods needed in order to apply the foundational theories covered in Biomedical Informatics I. The course will cover a broad spectrum of such methods -- including both computational and quantitative science techniques -- that can be employed in the design, conduct, and analysis of basic science, clinical, and translational research

programs. This course is intended to enable individuals to critically select such methods and evaluate their results as part of both the design of new projects as well as the review of results available in the public domain (e.g., literature, public datasets). Core concepts to be reviewed during this course include basic computational skills, data modeling and integration, formal knowledge representation, in silico hypothesis generation, quantitative data analysis principles, and critical thinking skills surrounding the ability to ask and answer questions about complex and heterogeneous biomedical data. Prerequisite: M18 5302 or instructor permission.
Credit 3 units.

**M18 BMI 5304 Introduction to Biomedical Data Science I**
This course (formerly Biomedical Computing I) provides an introduction to fundamental principles of informatics tools and data analysis, and it is expected to fulfill the requirements of computer science prerequisites for suggested biomedical informatics electives. Competencies and concepts covered will include the following: (1) an overview of the Linux/Unix command line interface; (2) an introduction to programming using Python and R; (3) database models, management and querying using MySQL; (4) basic data manipulation, analysis and visualization using Excel, Python and R; and (5) an introduction to the development of web applications. Biomedical Data Science is designed primarily for individuals who wish to learn the basic skills required for biomedical informatics-based research and who have little or no computational experience in using command line shells, programming and databases. No assumptions are made about computer science or clinical background; however, some experience with computers and a high-level familiarity with the health and life sciences will be useful. The course will consist of both didactic lectures as well as experiential learning opportunities including hands-on laboratory sessions and a culminating project.
Credit 3 units.

# Biostatistics

The biostatistics education programs offered by the Division of Biostatistics include three master's degrees and two graduate certificates: the Master of Science in Biostatistics (https://biostatistics.wustl.edu/education/master-of-science-in-biostatistics-msibs-2/) (MSIBS), the Master of Science in Biostatistics and Data Science (https://biostatistics.wustl.edu/education/master-of-science-in-biostatistics-msibs/) (MSBDS), the Master of Science in Genetic Epidemiology (https://biostatistics.wustl.edu/education/master-of-science-in-genetic-epidemiology-gems/) (GEMS; for postdocs only), the Certificate in Genetic Epidemiology (https://biostatistics.wustl.edu/education/certificate-in-genetic-epidemiology/), and the Certificate in Biostatistics and Data Science (https://biostatistics.wustl.edu/education/certificate-in-biostatistics-and-data-science/). Interested students may pursue individual courses offered by the division.

The 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.

## NIH-Sponsored Training Program

The PRIDE Summer Institute in Cardiovascular Genetics and Epidemiology (CVD-CGE) focuses on cardiovascular and other heart, lung, blood, and sleep disorders. This all-expenses-paid summer institute is supported by funding from the National Heart, Lung, and Blood Institute. The goal is to mentor junior faculty from underrepresented minorities as well as faculty with disabilities into independent research careers in the biomedical sciences. For more information, visit the PRIDE CVD-CGE website (https://biostatistics.wustl.edu/education/pridecge/) or email the program administrator (schreierl@wustl.edu).

## Academic Calendar

The academic programs begin in early July each year. They start with preparatory workshops, which are followed by intensive summer semester courses. For fall and spring courses, the program follows the Washington University academic calendar (p. 5).

## Location

The program is located in the Division of Biostatistics, which can be found on the fifth floor of the Bernard Becker Medical Library (660 S. Euclid Ave., St. Louis, MO 63110) in rooms 500 through 508.

## Additional Information

**Kim Freels**
Program Manager
Phone: 314-362-1384
Email: kfreels@wustl.edu

**DC Rao, PhD**
Program Director
Email: rao@wustl.edu

**Lei Liu, PhD**
Associate Program Director
Email: lei.liu@wustl.edu

Washington University School of Medicine
Biostatistics Education Programs
Division of Biostatistics
660 S. Euclid Ave., CB 8067
St. Louis, MO 63110-1093

| | |
|---|---|
| **Phone:** | 314-362-1384 |
| **Email:** | biostat-msibs@email.wustl.edu |
| **Website:** | https://biostatistics.wustl.edu |

# Degrees & Offerings

- Master of Science in Biostatistics (p. 66)
- Master of Science in Biostatistics and Data Science (p. 67)
- Master of Science in Genetic Epidemiology (p. 67)
- Certificate in Biostatistics and Data Science (p. 68)
- Certificate in Genetic Epidemiology (p. 68)

# Research

Master's students have multiple opportunities to engage in biomedical research. After completing the first summer semester, students in the MSIBS and MSBDS program are eligible to work as part-time research assistants. These positions are frequently available, both within the Division of Biostatistics as well as in other departments and research labs on the Medical School campus. In addition, depending on the degree program, students will intern and/or work on an independent mentored research project to hone their research skills, including study design, data analysis, and interpretation. GEMS students will work on a mentored research project to explore and characterize the interplay between genes and the environment that affects the biological processes underlying disease.

# Faculty

## Division Interim Director

**Chengjie Xiong, PhD**

Visit our website for more information about our faculty (https://biostatistics.wustl.edu/faculty-staff/) and their appointments.

## C

**Ling Chen, MPH, MS, PHD**
Assistant Professor of Biostatistics (primary appointment)
Assistant Professor of Medicine
MPH University South Carolina 2003
MS Beijing Medical University 1998
BS Beijing Medical University 1996
PHD University of MO Columbia 2009

## G

**Charles William Goss, MS, PHD**
Instructor in Biostatistics (primary appointment)
Instructor in Medicine
BS University of Michigan 2003
MS Florida International 2018
PHD Ohio State University 2014
BA University of Michigan 2018

**Chi Gu, PHD, MS**
Associate Professor of Biostatistics (primary appointment)
Associate Professor of Genetics
BS Nanjing Medical University 1982
PHD Washington Univ in St. Louis 1992
MS Nanjing Medical University 1985

**Aditi Gupta, PHD, MS1**
Instructor in Biostatistics (primary appointment)
BS UNIVERSITY OF DELHI 2005
PHD Indaprastha Inst. of Informati 2015
MS1 UNIVERSITY OF DELHI 2008

## L

**Daphne Lew, MED, PHD, BE, M PH**
Instructor in Biostatistics (primary appointment)
MED University of MO St Louis 2014
PHD Saint Louis University 2020
BE University of Pennsylvania 2012
M PH Saint Louis University 2016

**Lei Liu, BS1, MS2, MS1, PHD**
Professor of Biostatistics (primary appointment)
Professor of Medicine
BS1 ZHEJIANG UNIVERSITY 1994
MS2 Virginia Tech 1998
MS1 ZHEJIANG UNIVERSITY 1997
PHD University of Michigan 2017

## M

**J. Philip Miller**
Professor of Biostatistics (primary appointment)
Professor of Medicine
Tenure Held At-Large in the Medical School
BA Washington Univ in St. Louis 1965

## R

**Dabeeru C Rao, MS, PHD**
Professor of Biostatistics (primary appointment)
Professor of Biostatistics in Genetics
Professor of Biostatistics in Psychiatry
Professor of Mathematics
Tenure Held At-Large in the Medical School
MS Indian Statistical Institute 1968
BS Indian Statistical Institute 1967
PHD Indian Statistical Institute 1971

**Treva Kay Rice, MA, PHD**
Professor of Biostatistics (primary appointment)
Professor of Psychiatry
MA University of Colorado Boulder 1984

BS University of Texas Arlington 1981
PHD University of Colorado Boulder 1987

## S

**Kenneth B Schechtman, MA, MS, PHD**
Professor of Biostatistics (primary appointment)
Professor of Medicine
Tenure Held At-Large in the Medical School
BS City University of New York 1967
MA Washington Univ in St. Louis 1978
MS Purdue University 1971
PHD Washington Univ in St. Louis 1978

## W

**Guoqiao Wang, MS, MA, PHD**
Assistant Professor of Biostatistics (primary appointment)
Assistant Professor of Neurology
MS Yunnan University 2007
MA University of Alabama-Tuscaloo 2010
PHD University of Alabama-Birmingh 2014

## X

**Chengjie Xiong, PHD, MS**
Professor of Biostatistics (primary appointment)
Professor of Mathematics
Professor of Neurology
PHD Kansas State University 1997
MS Peking University 1989
BS Xinjiang University 1983

# Courses

Visit online course listings to view offerings for M21 MSB (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M21).

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**M21 MSB 503 Statistical Computing with SAS**
Intensive hands-on summer training in SAS (Statistical Analysis System) during seven full weekdays. Students will learn how to use SAS for handling, managing, and analyzing data. Instruction is provided in the use of SAS programming language, procedures, macros, and SAS SQL. The course will include exercises using existing programs written by SAS experts. Contact the Program Managers for details, to register or to obtain permission of the Course Master (biostat-msibs@email.wustl.edu).
Credit 2 units.

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**M21 MSB 506 Introduction to R for Data Science**
This is an introduction to the R Statistical Environment for new users. R is "a freely available language and environment for statistical computing and graphics which provides a wide variety of statistical and graphical techniques: linear and nonlinear modeling, statistical tests, time series analysis, classification, clustering, etc." The goal is to give students a set of tools to perform statistical analysis in medicine, biology, or epidemiology. At the conclusion of this primer, students will: be able to manipulate and analyze data, write basic models, understand the R environment for using packages, and create standard or customized graphics. This primer assumes some knowledge of basic statistics as taught in a first-semester undergraduate or graduate sequence. Topics should include: probability, cross-tabulation, basic statistical summaries, and linear regression in either scalar or matrix form. Contact the program manager (biostat-msibs@email.wustl.edu) for details, to register, or to obtain permission from the course director.
Credit 2 units.

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**M21 MSB 512 Ethics in Biostatistics and Data Science**
This course prepares biostatisticians to analyze and address ethical and professional issues in the practice of biostatistics across the range of professional roles and responsibilities of a biostatistician. The primary goals are for biostatisticians to recognize complex situational dynamics and ethical issues in their work and to develop professional and ethical problem-solving skills. The course specifically examines ethical challenges related to research design, data collection, data management, ownership, security, and sharing, data analysis and interpretation, and data reporting and provides practical guidance on these issues. The course also examines fundamentals of the broader research environment in which biostatisticians work, including principles of ethics in human subjects and animal research, regulatory and compliance issues in biomedical research, publication and authorship, and collaboration in science. By the conclusion of the course, participants will understand the ethical and regulatory context of biomedical research; identify ethical issues, including situational dynamics that serve to foster or hinder research integrity, in the design and conduct of research and the management, analysis and reporting of data; and utilize strategies that facilitate ethical problem-solving and professionalism. Contact the program manager for details, to register, or to obtain permission of the course director (by email (biostat-msibs@email.wustl.edu) or phone: 314-362-1384).
Credit 2 units.

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**M21 MSB 515 Fundamentals of Genetic Epidemiology**
Lectures cover causes of phenotypic variation, familial resemblance and heritability, Hardy-Weinberg Equilibrium, ascertainment, study designs and basic concepts in genetic segregation, linkage and association.The computer laboratory portion is designed as hands-on practice of fundamental concepts. Students will gain practical experience with various genetics computer programs (e.g. SOLAR, MERLIN, QTDT, and PLINK). Auditors will not have access to the computer lab sessions. Prerequisite: R for Data Science (M21-506). Contact the Program Manager for details, to register, or to obtain permission from the Course Master (biostat-msibs@email.wustl.edu).
Credit 3 units.

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**M21 MSB 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, multipoint analysis, nonparametric 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 bases 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. Prerequisite: M21-515 Fundamentals of Genetic Epidemiology. For details, to register, and to receive the required permission of the course director, contact the MSIBS program manager (by email (biostat-msibs@email.wustl.edu) or phone: 314-362-1384).
Same as L41 Biol 5483
Credit 3 units.

**M21 MSB 550 Introduction to Bioinformatics**
Provide a broad exposure to the basic concepts, methodology and application of bioinformatics to solve biological problems. Specifically, the students will learn the basics of online genomic/protein databases and database mining tools, and acquire understanding of mathematical algorithms in genome sequence analysis (alignment analysis, gene finding/predicting), gene expression microarray (genechip) analysis, and of the impact of recent developments in the protein microarray technology. Prerequisite: R for Data Science (M21-506). Contact the Program Manager for details, to register, or to obtain permission from the Course Master (biostat-msibs@email.wustl.edu).
Credit 3 units.

**M21 MSB 560 Biostatistics I**
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 SAS. Prerequisite: M21-503, Statistical Computing with SAS®, or student must have good practical experience with SAS®. Students are required to participate in the "Computing/Unix" workshops offered free of charge prior to this course. For details, to register and/or to obtain the required permission of the Course Master, contact the Program Manager (biostat-msibs@email.wustl.edu or telephone 362-1384).
Credit 3 units.

**M21 MSB 570 Biostatistics II**
This course is designed for students who have taken Biostatistics I or the equivalent and who want to extend their knowledge of biostatistical applications to more modern and more advanced methods. Biostatistical methods to be discussed include logistic and Poisson regression, survival analysis, Cox regression analysis, and several methods for analyzing longitudinal data. Students will be introduced to modern topics that include statistical genetics and bioinformatics. The course will also discuss clinical trial design, the practicalities of sample size and power computation and meta analysis, and will ask students to read journal articles with a view toward encouraging a critical reading of the medical literature. Both in-class examples and homework assignments will involve extensive use of SAS. Prerequisite: M21-560, Biostatistics I or its equivalent as judged by the course directors. For details, to register, and/or to obtain the required permission of the course director, contact the program manager (by email (biostat-msibs@email.wustl.edu) or phone: 314-362-1384).
Credit 3 units.

**M21 MSB 600 Mentored Research**
Student undertakes supervised research in a mentor's lab. The goal is to acquire important research skills as well as good writing and presentation skills. The student finds a mentor and they together identify a research topic. A written thesis based on the research, prepared in the format of an actual scientific publication, must be submitted and presented to a select audience. The course masters will organize a few meetings throughout to facilitate the whole process. The course masters will determine the grade (pass/fail) in consultation with the mentors. Permission of the Course Masters is required.
Credit variable, maximum 6 units.

**M21 MSB 617 Study Design and Clinical Trials**
The course will focus on statistical and epidemiological concepts of study design and clinical trials. Topics include: different phases of clinical trials, various types of medical studies (observational studies, retrospective studies, adaptive designs, and comparative effectiveness research), and power analysis. Study management and ethical issues are also addressed. Students will be expected to do homework and practice power analysis during lab sessions. Prerequisites: M21-560 Biostatistics I and M21-570 Biostatistics II. Permission of the course director required. For details, to register, and to receive the required permission of the course director, contact the program manager (biostat-msibs@email.wustl.edu).
Credit 3 units.

**M21 MSB 618 Survival Analysis**
This course will cover the basic applied and theoretical aspects of models to analyze time-to-event data. Basic concepts will be introduced including the hazard function, survival function, right censoring, and the Cox-proportional hazards (PH) model with fixed and time dependent covariates. Additional topics will include regression diagnostics for survival models, the stratified PH model, additive hazards regression models and multivariate survival models. Permission of the course director required. Prerequisites: M21-560 Biostatistics I and M21-570 Biostatistics II. For details, to register, and to receive permission from the course director, contact the program manager (by email (biostat-msibs@email.wustl.edu) or phone: 314-362-1384).
Credit 3 units.

**M21 MSB 621 Computational Statistical Genetics**
This course is designed to give the students computational experience with the latest statistical genetics methods and concepts, so that they will be able to computationally implement the method(s)/model(s) developed as part of their thesis. Concentrating on the applications of genomics and computing, it deals with creating efficient new bioinfomatic tools to interface with some of the latest, most important genetic epidemiological analysis software, as well as how to derive, design and implement new statistical genetics models. The course also includes didactic instruction on haplotype estimation and modeling of relationship to phenotype, LD mapping, DNA pooling analysis methods, analysis approaches in pharmacogenomics (with an emphasis on possible genomic role in drug response heterogeneity), and epistasis (GxG) and GxE

interactions; data mining methods, including clustering, recursive partitioning, boosting, and random forests; and fundamentals of meta-analysis, importance sampling, permutation tests and empirical p-values, as well as the design of monte-carlo simulation experiments. Prerequisite: Biostatistics I and II, permission of the instructor. Contact the Program Manager for the required permission of the Course Master (biostat-msibs@email.wustl.edu or 314-362-1384).
Credit 3 units.

**M21 MSB 630 Internship**
The primary goal of the Internship program is for students 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 develop contacts, build marketable skills and perceive likes and dislikes in the chosen field. 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, and protocol development among other things. Students may have opportunities to contribute to and participate in the preparation of publishable quality manuscripts. As part of the Internship requirements, each student will submit a one-page Abstract of the work performed as part of the internship and will give a presentation of the Internship experience. The grade (pass/fail) for each student will be determined in consultation with the mentor.
Credit variable, maximum 6 units.

**M21 MSB 660 Biomedical Data Mining**
This course introduces methods and applications of biomedical data mining. Various computational and statistical methods will be presented, such as model selection and regularization, resampling methods, tree-based methods, and artificial intelligence. In addition to the common applications of the covered methods in biomedical sciences, this course will prepare students for future challenges and opportunities in data science. Prerequisites: M21 506, M21 560, M21 570, and M21 550. Matrix algebra is also highly recommended.
Credit 3 units.

# Clinical Investigation

The Master of Science in Clinical Investigation (MSCI) and the Certificate in Clinical Investigation (CI) are programs for young investigators committed to pursuing academic careers in clinical research. The unique MSCI degree combines didactic course work with mentored research and career development opportunities, and it provides students with the knowledge and tools needed to excel in the areas of clinical investigation most relevant to their careers. The CI certificate is made up of the core MSCI didactic course work in study design, research implementation, statistical approaches, responsible conduct of research, scientific communication and literature critique, leadership, and community engagement. Clinical investigation programs offered through the Washington University School of Medicine are sponsored by the Clinical Research Training Center (https://crtc.wustl.edu/) and the Institute of Clinical and Translational Sciences (http://icts.wustl.edu/).

Students in the 33-credit MSCI program will do the following:

- Engage in high-quality didactic courses (refer to the MSCI course list (https://crtc.wustl.edu/courses/class-list/msci-courses/)) 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 (https://crtc.wustl.edu/msci-concentrations/), 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 (https://crtc.wustl.edu/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

## 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.

## Additional Information

**Sara O'Neal**
Program Coordinator – Curriculum and Evaluation
Phone: 314-454-8936
Email: saraoneal@wustl.edu

**David Warren, MD, MPH**
Program Director
Email: dwarren@wustl.edu

**Dominic Reeds, MD**
Program Director
Email: dreeds@wustl.edu

Washington University School of Medicine
Master of Science in Clinical Investigation Program
Clinical Research Training Center

660 South Euclid Avenue, CB 8051
St. Louis, MO 63110

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| **Email:** | crtcmsci@email.wustl.edu |
| **Website:** | https://crtc.wustl.edu |

## Degrees & Offerings

- Master of Science in Clinical Investigation (p. 69)
- Graduate Certificate in Clinical Investigation (p. 70)
- Graduate Certificate in Dissemination and Implementation (p. 70)

## 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

**Ana A. Baumann, PhD (https://publichealth.wustl.edu/scholars/ana-a-baumann/)**
Research Assistant Professor
Brown School of Social Work

**Stephanie Solomon Cargill, PhD**
Adjunct Assistant Professor, Medicine
Department: Internal Medicine

**Patricia Cavazos-Rehg, PhD (https://publichealth.wustl.edu/scholars/patricia-cavazos-rehg/)**
Associate Professor
Department: Psychiatry

**Karen L. Dodson, MBA (https://crtc.wustl.edu/people/karen-l-dodson-mba/)**
Manager, Professional Development
Department: Office of the Associate Dean of Faculty Affairs

**Brian F. Gage, MD, MSc (https://generalmedicalsciences.wustl.edu/directory/brian-f-gage-md-msc/)**
Professor of Medicine
Department: Internal Medicine
Division: General Medical Sciences

**Elvin Geng, MD, MPH (https://publichealth.wustl.edu/scholars/elvin-geng/)**
Professor of Medicine
Department: Internal Medicine
Division: Infectious Diseases

**Jane Garbutt, MB, ChB (https://generalmedicalsciences.wustl.edu/directory/jane-garbutt-mb-chb/)**
Professor of Medicine
Department: Internal Medicine & Pediatrics
Division: General Medical Sciences

**Dorina Kallogjeri, MD, MPH (https://pacs.wustl.edu/people/dorina-kallogjeri-md/)**
Research Statistician
Department: Otolaryngology

**Jessica Mozersky, PhD (https://generalmedicalsciences.wustl.edu/directory/jessica-mozersky-phd/)**
Assistant Professor in Medicine
Department: General Medical Sciences

**Jay F. Piccirillo, MD, FACS (https://medicine.wustl.edu/news/jay-f-piccirillo-md-facs/)**
Professor of Otolaryngology
Department: Otolaryngology

**Dominic Reeds, MD (https://gns.wustl.edu/about/faculty/dominic-reeds-md/)**
Assistant Professor of Medicine
Department: Internal Medicine
Division: Nutritional Science

**Carl Siekmann, MBA (https://crtc.wustl.edu/people/carl-siekmann-mba/)**
Adjunct Instructor
Department: University College, Clinical Research Management Program

**Peter Takes, PhD, RAC, FRAPS (https://crtc.wustl.edu/people/peter-takes-phd-rac-fraps/)**
Adjunct Instructor
Department: University College, Clinical Research Management Program

**David K. Warren, MD, MPH (https://crtc.wustl.edu/people/david-k-warren-md-mph/)**
Professor of Medicine
Department: Internal Medicine
Division: Infectious Diseases

## Courses

Visit online course listings to view offerings for M17 CLNV (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M17).

**M17 CLNV 503 PIRTT Mentored Independent Research**
Trainees earn Predoctoral Interdisciplinary Clinical Research Training 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. PICRT Mentored Independent Research will provide scholars with the practical application of skills learned in the Clinical Research Training Program didactic course work and seminars. Open to CRTC Predoctoral Program scholars only.
Credit variable, maximum 6 units.

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**M17 CLNV 510 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.

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**M17 CLNV 5110 MTPCI 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 course work and seminars. Open to CRTC Postdoctoral Program scholars only.
Credit variable, maximum 4 units.

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**M17 CLNV 513 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.

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**M17 CLNV 5140 MTPCI Research 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 their 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 unit.

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**M17 CLNV 515 PIRTT Research Seminar**
Pre/Postdoctoral Interdisciplinary Research Training in Translation (PIRTT) Seminar. Two semesters of this course are required for the TL1 Scholars. This course alternates faculty presentations, research-in-progress discussions, and reading and journal discussions. CRTC scholars only.
Credit 2 units.

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**M17 CLNV 518 Drug and Device Development**
This course will provide an overview of the commercial development pathways for both pharmaceuticals and medical devices, from inception to market. Through lectures and discussions, students will gain an appreciation for the role clinical study programs play in the broader scope of product development. Class topics will include preclinical, clinical, regulatory, and marketing factors which influence discovery and development of new medical products.
Same as U80 CRM 518
Credit 3 units.

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**M17 CLNV 520 Entrepreneurship for Biomedicine I**
Today's biomedical research trainees have the opportunity to pursue multiple career paths within academic, industry, nonprofit, and entrepreneurial settings. In addition to scientific and technical expertise, today's trainees need additional skills in innovation and entrepreneurship (I&E) to take advantage of this

opportunity. This course is designed to teach these skills. This course consists of seven "nanocourses" focused on different aspects of the entrepreneurial process. Throughout the course, trainees will work to identify an innovation and assess a new academic, entrepreneurial, or nonprofit venture to bring that innovation to market. Nanocourses are taught by successful real-world entrepreneurs and experts in their fields. The primary instructional methods are via video and hands-on learning experiences, with some supplementary reading. To succeed in this class, students should be prepared to work with their peers and coursemasters using online communication tools both inside and outside Canvas.
Credit 1 unit.

**M17 CLNV 522 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.

**M17 CLNV 524 Intermediate Statistics for the Health Sciences**
This course builds upon Introduction to Statistics for Clinical Research (M17-522) 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. Course director is Mark Walker, PhD, and instructor is Brian Waterman, MPH. Prerequisite: M17-522.
Credit 3 units.

**M17 CLNV 528 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.

**M17 CLNV 529 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.

**M17 CLNV 532 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. Course options include face-to-face, hybrid and online.
Credit 1 unit.

**M17 CLNV 533 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. Students may enroll in this course even if they have not taken Genomics in Medicine I (M17-532). Prior clinical research experience is helpful but not required. Course options include face-to-face, hybrid and online.
Credit 1 unit.

**M17 CLNV 540 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.

**M17 CLNV 541 Methods, Metrics and Measures for Dissemination and Implementation Research**
Despite the unequivocal successes of biomedical research over the last generation, the use of evidence-based clinical interventions in routine public health and clinical practice remains far from optimal. Today, Americans receive approximately half of indicated medical care (and much unindicated care as well). As a result, even though the past 30 years have yielded unprecedented gains in clinical and medical sciences, the health of Americans lags behind that of other industrialized countries. Globally, the proportion of morbidity and mortality due to available (and affordable) but unused clinical interventions is even larger. Dissemination & Implementation (D&I) research is an emerging area of scientific inquiry with a growing body of distinctive perspectives and methods that seeks to tackle this gap. This course focuses on approaches of particular or distinctive relevance to implementation research. Given that implementation issues often occur at an organizational, practice, or regional level, knowledge of concepts involving multi-stage sampling, attendant design effects, quantification of within- and between-cluster correlation, and cluster-level randomization is crucial. In addition, many emerging concepts in implementation research — including context, adaptation, strategies and outcomes — are now accompanied by advancement in their conceptualization and measurement. This course introduces the foundational methods of measurement development (e.g., latent class analysis, criterion and construct validity) as well as important recent publications in this area (e.g., the Program Sustainability Assessment Tool). The final part of this course will focus on the use and appraisal of data taken from health systems, including administrative databases and electronic medical records, to assess implementation behaviors and outcomes. Each of the areas covered in this course will offer practical knowledge and skills for advancing implementation research.
Credit 3 units.

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**M17 CLNV 588 Epidemiology for Clinical Research**
The purpose of this course is to provide an understanding of the use of epidemiological concepts and methods in clinical research. Two primary foci are included: 1) common applications of epidemiologic principles and analytic tools in evaluating clinical research questions; and 2) student development of skills to review and interpret the medical literature and utilize publicly available datasets to address clinical research questions.
Same as M88 AHBR 588
Credit 3 units.

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**M17 CLNV 589 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. Prerequisite: M17-513 Designing Outcomes for Clinical Research
Credit 3 units.

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# Medical Education

## Degrees & Offerings

### MD and Joint MD Degrees

- Doctor of Medicine (MD) (p. 71)
- Doctor of Medicine Five-Year Program (p. 80)
- Doctor of Medicine and Master of Science in Clinical Investigation (p. 80)
- Doctor of Medicine and Master of Population Health Sciences (p. 80)
- Doctor of Medicine and Master of Public Health (p. 80)
- Doctor of Medicine and Doctor of Philosophy (p. 80)

### Postgraduate Medicine

- Graduate Medical Education (p. 80)
- Continuing Medical Education (p. 81)

# Medical Physics

The new Master of Science in Medical Physics (MSMP) (https://radonc.wustl.edu/education/master-of-science-in-medical-physics/) offered through the Department of Radiation Oncology at the School of Medicine and the Post-PhD Graduate Certificate in Medical Physics (https://radonc.wustl.edu/education/post-phd-graduate-certificate-in-medical-physics/) are available 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.

## Program Contacts

**MSMP and Post-PhD Certificate Program Director**
Rao Khan, PhD

**MSMP Associate Program Director**
Tiezhi Zhang, PhD

**MSMP Program Coordinator**
Justina Dodson, MS

## Degrees & Offerings

- Master of Science in Medical Physics (p. 82)
- Post-PhD Graduate Certificate in Medical Physics (p. 83)

## Research

## Master of Science in Medical Physics

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 will be required to complete 6 credits of thesis research, with the option for additional research opportunities over the summer semester as

part of the 36-unit requirement. Students who choose the clinical pathway will be required to complete a 1-credit-unit clinical rotation and a 3-credit-unit clinical project, with the option for additional clinical rotations over the summer.

# 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.

# Faculty

## Program Director

**Rao Fawwad Khan, MD, PhD (https://radonc.wustl.edu/people/rao-khan-phd/)**
Associate Professor of Radiation Oncology (primary appointment)
Associate Professor of Biomedical Engineering
MD, Quaid-Azam University, 1997
PhD, McMaster University, 2003

## Associate Program Director

**Tiezhi Zhang, MS, PhD (https://radonc.wustl.edu/people/tiezhi-zhang-phd/)**
Assistant Professor of Radiation Oncology (primary appointment)
BS, Jilin Medical University, 1994
MS, Drexel University, 1999
PhD, University of Wisconsin–Madison, 2004

**Buck Edward Rogers, MA, PhD (https://radonc.wustl.edu/people/buck-rogers-phd/)**
Professor of Radiation Oncology (primary appointment)
Adjunct Professor of Chemistry (courtesy affiliation)
Professor of Radiology
BS, Loyola University Chicago, 1989
MA, Washington University in St. Louis, 1991
PhD, Washington University in St. Louis, 1995

**David Strait, PhD (https://anthropology.wustl.edu/people/david-strait/)**
Instructor of Principles of Human Anatomy and Development
PhD, State University of New York at Stony Brook

**Joseph O'Sullivan, PhD (https://engineering.wustl.edu/Profiles/Pages/Joseph-OSullivan.aspx)**
Instructor of Biological Imaging Technology
BS, University of Notre Dame, 1982
MS, University of Notre Dame, 1984
PhD, University of Notre Dame, 1986

**Michael Altman, PhD (https://radonc.wustl.edu/people/michael-altman-phd/)**
Assistant Professor of Radiation Oncology (primary appointment)
BA (Physics), University of Chicago, 2002
PhD (Medical Physics), University of Chicago, 2010
Medical Physics Residency, Henry Ford Health System, 2012

**Jochen Cammin, PhD (https://radonc.wustl.edu/people/jochen-cammin-phd/)**
Instructor in Radiation Oncology (primary appointment)
Diploma (Physics), University of Bonn, 1999
PhD (Experimental Particle Physics), University of Bonn, 2004
Postgraduate Certificate (Medical Physics), University of Pennsylvania, 2015

# Courses

Visit online course listings to view offerings for M91 MedPhys (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M91).

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**M91 MedPhys 501 Clinical Imaging Fundamentals**
This course will cover the physical principles underlying various imaging modalities used in medicine, including radiography, computed tomography, ultrasound, positron emission tomography and magnetic resonance imaging. Topics to be covered include (1) aspects of X-ray generation for imaging, including X-ray tube construction and imaging geometries; and (2) image-acquisition devices, such as storage phosphor plates, image intensifiers, and various digital imagers. Clinical applications of X-ray imaging, including mammography and angiography, will be reviewed. Advanced imaging systems to be covered include diagnostic computed tomography (CT) scanners and cone-beam CT scanners. Basics of MRI imaging systems will be reviewed, including (1) the physics underlying both commonly used and specialized pulse sequences; and (2) the design and construction of typical scanners. The physics and clinical applications of both ultrasound and PET imaging will also be discussed. Topics to be considered throughout the course include image-quality metrics used to evaluate the performance of any imaging system and how the performance of imaging platforms can be degraded or improved in terms of these metrics. In addition to the didactic component, there will also be hands-on laboratory sessions on ultrasound, cone-beam CT, MRI imaging, radiography, and computed tomography performance testing for various clinical systems. Prerequisites: modern physics and calculus; permission of the program director.
Credit 2 units.

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**M91 MedPhys 502 Radiological Physics and Dosimetry**
This course is designed to construct a theoretical foundation for ionizing radiation dose calculations and measurements in a medical context and to prepare graduate students for proper scientific applications in the field of X-ray imaging and radiation

therapy. This course will cover the fundamental concepts of radiation physics, how ionizing radiation interacts with matter, and how the energy that is deposited in the matter can be measured in theory and practice. Prerequisites: calculus and modern physics; permission of the program director. Instructor: Tiezhi Zhang, PhD. Fall.
Credit 3 units.

**M91 MedPhys 503 Independent Study**
The graduate student will pursue independent laboratory or industrial research during the academic year. Many WUSM faculty have research opportunities for students. Students should reach an agreement with a faculty member who is willing to serve as their supervisor for the objective and scope of the project. The faculty supervisor must be either employed full-time in the Department of Radiation Oncology or affiliated with its Medical Physics Division. The grade for the independent study will be pass/fail. The student may continue to develop their research during a second term and expand the research into either a clinical project or thesis research. Instructor Rao Khan, PhD. Fall and spring.
Credit 1 unit.

**M91 MedPhys 521 Radiation Protection and Safety**
This class is designed to introduce concepts of radiation protection and safety as well as the biological consequences of human radiation exposure. Protection and safety of the radiation worker and patient as well as detection equipment and shielding analysis will be the main focus. The course will broadly cover regulations and radiological protection in various clinical environments. Prerequisites: one year each of biology, physics and organic chemistry; permission of the program director. Instructor: Rao Khan, PhD. Fall.
Credit 2 units.

# Occupational Therapy

The Program in Occupational Therapy offers several professional degrees as well as a joint 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 6116 Executive Boulevard, Suite 200, North Bethesda, MD 20852-4929. ACOTE's telephone number, c/o AOTA, is 301-652-AOTA. For more information, visit the ACOTE Accreditation (https://www.aota.org/Education-Careers/Accreditation.aspx) webpage.

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| **Email:** | wuotinfo@wustl.edu |
| **Website:** | http://www.ot.wustl.edu |

## Degrees & Offerings

- Master of Science in Occupational Therapy (p. 83)
- Clinical Doctorate of Occupational Therapy (p. 84)

## 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 (http://www.ot.wustl.edu/research-105/) page of our website.

## Faculty

### Elias Michael Executive Director

**Lisa Tabor Connor, PhD, MSOT, OTR/L (https://www.ot.wustl.edu/about/our-people/lisa-tabor-connor-171/)**

### Director, Division of Professional Education and the Teaching Scholars Program

**Steve Taff, PhD, OTR/L, FNAP, FAOTA (https://www.ot.wustl.edu/about/our-people/steve-taff-100/)**

## Director, Clinical Operations

**Patricia Nellis, OTD, OTR/L (https://www.ot.wustl.edu/about/our-people/patricia-nellis-65/)**

## Manager, Business Departmental Operations

Bill Bauer

## Assistant Director, Entry-Level Professional Programs

**Stacy Smallfield, DrOT, OTR/L, BCG, FAOTA (https://www.ot.wustl.edu/about/our-people/stacy-smallfield-91/)**

## Assistant Director, Educational Evaluation and Quality

**Vicki Kaskutas, OTD, OTR/L, FAOTA (https://www.ot.wustl.edu/about/our-people/victoria-kaskutas-44/)**

Visit our website for more information about our faculty (https://www.ot.wustl.edu/about/our-people-117/?typeId=2) and their appointments.

## A

**Regina A. Abel, PHD**
Instructor in Occupational Therapy (primary appointment)
Instructor in Medicine
BS Southwest Misouri St Universi 1992
PHD Indiana University Bloomington 2000

## B

**Parul Bakhshi, PHD**
Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Surgery (Public Health Sciences)
PHD University Rene' Descartes 2003

**Peggy Barco, MED**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Medicine
MED Washington Univ in St. Louis 1987

**M. Carolyn Baum, MA, PHD**
Professor of Occupational Therapy (primary appointment)
Professor of Neurology (Occupational Therapy)
Professor of Social Work (Courtesy)
BS University of Kansas 1966
MA Webster University 1979
PHD Washington Univ in St. Louis 1993

**Christine R. Berg, MS, PHD, BSOT**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Neurology
MS Boston University 1980
PHD Washington Univ in St. Louis 1999
BSOT Tufts University 1976

**Jessie Lynne Bricker, MS, OTD**
Instructor in Occupational Therapy (primary appointment)
Instructor in Medicine
BS Illinois Wesleyan University 2000
MS Washington Univ in St. Louis 2001
OTD Eastern Kentucky University 2018

## C

**Chih-Hung Chang, PHD**
Professor of Occupational Therapy (primary appointment)
Professor of Medicine
Professor of Orthopaedic Surgery
PHD University of Chicago 1995
BS National Chengchi University 1987

**Lisa Tabor Connor, MS, MA, PHD**
Professor of Occupational Therapy (primary appointment)
Associate Dean for Occupational Therapy
Elias Michael Executive Director of the Program in Occupational Therapy
Professor of Neurology
BA Johns Hopkins University 1986
MS Washington Univ in St. Louis 2013
MA Washington Univ in St. Louis 1990
PHD Washington Univ in St. Louis 1992

## D

**Jessica L Dashner, OTD**
Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Neurology
BS McKendree College 2000
OTD Washington Univ in St. Louis 2002

## E

**Dorothy F Edwards, PHD**
Adjunct Professor of Occupational Therapy (primary appointment)
Adjunct Professor of Neurology
PHD Washington Univ in St. Louis 1980
BA Loyola University 1972

## H

**Kelly McClelland Harris, MA, PHD**
Instructor in Occupational Therapy (primary appointment)
Instructor in Surgery (Public Health Sciences)
MA Northwestern University 2001
BA University of Kansas 2000
PHD Washington Univ in St. Louis 2017

**Catherine R Hoyt, OTD**
Instructor in Occupational Therapy (primary appointment)
BS Juniata College 2007

OTD Washington Univ in St. Louis 2010

## K

**Victoria Kaskutas, MHS, OTD**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Medicine
BS University of Illinois 1980
OTD Washington Univ in St. Louis 2009

**Marian Keglovits**
Instructor in Occupational Therapy (primary appointment)
Instructor in Neurology
BS Colorado College 2008

**Allison A King, MD**
Professor of Occupational Therapy (primary appointment)
Professor of Education (Courtesy)
Professor of Medicine
Professor of Pediatrics
Professor of Surgery (General Surgery)
BS Washington Univ in St. Louis 1992
MD University of MO Columbia 1996

**Kathleen Marie Kniepmann, M PH, DED**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Neurology
BS Washington Univ in St. Louis 1974
M PH Harvard University 1981
BA Washington Univ in St. Louis 1974
DED Harvard University 1980

## M

**Wanda Jean Mahoney, MS, MA, OTD**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Medicine
MS Washington Univ in St. Louis 1999
BS Saint Louis University 1997
MA De Paul University 2018
OTD Nova Southeastern University 2008

**Lauren Elizabeth Milton, PHD, BS1**
Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Medicine
PHD Washington Univ in St. Louis 2008
BS1 Saint Louis University 2001

**Marian A Minor, PHD, M PH**
Associate Professor of Occupational Therapy (primary appointment)
BS University of Kansas 1965
PHD University of Missouri 1989
M PH University of Missouri 1979

**Kerri A Morgan, MS, PHD**
Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Neurology
MS Washington Univ in St. Louis 1998
BA Texas Christian University 1996
PHD Washington Univ in St. Louis 2015

## N

**Patricia K Nellis, BSOT, MBA**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Neurology
BSOT Western Michigan University 1980
MBA Columbia College 2004

## P

**Adam C Pearson, OTD**
Instructor in Occupational Therapy (Pending Dean's Approval) (primary appointment)
OTD Washington Univ in St. Louis 2011
BS Missouri State University 2008

**Monica S Perlmutter, OTD, BSOT, MA**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Ophthalmology and Visual Sciences
OTD Washington Univ in St. Louis 2012
BSOT University of MO Columbia 1981
MA Washington Univ in St. Louis 1989

**Benjamin Allen Philip, PHD**
Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Neurology
Assistant Professor of Surgery (Plastic and Reconstructive Surgery)
PHD Brown University 2009

**Roberta G Pineda, PHS, MHS**
Adjunct Assistant Professor of Occupational Therapy (primary appointment)
PHS University of Florida 2006
MHS University of Florida 1994

## S

**Stacy Lynn Smallfield, MD, MS**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Medicine
MD Nova Southeastern University 2007
BS Gustavus Adolphus College 1995
MS Washington Univ in St. Louis 1996

**Emily K Somerville, MA**
Instructor in Occupational Therapy (primary appointment)
Instructor in Neurology

MA Washington Univ in St. Louis 2007
BA Covenant College 2005

**Susan L Stark, PHD, MS**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Neurology
Associate Professor of Social Work
BS Alma College 1988
PHD University of MO Columbia 1998
MS Washington Univ in St. Louis 1989

## T

**Steven D Taff, MS, PHD**
Associate Professor of Occupational Therapy (primary appointment)
Associate Professor of Medicine
MS Washington Univ in St. Louis 1997
BS MO State U (formerly SW MO St) 1989
PHD University of MO St Louis 2005

**Susan M Tucker, MS**
Instructor in Occupational Therapy (primary appointment)
Instructor in Neurology
MS Washington Univ in St. Louis 2002

**Quinn Peal Tyminski, MS**
Instructor in Occupational Therapy (primary appointment)
Instructor in Psychiatry
MS Washington Univ in St. Louis 2012
BS Adrian College 2010

## V

**Erin Foster Voegtli, OTD, PHD**
Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Neurology
Assistant Professor of Psychiatry
OTD Washington Univ in St. Louis 2005
BS Washington Univ in St. Louis 2003
PHD Washington Univ in St. Louis 2018

## W

**Carla W Walker, MS**
Instructor in Occupational Therapy (primary appointment)
MS Washington Univ in St. Louis 2000

**Timothy J Wolf, OTD**
Adjunct Associate Professor of Occupational Therapy (primary appointment)
Adjunct Associate Professor of Occupational Therapy
OTD Washington Univ in St. Louis 2007

**Wing Kai Wong, PHD**
Assistant Professor of Occupational Therapy (primary appointment)
Assistant Professor of Neurology
Assistant Professor of Psychiatry
PHD Univ of IL -Urbana-Champaign 2012

# Courses

Visit online course listings to view offerings for M01 OT (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M01).

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**M01 OT 593A Fieldwork II**
Provides fieldwork experiences under the supervision of an occupational therapist. Students' participation includes in-depth experience in delivering occupational therapy services to clients including evaluation, treatment and intervention. 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. The fieldwork experience is designed to promote clinical reasoning, professionalism and competency. Duration is 12 weeks per course section.
Credit 6 units.

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**M01 OT 593B Fieldwork II**
Provides fieldwork experiences under the supervision of an occupational therapist. Students' participation includes in-depth experience in delivering occupational therapy services to clients including evaluation, treatment and intervention. 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. The fieldwork experience is designed to promote clinical reasoning, professionalism and competency. Duration is 12 weeks per course section.
Credit 6 units.

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**M01 OT 595 Independent Study**
Active participation in research activities with program faculty. A written plan of study agreed upon by faculty and student. Permission of faculty adviser required.
Credit variable, maximum 6 units.

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**M01 OT 596 Fieldwork II — Elective**
Optional fieldwork after graduation. Permission required to register.
Credit variable, maximum 6 units.

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**M01 OT 611 Professional Immersion in Occupational Therapy**
This foundational course prepares students to manage the changing paradigms of health care that are encountered in future practice. Students are introduced to settings across the continuum of care, professional team roles, and health policy which are integrated into future coursework. Health informatics systems support professional practice and are explored as a means to understand continuum of service delivery, documentation, and reimbursement systems. Students learn foundational tools of the profession, including the current practice framework and activity analysis.
Credit 3 units.

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**M01 OT 612 Neuroscience Principles Supporting Occupational Performance**
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 3 units.

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**M01 OT 613 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 PEOP model of occupational performance and the core principles of client-centered care and disability. 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.

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**M01 OT 614 Elements of Research Design and Use of Data**
Building on prerequisite knowledge, the student engages in research design and data analysis. Students locate sources of grant funding, compose an IRB proposal, identify appropriate statistical analyses of data based on the research question, evaluate the psychometrics of assessments, and analyze both qualitative and quantitative data.
Credit 3 units.

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**M01 OT 641 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.

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**M01 OT 642 Evaluation and Intervention: Adults and Older Adults I**
This course explores the person, environment, and occupation factors that influence occupational performance of adults and older adults. 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 various practice settings are addressed.
Credit 6 units.

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**M01 OT 648 OTD Mentored Scholarship II**
This is the second in a three-coursesequencein 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.

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**M01 OT 650 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.

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**M01 OT 660 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.

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**M01 OT 670 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.

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**M01 OT 680 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.

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**M01 OT 690 Rehabilitation Neuroscience**
The role of experience in shaping brain functions is a central question in psychology and neuroscience. The prevailing view is that the functional organization of even the mature brain is dynamic — changing in response either to increases or decreases in stimulation. However, this has not always been the accepted perspective. Even now, many fundamental questions remain, and the answers should directly impact the way that we approach learning and the rehabilitation (re-learning) in the future. Just what are the limits on plasticity in the adult brain?

How should environments be structured to exploit this capacity effectively? Is all reorganization behaviorally relevant? What factors contribute to adaptive, as opposed to maladaptive, changes? Together, we will consider historical perspectives on, and what is presently known about, these and related questions.
Credit 3 units.

**M01 OT 710 Lab Practicum**
Laboratory practicum is designed to permit the student to learn the basic processes of their selected laboratory. The practicum will involve ongoing research projects and can be both laboratory and clinical in nature.
Credit 2 units.

**M01 OT 720 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.

**M01 OT 721 Teaching Practicum II**
The teaching practicum provides a continued 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.

**M01 OT 750A Directed Practice Research: Productive Aging**
This is the first course in a series of three courses designed as an applied clinical experience or clinical research project under the guidance of a graduate faculty mentor. The focus of the project will be in productive aging. The project, over the course of three semesters, will result in a scholarly paper. Students enter this course after they have completed OT 630, the Proposal Seminar course.
Credit 3 units.

**M01 OT 750D Directed Practice Research: Social Participation**
This is the first course in a series of three courses designed as an applied clinical experience or clinical research project under the guidance of a graduate faculty mentor. The focus of the project will be in social participation. The project, over the course of three semesters, will result in a scholarly paper. Students enter this course after they have completed OT 630, the Proposal Seminar course.
Credit 3 units.

**M01 OT 750P Directed Practice Research: Pediatrics**
This is the first course in a series of three courses designed as an applied clinical experience or clinical research project under the guidance of a graduate faculty mentor. The focus of the project will be in pediatrics. The project, over the course of three semesters, will result in a scholarly paper. Students enter this course after they have completed OT 630, the Proposal Seminar course.
Credit 3 units.

**M01 OT 750R Directed Practice Research: Rehabilitation**
This is the first course in a series of three courses designed as an applied clinical experience or clinical research project under the guidance of a graduate faculty mentor. The focus of the project will be in rehabilitation. The project, over the course of three semesters, will result in a scholarly paper. Students enter this course after they have completed OT 630, the Proposal Seminar course.
Credit 3 units.

**M01 OT 750W Directed Practice Research: Work & Industry**
This is the first course in a series of three courses designed as an applied clinical experience or clinical research project under the guidance of a graduate faculty mentor. The focus of the project will be in Work & Industry. The project, over the course of three semesters, will result in a scholarly paper. Students enter this course after they have completed OT 630, the Proposal Seminar course.
Credit 3 units.

**M01 OT 751A Directed Practice / Research Aging I**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member.
Credit variable, maximum 6 units.

**M01 OT 751D Directed Practice / Research Disability I**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member.
Credit variable, maximum 6 units.

**M01 OT 751P Directed Practice / Research Pediatrics I**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member.
Credit variable, maximum 6 units.

**M01 OT 751R Directed Practice / Research Rehab**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member.
Credit variable, maximum 6 units.

**M01 OT 751W Directed Practice / Research Work I**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member.
Credit variable, maximum 6 units.

**M01 OT 752A Directed Practice / Research Aging II**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member. Prerequisite: OT 751A.
Credit variable, maximum 6 units.

**M01 OT 752D Directed Practice / Research Disability II**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member. Prerequisite: OT 751D.
Credit variable, maximum 6 units.

**M01 OT 752P Directed Practice / Research Pediatrics II**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member. Prerequisite: OT 751P.
Credit variable, maximum 6 units.

**M01 OT 752R Directed Practice Research III: Rehab**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member. Prerequisite: OT 751R.
Credit variable, maximum 6 units.

**M01 OT 752W Directed Practice / Research Work II**
Student will engage in applied clinical research under the guidance of a graduate faculty member. Topics will be in the area of specialization chosen by the student in consultation with the faculty member. Prerequisite: OT 751W.
Credit variable, maximum 6 units.

**M01 OT 762 Seminar in Education Strategies**
This course offers an opportunity for students to reflect on and examine concurrent occupational therapy teaching assistantship experiences. Attention will be given to learning theories underlying practice, teaching tools and strategies, and situated and distributed learning. Activities will include critical reading, peer supervision, and self-assessment.
Credit 3 units.

**M01 OT 770 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.

**M01 OT 780 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 variable, maximum 6 units.

**M01 OT 793C Doctoral Experiential Component**
Provides a customized field experience specific to the doctoral pursuit of the student. Students may participate in research, policy, clinical practice, advocacy, teaching, etc. Students are expected to achieve specific goals established by the student, their doctoral chair, and the site mentor. Duration is 16 weeks.
Credit 6 units.

**M01 OT 793D Doctoral Experiential Component**
Provides a customized field experience specific to the doctoral pursuit of the student. Students may participate in research, policy, clinical practice, advocacy, teaching, etc. Students are expected to achieve specific goals established by the student, their doctoral chair, and the site mentor. Duration is 16 weeks.
Credit variable, maximum 6 units.

# 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. 84) and the PhD in Movement Science (p. 85).

## 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 (https://outlook.wustl.edu/movement-redefined/) 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) (http://www.apta.org/), 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:

Program in Physical Therapy
Washington University School of Medicine
4444 Forest Park Avenue, CB 8502
St. Louis, MO 63108-2212

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. 84)
- PhD in Movement Science (p. 85)

## Research

The mission of the Research Division is to understand how the movement system (https://pt.wustl.edu/about-us/) 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 (https://pt.wustl.edu/research/our-research-areas/) 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 (https://pt.wustl.edu/research/movement-science-research-center/).

Our doctoral and postdoctoral Research Training Programs (https://pt.wustl.edu/research/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 |
| Hardware & Software Design for Rehabilitation Research | Joseph W. Klaesner, PhD |
| Integrative Muscle Physiology | Gretchen A. Meyer, PhD |
| Metabolism & Organ Function in Metabolic Disease | W. Todd Cade, PT, PhD |
| Movement & Musculoskeletal Problems in Diabetes | Michael J. Mueller, PT, PhD, FAPTA |
| Movement & Neurodegenerative Disease | Gammon M. Earhart, PT, PhD |
| Movement & Neurodegenerative Disease | Ryan P. Duncan, PT, DPT |
| Nutrition & Exercise | Diana C. Parra Perez, MPH, PhD |
| Physical Activity & Fitness | B. Ruth Clark, PT, PhD |
| Physical Activity & Fitness | Susan B. Racette, PhD |
| Prevention, Rehabilitation & Maintenance in Musculoskeletal Conditions | Linda Van Dillen, PT, PhD, FAPTA |
| Rehabilitation Research for Orthopaedic Conditions | Marcie Harris-Hayes, PT, DPT, MSCI |
| Stroke Recovery & Rehabilitation Accelerometry | Catherine Lang, PT, PhD |
| Stroke Recovery & Rehabilitation Accelerometry | Marghuretta D. Bland, PT, DPT, NCS |
| 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 |
| Cell culture suite | Muscle physiology testing equipment |
| Dynamometers | Oscilloscopes |
| Electromyography | Rotating treadmill |
| Eye tracking | Simulated spaces for functional activities |
| Force platforms | Split-belt treadmill |
| Function generators | Treadmills |
| GAITRite instrumented walkway | Wheel mill system |

## 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 (https://pt.wustl.edu/education/phd-in-movement-science/).

## 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 (https://pt.wustl.edu/education/postdoctoral-fellowship-in-movement-science/).

## 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 (https://www.corrt.pitt.edu/).

## 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 (https://icts.wustl.edu/) .

## 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 (https://crtc.wustl.edu/) .

# Faculty

## Executive Director, Program in Physical Therapy

**Gammon Earhart, PT, PhD (https://pt.wustl.edu/faculty-staff/faculty/gammon-m-earhart-pt-phd/)**

## Division Director of Education

**Jennifer Stith, PT, PhD, LCSW (https://pt.wustl.edu/faculty-staff/faculty/jennifer-s-stith-pt-phd-lcsw/)**

## Division Director of Research

**Linda Van Dillen, PT, PhD, FAPTA (https://pt.wustl.edu/faculty-staff/faculty/linda-van-dillen-pt-phd/)**

## Division Director of Clinical Practice

**Beth Crowner, PT, DPT, NCS, MPPA (https://pt.wustl.edu/faculty-staff/faculty/beth-crowner-pt-dpt-ncs-mppa/)**

Visit our website for more information about our faculty (https://pt.wustl.edu/faculty-staff/faculty/) and their appointments.

## A

**Steven B Ambler, M PH, PHD, DPT**
Associate Professor of Physical Thereapy (primary appointment)
Associate Director of Professional Curriculum in Physical Therapy
Associate Professor of Orthopaedic Surgery
M PH University of South Florida 2014
PHD University of South Florida 2016
BS University of Illinois 2002
DPT Washington Univ in St. Louis 2005

## B

**Amy J Bastian, PHD**
Adjunct Assistant Professor of Physical Therapy (primary appointment)
BS University of Oklahoma 1990
PHD Washington Univ in St. Louis 1995

**Marghuretta Dakota Bland, MS, DPT**
Associate Professor of Physical Therapy (primary appointment)
associate Professor of Neurology
Associate Professor of Occupational Therapy
BS Canisius College 2004
MS Washington Univ in St. Louis 2008
DPT Washington Univ in St. Louis 2008

**Marybeth Brown, PHD, MA**
Adjunct Associate Professor of Physical Therapy (primary appointment)
BS Russell Sage College 1967
PHD University of Southern Calif 1984
MA University of Southern Calif 1974

**Megan Maupin Burgess, DPT**
Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopaedic Surgery
BS University of Virginia 2006
DPT Washington Univ in St. Louis 2010

**Tamara Lavon Burlis, DPT, MHS**
Professor of Physical Therapy (primary appointment)
Assistant Director of Professional Curriculum in Physical Therapy
Associate Director for Clinical Education in Physical Therapy
Professor of Medicine

BA Wartburg College 1988
DPT Washington Univ in St. Louis 2003
BS Washington Univ in St. Louis 1988
MHS Washington Univ in St. Louis 1993

## C

**Cheryl Ann Caldwell, MHS, DPT**
Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopaedic Surgery
BS University of Colorado Boulder 1976
MHS Washington Univ in St. Louis 1988
DPT Washington Univ in St. Louis 2002

**Billie Ruth Clark, PHD**
Professor of Physical Therapy (primary appointment)
Professor of Neurology
BS Saint Louis University 1974
PHD Saint Louis University 1988

**Suzanne Marie Cornbleet, DPT, MA**
Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopaedic Surgery
BS University of Colorado Boulder 1975
DPT Washington Univ in St. Louis 2003
MA Washington Univ in St. Louis 1987

**Beth Elaine Crowner, MS, BS PT, DPT, M PP**
Professor of Physical Therapy (primary appointment)
Professor of Neurology
MS Washington Univ in St. Louis 1989
BS PT Washington Univ in St. Louis 1989
DPT Washington Univ in St. Louis 2007
M PP University of MO St Louis 1997

**Sylvia Lin Czuppon, MS, DPT**
Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopaedic Surgery
MS Washington Univ in St. Louis 2002
BA Washington Univ in St. Louis 2000
DPT Washington Univ in St. Louis 2011

## D

**Ryan Michael DeGeeter, DPT**
Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopeadic Surgery
BS Ball State University 2007
DPT Washington Univ in St. Louis 2010

**Ryan Patrick Duncan, DPT, MS**
Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Neurology
BS Maryville University 2007
DPT Washington Univ in St. Louis 2012
MS Maryville University 2008

## E

**Gammon Marie Earhart, PHD, MS**
Professor of Physical Therapy (primary appointment)
Associate Dean for Physical Therapy
Professor of Neurology
Professor of Neuroscience
BS Beaver College 1994
PHD Washington Univ in St. Louis 2000
MS Beaver College 1996

## H

**Michael Dennison Harris, PHD**
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Assistant Professor of Mechanical Engineering and Materials Science
Assistant Professor of Orthopaedic Surgery
BS University of Utah 2007
PHD University of Utah 2013

**Mary Kent Hastings, DPT, MS**
Professor of Physical Therapy (primary appointment)
Professor of Orthopaedic Surgery
DPT Washington Univ in St. Louis 2002
BS University of Illinois 1990
MS Washington Univ in St. Louis 1993

**Marcie Harris Hayes, MS, DPT**
Professor of Physical Therapy (primary appointment)
Professor of Orthopaedic Surgery
MS Northwestern University 1996
DPT Washington Univ in St. Louis 2003
BS Southwest Misouri St Universi 1994

**Carey Lane Holleran, DHS, M PHYSTH**
Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Neurology
BS Duquesne University 2003
DHS University of Indianapolis 2014
M PHYSTH Duquesne University 2004

**Gregory William Holtzman, DPT, MS**
Professor of Physical Therapy (primary appointment)
Division Director of Clinical Practice in Physical Therapy
Professor of Orthopaedic Surgery
BA Emory University 1995
DPT Washington Univ in St. Louis 2007
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## I

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Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopaedic Surgery
DPT Washington Univ in St. Louis 2006
BS Maryville University 1984
MHS Washington Univ in St. Louis 1996

## K

**Lynnette C Khoo-Summers, DPT, MS**

Associate Professor of Physical Therapy (primary appointment)
Associate Professor of Orthopaedic Surgery
BA Colorado St University 1990
DPT Washington Univ in St. Louis 2008
MS Washington Univ in St. Louis 1998

**Joseph W. Klaesner, PHD, MS, BS1**
Professor of Physical Therapy (primary appointment)
Professor of Radiology
PHD Vanderbilt University 1995
BS Marquette University 1987
MS Vanderbilt University 1993
BS1 Marquette University 1987

## L

**Catherine Eckels Lang, MS, PHD**
Professor of Physical Therapy (primary appointment)
Associate Director of Movement Science PhD Program in Physical Therapy
Professor of Neurology
Professor of Occupational Therapy
MS University of Vermont 1997
PHD Washington Univ in St. Louis 2001
BS University of Vermont 1993

**Vanessa Mae Lanier, DPT**
Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopaedic Surgery
BS Washington Univ in St. Louis 2007
DPT Washington Univ in St. Louis 2012

## M

**Mary Kate McDonnell, MHS, DPT**
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Associate Director of Residencies and Fellowships in Physical Therapy
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BS Saint Louis University 1981
MHS Washington Univ in St. Louis 1985
DPT Washington Univ in St. Louis 2003

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Assistant Professor of Orthopaedic Surgery
BA Washington Univ in St. Louis 2001
DPT Washington Univ in St. Louis 2004
BA Washington Univ in St. Louis 2001

**Jacob Graves McPherson, MS, PHD**
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MS Northwestern University 2008
BS University of North Carolina a 2005
PHD Northwestern University 2011

**Laura Crego Miller McPherson, PHD, DPT**
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Assistant Professor of Neurology
BS Vanderbilt University 2006
PHD Northwestern University 2014
DPT Northwestern University Med 2012

**Gretchen Ann Meyer, MS, PHD**
Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Neurology
Assistant Professor of Orthopaedic Surgery
MS Washington Univ in St. Louis 2004
BS Washington Univ in St. Louis 2004
PHD University of CA San Diego 2011

**Jennifer Alaine Miller-Katsafanas, BBA, DPT, DPT**
Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Obstetrics and Gynecology
BA University of MO St Louis 1996
BBA University of MO St Louis 1996
DPT Washington Univ in St. Louis 2012
BA University of MO St Louis 1996
DPT Washington Univ in St. Louis 2012

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BS Washington Univ in St. Louis 1979
MHS Washington Univ in St. Louis 1984
PHD Washington Univ in St. Louis 1992

## N

**Barbara Jean Norton, MHS, PHD**
Professor of Physical Therapy (primary appointment)
Associate Director of Education Technology in Physical Therapy
Professor of Neurology
BS Washington Univ in St. Louis 1966
MHS Washington Univ in St. Louis 1985
PHD Washington Univ in St. Louis 1996

## R

**Susan B. Racette, PHD**
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Professor of Medicine
PHD University of Chicago 1994
BS Bucknell University 1988

## S

**David R Sinacore, PHD, MHS**
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BS State University of New York 1979
PHD West Virginia University 1992
MHS Washington Univ in St. Louis 1983

**Cheryl Renae Smith, MS, DPT**
Assistant Professor of Physical Therapy (primary appointment)
Assistant Professor of Orthopaedic Surgery
MS University of Oklahoma 2004

DPT Washington Univ in St. Louis 2010

**Nancy Bloom Smith, DPT, MS**
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Professor of Orthopaedic Surgery
BA University of Virginia 1976
DPT Washington Univ in St. Louis 2002
BS Washington Univ in St. Louis 1984
MS Washington Univ in St. Louis 1979

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DPT Washington Univ in St. Louis 2006
BS Marquette University 1986
MHS Washington Univ in St. Louis 1994

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Professor of Neurology
MS University of Southern Calif 1979
MSW Washington Univ in St. Louis 2006
PHD Washington Univ in St. Louis 1994
BS University of California 1976

## T

**Stacy Lynne Tylka, MS, DPT**
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Associate Professor of Orthopaedic Surgery
BS Saint Louis University 2000
MS Saint Louis University 2002
DPT Washington Univ in St. Louis 2009

## V

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PHD Washington Univ in St. Louis 1994
BS University of Missouri 1979
MS Washington Univ in St. Louis 1985

## Z

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Professor of Physical Therapy (primary appointment)
Professor of Radiology
ME Harbin Engineering University 1984
MS Washington Univ in St. Louis 1991
D SC Washington Univ in St. Louis 1993
BS Harbin Engineering University 1982

# Courses

Visit online course listings to view semester offerings for M02 PhysTher (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M02).

**M02 PhysTher 5001 Independent Study**
Independent research work under supervision of a faculty member in the Program in Physical Therapy. Prerequisite: junior or senior standing and permission of faculty. Petition forms are available from Dr. Clark.
Credit variable, maximum 6 units.

**M02 PhysTher 601 Diagnosis and Evidence Analysis in PT Practice I**
Includes processes required for effective clinical decision-making such as the use of disablement models, decision trees, diagnostic classification systems, patient interviewing and outcome measures. An introduction to basic research methods and systematic review of the literature. Patient cases will be used to practice clinical decision-making skills.
Credit 2 units.

**M02 PhysTher 602 Professional Issues and Skills 1**
An introduction to the profession of physical therapy, the APTA, professional behavior and clinical activities such as documentation and quality improvement. Includes ethics, legal issues and policies that guide professional behavior. Students will learn and practice using principles of patient teaching, negotiation and team building. Students will spend 80 hours at clinical sites.
Credit 3 units.

**M02 PhysTher 603 Essential Clinical Skills I**
Beginning skills for patient management include using systems screening and reliable assessment of impairments including visual appraisal, vital signs, sensation, reflexes, pain, range of motion, muscle strength and infection control. Skill and safety in positioning, draping and managing equipment during patient care activities such as walking and transfers will be developed.
Credit 4 units.

**M02 PhysTher 604 Cells, Systems and Disease I**
The first of a two-semester course, this course focuses on advanced human physiology and pathological mechanisms of disease. Course content emphasizes cellular and organ system physiology, pathological mechanisms of disease, and medical management of pathological conditions. Physicians will discuss medical diagnosis, clinical signs and symptoms, and management of selected diseases. Students will be introduced to pharmacology and to the relevance of clinical laboratory values. Patient case studies will be used to integrate information.
Credit 4 units.

**M02 PhysTher 605 Neuroscience**
Focuses on the study of structures, organization and function of the nervous and muscular systems. Emphasis is on the sensory and motor systems involved in motor control and on basic knowledge required for clinical practice.
Credit 3 units.

**M02 PhysTher 606 Kinesiology I**
An introduction to the analysis of normal human movement activities through the application of mechanical concepts including displacement, velocity, acceleration, force and torque. Emphasizes kinematic and kinetic concepts relevant to human movement and study of the structures involved in movement.
Credit 3 units.

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**M02 PhysTher 610 Cells, Systems and Disease II**
A continuation of the first semester. Open only to individuals enrolled in the Physical Therapy program.
Credit 4 units.

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**M02 PhysTher 611 Human Anatomy**
Emphasis is on: 1) Musculoskeletal, neural and vascular systems of the extremities, head, neck and trunk; and 2) anatomical features relevant to current physical therapy practice. Lectures are complemented by student-performed dissection of human cadavers, instructor-prepared prosections and computer-assisted instruction. Open only to individuals enrolled in the Physical Therapy program.
Credit 5 units.

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**M02 PhysTher 612 Diagnosis and Evidence Analysis in PT Practice II**
Continuation of research methods from the first semester, including use of statistics and outcome measurements. Students will complete a reliability project and write a paper based on the literature. Cases will permit further practice using decision trees and assigning diagnoses of basic movement-related conditions. *Open only to individuals enrolled in the Physical Therapy program.*
Credit 2 units.

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**M02 PhysTher 613 Kinesiology II**
Emphasizes principles of maturation and motor learning relative to the application of biomechanical principles to the analysis of human movement. Standardized methods of characterizing movement by observation and with the use of technology will be addressed. Topics include developmental, anatomical, electromyographical and physiological elements of kinesiology with regard to individual joints and common functional activities such as gait and transitional movements.
Credit 5 units.

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**M02 PhysTher 614 Diagnosis and Management of Musculoskeletal Conditions in PT I**
Students will learn postural assessment and application of Movement Systems Balance. Analysis of functional activities, the essential components and compensatory strategies, will prepare the student to begin to plan interventions for individuals with musculoskeletal problems. Skill in providing interventions of manual exercise, fitness training and functional mobility training will be developed. Cases will provide use of diagnostic systems relevant to musculoskeletal conditions.
Credit 3 units.

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**M02 PhysTher 615 Professional Issues and Skills Development II**
Students will be assigned to part-time clinical experiences for 45 hours to allow practice of acquired skills in patient care, documentation and communication.
Credit 0.5 units.

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**M02 PhysTher 621 Exercise Physiology**
A study of the responses of various physiological systems to exercise. Includes application and integration of these systems to various diseases and to human performance. Content will be coordinated with Diagnosis and Management of Cardiopulmonary Conditions in Physical Therapy. Open only to individuals enrolled in the Physical Therapy program.
Credit 3 units.

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**M02 PhysTher 622 Diagnosis and Management of Cardiopulmonary Conditions in PT**
Students will learn to assess, diagnose and treat movement-related cardiopulmonary conditions. Treatment techniques will include exercise and conditioning, breathing techniques, postural drainage and percussion. Interpretation of laboratory tests and pharmacology will prepare students to work with patients safely. Case studies will prepare students for general practice. *Open only to individuals enrolled in the Physical Therapy program.*
Credit 3 units.

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**M02 PhysTher 623 Orthopaedic Medicine**
Physician lectures will provide students with information on surgical and non-surgical procedures and postoperative management of patients with orthopaedic conditions. Physicians will discuss medical diagnosis, clinical signs and symptoms, and management of selected conditions to prepare the student to use this information in Diagnosis and Management of Musculoskeletal Conditions in PT II - III. Open only to individuals enrolled in the Physical Therapy program.
Credit 2 units.

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**M02 PhysTher 624 Diagnosis and Management of Musculoskeletal Conditions in PT II**
Students will acquire the skills needed to manage and prevent movement-related musculoskeletal problems of the spine and lower quarter. Acute and post-acute care will be addressed. Integration of information from previous and concurrent courses will be stressed with emphasis on screening, examination, analysis of findings, diagnosis, design and implementation of intervention programs for patients with increasingly complex problems. Functional activities across the life span also will be addressed. Open only to individuals enrolled in the Physical Therapy program.
Credit 3 units.

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**M02 PhysTher 625 Neurology Medicine**
Physician lectures will provide students with information on the medical management of patients with neurological conditions. Physicians will discuss medical diagnosis, clinical signs and symptoms, and management of selected conditions to prepare the student to use this information in Diagnosis and Management of Neuromuscular Conditions in PT. *Open only to individuals enrolled in the Physical Therapy program.*
Credit 2 units.

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**M02 PhysTher 626 Moderators of Health, Wellness and Rehabilitation**
Designed to explore individual attitudes toward health, illness, disability and death. Emphasizes the effect of these attitudes on individual goals, motivation, expectations, interpersonal relationships and exercise adherence. Investigates individual health attitudes, personal values, family interaction, stress management and concepts of wellness. Age-related issues will be addressed. *Open only to individuals enrolled in the Physical Therapy program.*
Credit 3 units.

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**M02 PhysTher 627 Essential Clinical Skills II**
Skill in providing interventions including massage and mobilization and the application of thermal, mechanical, hydro and electrotherapeutic modalities will be developed. Students will learn the basic indications for and prescription of adaptive equipment and wheelchairs. Open only to individuals enrolled in the Physical Therapy program.
Credit 3 units.

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**M02 PhysTher 628 Case Integration Lab I**
Paper, video and live patient cases provided by faculty and students will be completed to provide practice in managing patients with varying movement-related diagnoses of the cardiopulmonary and musculoskeletal systems. Open only to individuals enrolled in the Physical Therapy program.
Credit 1 unit.

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**M02 PhysTher 629 Diagnosis and Management of Neuromuscular Conditions in PT I**
Students will acquire the skills to examine patients with neuromuscular disorders. Emphasis will be on screening, selecting tests and measures, examination, determining impairments and functional loss, and making a movement system diagnosis. Students will practice examining both adult and pediatric patients. Content related to motor control and motor learning will be integrated into the course. Course content will be integrated with the concurrent Neurology Medicine course. *Open only to individuals enrolled in the Physical Therapy program.*
Credit 2 units.

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**M02 PhysTher 635 Professional Issues and Skill Development III**
Focuses on clinical application of compliance and motivation principles. Peer teaching, communication, consultation skills, leadership skills, lobbying legislation, documentation and negotiation in the clinic will be practiced. Students will practice decision making, supervision and delegation. Students will prepare resumes and begin career planning.
Credit 3 units.

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**M02 PhysTher 636 Diagnosis and Management of General Medical Conditions in PT**
Students will acquire the skills needed to manage movement-related problems in patients with diabetes, burns, arthritis, wounds, amputation and prosthetics, obesity, oncological problems, incontinence, pain, genetic conditions, osteoporosis, malnutrition, transplants and neonatology. Integration of information from previous and concurrent courses will be stressed with emphasis on screening, examination, analysis of findings, diagnosis, design and implementation of intervention programs for patients with increasingly complex problems. Functional activities across the life span will be addressed.
Credit 3 units.

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**M02 PhysTher 638 Diagnosis and Management of Musculoskeletal Conditions in PT III**
Students will acquire the skills needed to manage and prevent movement-related musculoskeletal problems of the spine, neck, elbow, wrist and hand, ankle and foot. Integration of information from previous and concurrent courses will be stressed with emphasis on screening, examination, analysis of findings, diagnosis, design and implementation of intervention programs for acute and post-acute patients with increasingly complex problems. Functional activities across the life span will be addressed.
Credit 3 units.

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**M02 PhysTher 642 Case Integration Lab II**
Students will use paper, computer, video and live patients to integrate information learned across the curriculum. Students will orally present cases they managed during Clinical Experience II.
Credit 1 unit.

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**M02 PhysTher 643 Diagnosis and Management of Neuromuscular Conditions in PT II**
Students will build on their skills for examining patients with neuromuscular disorders and diagnosing movement system dysfunction. Additional skills acquired will be designing and implementing intervention plans to address impairments and functional loss in patients of all ages. To aid in selecting appropriate interventions, students will consider patient prognosis. Students will learn to prescribe wheelchairs and orthotics, fabricate splints, apply kinesiotape, and use a variety of medical equipment. Motor control and motor learning principles will be integrated into the course. Open only to individuals enrolled in the Physical Therapy program.
Credit 4 units.

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**M02 PhysTher 650 Diagnosis and Evidence Analysis in PT Practice III**
Students will prepare written case reports based on patients seen during their clinical experiences. Students will defend use of diagnostic classifications and integrate the literature to support their case. Students will practice selecting appropriate outcome measures, designing clinical research questions, and use data to make decisions about individual and group treatment.
Credit 3 units.

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**M02 PhysTher 651 Organizational and Management Issues**
Dynamics of organizations and departments will be discussed using case examples. Focuses on the knowledge and skills needed by physical therapists early in their careers. Principles of administration and management that enable the physical therapist to supervise supportive personnel, to understand fiscal issues including reimbursement, and to recommend staffing schedules and patterns will be addressed. Students will learn marketing and public relations strategies.
Credit 3 units.

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**M02 PhysTher 652 Alternative Settings and Practice Environments**
Physical therapy practice in work and community settings will be addressed with an emphasis on ergonomics and group treatment. Special PT tests and the interpretation of other tests will be integrated into cases. Students will be introduced to care for the patient with vestibular problems, care in the ER, and an update in genetics/genomics. Alternative medicine and alternative PT practice will be studied. Students will explore recreational options for disabled populations.
Credit 3 units.

**M02 PhysTher 653 Health Fitness and Prevention**
Emphasis will be on critiquing and designing fitness and wellness programs for well and special populations. Programs will focus on those for employee fitness, diabetes, arthritis, obesity and the elderly. Students will participate in and evaluate group treatments and recreational exercise. Use of exercise equipment will be addressed.
Credit 3 units.

**M02 PhysTher 654 Case Integration Lab III**
A variety of teaching methods, including rounds format, assessment centers and student presentations will enable students to integrate information from across the curriculum to complete complex case studies. Emphasis will be on pharmacology, other tests, moderators, establishing time frames and setting priorities for care. Age-related issues will be addressed.
Credit 3 units.

**M02 PhysTher 655 Professional Issues and Skill Development IV**
Focus will be on the professional skills students need to function in entry-level practice in a variety of settings. Students will study licensure, and will participate in lobbying and a mock House of Delegates. Skills in serving as an expert witness, a leader, a peer instructor and in clinical instruction will be developed. Students will be expected to participate in a service project and activities of the American Physical Therapy Association. Cultural and race issues will be actively explored.
Credit 4 units.

**M02 PhysTher 691 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.

**M02 PhysTher 692 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.

**M02 PhysTher 693 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.

**M02 PhysTher 694 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.

# 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 course work 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 course work and skills learned in the program. MPHS students deepen their learning by choosing one of four concentrations: Clinical Epidemiology, Health Services, Quantitative Methods, or Psychiatric and Behavioral Health Sciences.

| | |
|---|---|
| **Contact:** | Blanka Hodzic, Program Coordinator |
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| **Website:** | http://www.mphs.wustl.edu |

## Degrees & Offerings

- Master of Population Health Sciences (p. 86)

## Research

### Research Projects & Assignments

The MPHS program uses applied course work, 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

## Director

**Graham Colditz, MD, DrPH (https://surgery.wustl.edu/people/graham-colditz/)**

## Co-Deputy Director

**Yikyung Park, ScD (https://surgery.wustl.edu/people/yikyung-park/)**

## Co-Deputy Director

**Adetunji Toriola, MD, PhD (http://publichealthsciences.wustl.edu/Faculty/ToriolaAdetunji/)**

## Associate Director for Medical Students

**Allison King, MD, MPH, PhD (https://wuphysicians.wustl.edu/for-patients/find-a-physician/allison-a-king/)**

Visit our website for more information about our faculty (http://publichealthsciences.wustl.edu/Faculty/) and their appointments.

# Courses

Visit online course listings to view offerings for M19 PHS (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M19).

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**M19 PHS 500 Current Topics in Public Health**
Students will review public health research, interventions and problems making headlines in print and television media. Discussion of how the problem is presented and evaluated will take place, and students will discuss alternate approaches. Course activities: brief presentations, short written assignments, class participation. Course note: required for medical students.
Credit 1 unit.

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**M19 PHS 501 Introduction to Epidemiology**
This course introduces the basic principles and methods of epidemiology, with an emphasis on critical thinking, analytic skills, and application to clinical practice. Topics include outcome measures, methods of adjustment, surveillance, quantitative study designs, and sources of data. Designed for those with a clinical background, the course will provide tools for critically evaluating the literature and skills to practice evidence-based medicine. Course activities: lectures, midterm and final exams, class participation, problem sets and papers. Course note: M21 503 required prerequisite.
Credit 3 units.

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**M19 PHS 502 Intermediate 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. Course note: M19-501 required prerequisite.
Credit 3 units.

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**M19 PHS 505 Ethics in Population and Clinical Health**
This course will expose population and clinical health researchers to the various ethical issues and situations encountered in their research and clinical duties, with a focus on research-related issues and solutions. It will also familiarize them with available ethics and compliance resources. Case studies and scenario presentations will facilitate discussion on topics such as informed consent, rights to health, personal responsibility for health, allegations of misconduct, research with communities, data objectivity and presentation, publications, collaborators' rights and responsibilities, intellectual property, and student-mentor relationships.
Credit 1 unit.

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**M19 PHS 510 Introduction to SAS for Clinical Research**
This one-week course is designed to equip medical students, clinicians and health researchers with basic SAS programming skills. Students will learn how to operate SAS, import external data, create SAS data sets, create, format and manipulate variables, and export data and results. Upon completion of this course, students will have obtained a basic understanding of the SAS environment.
Credit 1 unit.

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**M19 PHS 511 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 SAS program. Prerequisite for the course is knowledge in SAS.
Credit 3 units.

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**M19 PHS 512 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 and population-based data sets, including linear and logistic regression analyses, and survival analyses. Through applied course work, 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, and survival outcomes using the SAS program, and will be able to use these models to address their research questions. Prerequisite for the course is an introductory course in biostatistics and SAS knowledge.

Credit 3 units.

**M19 PHS 5252 Comparative Effectiveness Research**
This course will provide a comprehensive introduction to comparative effectiveness research. Topics include an overview of comparative effectiveness research, stakeholder engagement in comparative effectiveness research, designing comparative effectiveness research methodologic challenges in doing comparative effectiveness research, and recent developments in PCORI and federal policy. Students will be expected to review and evaluate comparative effectiveness studies as well as actively participate in class discussions. Course note: M19-501 and M21-560 are required prerequisites; SAS software required. If student is not in the MPHS program, they must contact the program regarding registration.
Credit 2 units.

**M19 PHS 5254 Using Administrative Data for Health Services Research**
The objective of this advanced graduate course is to prepare highly motivated students to perform health services research using administrative data. Lectures will provide tutorials on national administrative databases, review journal articles using these databases, instruction in SAS programming and application of health services research methods using administrative databases. Strengths and limitations of large databases that are commonly used for research will be considered, and special attention will be devoted to large federal databases that are readily available to new investigators. Students will learn how to obtain, link and analyze large databases, understand the key issues related to data security and confidentiality, and become knowledgeable about key methodologic issues in observational studies using administrative data. Students will evaluate published studies based on large administrative databases, develop a health services research proposal and complete a short research project that uses administrative data.
Credit 3 units.

**M19 PHS 526 Patient Safety, Quality Management, and Quality Improvement**
This course introduces principles of patient safety, quality measurement and quality improvement. Classes are designed to provide students with hands-on skills in systems thinking and in preventing, learning from, and dealing with medical error and adverse events. Students will also learn fundamentals in approaches to evaluating quality, including quantitative methods in measure development. We will discuss various approaches and challenges to knowledge translation and effective change management in improving quality. Students will be encouraged to use their real-world experiences in problem solving around patient safety concerns, to develop and evaluate quality measures in their respective fields and to develop a quality improvement project in their area of interest as part of the course. If student is not in the MPHS program, they must contact the program regarding registration.
Credit 3 units.

**M19 PHS 527 Development, Validation and Application of Risk Prediction Models**
This course will present an introduction to the methods of predictive modeling, with applications to both genetic and clinical data. Basic concepts and philosophy of supervised and unsupervised data mining as well as appropriate applications will be discussed. Topics covered will include multiple comparisons adjustment, cluster analysis, self-organizing maps, principal component analysis, and predictive model building through logistic regression, classification and regression trees (CART), multivariate adaptive splines (MARS), neural networks, random forests, and bagging and boosting. Approaches to validation will be discussed, and strategies for estimation of added value with expanded variable lists will be a key focus of this applied quantitative methods course. Course note: Biostatistics I and II (M21-560 and M21-570) are required prerequisites. If student is not in the MPHS program, they must contact the program regarding registration.
Credit 2 units.

**M19 PHS 530 Multilevel Models in Quantitative Research**
This course covers statistical model development with explicitly defined hierarchies. Such multilevel specifications allow researchers to account for different structures in the data and provide for the modeling of variation between defined groups. The course begins with simple nested linear models and proceeds on to non-nested models, multilevel models with dichotomous outcomes, and multilevel generalized linear models. In each case, a Bayesian perspective on inference and computation is featured. The focus on the course will be practical steps for specifying, fitting and checking multilevel models with much time spent on the details of computation in the R and Bugs environments. Prerequisites: Math 2200, Math 3200, Poli Sci 581, or equivalent.
Same as L32 Pol Sci 584
Credit 3 units.

**M19 PHS 532 Applied Qualitative Methods for Health Research**
This course will introduce students to the most commonly used qualitative methods for medical-related research. It will provide a foundation in the application of qualitative methods to medical and health research. Topics addressed 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 various interviewing techniques. Students will learn the best practices in qualitative research and how to critically evaluate qualitative studies and articles. Upon completion of the course, students will be able to plan, conduct and analyze a qualitative study. If student is not in the MPHS program, they must contact the program regarding registration.
Credit 3 units.

**M19 PHS 540 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.

**M19 PHS 550 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. Course activities: lectures, manuscript critiques, class project, paper. Course note: Students are strongly encouraged to have taken or be concurrently enrolled in M21-560. If student is not in the MPHS program, they must contact the program regarding registration.
Credit 3 units.

**M19 PHS 551 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. Stata IC required. Course note: M21-570 required prerequisite. If student is not in the MPHS program, they must contact the program regarding registration.
Credit 3 units.

**M19 PHS 559 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.

**M19 PHS 560 Principles of Shared Decision Making and Health Literacy in the Clinical Setting**
This course will provide a comprehensive introduction to principles of shared decision making and health literacy and their implications for clinical communication. Topics may include basic and applied research on shared decision making, principles of designing and evaluating patient decision aids, principles of health literacy, research on relationship between health literacy, numeracy, and health outcomes, best practices for communication with low-numerate and low-literate individuals, best practices (and controversies) in communicating probabilities and their associated uncertainty about screening and treatment outcomes, and best practices for designing and evaluating written information for clinical populations (such as intake forms, brochures, and informed consent documents). Course activities: lectures, manuscript critiques, class project, paper. If student is not in the MPHS program, they must contact the program regarding registration.
Credit 3 units.

**M19 PHS 562 Addictions and Addictive Behaviors**
This course provides an overview of the principles of substance-related addictions and the processes and mechanisms that underlie addiction. Students will be introduced to the epidemiology and developmental course of addiction, risk and protective influences that act on the course of addiction and its adverse health consequences. Both genetic and environmental underpinnings will be discussed. The impact of policy and economics will be studied. Emerging addictive behaviors, effective interventions and treatment modalities will be discussed. Students will be expected to participate in class discussions, complete written assignments (review paper format) and present one of their written assignments via in-class presentation. Course activities: lectures, class discussion, review paper presentation, three short papers. Course note: a required course for the Psychiatric and Behavioral Health Sciences Concentration. Prerequisite: M21-560 Biostatistics I or course director approval. If student is not in the MPHS program, they must contact the program regarding registration.
Credit 3 units.

**M19 PHS 5656 Global Burden of Diseases: Methods and Applications**
This transdisciplinary course provides an overview of quantitative and qualitative methods used in the field of global health, as well as their applications for studying the global burden of diseases. Topics covered include infectious diseases, non-communicable chronic medical illness and behavioral disorders. At the end of this course, students will have learned basic methods used in global health research and major trends in the global burden of diseases. Students will be able to apply the knowledge of measurements to forecast the future of the global burden of specific diseases and to develop needed policy recommendations. Students will also be able to address prevention and intervention strategies targeted to specific nations or regions, while drawing on perspectives and approaches from a range of disciplines. Students will learn sociocultural and economic factors that affect global and regional distributions of major disease categories and how they are linked to issues of global trade and political economy. The transdisciplinary knowledge and hands-on skills learned from this course will assist students with an interest in international research and the acquisition of practical skills will benefit their pursuit of health professions. This includes cultural competency training as it applies to medicine and public health. This course is open to postgraduate scholars and fellows and graduate and advanced undergraduate students.
Credit 3 units. A&S IQ: SSC EN: S

**M19 PHS 566 Psychiatric and Behavioral Assessment in the Digital Age**
The objective of this course is to help students develop the skills required to design research projects in the area of digital-based psychiatric assessment and prevention interventions. The course focuses on developing an innovative study using a digital format that includes mobile health (mHealth) technologies. The first segment of this course will introduce psychiatric disorder nosology, diagnostic assessment and screeners. The second segment will focus on existing treatment and intervention research using digital platforms. The third segment will introduce examples of analyses, including social media. The fourth segment will focus on topics related to the implementation of psychiatric and mental health research using digital platforms. Students will develop or analyze digitally-implemented psychiatric research projects.

Credit 2 units.

**M19 PHS 570 Communicating Research Findings to the Media and Lay Audiences**
A critical step in the dissemination of population-level clinical research is communicating research findings and key messages to the media and lay audiences. With conflicting messages coming from advocacy groups and others, the burden falls on the clinician-researcher to distill complex information, dispel misinformation, and tell a compelling story that resonates with the audience. The course will equip students with the skills, technique, experience and confidence needed to give successful, engaging media interviews and presentations related to the publication of research and expertise-specific topics. Through critique, tape and review exercises, class discussion, and guest speakers, students will learn about the facets that make an interview or presentation successful, including nonverbal communication and delivery skills (body language and vocal interpretation), content and messaging, and navigating interactions with the media. The instructor will evaluate each student's skill set and create a working skills inventory on which the student will build throughout the course in a series of on-camera experiences.
Credit 1 unit.

**M19 PHS 601 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.

**M19 PHS 610 Multilevel and Longitudinal Data Analyses for Clinical Research**
The course is designed for medical students, clinicians and health researchers. The course is an extension of Intermediate Biostatistics (M19-512, instructor Yan Yan). The topics include basic statistical concepts and methods for various types of clinical data (continuous, categorical, count, and time-to-event outcome data) in multilevel and longitudinal settings. Through lectures, SAS labs, and homework assignments, students will understand the basic statistical concepts and methods for the four types of clinical outcome data in multilevel and longitudinal settings, will be able to address clinical research questions using these concepts and methods, will be able to perform basic data analyses on these types of data with SAS software, and will be able to interpret the results in the context of clinical research.
Credit 3 units.

# 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 Brown School 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 Brown School 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 contact Angela Hobson, PhD, assistant dean for Public Health, by phone at 314-935-2760 or by email at hobsona@wustl.edu; information can also by obtained by sending an email to Brown School admissions (brownadmissions@wustl.edu).

## Degrees & Offerings

- Master of Public Health (p. 86)

## Research

Please visit the Brown School MPH website for more information about our public health research (https://brownschool.wustl.edu/Academics/Master-of-Public-Health/Curriculum/).

## Faculty

### Associate Dean for Public Health

**Lora Iannotti**
Associate Professor
PhD, Johns Hopkins University Bloomberg School of Public Health

### Assistant Dean for Public Health

**Angela Hobson (https://brownschool.wustl.edu/faculty-and-research/pages/angela-hobson.aspx)**
Senior Lecturer
PhD, Saint Louis University

### Brown School Faculty

For a complete list of Brown School faculty (https://brownschool.wustl.edu/faculty-and-research/), please visit our website.

## Courses

The Department of Public Health offers courses through the Graduate School. Visit the university online course listings for semester offerings for S55 MPH (https://courses.wustl.edu/CourseInfo.aspx?sch=S&dept=S55&crslvl=5:9).

# Degrees & Offerings

## Applied Health Behavior Research



## Audiology and Communication Sciences



## Biology & Biomedical Sciences



## Biomedical Informatics



## Biostatistics



## Clinical Investigation



## Medical Physics



## Medical Education



## Occupational Therapy



## Physical Therapy



## Population Health Sciences



## Public Health



# Applied Health Behavior Research

# Master of Science in Applied Health Behavior Research

The Master of Science (MS) in Applied Health Behavior Research (AHBR) (https://crtc.wustl.edu/programs/degrees/ahbr/) is a 33-credit multidisciplinary program that focuses on the applied skills required for the development, management and evaluation of research studies and health behavior programs in academic, clinical and community settings. Students choose one of two concentrations:

1. Health Education, Program Planning and Evaluation (HEPPE) (https://crtc.wustl.edu/programs/degrees/ahbr/part-time-master-science-applied-health-behavior-research/): This concentration is designed for individuals who want to develop, manage and evaluate health programs in clinical or community settings. Course work focuses on health behavior theory, program planning, program evaluation, health education and program management.
2. Health Behavior Research (HBR) (https://crtc.wustl.edu/programs/degrees/ahbr/part-time-master-science-applied-health-behavior-research/): This concentration is designed for individuals to develop theoretical knowledge and gain practical research experience in order to pursue careers in a variety of health-related fields and/or to manage research studies in clinical settings. Course work focuses on health behavior theory, research methodology, analytic methods and research project management.

- Health Behavior Research, One-Year/Research Intensive Option (https://crtc.wustl.edu/programs/degrees/ahbr/one-year-ahbr/): This program is for individuals who want to develop theoretical knowledge and gain practical research experience in order to pursue careers in a variety of health-related fields or to pursue advanced graduate degrees. It is designed to be completed in three semesters, and it includes 9 credit units of mentored research. In addition, it provides hands-on training for students interested in health-, medical- and psychology-related fields, and it provides students with an opportunity to fulfill specific graduate and medical school core competencies while enhancing their applications to MD and PhD programs.

## Program Requirements

The MS in AHBR can be pursued on a full-time or part-time basis. Registration is open to anyone with a four-year undergraduate degree from an accredited university or college in an appropriate field of study. Applications are accepted on a rolling basis, and students may pursue course work at their own pace. The MS does not require a thesis upon completion of the program, and the GRE is not required for admission.

### Required Core Courses for the Master of Science

| Code | Title | Units |
|---|---|---|
| AHBR 508 | Project Management in Clinical and Community Settings | 3 |
| AHBR 514 | Health Behavior Theory | 3 |
| AHBR 525 | Introduction to Biostatistics | 3 |
| AHBR 560 | Survey Methods: Design and Evaluation | 3 |

Visit the AHBR Courses webpage (https://crtc.wustl.edu/courses/class-list/ahbr-courses/) to view concentration-specific required courses and elective options.

## Admissions

To be considered for admission, applicants must submit the following:

- AHBR application (https://applyweb.collegenet.com/account/new/create/?instcode=wustl)
- Application fee
- Résumé/curriculum vitae
- Personal statement
- All college transcripts
- Three letters of recommendation

Please visit the Apply section of the AHBR home page (https://crtc.wustl.edu/programs/degrees/ahbr/) or email the program manager at ahbr@wustl.edu for the application deadline and additional information.

# Graduate Certificate in Health Behavior Planning and Evaluation

The Graduate Certificate in Health Behavior Planning and Evaluation (https://crtc.wustl.edu/programs/certificates/hbpe/) is a 15-credit program featuring a curriculum that is focused on key applied and theoretical concepts in health behavior as well as on the processes needed for managing program development and evaluation activities in clinical and community settings.

## Program Requirements

The graduate certificate can be pursued on a full- or part-time basis. Registration is open to anyone with a four-year undergraduate degree from an accredited university or college in an appropriate field of study. Applications are accepted on a rolling basis, and students may pursue course work at their own pace.

### Required Core Courses for the Graduate Certificate

| Code | Title | Units |
|---|---|---|
| AHBR 508 | Project Management in Clinical and Community Settings | 3 |
| AHBR 514 | Health Behavior Theory | 3 |
| AHBR 536 | Health Education: Methods, Planning, and Evaluation | 3 |
| AHBR 582 | Evaluation of Health Services Programs | 3 |

Visit the Applied Health Behavior Research Courses webpage (https://crtc.wustl.edu/courses/class-list/ahbr-courses/) to view concentration-specific required courses and elective options.

## Admissions

To be considered for admission, applicants must submit the following:

- Applied Health Behavior Research application (https://applyweb.collegenet.com/account/new/create/?instcode=wustl)
- Application fee
- Résumé/curriculum vitae
- Personal statement
- All college transcripts
- Three letters of recommendation

Please visit the Apply section of the Applied Health Behavior Research home page (https://crtc.wustl.edu/programs/degrees/ahbr/) or email the program manager at ahbr@wustl.edu for the application deadline and additional information.

# Audiology and Communication Sciences

## Doctor of Audiology

The Doctor of Audiology (AuD) (https://pacs.wustl.edu/programs/doctor-of-audiology/) program is a four-year course of study that integrates course work with clinical experiences and research opportunities during the first three years of study and that includes a full-time clinical externship during the fourth year. The curriculum covers the scope of practice and includes course work in the basic and applied sciences as well as in the prevention, identification, evaluation and treatment of auditory and vestibular disorders. During the first year of study, students complete foundational course work and begin observation and practicum. During years two and three, the time in practicum increases and the time in courses decreases. During the fourth year, students are fully immersed in clinical experiences.

## Master of Science in Deaf Education

The Master of Science in Deaf Education (MSDE) (https://pacs.wustl.edu/programs/master-of-science-in-deaf-education/) program trains teachers of the deaf and hard of hearing, preparing them as professionals with the knowledge and skills needed to work in a variety of settings with children from birth to grade 12. The early identification of hearing loss and advanced hearing technologies have increased the national need for teachers with experience in listening and spoken language, creating opportunities for our graduates across the country. During the first year of study, students complete foundational course work and begin observation and practice teaching; advanced course work and formal practice teaching experiences are completed during the second year.

## PhD in Speech and Hearing Sciences

The PhD program in Speech and Hearing Sciences (http://bulletin.wustl.edu/grad/gsas/sahs/) prepares students for academic and research careers in speech and hearing sciences. The program was established in 1947, and it is dedicated to fostering scientific inquiry in speech and hearing sciences and related disciplines. The program is administered through the Graduate School at Washington University in St. Louis.

## Minor in Speech and Hearing Sciences

The Minor in Speech and Hearing Sciences (http://bulletin.wustl.edu/undergrad/artsci/speechhearing/#minors) 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.

# Biology and Biomedical Sciences

## PhD Degrees in Biology & Biomedical Sciences

### PhD Degrees

Each program has its own steering committee, which provides students with guidance, addresses their needs, and monitors their progress. The committee also helps each student customize the course of study to match their individual needs. Each of the 12 programs establishes its own degree requirements.

Across all of the programs, the course of study consists of five distinct parts:

#### Courses

This generally requires two to five semesters and usually consists of four to nine courses in areas fundamental to the student's program. Students are expected to maintain a B average in graduate courses.

#### Laboratory Rotations

Selecting a thesis adviser 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.

## Qualifying Examination

After required courses are completed, each student takes a preliminary or qualifying examination to assess their mastery of the field and their ability to integrate information across fields. Upon successful completion of the qualifying exam, the student concentrates on thesis research.

## Thesis Research

Thesis research begins once the student has chosen a laboratory in which to work. With their mentor — the laboratory's principal investigator — the student devises a thesis project and chooses an advisory committee. Typically between the end of their second year and the middle of their third year, students present their thesis proposals to the thesis committee. Upon successful approval of the thesis proposal, the student officially becomes a doctoral candidate. For the rest of the student's program of study, the thesis committee monitors progress and meets at least once a year to provide analysis and advice. It also serves as the thesis defense committee when the thesis is ready for presentation. Most students complete and defend their dissertations by the end of their sixth 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 (http://dbbs.wustl.edu/curstudents/SpecialEmphasisPathways/Pages/SpecialEmphasisPathways.aspx) 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 to defray the costs of attending a national scientific meeting.

# Biomedical Informatics

# Master of Science in Biomedical Informatics

$I^2$ is pleased to offer a master of science in biomedical informatics. The master's degree program is administered through $I^2$ and housed in the Clinical Research Training Center. Degrees are conferred through Washington University School of Medicine.

More information about our programs can be found on the Graduate Programs in Biomedical Informatics webpage (https://informatics.wustl.edu/ms-biomedical-informatics-degree/).

## Master of Science

- 36 units
- Capstone/thesis
- Two to five years for program completion
- Full-time and part-time options
- Three tracks offered:
  - Translational bioinformatics and clinical research informatics
  - Clinical informatics
  - Bioinformatics

## Core Courses: All Tracks

All students in this program will be expected to take the core classes listed below (with the exception of the research credit units):

- BMI 5302 Introduction to Biomedical Informatics I (3 units)
- BMI 5303 Introduction to Biomedical Informatics II (3 units)
- BMI 5304 Introduction to Biomedical Data Science I
- BMI 5305 Biomedical Data Science II (3 units)
- BMI 5204 Mixed Methods in Biomedical Informatics
- BMI 5200 Biomedical Informatics Journal Club (2 units)
- CLNV 510 Ethical and Legal Issues in Clinical Research (2 units)
- BMI 5201 Biomedical Informatics Rotation (4 units)

## Core Competencies: All Tracks

Students in the MS program will be expected to have the competencies listed below by the time of graduation. Students who have taken the equivalent at other institutions may be excused from these courses with permission of the program director.

- MSB 506 Introduction to R for Data Science (2 units)
- MSB 560 Biostatistics I (3 units)
- MSB 570 Biostatistics II (3 units)
- BMI 5304 Introduction to Biomedical Data Science I (3 units)
- CLNV 529 Scientific Writing and Publishing (2 units)

## Suggested Competencies & Electives

### Track: Translational Bioinformatics and Clinical Research Informatics

| Code | Title | Units |
|---|---|---|
| **Competency:** | | |
| PHS 5252 | Comparative Effectiveness Research | 2 |
| PHS 5254 | Using Administrative Data for Health Services Research | 3 |

| | | |
|---|---|---|
| CSE 530S | Database Management Systems | 3 |
| PHS 532 | Applied Qualitative Methods for Health Research | 3 |
| CLNV 513 | Designing Outcomes and Clinical Research | 3 |
| CSE 511A | Introduction to Artificial Intelligence | 3 |
| CSE 556A | Human-Computer Interaction Methods | 3 |
| **Suggested Electives:** | | |
| CSE 514A | Data Mining | 3 |
| CSE 515T | Bayesian Methods in Machine Learning | 3 |
| CSE 517A | Machine Learning | 3 |
| MSB 503 | Statistical Computing with SAS | 3 |

## Track: Clinical Informatics

| Code | Title | Units |
|---|---|---|
| **Competency:** | | |
| CSE 530S | Database Management Systems | 3 |
| PHS 532 | Applied Qualitative Methods for Health Research | 3 |
| CLNV 513 | Designing Outcomes and Clinical Research | 3 |
| PHS 501 | Introduction to Epidemiology | 3 |
| CSE 556A | Human-Computer Interaction Methods | 3 |
| **Suggested Electives:** | | |
| PHS 560 | Principles of Shared Decision Making and Health Literacy in the Clinical Setting | 3 |
| PHS 526 | Patient Safety, Quality Management, and Quality Improvement | 3 |
| MSB 503 | Statistical Computing with SAS | 3 |

## Track: Bioinformatics

| Code | Title | Units |
|---|---|---|
| **Competency:** | | |
| CSE 584A | Algorithms for Biosequence Comparison | 3 |
| CSE 587A | Algorithms for Computational Biology | 3 |
| Or Biol 5495 | Computational Molecular Biology | |
| CSE 530S | Database Management Systems | 3 |
| CSE 511A | Introduction to Artificial Intelligence | 3 |
| Biol 5488 | Genomics | 3 |
| **Suggested Electives:** | | |
| Biol 5491 | Advanced Genetics | 3 |
| MSB 503 | Statistical Computing with SAS | 3 |

# Certificate in Biomedical Informatics

$I^2$ is pleased to offer a certificate program in biomedical informatics. The certificate program is administered through $I^2$ and housed in the Clinical Research Training Center. Degrees are conferred through Washington University School of Medicine.

More information about our programs can be found on the Graduate Programs in Biomedical Informatics webpage (https://informatics.wustl.edu/ms-biomedical-informatics-degree/).

## Certificate Program

- 16 units
- Two core courses
- Two competency/elective courses
- One to three years for program completion
- Full-time and part-time options

## Core Courses

All students in this program will be expected to take the core classes listed below (with the exception of the research credit units):

| Code | Title | Units |
|---|---|---|
| BMI 5302 | Introduction to Biomedical Informatics I | 3 |
| BMI 5303 | Introduction to Biomedical Informatics II | 3 |
| BMI 5204 | Mixed Methods in Biomedical Informatics | 3 |
| BMI 5304 | Introduction to Biomedical Data Science I | 3 |
| BMI 5305 | Introduction to Biomedical Data Science II | 3 |
| BMI 5200 | Biomedical Informatics Journal Club | 1 |

## Core Competencies: All Tracks

| Code | Title | Units |
|---|---|---|
| MSB 506 | Introduction to R for Data Science | 2 |
| MSB 560 | Biostatistics I | 3 |
| MSB 570 | Biostatistics II | 3 |
| BMI 5304 | Introduction to Biomedical Data Science I | 3 |
| CLNV 529 | Scientific Writing and Publishing | 2 |

## Suggested Competencies & Electives

### Track: Translational Bioinformatics and Clinical Research Informatics

| Code | Title | Units |
|---|---|---|
| **Competency:** | | |
| PHS 5252 | Comparative Effectiveness Research | 2 |
| PHS 5254 | Using Administrative Data for Health Services Research | 3 |
| CSE 530S | Database Management Systems | 3 |
| PHS 532 | Applied Qualitative Methods for Health Research | 3 |
| CLNV 513 | Designing Outcomes and Clinical Research | 3 |
| CSE 511A | Introduction to Artificial Intelligence | 3 |
| CSE 556A | Human-Computer Interaction Methods | 3 |
| **Suggested Electives:** | | |
| CSE 514A | Data Mining | 3 |
| CSE 515T | Bayesian Methods in Machine Learning | 3 |
| CSE 517A | Machine Learning | 3 |
| MSB 503 | Statistical Computing with SAS | 3 |

### Track: Clinical Informatics

| Code | Title | Units |
|---|---|---|
| **Competency:** | | |
| CSE 530S | Database Management Systems | 3 |
| PHS 532 | Applied Qualitative Methods for Health Research | 3 |
| CLNV 513 | Designing Outcomes and Clinical Research | 3 |
| PHS 501 | Introduction to Epidemiology | 3 |
| CSE 556A | Human-Computer Interaction Methods | 3 |
| **Suggested Electives:** | | |
| PHS 560 | Principles of Shared Decision Making and Health Literacy in the Clinical Setting | 3 |
| PHS 526 | Patient Safety, Quality Management, and Quality Improvement | 3 |
| MSB 503 | Statistical Computing with SAS | 3 |

### Track: Bioinformatics

| Code | Title | Units |
|---|---|---|
| **Competency:** | | |
| CSE 584A | Algorithms for Biosequence Comparison | 3 |
| CSE 587A | Algorithms for Computational Biology | 3 |
| or Biol 5495 | Computational Molecular Biology | |
| CSE 530S | Database Management Systems | 3 |
| CSE 511A | Introduction to Artificial Intelligence | 3 |
| Biol 5488 | Genomics | 3 |
| **Suggested Electives:** | | |
| Biol 5491 | Advanced Genetics | 3 |
| MSB 503 | Statistical Computing with SAS | 3 |

# Biostatistics

## Master of Science in Biostatistics

This 18-month, 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 another related field. It prepares graduates for rewarding employment in academia and industry and for further graduate studies. Students will choose between a traditional biostatistics pathway or a statistical genetics pathway. An internship is a required component of the program, and students have the option to do a thesis project or to enroll in approved elective courses. Students also have the opportunity to enhance their research and statistical training through a paid research assistant position.

| Code | Title | Units |
|---|---|---|
| **Summer Year 1** | | |
| MSB 503 | Statistical Computing with SAS | 2 |
| MSB 560 | Biostatistics I | 3 |
| MSB 506 | Introduction to R for Data Science | 2 |
| **Fall Year 1** | | |
| MSB 570 | Biostatistics II (first half of semester) | 3 |
| MSB 515 | Fundamentals of Genetic Epidemiology (second half of semester) | 3 |
| MSB 550 | Introduction to Bioinformatics | 3 |
| Pathway course | | 3 |
| **Spring Year 2** | | |
| MSB 617 | Study Design and Clinical Trials | 3 |
| MSB 512 | Ethics in Biostatistics and Data Science | 2 |
| Pathway course | | |
| Elective from approved list | | |
| **Summer Year 2** | | |
| MSB 630 | Internship (The internship may be taken for 3 or 6 credit units. If it is taken for 3 units, students will also enroll in an approved elective to fulfill the remaining 3 required units.) | 3 |

| | | |
|---|---|---|
| **Fall Year 2** | | |
| MSB 600 | Mentored Research (Students will enroll in the Mentored Research course or 6 credit units of electives.) | 6 |
| Elective from approved list* | | |

* For a list of approved electives (https://biostatistics.wustl.edu/education/master-of-science-in-biostatistics-msibs/curriculum-and-degree-requirements/), please visit our website.

## Specific Courses for Each Pathway

### Biostatistics

| Code | Title | Units |
|---|---|---|
| PHS 501 | Introduction to Epidemiology | 3 |
| MSB 618 | Survival Analysis | 3 |

### Statistical Genetics

| Code | Title | Units |
|---|---|---|
| MSB 5483 | Human Genetic Analysis | 3 |
| MSB 621 | Computational Statistical Genetics | 3 |

## Academic Policies

Academic policies for degree programs can be found in the Student Handbook (PDF) (https://biostatistics.wustl.edu/wp-content/uploads/2019/08/2019-Student-Handbook.pdf).

## Prospective Students

Those interested in applying for a training program or who would like more information may contact the program manager (biostat-msibs@email.wustl.edu).

# Master of Science in Biostatistics and Data Science

This 18-month, 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 another related field. It prepares graduates for rewarding employment in academia and industry and for further graduate studies. Students will choose between an internship experience or a thesis project. Students also have the opportunity to enhance their research and statistical training through a paid research assistant position.

| Code | Title | Units |
|---|---|---|
| **Summer Year 1** | | |
| MSB 503 | Statistical Computing with SAS | 2 |
| MSB 560 | Biostatistics I | 3 |
| MSB 506 | Introduction to R for Data Science | 2 |
| **Fall Year 1** | | |
| MSB 570 | Biostatistics II | 3 |
| MSB 515 | Fundamentals of Genetic Epidemiology | 3 |
| MSB 550 | Introduction to Bioinformatics | 3 |
| BMI 5302 | Introduction to Biomedical Informatics I | 3 |
| **Spring Year 1** | | |
| MSB 617 | Study Design and Clinical Trials | 3 |
| MSB 618 | Survival Analysis | 3 |
| MSB 512 | Ethics in Biostatistics and Data Science | 2 |
| BMI 5303 | Introduction to Biomedical Informatics II | 3 |
| **Summer Year 2** | | |
| MSB 630 | Internship | 3 |
| or MSB 600 | Mentored Research | |
| **Fall Year 2** | | |
| MSB 630 | Internship | 3 |
| or MSB 600 | Mentored Research | |
| MSB 660 | Biomedical Data Mining | 3 |
| Elective from approved list | | |

## Academic Policies

Academic policies for degree programs can be found in the Student Handbook (PDF) (https://biostatistics.wustl.edu/wp-content/uploads/2019/08/2019-Student-Handbook.pdf).

## Prospective Students

Those interested in applying or who would like more information may contact the program manager (biostat-msibs@email.wustl.edu).

# Master of Science in Genetic Epidemiology

Because genetic epidemiology is a multidisciplinary field, we expect applicants to come from a variety of backgrounds. However, most individuals who apply to this program are physician-scientists and other clinical investigators, particularly postdoctoral fellows and people with terminal degrees in other related disciplines who seek to gain expertise in genetic

epidemiology. All prospective students must provide evidence of basic skills in genetics, mathematics and computer programming through course work and documented experience or by passing a proficiency exam.

An option for those who have completed a doctoral degree (PhD, MD, or equivalent) is to pursue a postdoctoral Master of Science in Genetic Epidemiology (GEMS) degree. This 30-credit-unit program can be pursued either full-time or part-time, but it must be completed within three years.

The GEMS program for postdoctoral students includes eight core courses (24 credits) as listed below, as well as 6 credits of approved electives:

| Code | Title | Units |
|---|---|---|
| MSB 503 | Statistical Computing with SAS | 2 |
| MSB 506 | Introduction to R for Data Science | 2 |
| MSB 515 | Fundamentals of Genetic Epidemiology | 3 |
| MSB 550 | Introduction to Bioinformatics | 3 |
| MSB 5483 | Human Genetic Analysis | 3 |
| MSB 560 | Biostatistics I | 3 |
| MSB 512 | Ethics in Biostatistics and Data Science | 2 |
| MSB 600 | Mentored Research | 6 |
| Electives: Students will work with their advisers to determine elective options | | 6 |
| Total Units | | 30 |

# Certificate in Biostatistics and Data Science

This 18-credit-unit certificate is designed to prepare students to process and analyze data to effectively extract, present and interpret information from modern biomedical research and practices and to translate this new knowledge to improve health outcomes and public health. The certificate is earned after successful completion (with a minimum grade of B) of six core courses. To earn the certificate, the following courses must be taken over the course of one to two consecutive years:

| Code | Title | Units |
|---|---|---|
| MSB 560 | Biostatistics I | 3 |
| MSB 570 | Biostatistics II | 3 |
| MSB 550 | Introduction to Bioinformatics | 3 |
| MSB 660 | Biomedical Data Mining | 3 |
| BMI 5302 | Introduction to Biomedical Informatics I | 3 |
| BMI 5303 | Introduction to Biomedical Informatics II | 3 |
| Total Units | | 18 |

## Academic Policies

Academic policies for degree programs can be found in the Student Handbook (PDF) (https://biostatistics.wustl.edu/wp-content/uploads/2019/08/2019-Student-Handbook.pdf).

## Prospective Students

Those interested in applying or who would like more information may contact the program manager (biostat-msibs@email.wustl.edu).

# Certificate in Genetic Epidemiology

Because genetic epidemiology is a multidisciplinary field, we expect applicants to come from a variety of backgrounds. However, most individuals who apply to this program are physician-scientists and other clinical investigators, particularly postdoctoral fellows and people with terminal degrees in other related disciplines who seek to gain expertise in genetic epidemiology. All prospective students must provide evidence of basic skills in genetics, mathematics and computer programming through course work and documented experience or by passing a proficiency exam.

The 19-credit-unit certificate program is designed to prepare students to work at the interface of genetics, biostatistics, epidemiology and computing. The Certificate in Genetic Epidemiology is earned after the successful completion (with a minimum of a B average) of seven core courses plus labs that are normally offered to master's candidates in Biostatistics. To earn the certificate, the following courses may be taken over the course one or two consecutive years:

| Code | Title | Units |
|---|---|---|
| MSB 503 | Statistical Computing with SAS (summer) | 2 |
| MSB 560 | Biostatistics I (summer) | 3 |
| MSB 506 | Introduction to R for Data Science (summer) | 2 |
| MSB 570 | Biostatistics II (fall) | 3 |
| MSB 515 | Fundamentals of Genetic Epidemiology (fall) | 3 |
| MSB 550 | Introduction to Bioinformatics (fall) | 3 |
| MSB 5483 | Human Genetic Analysis (fall) | 3 |
| Total Units | | 19 |

## Academic Policies

Academic policies for degree programs can be found in the Student Handbook (PDF) (https://biostatistics.wustl.edu/wp-content/uploads/2019/08/2019-Student-Handbook.pdf).

## Prospective Students

Those interested in applying or who would like more information may contact the program manager (biostat-msibs@email.wustl.edu).

# Clinical Investigation

# Master of Science in Clinical Investigation

## Program Requirements

### Didactic Course Work

All Master of Science in Clinical Investigation (MSCI) scholars must complete 33 credit units of didactic course work, including 16 core credits, 4 credits of MTPCI Research Seminar, at least 6 credits of electives, and variable credits of mentored independent research. For additional information about the specific courses required for each of the concentrations, please visit the MSCI Concentrations (https://crtc.wustl.edu/msci-concentrations/) webpage. Core courses include the following:

| Code | Title | Units |
|---|---|---|
| CLNV 513 | Designing Outcomes and Clinical Research | 3 |
| CLNV 510 | Ethical and Legal Issues in Clinical Research | 2 |
| CLNV 522 | Introduction to Statistics for Clinical Research | 3 |
| CLNV 524 | Intermediate Statistics for the Health Sciences | 3 |
| CLNV 528 | Grantsmanship | 2 |
| or CLNV 529 | Scientific Writing and Publishing | |
| CLNV 589 | Advanced Methods for Clinical and Outcomes Research | 3 |
| Total Units | | 16 |

### Thesis

Scholars will form a thesis committee consisting of three faculty members and meet with that committee at least twice per year. The thesis committee should include the scholar's primary mentor, the MSCI program director, and a third faculty member in a closely related research field. The committee meetings will consist of reviewing the scholar's plan for completing and publishing a research project and manuscript. Scholars will return signed mentorship committee forms to the Clinical Research Training Center (CRTC) by December 1 and May 1. The final approval meeting will consist of a formal 15-minute presentation of the research followed by the committee's discussion of the manuscript. Visit the Thesis Requirement webpage (https://crtc.wustl.edu/thesis-requirement/) for more detail. The thesis must be based on original human research conducted during the period of pursuit of the degree. An alternate entrepreneurial thesis option (https://crtc.wustl.edu/programs/degrees/msci/msci-entrepreneurial-thesis-option/) is also available.

### CRTC Seminar

Scholars are required to attend the weekly CRTC Seminar (currently held on Tuesday afternoons) during the fall and spring semesters (mid-August through May). During their first and second years of the program, scholars are required to present research-in-progress once each year. Feedback will be provided by the directors, mentors and peers in attendance. The second week of each month will be dedicated to career development topics. During these seminars, speakers will be invited from outside the MSCI program to present.

### Mentors

Developing a successful clinical and translational research career requires strong relationships with mentors and a research team. Each scholar must have a program-approved primary research mentor. This mentor will be the scholar's main source of research supervision and career development. It is expected that scholars will meet weekly with their mentor and that the mentor will be available for consultation and support concerning the scholar's current projects and future progress. The mentor is expected to provide formal feedback to the scholar at least semiannually. In addition to the scholar's research mentor, the MSCI program director will serve as a mentor to the scholar to further assist with each scholar's career development during the program.

### Responsible Conduct of Research (RCR)

Scholars are required to complete the Ethical and Legal Issues in Clinical Research (CLNV 510) course during their time in the program as part of their RCR training.

### Institutional Review Board (IRB) Approvals

Scholars are required to obtain IRB approval for all research conducted as part of their MSCI degree and to provide documentation of current IRB approvals for their research project(s) to the MSCI program.

### Individual Development Plans

MSCI scholars must develop an Individual Development Plan in consultation with their mentors, and they must submit the plan by July 1 each year. The plan should include individual development goals for the next one to five years; career objectives for each goal; research activities/projects that will assist the scholar in meeting the objectives; and an overview of the courses, workshops and other educational/training activities that the scholar plans to pursue. For each objective, the

scholar should indicate what individual products (e.g., degrees, publications, presentations, grants) are expected. A timeline should be constructed to display the individual objectives, educational activities, research activities and products.

### Career Development Retreat

All MSCI scholars are required to attend the annual retreat hosted by the CRTC. During the late-afternoon event, speakers will highlight topics of relevance to scholars' career development and research.

### Research Training Symposium and Poster Session

In October of each year, the Washington University School of Medicine hosts a schoolwide, half-day Research Training Symposium and Poster Session. All MSCI scholars are strongly encouraged to submit an abstract and present a poster at the symposium each year of their appointments. Scholars are given the option to have their research considered for an oral presentation.

### Program Evaluation

Scholars are expected to complete required program evaluations twice per year. These evaluations are administered online and mandatory for all scholars. Scholars are also required to complete an exit interview one month prior to completing their degree.

## Eligibility

### Level of Education

MSCI candidates must either be enrolled in a predoctoral or postdoctoral mentored research program at Washington University School of 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.

### 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) for which an investigator or colleague directly interacts with human subjects.

### Mentor

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. Suggested mentors (https://crtc.wustl.edu/people/) can be found on our website. If applicants are having problems finding a mentor, they should contact us.

# Graduate Certificate in Clinical Investigation

The Graduate Certificate in Clinical Investigation (CI) (https://crtc.wustl.edu/programs/certificates/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, and leadership and community engagement. Three different tracks have been developed for the certificate: clinical investigation, translational medicine, and genetics/genomics.

On average, scholars complete the certificate requirements within one to two years. All course work must be successfully completed within five years from the start of the first course. Credits cannot be transferred into the CI program.

The evening course format allows for full- or part-time enrollment that can accommodate clinical schedules for students at any point during their careers.

# Graduate Certificate in Dissemination and Implementation

The Graduate Certificate in Dissemination and Implementation (https://crtc.wustl.edu/degrees-certificates/graduate-certificate-in-dissemination-and-implementation/) is a 16-credit certificate program for young investigators committed to pursuing academic careers in dissemination and implementation research. Students will gain knowledge and be able to describe crucial considerations in the design of survey samples and cluster-level interventions; relate emerging metrics distinctive to

implementation research, including of implementation processes, context, adaptation, and implementation outcomes; and understand pitfalls and opportunities for the use of widely representative non-research data, such as data culled from electronic medical records and administrative databases.

On average, scholars complete the certificate requirements within one to two years. All course work 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 at any point during their careers.

# Medical Education

# Doctor of Medicine

## Admissions

## Admission Requirements for the Study of Medicine

Entrance requirements to the School of Medicine include the following:

1. Evidence of superior intellectual ability and scholastic achievement;
2. Completion of at least 90 semester hours of college courses in an approved college or university;
3. Completion of the Medical College Admission Test of the Association of American Medical Colleges; and
4. 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. Course work 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, but applicants are strongly advised to pursue their interests in these and other areas of science.

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. At the same time, a diversity of background is encouraged in order to provide a necessary foundation for the development of cultural awareness, sensitivity and competence. Specific courses (other than the few in the natural sciences) are not prerequisites, because a great variety of courses and life experiences may prepare students for the many roles they may play in their medical careers.

## Technical Standards Statement

Graduates of Washington University with a Doctor of Medicine degree are expected to have broad competence in the basic skills that underlie the general practice of medicine and surgery. All graduates must be able to independently take a history, examine a person, and synthesize the findings into a diagnosis and plan of evaluation and treatment. Thus, medical students must possess the requisite sensory, motor, communicative and cognitive capabilities to accomplish these requirements in a reliable manner in order to be competent and safe medical practitioners.

## Application Procedure

General information for prospective medical students and instructions about how to apply can be found on the Medical Student Admissions website (http://mdadmissions.wustl.edu/).

Washington University School of 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 (https://students-residents.aamc.org/applying-medical-school/applying-medical-school-process/applying-medical-school-amcas/), 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 December 1 of the year prior to that in which they want to matriculate. In addition, applicants must complete a supplemental application (https://mdapply.wustl.edu/), submit letters of recommendation, and pay a nonrefundable application fee of $100. These materials must be received no later than December 15. The Committee on Admissions will only evaluate an application when it is complete.

Selected applicants are invited for a personal interview as well as a tour of the School of Medicine and the Washington University Medical Center. This visit provides extensive opportunities for the applicant to meet and talk with students and faculty members.

If an applicant is planning a trip to the St. Louis area, it is appropriate for them to contact us by email (mdadmissions@wustl.edu) to find out if an interview has been authorized. The inquiry should be submitted at least three weeks in advance of the anticipated travel. The Office of Admissions is open weekdays from 8:00 a.m. to 5 p.m. Central Standard Time.

Admission decisions are made by the Committee on Admissions on a rolling schedule beginning in early November. Applicants are notified as soon as a final decision has been made on their application. By April 1, every applicant should be notified whether they are accepted, on the waiting list or not accepted.

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 the School of Medicine all institutional judicial or academic sanctions and/or legal actions in which they have been a party prior to matriculation at the School of Medicine. Accepted applicants must report all institutional judicial and academic charges and/or legal charges brought against them before matriculation at the School of Medicine where such charges could result in sanctions. Concealing or failing to report such sanctions and/or charges promptly and, more generally, failure to maintain high standards of moral and ethical behavior may result in rescission of acceptance, dismissal from the School of Medicine, or revocation of the Doctor of Medicine degree.

## 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. There are multiple full and partial awards available. All accepted students are considered for merit-based scholarships without additional applications. Please consult the Financial Information section (p. 379) of this *Bulletin* for further details.

## Acceptance Protocols

As a participant in the American Medical College Application Service (AMCAS), the Washington University School of Medicine (WUSM) abides by the Application and Acceptance Protocols (https://students-residents.aamc.org/applying-medical-school/article/application-and-acceptance-protocols-applicants/) established by the AAMC and encourages students to use the accompanying AMCAS Choose Your Medical School Tool (https://students-residents.aamc.org/applying-medical-school/article/amcas-choosing-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 WUSM Admissions policy, applicants who have been offered admission to WUSM and who intend to matriculate at WUSM should indicate that they “Plan to Enroll” through the Choose Your Medical School Tool as soon as possible but by no later than April 30 of the year in which they will matriculate. WUSM reserves the right to rescind offers of acceptance if an applicant has not selected “Plan to Enroll” by April 30. After April 30, although applicants will maintain their “Plan to Enroll” status at WUSM, they may continue to hold positions on the waitlists of other schools.

Beginning April 30, accepted applicants have the option to “Commit to Enroll” at WUSM. When an applicant selects “Commit to Enroll” at WUSM, 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. WUSM reserves the right to rescind an offer of admission to any applicant still holding an active acceptance at another institution while having a “Commit to Enroll” status with WUSM. WUSM reserves the right to rescind offers of admission from any applicant still holding a WUSM acceptance while indicating that they either “Plan to Enroll” or “Commit to Enroll” at another institution after April 30.

For applicants accepted after April 30, the timeline for selecting “Plan to Enroll” will be specified by the Associate Dean for Admissions.

All MD applicants planning to matriculate at WUSM should select the “Commit to Enroll” option no later than one week 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 WUSM Admissions Office and seek an extension or exception.

## Background Checks and Screening for Controlled Substances

Students entering the School of 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 WUSM-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 to study at the School of 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 in the School of Medicine.

## Important Dates

- AMCAS application (https://students-residents.aamc.org/applying-medical-school/applying-medical-school-process/applying-medical-school-amcas/) deadline: December 1, 2020
- WUSM supplemental application (https://mdapply.wustl.edu/) deadline: December 15, 2020
- "Plan to Enroll" required: April 30, 2021

Visit the Important Dates page (https://mdadmissions.wustl.edu/how-to-apply/important-dates/) of the Admissions website for a complete list of dates and deadlines.

## Third-Year Class Transfer Program

Each year, Washington University School of Medicine accepts a limited number of transfer students into its third-year class, depending on the availability of positions. Transfer applications are accepted from well-qualified second-year students who are enrolled in good standing and eligible to continue in their Liaison Committee on Medical Education–accredited U.S. medical schools. Applicants must also have a compelling personal reason for requesting a transfer, and they must have the full approval of the dean of their current school. Accepted students are required to successfully complete the United States Medical Licensing Examination (USMLE) Step 1 examination.

Transfer application forms for admittance into the third-year class are available after October 1 for the following academic year. The deadline for the submission of these applications is March 31. Those applicants selected for an interview will be invited to visit the Washington University Medical Center. Applicants will be notified of the decision of the Committee on Admissions by May 15 or when a position becomes available.

**Inquiries should be directed here:**

Third-Year Class Transfer Program
Washington University School of Medicine
Campus Box 8077
660 S. Euclid Ave.
St. Louis, MO 63110-1093
Phone: 314-362-6844
Fax: 314-362-4658
Email: mdadmissions@wustl.edu

**Visit the Medical Student Admissions website (http://mdadmissions.wustl.edu/) 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 (https://www.usmle.org/)). 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 (https://www.acgme.org/)).

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 61 total weeks of curricular time: 48 of these will involve Integrated Foundational Modules, nine will be spent in Clinical Immersions, and four will be made up of the EXPLORE Immersion.

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:

- M81 500 Molecules to Society
- M81 505 Defense and Response to Injury
- M81 510 Circulation and Breathing
- M81 530 Ins and Outs
- M81 xxx Metabolism and Reproduction
- M81 xxx Scaffolding and Movement
- M81 xxx Brain and Behavior
- M81 xxx Phase 1 Capstone

The Clinical Immersion time will contain clinical experiences that are authentic, varied in content, and appropriate for the students' level of abilities. Every student will have an immersion in each of the following areas: Inpatient, Ambulatory, and Procedural. There will be substantial emphasis on professional identity formation and the social, behavioral, and health systems sciences. Courses in the Immersions will include the following:

- M81 515 Clinical Immersion: Ambulatory/ED
- M81 520 Clinical Immersion: Inpatient
- M81 525 Clinical Immersion: Procedural

The EXPLORE Immersion element of the curriculum will focus on four key areas: research, education, advocacy/global health, and innovation. Students will take the module M81 535 Explore Immersion.

## Phase 2

Phase 2 will include 12 months of clinical clerkship experiences in the content areas of Internal Medicine, Neurology, Obstetrics & Gynecology, Pediatrics, Psychiatry, and Surgery. Each clerkship will also include designated time to provide additional foundational science content specific to the clerkship.

## Phase 3

Phase 3 will consist of 64 weeks total. Students will engage in 36 weeks of required elements that will include four weeks of Internal Medicine Subinternship, 16 weeks of Advanced Clinical Rotations (ACRs), 12 weeks of required Keystone Integrated Science Courses (KISCs), and four weeks of Capstone. In addition, students will have the opportunity to take 36 weeks of electives (clinical, research, other non-clinical) inclusive of the following:

- Up to eight credit-bearing weeks of USMLE study time
- Six weeks of School of Medicine holiday time
- Up to 4 weeks of unscheduled (no credit) time, not inclusive of holiday time

There is no limit on the amount of elective time that can be dedicated to research activities (excepting MSTP students who have completed their PhD training).

# 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 (https://md.wustl.edu/academics/curriculum/first-year/) 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 (https://md.wustl.edu/academics/curriculum/first-year/selectives-requirements/) 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 (https://md.wustl.edu/academics/curriculum/electives-fourth-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 is 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 Competency-Based Learning 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.
2. Demonstrate knowledge of the basic mechanisms involved in the pathogenesis of common human diseases and their influence on clinical presentation and therapy.
3. Demonstrate knowledge of the epidemiology of common and clinically significant diseases.
4. Demonstrate basic knowledge of the impact of ethnicity, culture, socioeconomic status, patient and provider biases, and other social factors on health and disease.
5. Demonstrate basic knowledge of the ethical principles and professional values that underpin the medical profession.
6. Demonstrate basic knowledge of the common scientific methods used to study health and disease.
7. Demonstrate basic knowledge of the methods and principles used for improving the quality, safety and costs of health care delivery.

## Patient Care

1. Obtain appropriate medical histories that include the psychosocial and behavioral factors that influence health.
2. Perform accurate physical examinations.
3. Discuss the indications, risks and benefits of common medical procedures; demonstrate proficiency in performing the required procedures of the Washington University School of Medicine graduate.
4. Formulate a prioritized differential diagnosis for the patient's presenting symptoms, discuss expected physical examination findings based on the differential, and identify the diagnostic testing required.
5. Interpret common physical examination, laboratory and radiographic studies to inform the differential diagnosis and treatment plan.
6. Develop and carry out, with supervision, appropriate individualized diagnostic and treatment plans for patients across the broad spectrum of acute and chronic conditions.
7. Assess individual patient risk factors for common clinical conditions.
8. Educate patients and families about strategies to reduce risk and promote health.

## 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 health care team.
2. Discuss 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.

## Professionalism

1. Maintain a professionally appropriate demeanor.
2. Exhibit high standards of professional integrity.
3. Demonstrate an awareness of potential conflicts of interest.
4. Apply legal and ethical principles governing the physician–patient relationship.
5. Act in the patient's best interest and serve as a patient advocate.
6. Recognize, monitor and address psychological and physical factors in oneself that may affect professional performance.

## Systems-Based Practice

1. Work collaborative and effectively in interprofessional teams.
2. Recognize the roles of various members of the interprofessional health care team and the scope of their practice.
3. Demonstrate the ability and willingness to adapt to various health care delivery settings (e.g., inpatient, ambulatory, operating room, labor and delivery, emergency department).
4. Recognize barriers to and facilitators of safe, high-quality patient care.
5. Describe individual, team and system challenges that may contribute to medical errors; demonstrate the ability to identify medical errors when they occur.
6. Demonstrate the ability to identify medical errors when they occur.

## 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 medical practice through 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, Room 301
CB 8214
660 S. Euclid Ave.
St. Louis, MO 63110
Hours: 8:30 a.m. to 5:00 p.m., Monday through Friday
Phone: 314-362-7122
MD Program Website (https://md.wustl.edu/)

# Core Courses

# First-Year Medical Degree Requirements

## First-Year Core Courses

| Code | Title | Units |
|---|---|---|
| Neurosci 501B | Human Body: Anatomy, Embryology, Imaging | 140 |
| Neurosci 502A | Histology and Cell Biology | 66 |
| Biochem 502 | Molecular Foundations of Medicine | 46.5 |
| CellBio 501 | Physiology | 125 |
| Genetics 511 | Medical Genetics | 34 |
| Path 523 | Immunology | 37 |
| MolMB 526 | Microbes and Pathogenesis | 30 |
| Neurosci 554 | Neural Science | 109 |
| MolBio/Pha 500 | Principles of Pharmacology | 28 |
| Medicine 507 | Practice of Medicine I | 198.5 |
| Selectives | See details below | |

## First-Year Selectives

All first-year medical students are required to take and successfully complete at least four selective courses (https://md.wustl.edu/academics/curriculum-pre-2020/first-year/selectives-requirements/), with a maximum six allowed.

Students must enroll in a minimum of one course each from the humanities, basic sciences, and clinical categories. They must also choose an additional selective from the basic science or clinical category.

# Second-Year Medical Degree Requirements

## Second-Year Core Courses

| Code | Title | Units |
|---|---|---|
| Oto 660B | Clinical Topics In Otolaryngology | 9 |
| Medicine 615A | Endocrinology and Metabolism | 31 |
| Medicine 611B | Cardiovascular Disease | 30 |
| Medicine 612B | Pulmonary Diseases | 22.5 |
| Medicine 613B | Renal & Genitourinary Diseases | 38 |
| Medicine 614 | Dermatology | 8 |
| Medicine 620A | Gastroint. and Liver Diseases/ Nutrition | 32 |
| ObGyn 635B | Obstetrics and Gynecology | 16 |
| Neurol 632 | Diseases of the Nervous System | 53 |
| Psych 676A | Diseases of the Nervous System: Psychiatry | 44 |
| Medicine 605A | Infectious Diseases | 51 |
| Medicine 606A | Rheumatology | 17 |
| Medicine 625A | Hematology and Oncology | 39 |
| Medicine 607 | Practice of Medicine II | 89 |
| Peds 640 | Pediatrics: Physicians, Patients & Society | 27 |
| Path 665 | Pathology | 115 |

# Third-Year Medical Degree Requirements

## Third-Year Core Courses

| Code | Title | Units |
|---|---|---|
| Surgery 790 | Integrated Surgical Disciplines Clerkship | 462 |
| Medicine 710 | Medicine Clerkship | 462 |
| Neurol 720 | Neurology Clerkship | 154 |
| ObGyn 730 | OB/GYN Clerkship | 231 |
| Peds 760 | Pediatric Clerkship | 231 |
| Psych 770 | Psychiatry Clerkship | 154 |
| Medicine 707 | Practice of Medicine III | 0 |

# Fourth-Year Medical Degree Requirements

## Fourth-Year Core Courses

| Code | Title | Units |
|---|---|---|
| InterDis 849 | Fourth-Year Capstone | 0 |
| Electives | See details below | |

## Fourth-Year Electives

The elective year allows students to develop a flexible and individualized program of study at a crucial time in the continuum of formal medical education. Elective courses are offered at the 800 level and in the areas listed within each academic department.

### Department-Based Courses

- Anesthesiology (p. 97)
- Biochemistry and Molecular Biophysics (p. 103)
- Cell Biology and Physiology (p. 107)
- Developmental Biology (p. 111)
- Genetics (p. 116)
- Medicine (p. 172) (Internal Medicine)
- Molecular Microbiology (p. 184)
- Neurology (p. 197)
- Neuroscience (p. 203)
- Neurosurgery (p. 208)
- Obstetrics and Gynecology (p. 217)
- Ophthalmology and Visual Sciences (p. 230)
- Orthopaedic Surgery (p. 236)
- Otolaryngology (p. 245)
- Pathology and Immunology (p. 254)
- Pediatrics (p. 283)
- Psychiatry (p. 298)
- Radiation Oncology (p. 305)
- Radiology (p. 318)
- Surgery (p. 333)

### Interdisciplinary Courses

- List of Interdisciplinary Courses (p. 78)

# 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 (https://mdstudentresearch.wustl.edu/).

# Faculty

# 2020-21 Course & Clerkship Directors

## First Year

**Human Body: Anatomy, Embryology, Imaging**
Kari Allen, PhD
Amy Bauernfeind, PhD

**Histology and Cell Biology**
Paul Bridgman, PhD

**Molecular Foundations of Medicine**
Linda Pike, PhD

**Physiology**
Robert Mercer, PhD
Stephen Gregory, MD
Lai Kuan Dionne, PhD

**Immunology**
Brian Edelson, MD, PhD

**Medical Genetics**
Sabrina Nunez, PhD

**Microbes and Pathogenesis**
Henry Huang, PhD
Scott Hultgren, PhD

**Neural Sciences**
Krikor Dikranian, MD, PhD
Timothy Holy, PhD

**Principles of Pharmacology**
Simon Haroutounian, PhD

**Practice of Medicine I**
Timothy Yau, MD

**First-Year Selectives**
Faculty members from many departments and divisions at Washington University School of Medicine offer first-year selective course options focused on basic science, clinical experience and the humanities.

## Second Year

**Clinical Topics in Otolaryngology**
Joseph Bradley, MD

**Endocrinology and Metabolism**
Amy Riek, MD
Marina Litvin, MD

**Cardiovascular Disease**
Dana Abendschein, PhD
Justin Sadhu, MD, MPHS

**Pulmonary Disease**
Adrian Shifrin, PhD
Jeffrey Atkinson, MD

**Renal and Genitourinary Diseases**
Steven Cheng, MD

**Dermatology**
David Sheinbein, MD
Heather Jones, MD

**Gastroenterology and Liver Disease/Nutrition**
Sandeep Tripathy, MD, PhD

**Obstetrics and Gynecology**
Kenan Omurtag, MD

**Diseases of the Nervous System**
Allyson Zazulia, MD

**Diseases of the Nervous System: Psychiatry**
Marcie Garland, MD

**Infectious Diseases**
Nigar Kirmani, MD
Steven Lawrence, MD

**Rheumatology**
Lisa Zickuhr, MD

**Hematology and Oncology**
Meagan Jacoby, MD, PhD
Eric Knoche, MD

**Pediatrics**
Amanda Emke, MD
Ericka Hayes, MD

**Pathology**
Erika Crouch, MD, PhD

**Practice of Medicine II**
Megan Wren, MD

## Third Year

**Integrated Surgical Disciplines Clerkship**
Michael Awad, MD, PhD

**Medicine Clerkship**
Gerome Escota, MD

**Neurology Clerkship**
Robert Naismith, MD

**Obstetrics and Gynecology Clerkship**
Stewart Massad, MD
Tammy Sonn, MD

**Pediatrics Clerkship**
Laura Hall, MD
Colleen Wallace, MD

**Psychiatry Clerkship**
Brendan O'Connor, MD

**Practice of Medicine III**
Timothy Yau, MD

## Fourth Year

**Capstone**
Tosin Adeyanju, MD
Michael DeVita, MD
Holly Steiner, MD
Melissa Stewart, MD

**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.

# Interdisciplinary Courses

Return to Doctor of Medicine Core Courses (p. 76)

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**M80 InterDis 807 Physical Medicine and Rehabilitation**
The elective is designed to provide the student with a broad introduction to the field of Physical Medicine and Rehabilitation. 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 3-5 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 physiatry and neurology faculty of the Division of Rehabilitation. Rehabilitation and neurology residents are involved in student teaching as well. Students are required to participate in didactic teaching conferences within the PM&R residency. This rotation is particularly useful for students considering careers in rehabilitation, neurology, geriatrics, primary care, neurosurgery, or any other field that will require experience in the evaluation and management of patients with physical impairment and disabilities.

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**M80 InterDis 808 Step 1 Preparation**
Step 1 Preparation

**M80 InterDis 809 Ambulatory Care - Jacqueline Maritz Lung Center**

The Jacqueline Maritz Lung Center houses the ambulatory care activities of the Divisions of Pulmonary Medicine, Thoracic Surgery, and Allergy/Immunology, as well as the pulmonary function laboratory. The student will rotate through: 1. both general pulmonary and subspecialty clinics in Pulmonary Medicine (cystic fibrosis, transplantation, emphysema, etc.), 2. the Thoracic Surgery clinic, and 3. the Allergy/Immunology clinic. Students will also interpret pulmonary function tests. Chest imaging is also emphasized in the evaluation process. The rotation can be streamlined to meet areas of emphasis desired by individual students.

**M80 InterDis 823 Anatomy of Health - Community Navigator**

Four weeks of elective credit are awarded to students for this experience. Two weeks will include formal in-class work, and the other two weeks will have flexibility to be scheduled into students' schedule and can be completed over the following three months. Additional information about the flexible portion of the schedule will be provided to students by the course director. This course will be available to select at Pit Night. Are you interested in community engagement as an elective opportunity? Anatomy of Health is a four-week elective course structured to provide skills and experience in local community engagement. It requires two weeks of scheduled community engagement learning prerequisites, which will focus on social and structural determinants of health, principles of community engagement, and a review of Community Health Needs Assessment and the Community Health Improvement Plan for St. Louis. After this experience, students have the next three months to collaborate with a faculty "champion" working with a small group of Phase 1 students to provide insight and "navigation" through scheduled community-based collaborations and activities, classroom work, and direct mentoring in an effort to guide these early medical students in their own understanding of community health needs and engagement. Interested students will need to set up a brief meeting with Audrey Coolman and/or Dr. Punch to provide insight to why they are interested.

**M80 InterDis 827 Introduction to Global Health**

This is a cross-disciplinary "crash course" in global health for students considering a career in global health and should be particularly useful for those students planning to complete international electives before graduation or during residency. The course consists of a mix of lectures, workshops, discussions, debates, laboratory sessions, clinics, and simulation labs for two weeks. Topics will include significant coverage of high-burden infectious and tropical diseases (primarily case-based) in addition to discussion of emerging and neglected global health topics including mental health, non-communicable diseases, radiology, and maternal health. Active participation in all activities and discussions is expected in order to obtain credit for this course. The course is team taught by faculty from around the medical school with extensive experience in global health and will include opportunities to network with faculty and residents actively engaged in clinical, research, policy, and implementation work around the world. This course has been run for two years previously for residents only and now is being opened up to senior medical students as well. No specific clinical requirements or call is required. Attendance and active participation for each session throughout the two weeks is required and students should not schedule residency interviews or other time off during this block.

**M80 InterDis 835 Interprofessional Hotspotting**

We are looking for ONE Washington University Medical Student interested in joining an interprofessional team of students that will learn how to take care of patients with complex medical and social needs. This student will join the Interprofessional Student Hotspotting Learning Collaborative (ISHLC), which is an annual program run by the Camden Coalition that trains interdisciplinary teams of professional students from schools across the country to learn to help patients with complex medical and social needs. The Center for Interprofessional Practice and Education (CIPE) at the Washington University Medical Campus will send ONE team this year to the Interprofessional Student Hotspotting Learning Collaborative. The team will consist of one nursing student from Barnes-Jewish Goldfarb School of Nursing, one occupational therapy student from the WashU OT school, one medical student from WashU School of Medicine, and one pharmacy student from St Louis College of Pharmacy. This team will learn from and take care of high-risk patients from September 2020 through April 2021, with an estimated time commitment of two hours per week.

**M80 InterDis 849 Fourth-Year Capstone**

The fourth-year Capstone course is highly structured. In order to provide students with the absolute best experience possible, students are REQUIRED to attend all sessions. In general, the morning sessions will start at 8:00 am and run until approximately 12 noon. Afternoon sessions will generally run from 1:00 pm until about 5:00 pm. The afternoon sessions are typically hands-on activities which are faculty/staff intensive. By the end of this four-week course, students should be able to demonstrate improved cognitive and clinical skills needed to enter the internship year of graduate medical training. Topics to be covered include acute clinical problems commonly faced on the inpatient service or emergency room, review of key diagnostic testing, basic procedural skills and patient and family communications regarding informed consent and end-of-life issues. 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. Students will be assessed by performance on simulation exercises and a written exam.

**M80 InterDis 851 The Business of Medicine**

This two-week interactive course enhances medical students' Healthcare System Literacy, i.e. their understanding of how the healthcare system is structured, financed, operated, and regulated. They will learn how clinical decisions and options are tied to market forces, business structures, and health policy. From clinical practice management issues up to 'big picture' views of healthcare, the course modules help prepare students for the challenges they will face in their own practices as well as for leadership roles in improving patient care on a large scale. The course will be a blend of case-method sessions, targeted mini-lectures, expert panels, and field trips, all designed to invite student participation and engagement with representatives from a broad spectrum of the healthcare industry.

**M80 InterDis 863 Mind-Body Stress Reduction**

Mind-Body Stress Reduction is a program that uses intensive training in mindfulness meditation to teach people how to: - Reduce stress and anxiety - Increase focus & concentration - Manage health problems - Live more fully productive lives Mind-Body Stress Reduction utilizes both formal and informal mindfulness meditation practices. Mindfulness can be described

as non-judgmental, non-striving, moment-by-moment attention. It is often called present-centered awareness, a state of consciousness that has been shown to have health benefits for the autonomic nervous system, to increase immune function, and to increase alpha and theta brain waves, which are present in deep states of relaxation.

**M80 InterDis 899T Teaching Elective**
Teaching support for second-year courses

# 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 year in an academic program in a medical or medically related field. 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 program must be arranged with an academic adviser, and it is subject to the approval of the Associate Dean for Medical Student Research. Students enrolled in the five-year program must maintain insurance coverage through Student Health. Students interested in this program can contact the Office of Medical Student Research and Scholarship (https://md.wustl.edu/career-development/research/).

# 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. 36) section of this *Bulletin* for more information.

# Doctor of Medicine and Master of Population Health Sciences

The School of Medicine offers a combined MD/MPHS program. Please visit the Population Health Sciences (p. 56) section of this *Bulletin* for more information.

# Doctor of Medicine and Master of Public Health

The School of Medicine offers a combined MD/MPH program. Please visit the Public Health (p. 60) section of this *Bulletin* 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 (http://mstp.wustl.edu/program/Pages/MSTP-Curriculum.aspx) is integrated to allow for the timely completion of training. Students typically complete training in seven or eight years.

The program matriculates an average of 25 students per year, which is the equivalent of 25% of the entering School of Medicine class. All MSTP students receive financial support in the form of stipends (currently $30,500 per year), health coverage, disability and life insurance, and full tuition remission for both the MD and PhD phases of training.

**Medical Scientist Training Program**
Washington University School of Medicine
CB 8226
660 South Euclid Avenue
St. Louis, MO 63110-1093
Phone: 314-362-7190
MSTP Website (http://www.mstp.wustl.edu)

# Graduate Medical Education

Washington University School of Medicine has a number of Graduate Medical Education (https://gme.wustl.edu/) (GME) opportunities.

## GME-Sponsored Programs

In 1997, Washington University School of Medicine (https://medicine.wustl.edu/), Barnes-Jewish Hospital (http://www.barnesjewish.org/) and St. Louis Children's Hospital (http://www.stlouischildrens.org/) joined together to oversee the quality of graduate medical education training programs at these institutions. All three of these institutions have long histories of successfully training outstanding residents and clinical fellows; this collaborative educational effort demonstrates their dedication to quality healthcare and supports thoughtful patient care in the St. Louis area.

The GME Consortium sponsors more than 99 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 40 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 integral to the quality of patient care in the United States. Residents are doctors who have completed their medical education and who are pursuing three to seven years of advanced medical training in a chosen specialty. Clinical fellows have completed their residencies and are boards-eligible in their primary specialty training; they are pursuing additional years of training in an advanced subspecialty area of medicine. Both roles allow trainees to progressively assume greater responsibility working with patients while learning from faculty who are highly qualified in their specialties.

## Postdoctoral Training

Appointment as a Postdoctoral Research Associate or Scholar is a temporary training position designed to advance scientific research training and enhance professional skills. School of Medicine postdoctoral appointees conduct advanced research training with a faculty mentor and are supported by either research grants, individual fellowships or institutional training grants. The Office of Postdoctoral Affairs provides resources and professional development programming for postdoctoral appointees across the university. Washington University is an institutional member of the National Postdoctoral Association. More information is available from the Office of Postdoctoral Affairs (https://postdoc.wustl.edu/).

## Endowed Scholarships & Fellowships

Please visit the Medical Alumni & Development Programs webpage for Endowed Scholarships & Fellowships (https://medicalalumni.wustl.edu/give/scholarships/endowed-scholarships/).

# Continuing Medical Education

The study of medicine is a lifelong process, with continuing medical education (https://cme.wustl.edu/) 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 medicine but for pharmacy and nursing continuing education activities as well. The program's mission is to collaborate with teams of health care professionals as well as individual members of health care teams to provide opportunities for educational renewal and advancement to facilitate lifelong learning, the maintenance of professional competencies, and the enhancement of knowledge and skills to improve performance, clinical care and patient outcomes.

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 the development of faculty 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 160 symposia and more than 180 recurring academic rounds and conferences as well as videos, monographs and self-directed learning. About 9,000 registrants participate in these activities annually, and they receive more than 110,000

hours of instruction. CME Online (https://cme.wustl.edu/go/cmeonline/) 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

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.

## Admissions

For a list of MSMP admissions requirements, please visit the Department of Radiation Oncology website (https://radonc.wustl.edu/education/master-of-science-in-medical-physics/admissions/).

## 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 36 units of credit 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 clinical rotations. 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 perform clinical rotations to fine-tune their clinical skills.

## Course Schedule

### Clinical Project Stream

| Course | Fall Units | Spring Units | Summer Units |
|---|---|---|---|
| First Year | | | |
| Principles of Human Anatomy and Development (Biol 4580) | 3 | — | — |
| Clinical Imaging Fundamentals (MedPhys 501) | 2 | — | — |
| Radiological Physics and Dosimetry (MedPhys 502) | 3 | — | — |
| Independent Study (MedPhys 503) | 1 | — | — |
| Radiobiology (MedPhys 505) | — | 2 | — |
| Radiation Oncology Physics (MedPhys 506) | — | 3 | — |
| Biological Imaging Technology (BME 589) | — | 3 | — |
| Independent Study II (MedPhys 503) | — | 1 | — |
| Summer: Optional clinical rotation, clinical project, or studentship | — | — | |
| | **9** | **9** | **0** |
| Second Year | | | |
| Radiation Protection and Safety (MedPhys 521) | 2 | — | — |
| Clinical Rotations (MedPhys 522) | 1 | — | — |
| Clinical Project (MedPhys 503C) | 3 | — | — |
| Elective Course I | 3 | — | — |
| Advanced Clinical Medical Physics Lab (MedPhys 523) | — | 2 | — |
| Ethics, Professionalism, and Current Topics (MedPhys 504) | — | 1 | — |
| Elective Course II | — | 3 | — |
| Elective Course III | — | 3 | — |
| Summer: Optional clinical rotation | — | — | |
| | **9** | **9** | **0** |

### Thesis Research Stream

| Course | Fall Units | Spring Units | Summer Units |
|---|---|---|---|
| First Year | | | |
| Principles of Human Anatomy and Development (Biol 4580) | 3 | — | — |
| Clinical Imaging Fundamentals (MedPhys 501) | 2 | — | — |
| Radiological Physics and Dosimetry (MedPhys 502) | 3 | — | — |
| Independent Study (MedPhys 503) | 1 | — | — |
| Radiobiology (MedPhys 505) | — | 2 | — |
| Radiation Oncology Physics (MedPhys 506) | — | 3 | — |
| Biological Imaging Technology (BME 589) | — | 3 | — |
| Independent Study II (MedPhys 503) | — | 1 | — |
| Summer: Optional clinical rotation, thesis research | — | — | |
| | **9** | **9** | **0** |
| Second Year | | | |
| Radiation Protection and Safety (MedPhys 521) | 2 | — | — |
| Clinical Rotations (MedPhys 522) | 1 | — | — |

| | | | |
|---|---|---|---|
| Thesis Research I (MedPhys 503T) | 3 | — | — |
| Elective Course I | 3 | — | — |
| Advanced Clinical Medical Physics Lab (MedPhys 523) | — | 2 | — |
| Ethics, Professionalism, and Current Topics (MedPhys 504) | — | 1 | — |
| Thesis Research II (MedPhys 503T) | — | 3 | — |
| Elective Course II | — | 3 | — |
| Summer: Optional enhanced clinical rotation, thesis research | — | — | |
| | **9** | **9** | **0** |

# Post-PhD Graduate Certificate in Medical Physics

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.

The program is led by Associate Professor of Radiation Oncology Rao Khan, PhD, with Associate Professor of Radiation Oncology Tiezhi Zhang, PhD, serving as the assistant program director. This program requires the completion of 18 units of credit, and it is offered in a convenient one- or two-year format.

## Course Schedule

### One-Year Course Schedule

| Course | Fall Units | Spring Units | Summer Units |
|---|---|---|---|
| First Year | | | |
| Principles of Human Anatomy and Development (Biol 4580) | 3 | — | — |
| Radiological Physics and Dosimetry (MedPhys 502) | 3 | — | — |
| Radiation Protection and Safety (MedPhys 521) | 2 | — | — |
| Biological Imaging Technology (BME 589) | — | 3 | — |
| Radiobiology (MedPhys 505) | — | 2 | — |
| Radiation Oncology Physics (MedPhys 506) | — | 3 | — |
| Summer: Advanced Clinical Medical Physics Laboratory (MedPhys 573) | — | — | 2 |
| | **8** | **8** | **2** |

### Two-Year Course Schedule

| Course | Fall Units | Spring Units | Summer Units |
|---|---|---|---|
| First Year | | | |
| Principles of Human Anatomy and Development (Biol 4580) | 3 | — | — |
| Radiological Physics and Dosimetry (MedPhys 502) | 3 | — | — |
| Biological Imaging Technology (BME 589) | — | 3 | — |
| Radiobiology (MedPhys 505) | — | 2 | — |
| Summer: Advanced Clinical Medical Physics Laboratory (MedPhys 523) | — | — | 2 |
| | **6** | **5** | **2** |
| Second Year | | | |
| Radiation Protection and Safety (MedPhys 521) | 2 | — | — |
| Radiation Oncology Physics (MedPhys 506) | — | 3 | — |
| | **2** | **3** | **0** |

# 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 (https://www.nbcot.org/). Please visit the Program in Occupational Therapy website to view our NBCOT pass rate (http://www.ot.wustl.edu/education/nbcot-408/).

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 (https://www.nbcot.org/). Consult our Program in Occupational Therapy website for more information about our NBCOT Exam Results (http://www.ot.wustl.edu/education/nbcot-408/).

A felony conviction may affect a graduate's ability to sit for the NBCOT exam or to attain state licensure.

# Physical Therapy

## Doctor of Physical Therapy

The professional curriculum is an intensive three-year 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) (https://pt.wustl.edu/wp-content/uploads/2017/10/DPT-Curriculum-2016.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.

Applicants for admission must have completed the following:

1. A bachelor's degree at an accredited institution
2. Prerequisite courses in biology, chemistry, physics, anatomy, physiology, psychology and statistics
3. Science, math/science, and core prerequisites with a grade-point average of at least 3.0

Visit our website for more information regarding application and admissions (https://pt.wustl.edu/education/doctor-of-physical-therapy/application-admissions/) or eligibility and prerequisites (https://pt.wustl.edu/education/doctor-of-physical-therapy/eligibility-prerequisites/).

## DPT Curriculum

### Year One, Fall

| Code | Title | Units |
|---|---|---|
| PhysTher 601 | Diagnosis and Evidence Analysis in PT Practice I | 2 |
| PhysTher 602 | Professional Issues and Skills 1 | 3 |
| PhysTher 603 | Essential Clinical Skills I | 4 |

| | | |
|---|---|---|
| PhysTher 604 | Cells, Systems and Disease I | 4 |
| PhysTher 605 | Neuroscience | 3 |
| PhysTher 606 | Kinesiology I | 3 |
| Early Clinical Experience | | |

## Year One, Spring

| Code | Title | Units |
|---|---|---|
| PhysTher 610 | Cells, Systems and Disease II | 4 |
| PhysTher 611 | Human Anatomy | 5 |
| PhysTher 612 | Diagnosis and Evidence Analysis in PT Practice II | 2 |
| PhysTher 613 | Kinesiology II | 5 |
| PhysTher 614 | Diagnosis and Management of Musculoskeletal Conditions in PT I | 3 |
| PhysTher 615 | Professional Issues and Skills Development II | 0.5 |
| Early Clinical Experience | | |

## Year One, Summer

| Code | Title | Units |
|---|---|---|
| PhysTher 691 | Clinical Experience I | 4 |
| (8-week, full-time internship) | | |

## Year Two, Fall

| Code | Title | Units |
|---|---|---|
| PhysTher 621 | Exercise Physiology | 3 |
| PhysTher 622 | Diagnosis and Management of Cardiopulmonary Conditions in PT | 3 |
| PhysTher 623 | Orthopaedic Medicine | 2 |
| PhysTher 624 | Diagnosis and Management of Musculoskeletal Conditions in PT II | 3 |
| PhysTher 625 | Neurology Medicine | 2 |
| PhysTher 627 | Essential Clinical Skills II | 3 |
| PhysTher 628 | Case Integration Lab I | 1 |
| PhysTher 629 | Diagnosis and Management of Neuromuscular Conditions in PT I | 2 |

## Year Two, Winter

| Code | Title | Units |
|---|---|---|
| PhysTher 692 | Clinical Experience II | 4 |
| (8-week, full-time internship) | | |

## Year Two, Spring

| Code | Title | Units |
|---|---|---|
| PhysTher 626 | Moderators of Health, Wellness and Rehabilitation | 3 |
| PhysTher 635 | Professional Issues and Skill Development III | 3 |
| PhysTher 636 | Diagnosis and Management of General Medical Conditions in PT | 3 |
| PhysTher 638 | Diagnosis and Management of Musculoskeletal Conditions in PT III | 3 |
| PhysTher 642 | Case Integration Lab II | 1 |
| PhysTher 643 | Diagnosis and Management of Neuromuscular Conditions in PT II | 4 |

## Year Three, Summer

| Code | Title | Units |
|---|---|---|
| PhysTher 693 | Clinical Experience III | 5 |
| (10-week, full-time internship) | | |

## Year Three, Fall

| Code | Title | Units |
|---|---|---|
| PhysTher 694 | Clinical Experience IV | 6 |
| (12-week, full-time internship) | | |

## Year Three, Spring

| Code | Title | Units |
|---|---|---|
| PhysTher 650 | Diagnosis and Evidence Analysis in PT Practice III | 3 |
| PhysTher 651 | Organizational and Management Issues | 3 |
| PhysTher 652 | Alternative Settings and Practice Environments | 3 |
| PhysTher 653 | Health Fitness and Prevention | 3 |
| PhysTher 654 | Case Integration Lab III | 3 |
| PhysTher 655 | Professional Issues and Skill Development IV | 4 |
| Focused Clinical Study (30 hours) | | |

# PhD in Movement Science

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 (https://pt.wustl.edu/education/phd-in-movement-science/application-admissions/).

For more information about the PhD in Movement Science (http://bulletin.wustl.edu/grad/gsas/movesci/), please visit the Graduate School *Bulletin*.

# Population Health Sciences

# Master of Population Health Sciences

The MD/MPHS provides medical students with an opportunity to supplement their clinical training and course work 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 MPHS program is offered in a full-time, 10-month format. 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 510 | Introduction to SAS for Clinical Research [1] | 1 |
| PHS 501 | Introduction to Epidemiology | 3 |
| PHS 502 | Intermediate Epidemiology | 3 |
| PHS 511 | Introductory Biostatistics for Clinical Research | 3 |
| PHS 512 | Intermediate Biostatistics for Clinical Research | 3 |
| PHS 505 | Ethics in Population and Clinical Health | 1 |
| PHS 500 | Current Topics in Public Health (medical students only) | 1 |

[1] Students with previous SAS experience may opt out of this required class by taking the final exam on July 19 at the Taylor Avenue Building (Julius Richmond, Room 2132). Students who receive a 90% or higher on the exam will be exempt from taking the course.

Information about elective courses is available on the MPHS website (http://www.mphs.wustl.edu/).

# Public Health

# Master of Public Health

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 Brown School 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. In addition to completing their course work at Brown, all graduating students are required to sit for the Certification in Public Health exam. Students passing the exam will enter the workforce with CPH credentials that indicate their knowledge of and commitment to the field.

## Requirements

### Program Format

Medical students will spend their fourth year in the MPH program. The MD/MPH curriculum comprises three full-time semesters of course work (summer, fall, and spring) at the Brown School, 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 Brown School, 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

# Academic Departments

Washington University School of Medicine has 20 academic departments, all of which provide educational opportunities for the Doctor of Medicine (p. 71) and Graduate Medical Education (p. 80) programs.

- Anesthesiology (p. 87)
- Biochemistry and Molecular Biophysics (p. 99)
- Cell Biology and Physiology (p. 103)
- Developmental Biology (p. 107)
- Genetics (p. 111)
- Medicine (p. 116) (Internal Medicine)
- Molecular Microbiology (p. 180)
- Neurology (p. 184)
- Neuroscience (p. 199)
- Neurosurgery (p. 203)
- Obstetrics and Gynecology (p. 208)
- Ophthalmology and Visual Sciences (p. 218)
- Orthopaedic Surgery (p. 231)
- Otolaryngology (p. 239)
- Pathology and Immunology (p. 245)
- Pediatrics (p. 256)
- Psychiatry (p. 287)
- Radiation Oncology (p. 300)
- Radiology (p. 305)
- Surgery (p. 319)

# 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 (http://anest.wustl.edu) 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.

**Website:** http://anest.wustl.edu

## Faculty

### Department Chair

**Michael Avidan, MBBCh, FCA SA (https://anesthesiology.wustl.edu/people/michael-avidan-mbbch/)**

### Department Vice Chair for Faculty Affairs

**Ellen M. Lockhart, MD (https://wuphysicians.wustl.edu/for-patients/find-a-physician/ellen-moseley-lockhart/)**

## Department Vice Chair for Clinical Operations

**Courtney Hardy, MD, MBA (https://anesthesiology.wustl.edu/people/courtney-hardy-md-mba/)**

## Department Vice Chair for Research

**Robert Gereau, PhD (https://anesthesiology.wustl.edu/people/robert-gereau/)**

## Department Vice Chair for Health Systems Liaison

**Ivan Kangrga, MD, PhD (https://wuphysicians.wustl.edu/for-patients/find-a-physician/ivan-kangrga/)**

Visit our website for more information about our faculty (http://anest.wustl.edu/about/faculty/) and their appointments.

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## C

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## D

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## E

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## I

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# 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 (http://anest.wustl.edu); 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 and itch. Arrangements for these special electives are made through the specific investigators: Zhou-Feng Chen, PhD; Meaghan Creed, PhD; Alex S. Evers, MD; Narasimhan Gautam, PhD; Robert W. Gereau, PhD; Richard S. Hotchkiss, MD; Hongzhen Hu, PhD; 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; Michael Montana, MD, PhD; Ben Palanca, MD, PhD; Tanya Wildes, MD; or Troy Wildes, MD.

# Courses

Visit online course listings to view offerings for M10 Anesth (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M10).

**M10 Anesth 805 Anesthesiology**
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 (one-on-one). The student 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, 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, 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 three clinical simulator sessions using a simulator mannequin for practical management of airway problems, resuscitation, and trauma emergencies. By the end of the rotation, the student should be able to independently (under supervision) provide anesthesia for uncomplicated surgical procedures.

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**M10 Anesth 811 Cardiothoracic Anesthesiology Subinternship**
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. A presentation will be assigned.

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**M10 Anesth 812 Pediatric Anesthesiology**
This clinical elective is designed to teach the theory and practice of pediatric anesthesiology and pain management. It features individualized instruction with faculty who specialize in the perioperative care of pediatric patients. The elective consists of active participation with pediatric anesthesiologists at St. Louis Children's Hospital and St. Louis Shriners Hospital learning pre-anesthetic assessment, the performance of routine anesthetics (which includes instruction and practice in pediatric airway skills), learning other technical skills such as intravenous line placement and the management of post-anesthesia care and pain therapies. The final week may be tailored to meet the student's individual interests, needs and career goals. Possibilities include exposure to sedation and anesthesia for procedures outside of the operating rooms, and to subspecialties including cardiovascular anesthesia, neurosurgical anesthesia, and acute and chronic pediatric pain management. Students also will have an opportunity to learn the management of some common medical emergencies in the Clinical Simulation Center.

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**M10 Anesth 819 Cardiothoracic Critical Care Subinternship**
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.

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**M10 Anesth 820 Critical Care Subinternship**
Students on this rotation are integral members of the multidisciplinary intensivist-led critical care team in the Surgical Intensive Care Unit (SICU). Students learn an organ systems-based approach for evaluation and management of critically ill and injured patients, and application of evidence-based principles in delivery of state-of-the-art critical care. Emphasis is placed on critical care knowledge and techniques used at the bedside in the clinical management of serious traumatic and surgical conditions. Students become familiar with resuscitation and cardiopulmonary support, including methods for non-invasive and invasive hemodynamic monitoring, and techniques for airway management and pulmonary support in respiratory failure. Basic knowledge and skills in the management of blunt and penetrating trauma, neurologic injuries, multi-system organ failure, and life-threatening infections in the surgical patient are also taught, as is the importance of treatments to alleviate anxiety and pain, maintain fluid and electrolyte balance, and providing adequate nutrition. Practical experience is gained

in placement of vascular access devices, airway equipment, ultrasonography and its applications, interpretation of imaging and laboratory data, and use of guidelines, protocols and quality assurance tools in the management of critically ill patients.

**M10 Anesth 821 Pain Management**
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. Rotation is based at Barnes-Jewish Hospital with focus adjusted to meet student's interest and career plans.

**M10 Anesth 822 Anesthesiology for Neurosurgery Subinternship**
Students will help care for patients having challenging neurosurgical procedures. Students will become familiar with complex procedures, brain monitoring, cardiovascular support and airway management and will be exposed to all kinds of neurosurgical pathology. Student must be prepared to participate in the intricate anesthetic management of patients undergoing surgery in our novel intraoperative MRI rooms. For those interested, clinical research projects are ongoing and student participation is encouraged.

**M10 Anesth 823 Obstetrical Anesthesiology**
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).

**M10 Anesth 900 Research Elective - Anesthesiology**
Research opportunities may be available. If interested, please contact the Department of Anesthesiology.

# 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, 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, 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 Graduate School curriculum, the faculty teach courses in Nucleic Acids & Protein Biosynthesis (Biol 548), Chemistry and Physics of Biomolecules (Biol 5357), and Macromolecular Interactions (Biol 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 Graduate School 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 (https://biochem.wustl.edu/studentinfo/courses/) can be found on our website.

**Website:** http://biochem.wustl.edu

## Faculty

### Department Chair

**John A. Cooper, MD, PhD (https://biochem.wustl.edu/faculty/cooper/)**

Visit our website for more information about our faculty (http://biochem.wustl.edu/faculty/) and their appointments.

### B

**Wayne Morris Barnes, PHD**
Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
BA University of CA Riverside 1969
PHD Univ of Wisconsin Madison 1974

**Gregory R. Bowman, PHD**
Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
Adjunct Assistant Professor of Chemistry
Associate Director of the CSELS
PHD Stanford University 2010
BS Cornell University 2006

**Melissa Diane Stuchell Brereton, PHD, PHD**
Instructor in Biochemistry and Molecular Biophysics (primary appointment)
BS University of MO St Louis 2001
PHD University of Utah 2007
BS University of MO St Louis 2000
PHD University of Utah 2006

**Peter M Burgers, MS, PHD**

Marvin A. Brennecke Professor of Biological Chemistry (primary appointment)
MS Leiden University 1972
PHD Leiden University 1977
BS Leiden University 1969

## C

**John A Cooper, MD, PHD**
Professor of Biochemistry and Molecular Biophysics (primary appointment)
Head of the Department of Biochemistry
Professor of Cell Biology and Physiology
MD Johns Hopkins University 1982
BS Brown University 1977
PHD Johns Hopkins University 1983

## D

**Vishnu C Damalanka, PHD, MS**
Instructor in Biochemistry and Molecular Biophysics (Pending Dean's Approval) (primary appointment)
PHD Wichita St University 2017
BS Andhra University 2003
MS Andhra University 2005

**Greg Dekoster, PHD**
Instructor in Biochemistry & Molecular Biophysics (primary appointment)
PHD University of Iowa 1997
BA Monmouth College 1990

**Roland Ellwood Dolle, PHD, MS**
Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD University of Pennsylvania 1984
BS Arizona State University 1978
MS State University of New York 1980

## E

**Elliot L Elson, PHD**
Emeritus Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD Stanford University 1966
BA Harvard University 1959

## F

**Carl Frieden, PHD**
Professor of Biochemistry and Molecular Biophysics (primary appointment)
BA Carleton College 1951
PHD Univ of Wisconsin Madison 1955

## G

**Eric A Galburt, PHD**
Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD University of Washington 2002

**Roberto Galletto, MS, PHD**
Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
MS University of Genova 1996
PHD University of Texas Galveston 2002

**Lina Greenberg, PHD**
Instructor in Biochemistry and Molecular Biophysics (primary appointment)
PHD Tufts University 2010
BS Brandeis University 2004

**Michael Jonathan Greenberg, PHD**
Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
BS Brandeis University 2004
PHD Boston University 2010

## H

**Kathleen Hall, PHD**
Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD University of CA Berkeley 1985
BS University of Minnesota 1974

**Alexander Steven Holehouse, PHD**
Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD Washington Univ in St. Louis 2017

## I

**Maxenia Garcia Ilagan, PHD**
Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
Associate Professor of Developmental Biology
BS School Not Listed 1992
PHD University of Missouri 2000

## J

**James W Janetka, PHD**
Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD Univ of Wisconsin Madison 1996
BS University of Illinois 1990

## K

**Michael S Kinch, PHD**
Professor of Biochemistry and Molecular Biophysics (primary appointment)
Associate Vice Chancellor and Director Center Research Innovation in Biotechology
Professor of Radiation Oncology
BS Ohio State University 1989
PHD Duke University 1993

**Alexander Kozlov, PHD, MS**
Instructor in Biochemistry and Molecular Biophysics (primary appointment)
PHD Moscow State University 1994
MS Moscow State University 1983

**Andrzej Modest Krezel, MS, PHD**
Associate Professor of Biochemistry and Molecular Biophysics (Pending Executive Faculty Approval) (primary appointment)
MS University of Warsaw 1986
PHD Univ of Wisconsin Madison 1991

## L

**Shuang Li, PHD**
Instructor in Biochemistry and Molecular Biophysics (Pending Dean's Approval) (primary appointment)
PHD Capital Normal University 2015

**Weikai Li, PHD, MS**
Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
BS East China Univ of Sci & Tech 1993
PHD Yale University 2004
MS University of Tenn Chattanooga 1998

**Timothy M Lohman, PHD**
Brennecke Professor of Biophysics in Biochemistry and Molecular Biophysics (primary appointment)
PHD Univ of Wisconsin Madison 1977
BA Cornell University 1973

## M

**Garland R Marshall, PHD**
Professor of Biochemistry and Molecular Biophysics (primary appointment)
Professor of Biomedical Engineering
PHD Rockefeller University 1966
BS California Institute Technolo 1962

**Joseph B Monahan, PHD**
Adjunct Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
BS State Univ of NY Buffalo 1977
PHD Univ South Carolina Columbia 1983

## N

**Natalie Marie Niemi, PHD**
Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD Van Andel Research Institute 2012
BS University of Michigan 2005

## O

**Michael D Onken, PHD**
Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD Washington Univ in St. Louis 2000
BA Washington Univ in St. Louis 1990

## P

**Linda J Pike, PHD**
Alumni Endowed Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD Duke University 1980
BS University of Delaware 1975

## R

**Janice Lee Robertson, PHD**
Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD Cornell University 2009
BS University of Toronto 2002

**Ana Maria Ruiz Manzano, PHD**
Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
PHD Universidad Automoma de Madrid 2004

## S

**Andrea Soranno, MS, PHD**
Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
MS University of Milan 2005
PHD University of Milan 2008

## W

**Gabriel Waksman, MS, PHD**
Adjunct Professor of Biochemistry and Molecular Biophysics (primary appointment)
MS School Not Listed 1980
PHD School Not Listed 1982
BS School Not Listed 1979

**Katherine Anne Henzler Wildman, PHD**
Adjunct Associate Professor of Biochemistry and Molecular Biophysics (primary appointment)
BS Cornell University 1998
PHD University of Michigan 2003

## Z

**Rui Zhang, PHD**
Assistant Professor of Biochemistry and Molecular Biophysics (primary appointment)
BS Nanjing Medical University 2005
PHD Baylor University 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

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**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.

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**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.

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**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.

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**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.

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**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.

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## Courses

The Department of Biochemistry and Molecular Biophysics also offers courses through the Graduate School. For a full listing of courses offered, please visit the university online course catalog (https://courses.wustl.edu/CourseInfo.aspx?sch=L&dept=L41&crslvl=5:9).

Visit online course listings to view offerings for M15 Biochem (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M15).

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# 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 (http://cellbiology.wustl.edu) 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

Department Head

**David W. Piston, PhD (http://cellbiology.wustl.edu/People/Faculty/piston_d/)**

Visit our website for more information about our faculty (http://www.cellbiology.wustl.edu/faculty/) and their appointments.

### A

**Ghazaleh Ashrafi, PHD**

Assistant Professor of Cell Biology and Physiology (primary appointment)
Assistant Professor of Genetics
PHD Harvard University 2020

## B

**Kendall Jay Blumer, PHD**
Professor of Cell Biology and Physiology (primary appointment)
PHD Duke University 1986
BA Rice University 1977

**Thomas J Broekelmann, MS**
Instructor in Cell Biology and Physiology (primary appointment)
BA University of MO St Louis 1977
MS University of MO St Louis 1982

## D

**Panyue Deng, MS, PHD, MD**
Associate Professor of Cell Biology and Physiology (primary appointment)
MS CENTRAL SOUTH UNIVERSITY 2001
PHD CENTRAL SOUTH UNIVERSITY 2004
MD Hunan Medical University 1995

**Lai Kuan Dionne, PHD**
Instructor in Cell Biology and Physiology (primary appointment)
PHD University of Colorado 2010 2010

**Sergej Djuranovic, PHD**
Associate Professor of Cell Biology and Physiology (primary appointment)
PHD University of Tubingen 2007

## G

**Denis Goldfarb, PHD, BSCS**
Assistant Professor of Cell Biology and Physiology (primary appointment)
Assistant Professor of Medicine
PHD University of North Caroline C 2019
BSCS Rensselaer Polytechnic Institu 2010

**Subhadra C Gunawardana, MS, PHD**
Associate Professor of Cell Biology and Physiology (primary appointment)
MS Iowa State University 1995
PHD Cornell University 2002

## H

**Phyllis I Hanson, MD, PHD**
Adjunct Professor of Cell Biology and Physiology (primary appointment)
MD Stanford University 1993
BA Yale University 1985
PHD Stanford University 1993

**James E Huettner, PHD**
Professor of Cell Biology and Physiology (primary appointment)
Professor of Biomedical Engineering
BA Indiana University 1981
BS Indiana University 1980
PHD Harvard University 1987

## J

**Silvia Jansen, MS, PHD**
Assistant Professor of Cell Biology and Physiology (primary appointment)
MS Katholieke Universiteit 2003
PHD Katholieke Universiteit 2007

## K

**David John Edward Kast, PHD, MS**
Assistant Professor of Cell Biology and Physiology (primary appointment)
PHD University of Minnesota 2018
MS University of Minnesota 2004
BS University of Minnesota 2000

**Vitaly A Klyachko, PHD, MS**
Professor of Cell Biology and Physiology (primary appointment)
Professor of Biomedical Engineering
Professor of Neuroscience
BS Moscow State University 1997
PHD Univ of Wisconsin Madison 2002
MS Moscow State University 1998

## L

**Sun Joo Lee, PHD, MS**
Instructor in Cell Biology and Physiology (primary appointment)
PHD Washington Univ in St. Louis 2010
BS Handong Global University 2000
MS Kwang-Ju Inst. Of Sci & Tech 2002

## M

**Michael Benjamin Major, PHD, BS1**
Professor of Cell Biology and Physiology (primary appointment)
Alan A and Edith L Wolff Distinguished Professor
Professor of Otolaryngology
PHD University of Utah 2004
BS1 Michigan State University 1997

**Grigory Maksaev, MS, PHD**
Instructor in Cell Biology and Physiology (primary appointment)
MS Moscow Inst of Physics & Techn 1998
PHD Moscow State University 2002

**Dario Maschi, PHD**
Assistant Professor of Cell Biology and Physiology (primary appointment)
PHD Universidad del Buenos Aires 2012

**Robert Paul Mecham, PHD**
Alumni Endowed Professor of Cell Biology and Physiology (primary appointment)

Professor of Biomedical Engineering
Professor of Medicine
Professor of Pediatrics
PHD Boston University 1977
BS University of Utah 1973

**Robert W Mercer, PHD**
Professor of Cell Biology and Physiology (primary appointment)
BA San Jose State University 1974
PHD Syracuse University 1980

## N

**Colin G Nichols, PHD**
Professor of Cell Biology and Physiology (primary appointment)
Carl F Cori Professor
BS University of Leeds 1982
PHD University of Leeds 1985

## P

**David James Pagliarini, PHD**
Professor of Cell Biology and Physiology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Genetics
PHD Univ. of California San Diego 2020

**Slavica Pavlovic Djuranovic, PHD, DIP**
Assistant Professor of Cell Biology and Physiology (primary appointment)
BS UNIVERSITY OF BELGRADE 1999
PHD University of Tubingen 2006
DIP UNIVERSITY OF BELGRADE 2001

**David William Piston, MS, PHD**
Professor of Cell Biology and Physiology (primary appointment)
Head of the Department of Cell Biology and Physiology
BS Grinnell College 1984
MS University of Illinois 1985
PHD University of Illinois 1989

**Helen Piwnica-Worms, PHD**
Adjunct Professor of Cell Biology and Physiology (primary appointment)
BA St Olaf College 1979
PHD Duke University 1984

**Jasmina Profirovic, PHD**
Adjunct Assistant Professor of Cell Biology and Physiology (primary appointment)
PHD University of Illinois Chicago 2005
BS University of Belgrade 1997

## S

**Paul Henry Schlesinger, MD, PHD**
Associate Professor of Cell Biology and Physiology (primary appointment)
MD University of Chicago 1970
PHD University of Chicago 1973
BS University of Illinois 1966

**Sheila Stewart-Wigglesworth, PHD**
Professor of Cell Biology and Physiology (primary appointment)
Gerty Cori Professor of Cell Biology and Physiology
Professor of Medicine
PHD University of CA Los Angeles 1996
BS University of Minnesota 1990

**Amber Nicole Stratman, BS1, PHD1**
Assistant Professor of Cell Biology and Physiology (primary appointment)
Assistant Professor of Developmental Biology
BS1 Truman State University 2006
PHD1 University of MO Columbia 2010

## T

**Heather L. True, PHD, MS**
Professor of Cell Biology and Physiology (primary appointment)
Associate Director of the Division of Biology and Biomedical Sciences
PHD University of Illinois 1998
BS Univ of Wisconsin Madison 1992
MS University of Illinois 1995

## W

**Shizhen Wang, PHD**
Adjunct Instructor in Cell Biology and Physiology (primary appointment)
PHD Tsinghua University, China 2007

## Y

**Zhongsheng You, MS, PHD**
Associate Professor of Cell Biology and Physiology (primary appointment)
Associate Professor of Medicine
MS Shanghai Inst of Biochemistry 1997
BS Zhejiang Medical University 1994
PHD University of CA San Diego 2002

**Peng Yuan, PHD**
Associate Professor of Cell Biology and Physiology (primary appointment)
PHD University of Pennsylvania 2008
BS University of Science & Tech 1997

# 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.

**Sergej Djuranovic, PhD**
514 McDonnell Sciences Building
Phone: 314-362-9706

Molecular mechanisms of translational control; cellular processes regulated by changes in RNA metabolism.

**James E. Huettner, PhD**
4929 South Building
Phone: 314-362-6628

Excitatory amino acid receptors and synaptic transmission in the central nervous system; neural differentiation of embryonic stem cells.

**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.

**Michael Benjamin Major, PhD**
4624 Cancer Research 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.

**Robert P. Mecham, PhD**
4606 Cancer Research Building
Phone: 314-362-2254

This lab strives to understand the complex process of extracellular matrix assembly and organization, including studying the intracellular pathways used to transport matrix components to the cell surface and identifying helper or accessory proteins that facilitate trafficking and matrix assembly. We also study cell-matrix interactions in development and cellular mechanisms associated with connective tissue remodeling in vascular disease and heritable diseases of the connective tissues.

**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 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' a-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' a-cells. High glucose levels inhibit glucagon secretion from a-cells within the islets but not from dispersed a-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.

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**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.

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**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.

---

**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.

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**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.

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**Peng Yuan, PhD**
9608 BJC Institute of Health
Phone: 314-747-3793

The focus of this lab is on the structure and function of ion channels and transporters, which play essential roles in human physiology and disease. How do channels and transporters recognize their specific substrate ions? How do they respond to various stimuli, including chemical ligand, temperature, membrane voltage and mechanical force? How do they interact with the lipid membrane where they reside? To answer these fundamental questions, we use multidisciplinary approaches, including X-ray crystallography, biochemistry, biophysics and electrophysiology. Dysfunction of these membrane proteins could lead to a variety of diseases, such as asthma, hypertension, cancer, heart failure, diabetes, chronic pain and many more. The long-term goal is to provide a detailed mechanistic understanding of ion channels and transporters, which will offer novel strategies for drug development and better treatment of diseases.

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## Courses

The Department of Cell Biology and Physiology also offers courses through the Graduate School. For current courses, please visit the university's online course listings (https://courses.wustl.edu/CourseInfo.aspx?sch=L&dept=L41&crslvl=5:9).

Visit online course listings to view offerings for M75 CellBio (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M75).

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**M75 CellBio 501 Physiology**
The structures of cells, tissues, and major organ systems are studied in relationship to their functions. Lectures integrate histology with cell biology and physiology. The laboratories consist of the study of prepared slides and electron micrographs using an iBook or eBook (ePub) guide. An extensive online digital annotated atlas (Slide-atlas.org) and a video library are used to supplement the slides and electron micrographs. Presentations of case studies provide examples of clinical relevance. A dual-view microscope and slide set will be issued for each pair of students. Limited space is available for non-medical students, who must have permission from the coursemaster to enroll.
Credit 125 units.

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**M75 CellBio 900 Research Elective - Cell Biology and Physiology**
Research opportunities may be available. If interested, please contact the Department of Cell Biology & Physiology.

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# 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:** http://devbio.wustl.edu

# Faculty

## Department Head

**Lilianna Solnica-Krezel, PhD (https://developmentalbiology.wustl.edu/people/lilianna-solnica-krezel/)**

Visit our website for more information about our faculty (http://devbio.wustl.edu/faculty/) and their appointments.

## B

**Irving Boime, PHD, MS**
Professor of Developmental Biology (primary appointment)
Professor of Reproductive Biology in Obstetrics and Gynecology
BS St Louis College of Pharmacy 1964
PHD Washington Univ in St. Louis 1970
MS Purdue University 1966

**Angela N Bowman, PHD**
Assistant Professor of Developmental Biology (primary appointment)
PHD Stanford University 2012
BA University of Pennsylvania 2006

## C

**Douglas Floyd Covey, MA, PHD**
Professor of Pharmacology in Developmental Biology (primary appointment)
Andrew C and Barbara B Taylor Distinguished Professor of Psychiatry
Professor of Anesthesiology
Professor of Psychiatry
MA Johns Hopkins University 1969
PHD Johns Hopkins University 1973
BS Loyola College 1967

## D

**Aaron DiAntonio, PHD, MD, M PHIL**
Professor of Developmental Biology (primary appointment)
Alan A and Edith L Wolff Professor of Developmental Biology
BA Harvard University 1988
PHD Stanford University 1995
MD Stanford University 1995
M PHIL Cambridge University 1989

**Sabine Dietmann, MS, PHD**
Assistant Professor of Developmental Biology (primary appointment)
Assistant Professor of Medicine
MS University of Frankfurt 1994
PHD University of Berlin 1999

## H

**Tracey O Hermanstyne, PHD**
Instructor in Developmental Biology (primary appointment)
PHD Univ of Maryland Baltimore 2012

**Didier Hodzic, PHD**
Assistant Professor of Developmental Biology (primary appointment)
Assistant Professor of Cell Biology and Physiology
PHD University of Liege 1998
BS University of Liege 1991

## I

**Shin-Ichiro Imai, PHD, MD**
Professor of Developmental Biology (primary appointment)
Professor of Medicine
PHD Keio University 1995
MD Keio University 1989

## J

**Aaron N Johnson, PHD**
Assistant Professor of Developmental Biology (primary appointment)
PHD Arizona State University 2006
BA Arizona State University 1998

## K

**Stephen K Kornfeld, MD, PHD**
Professor of Developmental Biology (primary appointment)

BA Yale University 1984
MD Stanford University 1991
PHD Stanford University 1991

**Kristen Louise Kroll, PHD**
Associate Professor of Developmental Biology (primary appointment)
PHD University of CA Berkeley 1994
BA Northwestern University 1988

## L

**Yangjian Liu, PHD, BS1, MS1**
Instructor in Developmental Biology (primary appointment)
PHD John Hopkins University 2006
BS1 Nanjing University 1998
MS1 Chinese Academy of Sciences 2002

## M

**Helen McNeill, BS1, PHD**
Professor of Developmental Biology (primary appointment)
Larry J Shapiro and Carol-Ann Uetake-Shapiro Professor
BS1 Ramapo College 1985
PHD Stanford University 1993

**Craig Anthony Micchelli, PHD**
Associate Professor of Developmental Biology (primary appointment)
BS Univ of Wisconsin Madison 1993
PHD Univ of Wisconsin Madison 1999

**Mayssa Mokalled, PHD, MS**
Assistant Professor of Developmental Biology (primary appointment)
PHD University of Dallas 2010
MS American University of Beirut 2005
BS American University of Beirut 2003

**Samantha A Morris, BS1, PHD**
Assistant Professor of Developmental Biology (primary appointment)
Assistant Professor of Genetics
BS1 University of London 2002
PHD Cambridge University 2007

## N

**Philip Needleman, PHD, MS**
Adjunct Professor of Molecular Biology and Pharmacology (primary appointment)
BS School Not Listed 1960
PHD University of Maryland 1964
MS School Not Listed 1962

## O

**David M Ornitz, MD, PHD**
Alumni Endowed Professor of Developmental Biology (primary appointment)
MD University of Washington 1988
BS University of CA Davis 1981
PHD University of Washington 1987

## P

**Debabrata Patra, PHD, MS**
Associate Professor of Developmental Biology (primary appointment)
BS University of Bombay 1985
PHD University of Pittsburgh 1993
MS University of Bombay 2005

## R

**John Hall Russell, PHD**
Professor of Developmental Biology (primary appointment)
PHD Washington Univ in St. Louis 1974
BS Juniata College 1968

## S

**Diane S Sepich, PHD**
Assistant Professor of Developmental Biology (primary appointment)
BS University of San Diego 1981
PHD University of Oregon 1994

**Jimann Shin, PHD, MS**
Instructor in Developmental Biology (primary appointment)
PHD Vanderbilt University 2007
BS Kyung Pook National University 2002
MS Kyung Pook National University 2004

**Lilianna Solnica-Krezel, MS, PHD**
Professor of Developmental Biology (primary appointment)
Alan A and Edith L Wolff Professor of Developmental Biology
Head of the Department of Developmental Biology
MS Medical University of Warsaw 1985
PHD Univ of Wisconsin Madison 1991

## T

**Thorold W Theunissen, MA, PHD**
Assistant Professor of Developmental Biology (primary appointment)
MA Cambridge University 2008
PHD Cambridge University 2011
BA Harvard 2007

**Yu-Chen Tony Tsai**
Assistant Professor of Developmental Biology (primary appointment)

## W

**Spencer Gaffney Willet, PHD**
Instructor in Developmental Biology (primary appointment)
BS University of Tennessee 2007
PHD Vanderbilt University 2014

## Y

**Yongjun Yin, PHD**
Instructor in Developmental Biology (primary appointment)
PHD Hebrew University 2004

**Andrew Seungjo Yoo, PHD, MS**
Associate Professor of Developmental Biology (primary appointment)
BS McGill University 1995
PHD Columbia University 2005
MS University of British Columbia 1997

## Z

**Bo Zhang, PHD**
Assistant Professor of Developmental Biology (primary appointment)
BS Inner Mongolia University 2004
PHD 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 (http://devbio.wustl.edu/REGMED/), the Center for the Investigation of Membrane Excitability Diseases (http://cimed.wustl.edu/), the Center for Cardiovascular Research (https://cardiovascularresearch.wustl.edu/), and the Hope Center (https://hopecenter.wustl.edu/). 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.

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**Douglas F. Covey, PhD**
355 McDonnell Medical Sciences Building
Phone: 314-362-1726

Medicinal chemistry of steroids.

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**Aaron DiAntonio, MD, PhD**
6301 Couch Biomedical Research Building
Phone: 314-362-9925

Neurodevelopment, neurodegeneration, and axon regeneration in *Drosophila* and mouse.

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**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.

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**Aaron N. Johnson, PhD**
3602 Cancer Research Building
Phone: 314-273-1834

Molecular mechanisms of muscle development and regeneration.

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**Kerry Kornfeld, MD, PhD**
3607 Cancer Research Building
Phone: 314-747-1480

Signal transduction during development; zinc metabolism; aging.

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**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.

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**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.

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**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.

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**Mayssa Mokalled, PhD**
3601 Cancer Research Building
Phone: 314-273-1835

Spinal cord injury, degeneration and regeneration in zebrafish and mouse.

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**Samantha Morris, PhD**
3316 Couch Biomedical Research Building
Phone: 314-747-8618

The focus of this lab is on 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 guides to engineer fate in vitro.

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**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.

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**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.

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**Zachary Pincus, PhD**
5304 Couch Biomedical Research Building
Phone: 314-747-5520

Interindividual variability in aging and lifespan; developmental origins of longevity and adult health; quantitative microscopy and image analysis of *C. elegans.*

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**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.

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**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.

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**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.

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## Courses

The Department of Developmental Biology also offers courses through the Graduate School. For a full listing of current courses offered, please visit the Washington University online course listings (https://courses.wustl.edu/CourseInfo.aspx?sch=L&dept=L41&crslvl=5:9).

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**M04 FYSelect 500C Developmental Biology and Disease**
Basic Science. Explores connections between basic research in developmental biology and disease. Students are expected to make a presentation based on current literature in the field and participate in class discussions.
Credit 10 units.

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**M70 MolBio/Pha 900 Research Elective - Molecular Biology and Pharmacology**
Research opportunities may be available. If interested, please contact the department of Developmental Biology.

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# James S. McDonnell Department of Genetics

The Department of Genetics (http://genetics.wustl.edu) 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 (http://medicine.wustl.edu).

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

### James S. McDonnell Professor and Head of Genetics

### Executive Director, McDonnell Genome Institute

### Co-Director Needleman Center for Neurometabolism and Axonal Therapeutics

**Jeffrey Milbrandt, MD, PhD (http://milbrandt.wustl.edu/)**

### Director, Division of Statistical Genomics

**Michael Province, PhD (http://genetics.wustl.edu/staff-members/michael-province/)**

### Director, Genome Technology Access Center at McDonnell Genome Institute (GTAC@MGI)

**Rich Head, MS (http://genetics.wustl.edu/staff-members/rich-head/)**

### Director, Genome Engineering and iPSC Center

**Xiaoxia Cui, PhD (http://genetics.wustl.edu/staff-members/xiaoxia-cui-phd-ms/)**

Visit our website for more information about our faculty (http://genetics.wustl.edu/faculty/) and their appointments.

### B

**Ruteja A. Barve, MS, PHD**
Instructor in Genetics (primary appointment)
BS University of Pune 1995
MS Washington Univ in St. Louis 2008
PHD Washington Univ in St. Louis 2014

**John Rutledge Bermingham Jr, PHD**
Associate Professor of Genetics (primary appointment)
PHD University of Colorado Boulder 2016
BS Yale University 2016

**Adam J. Bloom, PHD**
Assistant Professor of Genetics (primary appointment)
Assistant Professor of Anesthesiology
BS University of CA Berkeley 1997
PHD Washington Univ in St. Louis 2006

**Ingrid B Borecki, PHD, MS**
Adjunct Professor of Genetics (primary appointment)
BS University of Illinois 1977
PHD University of Hawaii 1981
MS University of Hawaii 1980

**William James Buchser, B MUS, PHD**
Assistant Professor of Genetics (primary appointment)
B MUS University of Miami 2002
PHD University of Miami 2009

### C

**Paul F Cliften, PHD, MS**
Associate Professor of Genetics (primary appointment)
BS Utah St University 1992
PHD University of California 1999
MS Utah St University 1995

**Barak Alon Cohen, PHD**
Professor of Genetics (primary appointment)
Alvin Goldfarb Distinguished Professor of Computational Biology
PHD Harvard University 1998
BS Cornell University 1992

**Donald Franklin Conrad, MS, PHD**

Adjunct Associate Professor of Genetics (primary appointment)
MS Stanford University 2017
BS Dartmouth College 1999
PHD University of Chicago 2007

**Seth Daniel Crosby, MD**
Assistant Professor of Genetics (primary appointment)
BS University of California 1984
MD University Texas San Antonio 1989

**Xiaoxia Cui, MS, PHD**
Assistant Professor of Genetics (primary appointment)
BS Nanjing University 2017
MS University of Alabama 2017
PHD University of Texas Austin 2017

## D

**Joseph D Dougherty, PHD**
Associate Professor of Genetics (primary appointment)
Associate Professor of Psychiatry
PHD University of California 2005
BS Truman State University 1999

**Susan K. Dutcher, PHD**
Professor of Genetics (primary appointment)
Professor of Cell Biology and Physiology
BA Colorado College 1974
PHD University of Washington 1980

## F

**Justin C. Fay, PHD**
Adjunct Associate Professor of Genetics (primary appointment)
PHD University of Chicago 2001

## H

**Richard D Head, MS**
Professor of Genetics (primary appointment)
Professor of Pathology and Immunology
MS Southern Illinois University 1992

## J

**Sheng-Chih Jin, PHD, MS**
Assistant Professor of Genetics (primary appointment)
Assistant Professor of Pediatrics
BS National Chiao Tung U 2019
PHD Washington Univ in St. Louis 2014
MS Johns Hopkins University 2008

## L

**Haluk Lacin, PHD**
Instructor in Genetics (primary appointment)
BS Bogazici University 2003
PHD Washington Univ in St. Louis 2010

**Heather A Lawson, MA, PHD**
Assistant Professor of Genetics (primary appointment)
MA Pennsylvania State University 2004
PHD Pennsylvania State University 2008
BA Univ of Wisconsin Milwaukee 2002

## M

**Xianrong Mao, MS, PHD**
Instructor in Genetics (primary appointment)
MS Chinese Academy of Sciences 1996
BS Lanzhou University 1993
PHD University of Arkansas 2001

**James P Mc Carter, PHD, MD**
Adjunct Professor of Genetics (primary appointment)
BA Princeton University 1989
PHD Washington Univ in St. Louis 1998
MD Washington Univ in St. Louis 1998

**Jeffrey D Milbrandt, PHD, MD**
James S McDonnell Professor of Genetics (primary appointment)
Executive Director of the McDonnell Genome Institute
Head of the Department of Genetics
Professor of Medicine
Professor of Neurology
Professor of Pathology and Immunology
BS Univ of Nebraska at Kearney 1974
PHD University of Virginia 1983
MD Washington Univ in St. Louis 1978

**Robi D. Mitra, PHD**
Professor of Genetics (primary appointment)
Alvin Goldfarb Distinguished Professor of Computational Biology
PHD Mass Inst of Technology (MIT) 2000

**Shamim Ara Mollah, PHD**
Assistant Professor of Genetics (primary appointment)
PHD University of CA San Diego 2019

## P

**Zachary Scott Pincus, PHD**
Assistant Professor of Genetics (primary appointment)
Assistant Professor of Developmental Biology
PHD Stanford University 2007
BS Stanford University 2002

**Michael A Province, PHD, MA**
Professor of Genetics (primary appointment)
Professor of Biostatistics
BA University of Dallas 1973
PHD Washington Univ in St. Louis 1987
MA Washington Univ in St. Louis 1979

## S

**Nancy L. Saccone, PHD, MS**
Associate Professor of Genetics (primary appointment)
Associate Professor of Biostatistics
PHD Brown University 1993

BA University of California 1988
MS Brown University 1990

**Yo Sasaki, MS, PHD**
Associate Professor of Genetics (primary appointment)
MS Tokyo U of Agric & Technology 1994
BS Tokyo U of Agric & Technology 1991
PHD Gunma University, Med School 1997

**Tim B Schedl, PHD**
Professor of Genetics (primary appointment)
PHD Univ of Wisconsin Madison 1984
BA Lawrence University 1977

**Cherilynn Maria Reynolds Shadding, PHD**
Adjunct Assistant Professor of Genetics (primary appointment)
PHD Meharry Med College 2002

**James B Skeath, PHD**
Professor of Genetics (primary appointment)
BA Haverford College 1988
PHD Univ of Wisconsin Madison 1993

**Gary D Stormo, MA, PHD**
Professor of Genetics (primary appointment)
Joseph Erlanger Professor
Professor of Biomedical Engineering
Professor of Computer Science
MA University of Colorado Boulder 1975
BS California Institute Technolo 1972
PHD University of Colorado Boulder 1981

## T

**Tychele Naomi Turner, PHD**
Assistant Professor of Genetics (primary appointment)
BS Michigan State University 2008
PHD Johns Hopkns University Medic 2014

## W

**Ting Wang, MS, PHD**
Professor of Genetics (primary appointment)
Professor of Biostatistics
Professor of Computer Science and Engineering
Sanford and Karen Loewentheil Distinguished Professor of Medicine
MS Washington Univ in St. Louis 2001
BS School Not Listed 1997
PHD Washington Univ in St. Louis 2006

**Michael Aaron White, MS, PHD**
Assistant Professor of Genetics (primary appointment)
MS University of Rochester 2004
BA Brigham Young University 2000
PHD University of Rochester 2006

**Mary Kaye Wojczynski, MPH, PHD**
Associate Professor of Genetics (primary appointment)
BS Univ of Wisconsin Stevens Pt 1995
MPH Emory University 1999
BS Univ of Wisconsin Stevens Pt 1995
PHD University North Carolina 2006

## Y

**Jinsheng Yu, MS, MD, PHD**
Assistant Professor of Genetics (primary appointment)
BS Tongji University 1984
MS Tongji University 1995
MD Tongji University 1998
PHD Tongji University 1998

## Z

**Jian Zhu, PHD**
Instructor in Genetics (primary appointment)
Instructor in Medicine
PHD Oklahoma St University 2004

# Research Electives

## Genetics Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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**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.

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**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.

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**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.

**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.

**Heather Lawson, PhD**
Couch Biomedical Research Building, Room 6312
Phone: 314-362-7269
lawson@wustl.edu

Our lab focuses on translating genetic and epigenetic molecular and analytical observations to physiological endpoints. We apply several complementary and integrated approaches, including bench science, cultured cells, mouse phenotyping and husbandry, and computational and systems biology.

**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/glial 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.

**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.

**Zachary Pincus, PhD**
Couch Biomedical Research Building, Room 5304
Phone: 314-747-5520
zpincus@wustl.edu

Interindividual variability in aging and lifespan; developmental origins of longevity and adult health; quantitative microscope and image analysis of *C. elegans.*

**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 (nlims@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

We work in the general field of computational genomics and epigenomics. We study the evolution of human regulatory networks, with a focus on mobile elements (or transposable elements) and their impact on gene regulation, their genetic and epigenetic control, and their roles in human biology and diseases.

## Courses

Visit online course listings to view offerings for M20 Genetics (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M20).

**M20 Genetics 511 Medical Genetics**
Medical genetics is both a science and a clinical area or specialty of medicine, and the boundary between research and clinical application is increasingly blurred. The pace at which genomic and epigenomic tools are being developed is unprecedented. These tools result in continual conceptual advancements, which inevitably affect how we approach the study of disease risk, diagnosis and management in all areas of medicine, not just medical genetics. We are moving into a time when the interpretable data from the examination of individual genomes will be incorporated to all other clinical data to assess individual risks and guide clinical management and decision making. This course is intended as the first step toward life-long training in medical genetics and genomics. The course begins with a number of sessions devoted to basic principles of genetics. Drawing on this foundation, we move on to discuss genomic and epigenomic tools and to learn from leaders in their fields about the big questions in genetics and genomics (i.e., microbiome research, cancer genomics, current clinical uses of exome sequencing, and so) and how the tools are being used to answer these questions. Students are exposed to the use of genetic and genomic databases and information resources, which will allow them to keep up with new information and critically appraise validity and clinical utility. We begin to discuss the implication of this shift to the "genomic era," particularly regarding ethical aspects, regulatory aspects, equal access, healthcare costs and patient education. Clinical geneticists actively participate in the course and use a series of genetic disorders to help students apply their knowledge, focusing mainly on genetic etiology, pattern of inheritance, inheritance risk and molecular diagnostic testing. Frequent patient interviews further enhance the exposure to clinical genetics. Overall, the course aims to enhance genetic and genomic literacy, which is an essential first step in preparing students to participate in the multidisciplinary teams that effectively make cutting-edge genetic and genomic research results accessible to patients. This course is cross listed with L41 Biol 550.
Credit 34 units.

**M20 Genetics 899 Special Study Genetics**
Special study opportunities are available in the Department of Genetics. If interested, please contact the department for further information.

# John T. Milliken Department of Medicine

Instruction in medicine is provided during all four years of the medical curriculum, beginning with Practice of Medicine I (Medicine 507) during the first year. Teaching during the second year has two main objectives: (1) the correlation of the basic sciences with clinical aspects of disease; and (2) training in the technical methods of physical examination and laboratory diagnosis. By the beginning of the third year, the student is ready for the supervised clinical study of individual patients. A clinical clerkship of 12 weeks, divided into three four-week periods, is served by third-year students on the medical services of the department. During the final year, students may select a sub-internship in general medicine and a series of elective courses in the medical specialties.

**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 (https://infectiousdiseases.wustl.edu/faculty-staff/victoria-j-fraser/)**
Adolphus Busch Professor of Medicine and Chair

**Jeffrey S. Crippin, MD (https://profiles.wustl.edu/en/persons/jeffrey-crippin/)**
Marilyn E. Bornefeld Chair in Gastrointestinal Research and Treatment and Professor of Medicine
Vice Chair of Clinical Programs

**Andrew Odden, MD (https://profiles.wustl.edu/en/persons/andrew-odden/)**
Associate Professor of Medicine
Vice Chair of Patient Safety

**Roberto Civitelli, MD (https://profiles.wustl.edu/en/persons/roberto-civitelli/)**
Sydney M. & Stella H. Schoenberg Professor of Medicine
Chief, Division of Bone and Mineral Diseases

**Lynn A. Cornelius, MD (https://profiles.wustl.edu/en/persons/lynn-cornelius/)**
Winfred A. and Emma R. Showman Professor of Dermatology in Medicine
Chief, Division of Dermatology

**Nicholas O. Davidson, MD (https://profiles.wustl.edu/en/persons/nicholas-davidson/)**
John E. and Adaline Simon Professor of Medicine
Chief, Division of Gastroenterology

**Thomas M. De Fer, MD (https://profiles.wustl.edu/en/persons/tom-de-fer/)**
Professor of Medicine
Interim Chief, Division of General Medicine

**John F. DiPersio, MD, PhD (https://profiles.wustl.edu/en/persons/john-dipersio/)**
Virginia E. and Sam J. Golman Professor of Medicine
Chief, Division of Oncology

**Bradley A. Evanoff, MD, MPH (https://profiles.wustl.edu/en/persons/bradley-evanoff/)**
Richard A. and Elizabeth Henby Sutter Chair in Occupational, Industrial, and Environmental Medicine
Chief, Division of General Medical Sciences

**Gregory A. Ewald, MD (https://profiles.wustl.edu/en/persons/gregory-ewald/)**
Professor of Medicine
Interim Chief, Division of Cardiology

**Daniel M. Goodenberger, MD (https://profiles.wustl.edu/en/persons/daniel-goodenberger/)**
Professor of Medicine
Chief, Veteran's Administration

**Richard W. Gross, MD, PhD**
Professor of Medicine
Chief, Division of Bioorganic Chemistry and Pharmacology

**Michael J. Holtzman, MD (https://profiles.wustl.edu/en/persons/michael-holtzman/)**
Selma and Herman Seldin Professor of Medicine
Chief, Division of Pulmonary and Critical Care Medicine

**Benjamin D. Humphreys, MD, PhD (https://profiles.wustl.edu/en/persons/benjamin-humphreys/)**
Joseph P. Friedman Professor of Renal Diseases in Medicine
Chief, Division of Nephrology

**Peggy L. Kendall, MD (https://allergy.wustl.edu/peggy-kendall-md/)**
Associate Professor of Medicine
Chief, Division of Allergy and Immunology

**Samuel Klein, MD (https://profiles.wustl.edu/en/persons/samuel-klein/)**
William H. Danforth Professor of Medicine and Nutritional Science
Chief, Division of Geriatrics and Nutritional Sciences

**Michael Lin, MD (https://profiles.wustl.edu/en/persons/michael-lin-2/)**
Associate Professor of Medicine
Interim Chief, Division of Hospital Medicine

**Elaine M. Majerus, MD, PhD, MD (https://profiles.wustl.edu/en/persons/elaine-majerus/)**
Professor of Medicine
Interim Chief, Division of Hematology

**Christine Pham, MD (https://profiles.wustl.edu/en/persons/christine-pham/)**
Guy and Ella Mae Magness Professor of Medicine
Chief, Division of Rheumatology

**Jennifer A. Philips, MD, PhD (https://profiles.wustl.edu/en/persons/jennifer-philips/)**
Associate Professor of Medicine
Co-Chief, Division of Infectious Diseases

**William G. Powderly, MD (https://profiles.wustl.edu/en/persons/bill-powderly/)**
Dr. J. William Campbell Professor of Medicine
Co-Chief, Division of Infectious Diseases

**Clay F. Semenkovich, MD (https://profiles.wustl.edu/en/persons/clay-semenkovich/)**
Irene E. and Michael M. Karl Professor of Endocrinology and Metabolism in Medicine
Chief, Division of Endocrinology, Metabolism and Lipid Research

**Patrick H. White, MD (https://profiles.wustl.edu/en/persons/patrick-white/)**
The Stokes Family Endowed Chair in Palliative Medicine and Supportive Care Chair and Associate Professor of Medicine
Chief, Division of Palliative Care Medicine

Visit our website for more information about our faculty (https://internalmedicine.wustl.edu/divisions/) and their appointments.

## A

**Eva Marie Aagaard, MD**
Carol B and Jerome T Loeb Professor of Medical Education (primary appointment)
Associate Vice Chancellor for Medical Education
Sr Associate Dean for Education
BA University of CA Santa Barbara 1991
MD Cornell University 1995

**Elliot Efrem Abbey, MD**
Professor of Clinical Medicine (primary appointment)
MD New York University 1975
BA Cornell University 1971

**Camille N. Abboud, MD**
Professor of Medicine (primary appointment)
MD American University of Beirut 1974
BS American University of Beirut 1970

**Ramzi I Abboud, DIP, MD**
Instructor in Medicine (primary appointment)
DIP Washington Univ in St. Louis 2008
MD University of Rochester 2014
BS University of Pennsylvania 2001

**Basem Abdeen, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Jordan 2001

**Khaled M Abdel-Hamid**
Instructor in Clinical Medicine (primary appointment)

**Haley J Abel, MA, PHD**
Instructor in Medicine (primary appointment)
MA Washington Univ in St. Louis 2005
PHD Washington Univ in St. Louis 2009

**Barry K Abramson, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Miami 1985
BA Johns Hopkins University 1981

**Nada A Abumrad, PHD**
Robert C Atkins Professor of Obesity Research in Medicine (primary appointment)
Professor of Cell Biology and Physiology
PHD State University of New York 1978
BS American University of Beirut 1972

**Susan R Adams, MD**
Instructor in Clinical Medicine (primary appointment)
BA Carleton College 1985
MD University of Missouri 1989

**Foluso O Ademuyiwa, MBBS, M PH**
Associate Professor of Medicine (primary appointment)
MBBS University of Ibadan 1999
M PH Johns Hopkins University 2001

**Douglas R Adkins, MD**
Professor of Medicine (primary appointment)
BS Wright State University 1982
MD Wright State University 1986

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Instructor in Medicine (primary appointment)
MD Army Medical College 2010

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Assistant Professor of Medicine (primary appointment)
MD Johns Hopkns University Medic 2003
BA Johns Hopkins University 1999

**Abdulla Akfaly, MD**
Instructor in Clinical Medicine (primary appointment)
MD Aleppo University 1991

**Ziyad Al-Aly, MD**
Assistant Professor of Medicine (primary appointment)
MD Beirut University 1999
BS Beirut University 1995

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Instructor in Clinical Medicine (primary appointment)

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Instructor in Clinical Medicine (primary appointment)
MD School Not Listed 1965

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Assistant Professor of Medicine (primary appointment)
Assistant Professor of Pathology and Immunology
MD Washington Univ in St. Louis 2007
BS University of Nebraska 1999
PHD Washington Univ in St. Louis 2007

**Tarek Alhamad, MS, MD**
Associate Professor of Medicine (primary appointment)
MS Pennsylvania State University 2013
MD Damascus U. Medical School 2006

**Muhammad A Ali, MD**
Instructor in Clinical Medicine (primary appointment)
MD School Not Listed 1985

**Florence Michelle Almiron-Torralba**
Instructor in Clinical Medicine (primary appointment)

**Rajaa Almourani, MD**
Instructor in Medicine (primary appointment)
MD Damascus University School of 2007

**David Hershel Alpers, MD**

William B Kountz Professor of Gerontology in Medicine (primary appointment)
BA Harvard University 1956
MD Harvard University 1960

**Osama Altayar, MD**
Assistant Professor of Medicine (primary appointment)
MD Damascus University 2011

**David Michael Alvarado, PHD**
Instructor in Medicine (primary appointment)
BS University of South Florida 2007
PHD Johns Hopkins University 2014

**Jose A Alvarez-Cardona, MD**
Assistant Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
MD University of Puerto Rico 2011

**Jamaluddin Faisal Amanullah**
Instructor in Clinical Medicine (primary appointment)

**Surachai Amornsawadwattana, MD**
Assistant Professor of Medicine (primary appointment)
MD Mahidol University 2002

**Milan J. Anadkat, MD**
Professor of Medicine (Dermatology) (primary appointment)
BS University of Akron 1997
MD Ohio University 2001

**Adam Lee Anderson, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Illinois Chicago 2010
BS University of Illinois Chicago 2006

**Scott J Anderson, MD, PHD**
Instructor in Clinical Medicine (primary appointment)
BA University of California 1975
MD Duke University 1982
PHD Duke University 1981

**Muhammad Jaffer Ansari**
Assistant Professor of Clinical Medicine (primary appointment)

**George Ansstas, MD**
Associate Professor of Medicine (primary appointment)
MD Tishreen Univ College of Med 2001
BS Bin Ziad High School 1995

**Alison Lynne Antes Schuelke, PHD, MS**
Assistant Professor of Medicine (primary appointment)
PHD University of Oklahoma 2010
MS University of Oklahoma 2007
BS Indiana State University 2005
BS Indiana State University 2005

**Olivia Aranha, PHD, MD, MS**
Assistant Professor of Medicine (primary appointment)
PHD Wayne State University 2000
MD University of Bombay 1995
MS University of Detroit 1998

**Vivek Kumar Arora, MD, PHD**
Assistant Professor of Medicine (primary appointment)
MD University of Texas Southwest 2004
PHD University of Texas Southwest 2004
BS Northwestern University 1996

**Saira M Asadullah, MD**
Instructor in Clinical Medicine (primary appointment)
MD Aga Khan University 1992

**Motaz Hamzah Ashkar, MBBS**
Assistant Professor of Medicine (primary appointment)
MBBS King Abdul-Aziz University 2006

**Jordan Jerrell Atkins, MD**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2015
BS Morehouse College 2010

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Associate Professor of Medicine (primary appointment)
Associate Professor of Pediatrics
MD1 Hahnemann University 1994
BS1 Loyola College 1990
BS Loyola College 1990
MD Hahnemann University 1994

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Samuel Grant Professor of Medicine (primary appointment)
Professor of Molecular Microbiology
BA University of Kansas 1965
MD University of Kansas 1969

**Himachandana Atluri, MD**
Instructor in Medicine (primary appointment)
Instructor in Medicine
MD University of MO Kansas City 2017
BA University of MO Kansas City 2016

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Assistant Professor of Medicine (primary appointment)
MD University of Illinois Chicago 2009

**James G Avery, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD University of Tennessee 1990
BA Washington Univ in St. Louis 1986

**Riad Azar, MD**
Associate Professor of Medicine (primary appointment)
MD Saint Josephs University 1994

## B

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Professor of Medicine (primary appointment)
MD University of Texas Southwest 1994
BA Brown University 1989

MPH Saint Louis University 2006

**Richard G. Bach, MD, MS**
Professor of Medicine (primary appointment)
MD New York University 1984
BS Georgetown University 1977
MS New York University 1980

**Nusayba Bagegni, MD**
Assistant Professor of Medicine (primary appointment)
BS University of MO Columbia 2005
MD U of IA Carver College of Med 2010

**Maria Quintos Baggstrom, MD**
Associate Professor of Medicine (primary appointment)
MD University of Texas Houston 1996
BA Williams College 1991

**Om Parkash Bahl, MS**
Assistant Professor of Clinical Medicine (primary appointment)
MS Punjab University 1957

**Donald M Bailey**
Adjunct Instructor in Medicine (primary appointment)

**Thomas C Bailey, MD**
Professor of Medicine (primary appointment)
BA William Jewell College 1980
MD Washington Univ in St. Louis 1984

**Erin L Bakanas, MD**
Professor of Medicine (primary appointment)
MD University of Connecticut 1987

**Faris Adam Bakeer, MD**
Instructor in Medicine (primary appointment)
BS Union University 2011
MD East Tennessee State Universi 2016

**Gregory Eden Baker, MD**
Instructor in Clinical Medicine (primary appointment)
MD Mayo Clinic 2001

**Megan Tierney Baldridge, MD, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Molecular Microbiology
MD Baylor College of Medicine 2011
PHD Baylor College of Medicine 2009

**Fred J Balis, MS, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BS University of Vermont 1981
MS Cornell University 1985
MD Washington Univ in St. Louis 1989

**Clarence William Balke, MD**
Professor of Medicine (primary appointment)
BS Haverford College 1975
MD Temple University 1981

**Wenners Ballard, MD**
Instructor in Medicine (primary appointment)
MD Howard University 2015

**Monika Bambouskova, PHD, MS**
Instructor in Medicine (primary appointment)
PHD Charles University 2016
BS Charles University 2007
MS Charles University 2009

**David Ban, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD University of Oregon 1980
BA Kalamazoo College 1976

**James William Banks, MD**
Instructor in Clinical Medicine (primary appointment)
MD Marshall University 1984

**Abraham Barake, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD School Not Listed 1983
BS University of Maryland 1976

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Associate Professor of Medicine (primary appointment)
Associate Professor of Developmental Biology
PHD Washington Univ in St. Louis 1992
BS Univ of Wisconsin Madison 1985
MD Washington Univ in St. Louis 1992

**Rachel Hannah Bardowell, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Miami 2009

**Philip M Barger, MD**
Associate Professor of Medicine (primary appointment)
MD Case Western Reserve Univ 1989

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Professor of Medicine (primary appointment)
MD Harvard University 1990
BS University of Rhode Island 1982
MA Harvard University 1984

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BS Georgetown University 1990
MD1 Brown University 1994
MD Dartmouth College 1992

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BS Stanford University 1978
MS Mass Inst of Technology (MIT) 1979
MD Washington Univ in St. Louis 1986

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PHD University of Chicago 1967
MD University of Chicago 1967

BS University of Chicago 1962

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PHD Saint Louis University 2012
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PHD University of SAO Paulo 2008
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BS Loyola University Chicago 2012

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BS University of Notre Dame 2013
MD Saint Louis University 2017

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BA Allegheny College 1964
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MD Rutgers University 1991
BS Seton Hall University 1987

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Professor of Pediatrics
BA University of Texas Austin 1970
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MD Tulane University 1964
BS Tulane University 1960

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BA Northwestern University 1984
MD Washington Univ in St. Louis 1988

**William Waite Benedict, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Illinois 1971
MD Washington Univ in St. Louis 1975

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Assistant Professor of Medicine (primary appointment)
MD Vanderbilt University 2010

**Susan Berdy, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Saint Louis University 1984
BA Brown University 1980

**Daniel Ralph Berg, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BS Brown University 1994
MD Washington Univ in St. Louis 2000

**Michael A Berk, MD**
Professor of Clinical Medicine (primary appointment)
BA Northwestern University 1974
MD Indiana University Bloomington 1979

**Carlos Bernal-Mizrachi, MD**
Philip E & Carolyn E Cryer Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology
MD Universidad del Valle Med Sch 1990

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BA University of MO Kansas City 1987

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MD Washington Univ in St. Louis 1992
BA Haverford College 1988

**Douglas R Berson, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Pennsylvania 1983
BA Lehigh University 1981

**Anita R. Bhandiwad, MD**
Associate Professor of Medicine (primary appointment)
BA Northwestern University 1994
MD Northwestern University 1998

**Mythili C. Bharadwaj, UNKNOWN**
Instructor in Clinical Medicine (primary appointment)
UNKNOWN University of Madras 1988

**Rakhee Kapadia Bhayani, MD**
Associate Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 1999

**Stanley I Biel, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Illinois 1978
BA Rockford College 1974

**Ellen F Binder, MD**
Professor of Medicine (primary appointment)
Professor of Occupational Therapy
MD Washington Univ in St. Louis 1981
BA Davenport University 1977

**William D Birenbaum, MD**
Instructor in Clinical Medicine (primary appointment)

BA Washington Univ in St. Louis 1978
MD University of Missouri 1983

**Clifford Allen Birge, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1961
BA Amherst College 1956

**Thomas M Birkenmeier, MD**
Assistant Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 1982
BA Washington Univ in St. Louis 1978

**Kumar Sanjeev Bishnupuri, PHD, MS**
Instructor in Medicine (primary appointment)
BS Tilka Manjhi Bhagalpur Univ 1988
PHD Banaras Hindu University 1999
MS Banaras Hindu University 1992

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Instructor in Medicine (primary appointment)
PHD University of Bordeaux 2 1996
MS University of Bordeaux 2 1992

**Elizabeth Joy Blaney, MD**
Assistant Professor of Medicine (primary appointment)
BA Eastern Michigan University 2003
MD Ohio State University 2007

**Morey A Blinder, MD**
Professor of Medicine (primary appointment)
Professor of Pathology and Immunology
MD Saint Louis University 1981
BS University of Notre Dame 1977

**Donald Allen Blum**
Assistant Professor of Clinical Medicine (primary appointment)

**Imre Bodo**
Adjunct Instructor in Medicine (primary appointment)

**Michael Bolger**
Instructor in Clinical Medicine (primary appointment)

**Kelly Bolton, PHD, M PHIL, MD**
Assistant Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
BA Cornell University 2004
PHD Cambridge University 2011
M PHIL Cambridge University 2008
MD University of CA Los Angeles 2013

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Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 2009

**Adrianus C Boon, MS, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Molecular Microbiology
Associate Professor of Pathology and Immunology
MS University of Amsterdam 1997
PHD Erasmus University Rotterdam 2003

**Jamie Marie Borgmann**
Instructor in Clinical Medicine (primary appointment)

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Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1958

**Jonathan D Bortz, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of the Witwatersra 1979

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Associate Professor of Medicine (primary appointment)
Associate Professor of Cell Biology and Physiology
MD Cornell University 1999
PHD Cornell University 1998
PHD1 Cornell University 1998
BA University of Rhode Island 1991
BS University of Rhode Island 1991

**Matthew S Bosner, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Texas Austin 1983
BS Muhlenberg College 1979

**William G Bowen, MD**
Professor of Clinical Medicine (primary appointment)
BS Davidson College 1970
MD University of North Carolina 1974

**Lyndsey Jean Bowman, PHD**
Adjunct Instructor in Medicine (primary appointment)
PHD St Louis College of Pharmacy 2005

**Joseph Brancheck, MD**
Instructor in Medicine (primary appointment)
MD University of Illinois 2013

**Alan C Braverman, MD**
Alumni Endowed Professor of Cardiovascular Disease in Medicine (primary appointment)
MD University of Missouri 1985
BA University of MO Kansas City 1984

**Andrea Lynn Bredemeyer, PHD**
Instructor in Medicine (primary appointment)
BA Colby College 1999
PHD Washington Univ in St. Louis 2006

**Thomas J. Brett, PHD**
Assocaite Professor of Medicine (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
Associate Professor of Cell Biology and Physiology
PHD University of Nebraska 1999
BS North Dakota State University 1992

**Matthew Brinkmeier, MD, BS1**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2007

BS1 Washington Univ in St. Louis 2001

**Natalia Brito Rivera, MD**
Instructor in Medicine (primary appointment)
BA Cornell University 2011
MD Washington Univ in St. Louis 2016

**Steven L Brody, MD**
Dorothy R and Hubert C Moog Professor of Pulmonary Diseases in Medicine (primary appointment)
Professor of Radiology
MD University of Michigan 1980

**Rita Thomas Brookheart, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Pediatrics
BA Sweet Briar College 2003
PHD Washington Univ in St. Louis 2009

**Angela L Brown, MD**
Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 1992
BS Southern Methodist University 1987

**Ashley Elizabeth Brown, MD**
Instructor in Medicine (primary appointment)
MD University of Central Florida 2017
BS Cornell University 2012
BS Cornell University 2012

**David L. Brown, MD**
Professor of Medicine (primary appointment)
MD Baylor University 1982
BA University of Texas Austin 1977

**Jeffrey Wade Brown, MD, PHD**
Instructor in Medicine (primary appointment)
MD Boston University 2012
PHD Boston University 2012

**Robert M Bruce, MD**
Professor of Clinical Medicine (primary appointment)
BS University of Minnesota 1968
MD University of Minnesota 1968
BA Washington Univ in St. Louis 1964

**Monique W. Bruinsma, MD**
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MD Washington Univ in St. Louis 2016

**Kathleen S Brunts, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1981
BS Western Michigan University 1977

**Stanley Buck, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1977
BS Princeton University 1973

**Philip J Budge, BS1, PHD, MD**
Associate Professor of Medicine (primary appointment)
BS1 Brigham Young University 1998
PHD Vanderbilt University 2003
BS Brigham Young University 1998
MD Vanderbilt University 2007

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Instructor in Medicine (primary appointment)
BS Miami University 2012
MD Wright State University 2016

**Jason P Burnham, BS1, MD**
Assistant Professor of Medicine (primary appointment)
BS1 Southwestern University 2008
MD University of Texas Galveston 2012
BS Southwestern University 2008

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BA Saint Louis University 1974
MD University of Missouri 1983

**Anne Mobley Butler, MS, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Surgery (Public Health Sciences)
MS Harvard University 2006
PHD University of North Carolina 2014
BS Emory University 2003

**Melvin J Butler**
Instructor in Clinical Medicine (primary appointment)

**Derek E Byers, MD, PHD**
Associate Professor of Medicine (primary appointment)
MD University of Texas Southwest 2001
BS University of Oklahoma 1993
PHD University of Texas Southwest 2001

**Jonathan Nicholas Byrd, MD, BS1**
Assistant Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 2011
BS1 Tulane University 2007

## C

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Associate Professor of Clinical Medicine (primary appointment)
MD School Not Listed 1964

**Matthew David Cain, PHD**
Assistant Professor of Medicine (primary appointment)
BS Rhodes College 2007
PHD Washington Univ in St. Louis 2014

**Juan Jose Calix, MD, PHD**
Instructor in Medicine (primary appointment)
MD University of AL Birmingham 2014
PHD University of AL Birmingham 2014
BA Loyola University 2005

**John William Campbell, MD**

Professor of Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1973
MD Washington Univ in St. Louis 1977

**Jian Li Campian, MD, MS, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Neurological Surgery
MD Tianjin Medical University 1997
MS Peking Union Medical College 2000
PHD University of Louisville 2003

**Maria J Canizares, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
MD Saint Louis University 2001
BA Saint Louis University 1996

**Rosemary L Cannistraro, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1992

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Instructor in Medicine (primary appointment)
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PHD ZHEJIANG UNIVERSITY 2003

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Adjunct Instructor in Medicine (primary appointment)

**Stephanie Solomon Cargill, PHD**
Adjunct Assistant Professor of Medicine (primary appointment)
BS Ohio State University 2001
PHD Emory University 2008

**Kim Alan Carmichael, MD**
Professor of Medicine (primary appointment)
MD Virginia College 1978

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Professor of Medicine (primary appointment)
Alan A and Edith L Wolff Distinguished Professor of Geriatric Medicine
Professor of Neurology
BA University of MO Columbia 1981
MD University of MO Columbia 1985

**Amanda Fishback Cashen, MD, BS1**
Professor of Medicine (primary appointment)
Executive Chair Washington University Institutional Review Board
MD Washington Univ in St. Louis 1999
BS Yale University 1995
BS1 Yale University 1995

**Roque Castillo, MD**
Assistant Professor of Medicine (primary appointment)
MD Universidad Peruana Cayetano 1993

**Lilibeth Maria Cayabyab-Loe, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA Saint Louis University 1986
MD University of Missouri 1990

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Professor of Medicine (primary appointment)
BS Duke University 1990
MD Vanderbilt University 1994

**Grant A Challen, PHD**
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PHD University of Queensland 2006

**Pallavi Chandra, PHD, MS**
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BS UNIVERSITY OF DELHI 2008
PHD Jawaharlal Nehru Univerisity 2014
MS UNIVERSITY OF DELHI 2010

**Dennis Tian-Shu Chang, MD, MED**
Associate Professor of Medicine (primary appointment)
MD University of Chicago 2003
MED University of Chicago 2003
BS Yale University 1999

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Instructor in Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1991
MD University of Missouri 1995

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MD Texas Tech University 2009

**Siroth Charnond, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of MO Kansas City 1995
BA University of MO Kansas City 1995

**Salman Chaudhry, MBBS**
Instructor in Medicine (primary appointment)
MBBS Agha Khan University, Pakistan 2007

**Lakshmi Ramya Chelapareddy, MBBS**
Instructor in Medicine (primary appointment)
MBBS Dr. NTR University of Health S 2010

**Alexander Chi Chen, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Surgery (Cardiothoracic Surgery)
MD University of MO Kansas City 2001

**Chien-Huan Chen, PHD, MD**
Professor of Medicine (primary appointment)
PHD Johns Hopkns University Medic 1999
MD National Taiwan University 1993

**David Yuan-Sou Chen, MD, PHD**
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MD Washington Univ in St. Louis 2012
PHD Washington Univ in St. Louis 2012
BS University of Michigan 2003

**Dennis Di Chen, MD**
Assistant Professor of Medicine (primary appointment)
MD Univ of Texas San Antonio 2012

**Edward C. Chen, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 2005

**Feng Chen, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Cell Biology and Physiology
BS Fudan University 1991
PHD University of Utah 1998

**Phyllis Chen, MD**
Instructor in Clinical Medicine (primary appointment)
MD Northwestern University Med 1992

**Qing Chen, MD, UNKNOWN, MS**
Instructor in Clinical Medicine (primary appointment)
MD Nanjing Medical University 1983
UNKNOWN School Not Listed 1983
MS Nanjing Medical University 1988

**Sara X Chen, MD**
Assistant Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 2014
BS Vanderbilt University 2010

**Ying Chen, MD, PHD**
Associate Professor of Medicine (primary appointment)
MD Shanghai Medical University 1996
PHD Vanderbilt University 2004

**Steven Chih Nung Cheng, MD**
Professor of Medicine (primary appointment)
BA Northwestern University 2001
MD Northwestern University Med 2002

**Praveen R Chenna, MBBS**
Associate Professor of Medicine (primary appointment)
BS Washington Univ in St. Louis 1998
MBBS Sri Ramachandra Medical Colleg 2005

**Cynthia Cherfane, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD St. Joseph University, Beirut 2011

**Milan G Chheda, MD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Neurology
MD Albert Einstein College of Med 2001

**Rebecca Joy Chibnall, MD, AA**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of California 2012
BS Washington Univ in St. Louis 2007
AA Washington Univ in St. Louis 2007

**Phillip Ruben Chisholm**
Instructor in Clinical Medicine (primary appointment)

**Jaehyung Cho, BS1, PHD, MS**
Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
BS1 Chung-Ang University 1994
PHD Univ of Wisconsin Madison 2006
MS Chung-Ang University 1996

**Jaebok Choi, BE, PHD, MS**
Assistant Professor of Medicine (primary appointment)
BE Kyung Pook National University 1996
PHD Baylor University 2006
MS Univ of Nebraska at Omaha 2001

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BS Northwestern University 2003
MD Washington Univ in St. Louis 2007

**Matthew Christopher, MD, PHD**
Assistant Professor of Medicine (primary appointment)
BA Saint Louis University 1993
MD Washington Univ in St. Louis 2010
PHD Washington Univ in St. Louis 2010

**Shirley Chu**
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**Philip Chu Pak-Yu, MD**
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MD University of CA Los Angeles 1992
BS California State Fresno 1986

**Duck Sung Chun, MD**
Instructor in Clinical Medicine (primary appointment)

**Andy Chuu, MD**
Assistant Professor of Medicine (primary appointment)
BA University of MO St Louis 2010
MD University of Arizona 2015

**Jeffrey Peter Ciaramita**
Instructor in Clinical Medicine (primary appointment)

**Thomas Michael Ciesielski, MD**
Associate Professor of Medicine (primary appointment)
MD Oregon Health Science Univers 2010

**Vincenza Cifarelli, MS, PHD**
Assistant Professor of Medicine (primary appointment)
MS Universita de Modena e Reggio 2005
PHD University of Pittsburgh 2011

**Matthew Aaron Ciorba, MD**
Associate Professor of Medicine (primary appointment)
MD University of Iowa 2001

**Geoffrey Cislo, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Michigan 1996
BS University of Michigan 1993

**Roberto Civitelli, MD**

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Professor of Orthopaedic Surgery
BS University of Siena 1980
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**Katherine K Clifton, MD**
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BA Saint Louis University 2009
MD Loyola University Chicago 2013

**Dorothy Jean Cline, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
MD Saint Louis University 1977
BA University of Missouri 1973

**William Edward Clutter, MD**
Associate Professor of Medicine (primary appointment)
Associate Director of the House Staff Training Program, Department of Internal Medicine
MD Ohio State University 1975
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**Shari J Cohen, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA University of MO Kansas City 1986
MD University of Missouri 1987

**Danita L Cole, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of MO Kansas City 1990
MD University of MO Kansas City 1991

**Patricia L Cole, MA, MD**
Associate Professor of Clinical Medicine (primary appointment)
MA Brown University 1975
BA Mount Holyoke College 1972
MD Harvard University 1981

**Roger Barto Cole, MS, MD, PHD**
Instructor in Clinical Medicine (primary appointment)
BS Rice University 1997
MS Yale University 2001
MD Washington Univ in St. Louis 2008
PHD Yale University 2004

**Sarah F Cole**
Instructor in Clinical Medicine (primary appointment)

**Laura Ann Colletti-Mann, MD**
Associate Professor of Medicine (primary appointment)
MD Boston University 1980

**Kim David Colter, MS, MD**
Instructor in Clinical Medicine (primary appointment)
MS University of CA Berkeley 1974
BS MO S&T (formerly UofMO Rolla) 1973
MD Washington Univ in St. Louis 1978

**Arthur Hamilton Combs, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD New York Medical College 1975

**Daniel Horatio Cooper, MD**
Associate Professor of Medicine (primary appointment)
MD Loyola University Chicago 2003
BS Washington Univ in St. Louis 1999

**Matthew Cooper, PHD**
Adjunct Assistant Professor of Medicine (primary appointment)
BS University of Surrey 2004
PHD University of Surrey 2008

**Lynn Anne Cornelius, BN, MD**
Winfred A and Emma R Showman Professor of Dermatology in Medicine (primary appointment)
BN University of Delaware 1977
MD University of Missouri 1984

**Dominique Leah Cosco, MD**
Associate Professor of Medicine (primary appointment)
MD Tulane University 2005

**Natalie Danielle Cosgrove, MD**
Assistant Professor of Medicine (primary appointment)
MD Temple University 2011

**John Bernard Costello, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1977
BA Saint Louis University 1974

**Carrie Christine Coughlin, MD**
Assistant Professor of Medicine (Dermatology) (primary appointment)
Assistant Professor of Pediatrics
MD Washington Univ in St. Louis 2010
BA Yale University 2005

**Martha Laurin Council, MD**
Associate Professor of Medicine (Dermatology) (primary appointment)
MD Washington Univ in St. Louis 2004
BS Louisiana St University 2000

**Daniel W Coyne, MD**
Professor of Medicine (primary appointment)
BA Saint Louis University 1979
MD Case Western Reserve Univ 1983

**Johnetta M Craig, MD, MBA**
Instructor in Clinical Medicine (primary appointment)
MD University of Iowa 1986
BS University of Missouri 1980
MBA University of Pennsylvania 1994

**John Jeffrey Cras, MD, MS**
Assistant Professor of Medicine (primary appointment)

MD Georgetown University 2003
BS Loyola College 1994
MS Georgetown University 1998

**Charles Crecelius, MD, PHD**
Associate Professor of Clinical Medicine (primary appointment)
BA Carleton University 1976
MD Saint Louis University 1984
PHD Saint Louis University 1984

**Sharon Cresci, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Genetics
MD New York University 1986
BS State Univ of NY Binghampton 1982

**Stephen R Crespin, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA Harvard University 1960
MD Harvard University 1965

**Jeffrey S Crippin, MD**
Professor of Medicine (primary appointment)
MD University of Kansas 1984
BS University of Notre Dame 1980

**Paulina Cruz Bravo, MD**
Assistant Professor of Medicine (primary appointment)
MD Universidad Automoma de Madrid 2009

**Philip E Cryer, MD**
Professor Emeritus of Medicine (primary appointment)
Adjunct Professor of Medicine
BA Northwestern University 1962
MD Northwestern University Med 1965

**Phillip S. Cuculich, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Radiation Oncology
MD Vanderbilt University 2001

**Robert Culverhouse, MA, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Biostatistics
MA University of CA Berkeley 1987
PHD Washington Univ in St. Louis 1998
BA Vanderbilt University 1983

**Lenise Andrea Cummings-Vaughn, MD, MS**
Associate Professor of Medicine (primary appointment)
MD Saint Louis University 2005
BS Williams College 1995
MS San Francisco St University 1998

**Robert B Cusworth, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Rochester 1974

## D

**Stacy Zhao Dai, MD**
Instructor in Medicine (primary appointment)
BA Brandeis University 2009
MD Washington Univ in St. Louis 2013

**Ann Marie Dale, PHD**
Professor of Medicine (primary appointment)
Professor of Occupational Therapy
PHD Saint Louis University 2009
BS University of MO Columbia 1983

**Ha Xuan Dang, PHD**
Instructor in Medicine (primary appointment)
BS HANOI U OF SCIENCE AND TECH 2003
PHD Virginia Tech 2014

**Erik D. Daniels, MD**
Instructor in Clinical Medicine (primary appointment)
BS Howard University 1985
MD Howard University 1989

**Peter G Danis**
Instructor in Clinical Medicine (primary appointment)

**Rand E Dankner, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA University of Pennsylvania 1974
MD Baylor University 1978

**Maria Cristina Dans, MD**
Associate Professor of Medicine (primary appointment)
BA Princeton University 1989
MD Washington Univ in St. Louis 1999

**Anthony Trung Dao, MD**
Instructor in Medicine (primary appointment)
MD Northeast Ohio Medical U 2016
BS Northeast Ohio Medical U 2012

**Bhajan Shewaldas Dara, MD**
Instructor in Clinical Medicine (primary appointment)
MD Sindh Medical College 1987

**Lakshman Darsi, MBBS**
Assistant Professor of Medicine (primary appointment)
MBBS Guntur Medical College 1985

**Koushik Kumar Das, MD**
Assistant Professor of Medicine (primary appointment)
MD Columbia University 2016

**Sundeep Das, MD**
Instructor in Clinical Medicine (primary appointment)
MD University College of Med Sci 1986

**John D Davidson, MD**
Professor of Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1948
MD Washington Univ in St. Louis 1952

**Victor G Davila-Roman, MD**
Professor of Medicine (primary appointment)
Professor of Anesthesiology

Professor of Radiology
MD University of Puerto Rico 1981
BS University of Puerto Rico 1977

**Andrea Jill Davis, MSN, MD**
Instructor in Clinical Medicine (primary appointment)
BS Randolph Macon College 1997
MSN Arizona State University 2000
MD St George's University 2004

**Andrew Adam Bernstein Davis, MD**
Assistant Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
MD Northwestern University Med 2014
BA Cornell University 2009

**James Alvin Davis, MD**
Assistant Professor of Medicine (primary appointment)
BS Morehead St University 1994
MD University of Kentucky 1999

**Thomas Edward Davis**
Instructor in Clinical Medicine (primary appointment)

**Caroline Elizabeth Day, M PH, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Colorado Boulder 1990
M PH San Diego St University 2005
MD Washington Univ in St. Louis 1995

**Thomas M De Fer, MD**
Associate Dean of Medical Student Education
Professor of Medicine
MD University of Missouri 1989
BA University of Missouri 1985

**Lisa De Las Fuentes, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Biostatistics
BA Stanford University 1991
MD University of Texas Southwest 1996

**Anne V Dean, MD**
Instructor in Clinical Medicine (primary appointment)
MD Loyola University 1995
BA Bowdoin College 1986

**Joshua Thomas Dearborn, PHD, MS**
Instructor in Medicine (Pending Dean's Approval) (primary appointment)
PHD University of MO St Louis 2013
BS University of MO St Louis 2005
MS University of MO St Louis 2007

**Parakkal Deepak, MBBS**
Assistant Professor of Medicine (primary appointment)
MBBS Jawaharlal Institute of PostGr 2004

**Angeline Diane DeiSanti, MD**
Assistant Professor of Medicine (primary appointment)
BS University of MO Columbia 1998
MD University of MO Columbia 2003

**Jennifer A. Delaney, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1997
BA Georgetown University 1992

**Rowena Bayudan Delos Santos, MD**
Associate Professor of Medicine (primary appointment)
BS Creighton University 2000
MD Creighton University 2004

**Bethany L Dement, MD**
Instructor in Medicine (primary appointment)
MD Southeast Missouri St Univers 2001

**David G. DeNardo, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Pathology and Immunology
BS Willamette University 1999
PHD Baylor University 2005

**Amber Zimmer Deptola, MD**
Assistant Professor of Medicine (primary appointment)
BS Miami University 2008
MD University of Louisville 2012

**Sunny Desai, MS, UNKNOWN**
Instructor in Clinical Medicine (primary appointment)
MS School Not Listed 1991
UNKNOWN School Not Listed 1991

**Teresa Deshields, MS, PHD**
Associate Professor of Clinical Medicine (primary appointment)
Associate Professor of Clinical Psychiatry
MS University of Georgia 1983
BA Meredith College 1981
PHD University of Georgia 1985

**Vladimir Novak Despotovic, MD**
Associate Professor of Medicine (primary appointment)
MD Michigan State University 2004
BS Michigan State University 2000

**Siddhartha HK Devarakonda, MD**
Assistant Professor of Medicine (primary appointment)
MD Gandhi Medical College 2009

**Michael D DeVita, MD**
Assistant Professor of Medicine (primary appointment)
BS University of Wisconsin 2006
MD University of Wisconsin 2011

**Michael Diamond, PHD, MD**
Professor of Medicine (primary appointment)
Herbert S Gasser Professor
Professor of Molecular Microbiology
Professor of Pathology and Immunology
BA Columbia College 1985

PHD Harvard University 1992
MD Harvard University 1994

**Judith A Dibble, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1986

**Brian K Dieckgraefe, PHD, MD**
Associate Professor of Medicine (primary appointment)
PHD Washington Univ in St. Louis 1987
MD Washington Univ in St. Louis 1988
BA University of Kansas 1982

**Kathryn M Diemer, MD**
Professor of Medicine (primary appointment)
Assistant Dean for Career Counseling
MD University of Missouri 1985
BA University of Missouri 1984

**Colin Diffie, MD**
Assistant Professor of Medicine (primary appointment)
BA University of Texas Austin 2008
MD Univ of Texas Med Sch Houston 2014
BA University of Texas Austin 2008

**Hanan M Dihowm, MBCHB**
Instructor in Medicine (primary appointment)
MBCHB Misurate University 2006

**Li Ding, PHD**
Professor of Medicine (primary appointment)
Professor of Genetics
PHD University of Utah 1998

**John F Dipersio, MD, PHD**
Virginia E and Sam J Golman Professor of Medicine (primary appointment)
Professor of Pathology and Immunology
Professor of Pediatrics
MD University of Rochester 1980
PHD University of Rochester 1980
BA Williams College 1973

**Richard M Divalerio, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1988
BS University of Notre Dame 1984

**Abhinav Diwan, MD**
Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology
Professor of Obstetrics and Gynecology
MD All-India Inst of Medical Sci 1997

**Irl Joseph Don, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1972
BA Washington Univ in St. Louis 1969

**James W Donnelly, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
BA Northwestern University 1982
MD Washington Univ in St. Louis 1986

**Balraj Doray, PHD**
Associate Professor of Medicine (primary appointment)
PHD University of Illinois 1999
BS Southern Illinois University 1993

**Gerald W. Dorn II, MD**
Philip and Sima K Needleman Professor of Medicine (primary appointment)
MD Medical University of Sth Car 1981

**Nicole Camille Droz, MD**
Assistant Professor of Medicine (primary appointment)
MD Creighton University 2013

**Erik R Dubberke, MD, MPH**
Professor of Medicine (primary appointment)
MD University of Illinois 1999
BA Augustana University College 1995
MPH Saint Louis University 2008

**James Matthew DuBois, D SC, PHD, MA**
Steven J Bander Professor of Medical Ethics and Professionalism (primary appointment)
Professor of Psychological & Brain Sciences
D SC University of Vienna 1997
PHD Intrnl Academy of Philosophy 1992
MA University of Rhode Island 1990
BA Franciscan University Stubenv 1989

**Nicole Marie Ducharme, DOST**
Instructor in Medicine (primary appointment)
BS Muhlenberg College 1998
DOST Univ of Health Sciences KC 2003

**Carolyn Dufault, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Dean for Education and Technology
BS Mount Holyoke College 1997
PHD Washington Univ in St. Louis 2009

**Maria C Dumadag-Sabio, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of Missouri 1988
MD University of Missouri 1988

**Edward Harry DuMontier**
Instructor in Clinical Medicine (primary appointment)

**William C Dunagan, MD, MS**
Professor of Medicine (primary appointment)
BS University of Texas Austin 1978
MD Washington Univ in St. Louis 1983
MS University of Texas Austin 1980

**Julia Passyn Dunn, MS, MD**

Adjunct Assistant Professor of Medicine (primary appointment)
MS Vanderbilt University 2010
MD University of South Alabama 2002
BS Auburn University 1998

**Evan Louis Dupart, MD**
Instructor in Medicine (primary appointment)
MD University of Colorado Denver 2017

**Michael Joseph Durkin, M PH1, MD**
Assistant Professor of Medicine (primary appointment)
M PH1 University of North Carolina 2015
BA Illinois Wesleyan University 2004
MD Medical College of Wisconsin 2008

**Adriana S Dusso, PHD**
Associate Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
PHD Univ Nacional De Rosario 1985
BS Univ Nacional De Rosario 1969

**Tiffany Biason Dy, MD**
Assistant Professor of Medicine (primary appointment)
BS University of Miami 2005
MD Univ Texas Health Science Ctr 2009

## E

**William Charles Eades Jr, BEE**
Associate Professor of Medicine (primary appointment)
BEE MO S&T (formerly UofMO Rolla) 1982

**Dayna S Early, MD**
Professor of Medicine (primary appointment)
BA University of Missouri 1986
MD University of Missouri 1990

**Royal J Eaton, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Missouri 1964
BA University of Missouri 1960

**Cady Beedy Edwards, MD**
Instructor in Medicine (primary appointment)
MD University of South Alabama 2017
BS University of Alabama 2013

**Charmaine E. Edwards, MD**
Instructor in Clinical Medicine (primary appointment)
MD Howard University 1992
BS Alcorn State University 1987

**John R. Edwards, PHD**
Associate Professor of Medicine (primary appointment)
PHD Columbia University 2003

**Stilianos Efstratiadis**
Assistant Professor of Clinical Medicine (primary appointment)

**Russell E Eggebrecht, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1971
BS University of Illinois 1967

**Ali A Ehsani, MD**
Professor of Medicine (primary appointment)
MD Tehran University 1965

**Syed Usman Mohsin Ehsanullah, MBBS**
Instructor in Medicine (primary appointment)
MBBS Baqai Medical University, Kara 2020

**Zamir Eidelman, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD School Not Listed 1987

**Seth A Eisen, MS, MD**
Professor of Medicine (primary appointment)
MS Harvard University 1989
MD Washington Univ in St. Louis 1966
BA Reed College 1963

**Linda G Eissenberg, PHD**
Assistant Professor of Medicine (primary appointment)
BA University of Tennessee 1977
PHD University of North Carolina 1982

**Jack El Sawda, MD**
Instructor in Medicine (Pending Dean's Approval) (primary appointment)
MD University of Balamand, Lebano 2014

**Lamice R. El-Kholy, MS, UNKNOWN**
Instructor in Clinical Medicine (primary appointment)
MS School Not Listed 1986
UNKNOWN School Not Listed 1982

**John Ellena, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Southern Illinois University 1983
BS Southern Illinois University 1980

**Melissa Berrien Elliott, PHD**
Instructor in Medicine (primary appointment)
PHD Saint Louis University 2014
BS Eckerd College 2006

**Charlene Ann Ellsworth, PHD, MD**
Instructor in Clinical Medicine (primary appointment)
PHD Mass Inst of Technology (MIT) 2004
MD Washington Univ in St. Louis 2008

**Amged Eltahir, AB1, MD**
Instructor in Clinical Medicine (primary appointment)
AB1 Saint Louis University 2006
MD University of Khartoum 1985

**Jill Elizabeth Elwing, MD**
Assistant Professor of Medicine (primary appointment)
MD University of MO Columbia 2000
BS University of MO Columbia 1996

**James Michael Epstein, MD**

Instructor in Clinical Medicine (primary appointment)
BS University of Notre Dame 1965
MD Washington Univ in St. Louis 1969

**Gerome V Escota, MD**
Associate Professor of Medicine (primary appointment)
MD University of the Philippines 2004
BS University of the Philippines 1999

**Ingrid Eshun-Wilsonova, MS, MD**
Instructor in Medicine (primary appointment)
MS University College London 2009
MD University of Cape Town 2000

**Amir Esmaeeli, MD**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2015

**Neil A Ettinger, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BS Vanderbilt University 1979
MD Washington Univ in St. Louis 1983

**Bradley A Evanoff, MD, M PH**
Richard A and Elizabeth Henby Sutter Professor of Occupational, Industrial, and Environmental Medicine in Medicine (primary appointment)
Professor of Occupational Therapy
BA Cornell University 1982
MD Washington Univ in St. Louis 1986
M PH University of Washington 1993

**Elyse Aufman Everett, MA, MD**
Instructor in Medicine (primary appointment)
BS University of Pittsburgh 2009
MA University of Pittsburgh 2011
MD Washington Univ in St. Louis 2015

**Carol Jane Evers, MD**
Instructor in Clinical Medicine (primary appointment)
MD Brown University 1977
BA Brown University 1973

**Gregory A Ewald, MD**
Professor of Medicine (primary appointment)
MD Northwestern University 1989
BS University of Illinois 1985

## F

**Elisa Fabbrini, MD, PHD**
Adjunct Assistant Professor of Medicine (primary appointment)
MD La Sapienza University 1998
PHD La Sapienza University 2006

**Mitch N Faddis, MD, PHD**
Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 1993
BS Kansas State University 1985
PHD Washington Univ in St. Louis 1993

**Sarah Schwarz Farabi**
Assistant Professor of Clinical Medicine (primary appointment)

**Akinrinola Fatoki, MS**
Instructor in Clinical Medicine (primary appointment)
BS School Not Listed 1982
MS School Not Listed 1989

**Carol Faulk, MD**
Instructor in Medicine (primary appointment)
MD Louisiana St University 2014

**Todd A Fehniger, MD, PHD**
Professor of Medicine (primary appointment)
BS State Univ of NY Buffalo 1994
MD Ohio State University 2002
PHD Ohio State University 2000

**Francesca Ferraro, MD, PHD**
Instructor in Medicine (primary appointment)
MD University of Parma 2004
PHD University of Parma 2014

**Herman L Ferrell, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Arkansas 1975
BS University of Arkansas 1973

**Mark A Fiala, MSW**
Instructor in Medicine (primary appointment)
BS Southeast Missouri St Univers 2006
MSW Washington Univ in St. Louis 2017

**Kathryn Lynn Filson, MD**
Instructor in Medicine (primary appointment)
MD Southern Illinois University 2015

**Brian N. Finck, MS, PHD**
Professor of Medicine (primary appointment)
BS University of Illinois 1994
MS University of Illinois 1996
PHD University of Illinois 2000

**Lewis Conrad Fischbein, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1974
BA University of Rochester 1970

**Peter Uwe Fischer, PHD, MS**
Professor of Medicine (primary appointment)
PHD University of Hamburg 1996
MS Free University of Berlin 1991

**Norman Fishman, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA School Not Listed 1970
MD School Not Listed 1974

**James M Fleckenstein, MD**
Professor of Medicine (primary appointment)
Professor of Molecular Microbiology

MD Saint Louis University 1985
BS Xavier University 1981

**Jaquelyn F Fleckenstein, MD**
Professor of Medicine (primary appointment)
BA Cornell University 1981
MD Saint Louis University 1985

**Jaime Eduardo Flores-Ruiz, MD**
Instructor in Medicine (primary appointment)
MD University of Puerto Rico 2015

**Emily Fondahn, MD**
Associate Professor of Medicine (primary appointment)
MD Northwestern University 2008

**Francesca Fontana, MD, PHD**
Instructor in Medicine (primary appointment)
MD Vita-Salute San Raffaele Univ 2008
PHD Vita-Salute San Raffaele Univ 2012

**Luigi Fontana, PHD, MD**
Adjunct Professor of Medicine (primary appointment)
PHD University of Padova 2004
MD University of Verona 1994

**Randi Elizabeth Foraker, PHD, MA**
Associate Professor of Medicine (primary appointment)
PHD University North Carolina 2010
BA University of Iowa 1997
MA University of Iowa 1999

**Nickole A Forget, MD**
Assistant Professor of Medicine (primary appointment)
MD Saint Louis University 1996

**Glennon Joseph Fox, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of MO Columbia 1984

**Judy Ann Frain, BN, MSN, PHD**
Adjunct Assistant Professor of Medicine (primary appointment)
BN Webster University 2003
MSN Saint Louis University 2004
PHD University of MO St Louis 2013

**Antonietta Franco, PHD, MS**
Instructor in Medicine (primary appointment)
BS University of Naples 2010
PHD University of Naples 2016
MS University of Naples 2012

**Victoria J Fraser, MD**
Adolphus Busch Professor of Medicine (primary appointment)
Head of the Department of Medicine
MD University of MO Columbia 1983
BS William Woods College 1978

**James Matthew Freer, MD**
Assistant Professor of Medicine (primary appointment)
BS Truman State University 1998
MD University of MO Columbia 2002

**Deborah Frenchie, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1993
BA Washington Univ in St. Louis 1984

**Ashley Elizabeth Frith, MD**
Assistant Professor of Medicine (primary appointment)
BS Christian Brothers University 2004
MD University of AR Med Sciences 2008

**Stephen Fuest, MD**
Instructor in Medicine (primary appointment)
Instructor in Medicine
MD Washington Univ in St. Louis 2017
BS Niagara University 2013

**Michael Paul Fuller, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA Brigham Young University 1990
MD University of Utah 1994

**Steven Daniel Funk, PHD**
Instructor in Medicine (primary appointment)
PHD Louisiana St University 2013
BS University of Louisiana 2005

**Suzanne Furesz**
Instructor in Clinical Medicine (primary appointment)

## G

**Brian F Gage, MS, MD**
Professor of Medicine (primary appointment)
MS Stanford University 1995
MD University of California 1988
BS Stanford University 1984

**Daniel Gaitan, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD University of Mississippi 1986
BS University of AL Birmingham 1980

**Arthur H Gale, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD University of Missouri 1959
BS Washington Univ in St. Louis 1955

**Sumanth Gandra, MD, MA**
Associate Professor of Medicine (primary appointment)
BA Osmania Medical College 2014
MD University of Chicago 2010
MA Eastern Kentucky University 2007

**Jane M. Garbutt, MBCHB, MHS**
Professor of Medicine (primary appointment)
Professor of Pediatrics
MBCHB Bristol University 1977
MHS University of Toronto 1988

**John A Garcia, MBA, MD**
Instructor in Clinical Medicine (primary appointment)
MBA University of MO St Louis 1998
BA Carleton College 1985
MD University of Illinois 1990

**Mauricio Garcia Saenz De Sicilia, MD**
Associate Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
MD UN Nacional Autonoma De Mex 2004

**Jacquelyn B Garrett, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
MD Howard University 1985
BS Howard University 1983

**Francisco J Garriga, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1970
BS University of Puerto Rico 1966

**Felicitas Z Gatachalian, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Santo Tomas 1970
MD University of Santo Tomas 1976

**Vered Gazit, MS, PHD**
Instructor in Medicine (primary appointment)
MS Tel Aviv University 1999
BS Tel Aviv University 1991
PHD School Not Listed 2000

**William M Gee, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1981
BA Cornell College 1977

**Richard A Geisman, MD**
Instructor in Clinical Medicine (primary appointment)
BS Saint Louis University 1979
MD Tulane University 1983

**Taylor Elizabeth Geisman, BS1, MD**
Instructor in Medicine (primary appointment)
BS1 University of Dayton 2013
MD Washington Univ in St. Louis 2017

**Edward M Geltman, MD**
Professor of Medicine (primary appointment)
Assistant Professor of Radiology
BS Mass Inst of Technology (MIT) 1967
MD New York University 1971

**Natalia Genere, MD**
Instructor in Medicine (primary appointment)
MD University of Minnesota 2020
BS University of Michigan 2009

**Elvin Hsing Geng, MPH, MD**
Professor of Medicine (primary appointment)
BA University of CA Berkeley 1996
MPH Columbia University 2002
MD Columbia University 2002

**Ige A George, MBBS**
Assistant Professor of Medicine (primary appointment)
MBBS Christian Medical College 1998

**Armin Ghobadi, MD**
Associate Professor of Medicine (primary appointment)
MD Iran Univ of Medical Sciences 2001

**Bria D Giacomino, MD**
Assistant Professor of Medicine (primary appointment)
MD Midwestern University 2012

**Matthew John Gibfried, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of MO Columbia 2003

**Margo Renee Girardi, MD**
Assistant Professor of Medicine (primary appointment)
MD Saint Louis University 2005
BS University of Illinois 2001

**Gardar T Gislason**
Adjunct Instructor in Medicine (primary appointment)

**Josephine Lee Aguhob Glaser**
Instructor in Clinical Medicine (primary appointment)

**Marye J Gleva, MD**
Professor of Medicine (primary appointment)
MD University of Washington 1988
BA Wellesley College 1984

**Tracey L Godbold, MD**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2017
BA Wellesley College 2007

**Andrew S Gold, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Iowa 1989
BS University of Illinois 1985

**Anne Carol Goldberg, MD**
Professor of Medicine (primary appointment)
BA Harvard University 1973
MD University of Maryland 1977

**Daniel E Goldberg, PHD, MD**
David M and Paula L Kipnis Distinguished Professor (primary appointment)
Professor of Molecular Microbiology
BA Harvard University 1978
PHD Washington Univ in St. Louis 1985
MD Washington Univ in St. Louis 1985

**Seth Goldberg, MD**
Associate Professor of Medicine (primary appointment)

BS University of South Florida 1999
MD University of South Florida 2003

**Benjamin M Goldstein, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1964
BA Washington Univ in St. Louis 1960

**Daniel Arthur Goldstein**
Adjunct Professor of Emergency Medicine in Medicine (primary appointment)

**Felicia Ismay Gomez, PHD**
Instructor in Medicine (primary appointment)
PHD George Washington University 2015

**Maria Cristina Gonzalez-Mayda, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Puerto Rico 2008
BS University of Puerto Rico 2004

**Daniel M Goodenberger, MD**
Professor of Medicine (primary appointment)
BS University of Nebraska 1970
MD Duke University 1974

**David Alan Goran, MD**
Assistant Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 1976
BA University of Michigan 1972

**Mary Jo Gorman, MBA, MD**
Instructor in Clinical Medicine (primary appointment)
MBA Washington Univ in St. Louis 1996
BA Saint Louis University 1981
MD Southern Illinois University 1984

**Ramaswamy Govindan, MD**
Professor of Medicine (primary appointment)
MD University of Madras 1986

**Siddhesh Gowda, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD School Not Listed 1970

**Gregory Alan Grant, PHD**
Professor of Biochemistry in Medicine (Dermatology) (primary appointment)
Professor of Developmental Biology
BS Iowa State University 1971
PHD Univ of Wisconsin Madison 1975

**Alfred Greco, MD**
Assistant Professor of Medicine (primary appointment)
BS University of MO St Louis 1971
MD University of MO Columbia 1975

**Aaron Greenspan**
Instructor in Clinical Medicine (primary appointment)

**Mark H Gregory, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Vermont 1986
BA University of Vermont 1982

**Anas Khalifa Gremida, MD**
Assistant Professor of Medicine (primary appointment)
MD Zawia University School of Med 2008

**Patrick Grierson, PHD, MD**
Instructor in Medicine (primary appointment)
BS University of Wisconsin-Madiso 2015
PHD Ohio State University 2012
MD Ohio State University 2014

**Malachi Griffith, PHD, BS1**
Associate Professor of Medicine (primary appointment)
Associate Professor of Genetics
PHD University of British Columbia 2010
BS1 University of Winnipeg 2002
BS University of Winnipeg 2002

**Obi Lee Griffith, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Genetics
PHD University of British Columbia 2008
BS University of Winnipeg 2002

**Scott D. Groesch, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BS University of Illinois 1990
MD Washington Univ in St. Louis 1994

**John R Groll, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Illinois 1988
BA Illinois Wesleyan University 1984

**Richard Warren Gross, AB, PHD, MD**
Professor of Medicine (primary appointment)
Professor of Chemistry
Professor of Developmental Biology
AB Columbia University 1972
PHD Washington Univ in St. Louis 1982
MD New York University 1976

**Brian Anthony Grus, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Pittsburgh 1988
MD University of Pennsylvania 1992

**Lucas Bohao Gu, DOST**
Instructor in Medicine (primary appointment)
DOST Des Moines Universtiy 2017
BS University of Wisconsin-Madiso 2011

**Guner B Gulmen, MD, PHD**
Assistant Professor of Clinical Medicine (primary appointment)
MD School Not Listed 1969
PHD University of Minnesota 1974

**Vyjanthanath R. Gunasingham, MD**

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MD School Not Listed 1982
BS School Not Listed 1975

**Mark Cobb Gunby, DOST**
Assistant Professor of Clinical Medicine (primary appointment)
BS University of Tulsa 1981
DOST Oklahoma St University 1988

**Maria Gurrieri, DIP, MD**
Instructor in Clinical Medicine (primary appointment)
DIP School Not Listed 1982
MD Catholic University 1989

**Alexandra Gutierrez, M PH, MD**
Professor of Medicine (primary appointment)
M PH Harvard University 2006
BS Brown University 1996
MD Case Western Reserve Univ 2000

**Chandra Prakash Gyawali, MBBS, MD**
Professor of Medicine (primary appointment)
MBBS University of Calicut 1985
MD University of Calicut 1990

## H

**Ramsey R Hachem, MD, BA1, MD1**
Professor of Medicine (primary appointment)
Tracey C Marshall - Dr. Elbert P Trulock Distinguished Professor of Medicine
MD University of Texas Southwest 1997
BA Southern Methodist University 1992
BA1 Southern Methodist University 1992
MD1 University of Texas Southwest 1997

**Matthew D Hageman, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1996

**Jennifer Christine Hagopian**
Adjunct Instructor in Medicine (primary appointment)

**Ashfaq H Hakim, MD, MBBS**
Instructor in Clinical Medicine (primary appointment)
MD RNT Medical College 1973
MBBS RNT Medical College 1968

**Ilia Gueorguev Halatchev, MD**
Assistant Professor of Medicine (primary appointment)
MD Oregon Health Science Univers 2007

**Yasir A Hamad, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Juba 2004

**Lana Hamieh, MD**
Instructor in Medicine (primary appointment)
BS American University of Beirut 2009
MD American University of Beirut 2020

**Stephanie M Hammer, MD**
Instructor in Clinical Medicine (primary appointment)
BA Smith College 1990
MD Chicago St University 1995

**Janice L Hanson, PHD**
Professor of Medicine (primary appointment)
PHD University of Michigan 1984

**Zahirul Haque**
Instructor in Clinical Medicine (primary appointment)

**Annie Chamren Harmon, MS, PHD**
Assistant Professor of Medicine (primary appointment)
MS Missouri College 2010
BA University of Evansville 2004
PHD University of Michigan 2016

**Lydia-Ann Lynell Harris, PHD**
Adjunct Assistant Professor of Medicine (primary appointment)
PHD State University of New York 2011

**Justin C Hartupee, MD, PHD**
Assistant Professor of Medicine (primary appointment)
MD Case Western Reserve Univ 2010
PHD Case Western Reserve Univ 2008

**Rim Hasan, MD**
Instructor in Medicine (primary appointment)
MD Damascus University, School of 2011

**Syed Hasan, MBBS**
Instructor in Medicine (primary appointment)
MBBS Sindh Medical College 2013

**Jeffrey A Haspel, MD, PHD**
Assistant Professor of Medicine (primary appointment)
BS Binghamton University 1994
MD New York U. School of Medicine 2003
PHD New York U. School of Medicine 2001

**Anisa Hassan, MD**
Instructor in Clinical Medicine (primary appointment)
MD Dow Medical College Karachi 1976

**Thomas F Hastings, MD**
Instructor in Clinical Medicine (primary appointment)
BA Rockhurst College 1981
MD University of Missouri 1986

**Krysta Lynn Heath, MD**
Instructor in Medicine (primary appointment)
MD University of AR Med Sciences 2011

**James N Heins, MD**
Professor of Clinical Medicine (primary appointment)
MD University of Louisville 1961
BA University of Louisville 1957

**Jason M Held, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Anesthesiology

PHD University of CA San Francisco 2006
BS Duke University 2001

**Katherine Therese Hemingway, MD**
Instructor in Medicine (primary appointment)
MD Florida Atlantic University 2017
BA Univ of Massachusetts Amherst 2007

**Jeffrey P. Henderson, MD, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Molecular Microbiology
MD Washington Univ in St. Louis 2002
PHD Washington Univ in St. Louis 2002
BS Univ of Wisconsin Madison 1994

**Katherine Eileen Henderson, MD**
Associate Professor of Clinical Medicine (primary appointment)
BS Univ of Wisconsin Madison 1993
MD University of Minnesota 1998

**Kristina Louise Henderson, MD**
Instructor in Clinical Medicine (primary appointment)
BA Saint Louis University 1982
MD Saint Louis University 1991

**Rochelle Rene' Henderson, PHD**
Adjunct Assistant Professor of Medicine (primary appointment)
PHD University of missouri 2010

**Michael Hendrix, MD**
Instructor in Medicine (primary appointment)
BS Northern Arizona University 2010
MD University of AR Med Sciences 2015

**Daniel Robert Herleth**
Instructor in Clinical Medicine (primary appointment)

**Catherine Hermann, MD, M ENG**
Instructor in Clinical Medicine (primary appointment)
BA Truman State University 1992
MD Washington Univ in St. Louis 2000
M ENG Univ of Southern Mississippi 1993

**Leonel F. Hernandez Aya, MD**
Assistant Professor of Medicine (primary appointment)
MD Universidad Nacional de Columb 2007

**Cynthia Joan Herrick, MD**
Associate Professor of Medicine (primary appointment)
BS Princeton University 2002
MD Washington Univ in St. Louis 2006

**Andreas Herrlich, MD, PHD**
Associate Professor of Medicine (primary appointment)
MD Freie University 1994
PHD Freie University 1998

**Virginia M Herrmann, MD**
Professor of Medicine (primary appointment)
Professor of Surgery (General Surgery)
MD Saint Louis University 1974

**Karin Hickey, MD**
Assistant Professor of Medicine (primary appointment)
MD Luliu Hatieganu U of Med 2007

**Stuart T. Higano, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Massachussetts 1984

**Paul Flack Hintze, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BS Brigham Young University 1974
MD University of Utah 1978

**Angela Christine Hirbe, PHD, MD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Pediatrics
BS Washington Univ in St. Louis 2001
PHD Washington Univ in St. Louis 2009
MD Washington Univ in St. Louis 2009

**Grant S. Hoekzema, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1992

**J. Langston Hoffman, MD**
Instructor in Clinical Medicine (primary appointment)
BS Univ of Wisconsin Madison 1994
MD Washington Univ in St. Louis 1999

**Sandra S Hoffmann, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of Kansas 1972
MD University of Kansas 1976

**Timothy Richard Holden, MA, MD**
Assistant Professor of Medicine (primary appointment)
MA University of Wisconsin 2013
BS Northwestern University 2006
MD University of Minnesota 2010

**Melissa Louise Hollie**
Instructor in Clinical Medicine (primary appointment)

**Michael J Holtzman, MD**
Selma and Herman Seldin Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology
BA Northwestern University 1971
MD Northwestern University 1975

**Neal Holzum**
Instructor in Clinical Medicine (primary appointment)

**Hitoshi Honda**
Adjunct Assistant Professor of Medicine (primary appointment)

**Bruce Jay Hookerman, MD**
Assistant Professor Emeritus of Clinical Medicine (Dermatology) (primary appointment)
BA Dartmouth College 1964
MD Saint Louis University 1968

**Barbra A Horn, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1982
BA Clark University 1975

**Ian Kerst Hornstra, MD, PHD**
Associate Professor of Medicine (Dermatology) (primary appointment)
MD University of MO Kansas City 1986
BA University of MO Kansas City 1985
PHD University of Florida 1993

**Timothy Adam Horwedel, PHD**
Adjunct Instructor in Medicine (primary appointment)
PHD Northeastern University 2008

**Jianghui Hou, PHD, MS**
Associate Professor of Medicine (primary appointment)
BS Nanjing University 1999
PHD Edinburgh University 2003
MS Edinburgh University 2000

**Dennis Emil Hourcade, MA, PHD**
Professor of Medicine (primary appointment)
BS Mass Inst of Technology (MIT) 1971
MA Harvard University 1974
PHD Harvard University 1978

**Jacqueline Howard, UNKNOWN**
Instructor in Clinical Medicine (primary appointment)
UNKNOWN School Not Listed 1995

**David Thomas Howell**
Instructor in Clinical Medicine (primary appointment)

**Thomas W Hoyt, MD**
Instructor in Medicine (primary appointment)
BA MO State U (formerly SW MO St) 2009
MD University of Iowa 2016

**Chyi-Song Hsieh, MD, PHD**
Professor of Medicine (primary appointment)
Alan A and Edith L Wolff Distinguished Professor
Professor of Pathology and Immunology
MD Washington Univ in St. Louis 1996
PHD Washington Univ in St. Louis 1996

**James J Hsieh, MD, PHD**
Professor of Medicine (primary appointment)
MD Taipei Medical University 1990
PHD John Hopkins University 1995

**Fong Fu Hsu, MS, PHD**
Professor of Medicine (primary appointment)
MS Tsinghua University, China 1975
PHD University of Utah 1986
BS School Not Listed 1970

**Kevin Hsueh, MD, BS1**
Assistant Professor of Medicine (primary appointment)
MD New York University 2008
BS Williams College 2003
BS1 Williams College 2003

**Raymond J Hu, MD**
Instructor in Clinical Medicine (primary appointment)
BA Saint Louis University 1977
MD University of Missouri 1982

**Wei-Wei Huang**
Instructor in Clinical Medicine (Dermatology) (primary appointment)

**Yafei Huang, MS, PHD**
Assistant Professor of Medicine (primary appointment)
MS Beijing Medical University 2000
PHD Univ of Texas Med Sch Houston 2007

**John W Hubert, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA Wabash College 1971
MD Washington Univ in St. Louis 1975

**Elizabeth Stack Huebner, MD**
Associate Professor of Medicine (primary appointment)
MD Loyola University Chicago 2000
BA Washington Univ in St. Louis 1995

**Jing Hughes, MD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Cell Biology and Physiology
BS Stanford University 2002
MD University of Pennsylvania 2009

**Michael Evan Hughes, PHD, MS**
Assistant Professor of Medicine (primary appointment)
PHD Harvard University 2007
BS Stanford University 2002
MS Stanford University 2002

**Benjamin Duane Humphreys, PHD, AB, MD**
Joseph Friedman Professor of Renal Diseases in Medicine (primary appointment)
Professor of Developmental Biology
PHD Case Western Reserve Univ 2000
AB Harvard University 1991
MD Case Western Reserve Univ 1998

**Eva A Hurst, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 2002

**Mark Albert Hurt, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
MD University of Missouri 1982
BS Southeast Missouri St Univers 1978

**Mustafa H Husaini, MD**

Assistant Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
BA Grand Valley St University 2010
MD Michigan State University 2014

**Elaine Joyce Hutchison, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Arizona 2016
BS Cornell College 2011

## I

**Richard G. Ihnat, MD**
Instructor in Clinical Medicine (primary appointment)
BS Rutgers University 1987
MD Yale University 1991

**Belinda K. Ireland, MD**
Adjunct Assistant Professor of Medicine (primary appointment)
MD University of MO Columbia 1976

**Eva Susanne Istvan, PHD**
Associate Professor of Medicine (primary appointment)
HHMI Specialist II
BS University of Houston 1993
PHD University of Texas Southwest 2000

## J

**Carolyn M Jachna, MD**
Assistant Professor of Medicine (primary appointment)
MD Northwestern University Med 1998
BS Washington Univ in St. Louis 1993

**Daryl Jacobs, ME, MD**
Instructor in Clinical Medicine (primary appointment)
ME Carnegie Mellon University 1979
BS Washington Univ in St. Louis 1977
MD Washington Univ in St. Louis 1983

**Myron H Jacobs, MD**
Instructor in Clinical Medicine (primary appointment)
BA Vanderbilt University 1965
MD Louisiana St Univ Hlth Sci 1969

**Steven Jacobson, MD**
Instructor in Clinical Medicine (primary appointment)
BS Rhodes College 1981
MD Saint Louis University 1985

**Meagan A. Jacoby, PHD, MD**
Associate Professor of Medicine (primary appointment)
PHD Washington Univ in St. Louis 2005
MD Washington Univ in St. Louis 2005
BS Johns Hopkins University 1996

**Maria Miriam Jacome Sosa, PHD**
Instructor in Medicine (primary appointment)
PHD University of Alberta 2013

**Jordan M Jacquez, MD**
Instructor in Medicine (primary appointment)
BA Duke University 2013
MD Washington Univ in St. Louis 2017

**Nhila Jagadeesan, MD**
Instructor in Medicine (primary appointment)
BA Indiana University Purdue 2011
BS Indiana University Purdue 2011
MD Washington Univ in St. Louis 2015

**Poonam Jain, JD, MD**
Assistant Professor of Medicine (primary appointment)
JD Saint Louis University 2004
BS University of Iowa 1984
MD University of Iowa 1988

**Sanjay Jain, MD, PHD**
Professor of Medicine (primary appointment)
Professor of Pathology and Immunology
MD Northwestern University 1999
PHD Northwestern University 1998
BA University of California 1990

**Sudhir Kumar Jain, MBBS**
Associate Professor of Medicine (primary appointment)
MBBS Maulana Azad Medical College 1986

**George Jarad, MD**
Associate Professor of Medicine (primary appointment)
MD Damascus U. Medical School 1993

**Sina Jasim, M PH, MBCHB**
Assistant Professor of Medicine (primary appointment)
M PH Saint Louis University 2008
MBCHB University of Baghdad 2001

**Daniel Ragin Jasper, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1994
BA University of Texas Austin 1990

**Anuja Java, MD**
Assistant Professor of Medicine (primary appointment)
MD Government Medical College 2002

**Ali Javaheri, MD, PHD**
Assistant Professor of Medicine (primary appointment)
BA University of Chicago 2000
MD University of Chicago 2008
BS University of Chicago 2000
PHD University of Chicago 2006

**Donna Beth Jeffe, MA, PHD**
Professor of Medicine (primary appointment)
BA Washington Univ in St. Louis 1972
MA Washington Univ in St. Louis 1990
PHD Washington Univ in St. Louis 1993

**Christopher M. Jenkins, PHD**
Assistant Professor of Medicine (primary appointment)

PHD Vanderbilt University 1997
BS Michigan State University 1991

**Benjamin C. Jennings, PHD**
Instructor in Medicine (primary appointment)
PHD Washington Univ in St. Louis 2018
BS Univ of Wisconsin Madison 2004

**Maya Jerath, MS, MD, PHD**
Professor of Medicine (primary appointment)
MS University of Texas Austin 1990
MD University of Vermont 2000
PHD University of Texas Austin 1992

**Joyce Ji, MD**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2016

**Xuntian Jiang, PHD**
Assistant Professor of Medicine (primary appointment)
PHD China Pharmaceutical Univ 1992

**Morris Joftus, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Illinois 1967

**Tanner Michael Johanns, MD, PHD**
Assistant Professor of Medicine (primary appointment)
MD University of Minnesota 2012
BS University of Saint Thomas 2002
PHD University of Minnesota 2010

**Eric Keith Johnson, MD**
Assistant Professor of Medicine (primary appointment)
MD Univ of Wisconsin Madison 1999

**William F Johnson**
Adjunct Instructor in Medicine (primary appointment)

**Heather Jones, MD**
Assistant Professor of Medicine (Dermatology) (primary appointment)
BS Michigan State University 2007
MD University of Texas Galveston 2011

**Allison Jordan, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Texas Southwest 2008

**Amy M Joseph, MD**
Professor of Medicine (primary appointment)
BA Johnston Community College 1977
MD Vanderbilt University 1986

**Barbara Jost, MD, MS**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1997
BS University of Missouri 1993
MS Northwestern University 1995

**Karen Ellen Joynt Maddox, MD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Social Work
BA Princeton University 2000
MD Duke University 2004

## K

**Brad S Kahl, MD**
Professor of Medicine (primary appointment)
BS University of Wisconsin-Madiso 1989
MD Tufts University 1994

**Caroline Holleck Kahle, MD**
Assistant Professor of Medicine (primary appointment)
MD University of North Carolina 2006

**Lalit Chandra Kalvala, MBBS**
Instructor in Medicine (primary appointment)
MBBS Kakatiya Medical College 2016

**Sona Sharad Kamat**
Instructor in Clinical Medicine (primary appointment)

**Vinay Gopal Kamat, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Pennsylvania 1994

**Patricia F Kao, MD, BE, MS2**
Associate Professor of Medicine (primary appointment)
MD Case Western Reserve Univ 2001
BE Princeton University 1994
MS2 Ohio State University 1997

**Divya Kapoor, MD**
Associate Professor of Medicine (primary appointment)
MD University of Washington 2002

**Robert S Karsh, MD**
Professor of Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1951
MD Washington Univ in St. Louis 1952

**Casey Duncan Saul Katerndahl, PHD**
Instructor in Medicine (primary appointment)
PHD University of Minnesota 2015
BS University of Minnesota 2008

**Andrew M. Kates, MD**
Professor of Medicine (primary appointment)
MD Tufts University 1994
BS Tufts University 1990

**David A Katzman, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1991
BA Brown University 1986

**Andrew L. Kau, PHD, MD**
Assistant Professor of Medicine (primary appointment)
PHD Washington St University 2006
MD Washington Univ in St. Louis 2006
BS Emory University 1998

**Charles Kaufman, MD, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Developmental Biology
BA Washington Univ in St. Louis 1997
MD University of Chicago 2005
PHD University of Chicago 2003

**Robert L Kaufman, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1963
BA Washington Univ in St. Louis 1959

**Elizabeth Jane Keath, PHD**
Associate Professor of Medicine (primary appointment)
PHD Saint Louis University 1985
BA University of MO St Louis 1978
BA University of MO St Louis 1978

**Dalius Kedainis, MD**
Instructor in Clinical Medicine (primary appointment)
MD Kaunas University of Medicine 1998

**Eirini Kefalogianni, PHD**
Instructor in Medicine (primary appointment)
BS University of Athens 2002
PHD University of Athens 2007

**Jesse Wade Keller, MD**
Assistant Professor of Medicine (primary appointment)
BS University of Tulsa 2005
MD Johns Hopkns University Medic 2009

**Daniel P Kelly, MD**
Adjunct Professor of Medicine (primary appointment)
MD University of Illinois 1982
BS University of Illinois 1978

**Peggy Lynn Kendall, MD**
Virginia Minnich Distinguished Professor of Medicine (primary appointment)
Professor of Pathology and Immunology
MD University of Texas Dallas 2019

**Charlotte J Kennedy, PHD, MD**
Assistant Professor of Clinical Medicine (primary appointment)
PHD Washington Univ in St. Louis 1992
MD Washington Univ in St. Louis 1992
BA Agnes Scott College 1984

**Martin Hurley Kerrigan, MD**
Assistant Professor of Medicine (primary appointment)
MD Jefferson Medical College 2005
BS Saint Josephs University 2001

**Ahmed Sultan Khan**
Adjunct Instructor in Medicine (primary appointment)

**Aava Khatiwada, MD**
Instructor in Medicine (primary appointment)
MD Indiana State University 2017
BA Indiana State University 2013

**Charbel Chafic Khoury, MD**
Assistant Professor of Medicine (primary appointment)
BS American University of Beirut 2004
MD American University of Beirut 2008

**Daniel Jason Kichura, MD**
Instructor in Medicine (primary appointment)
BA Indiana University 2008
MD Israel Institute of Technology 2012

**George Kichura, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1993

**Mary Kiehl, MD, AS**
Assistant Professor of Clinical Medicine (primary appointment)
BA University of California 1985
MD University of California 1990
AS Long Beach City College 1976

**Kenneth Richard Kilian, MD**
Instructor in Clinical Medicine (primary appointment)
BS Saint Louis University 1980
MD Saint Louis University 1984

**Charles John Kilo, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of Kansas 1987
MD Washington Univ in St. Louis 1991

**Alfred Kim, MD, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Pathology and Immunology
MD Drexel University 2005
PHD Drexel University 2005
BA University of Pennsylvania 1996

**Brian Kim, MD**
Associate Professor of Medicine (Dermatology) (primary appointment)
Associate Professor of Anesthesiology
Associate Professor of Pathology and Immunology
BS Haverford College 2001
MD University of Washington 2007

**Miriam Yunhee Kim, MD**
Assistant Professor of Medicine (primary appointment)
BS Yonsei University 2004
MD Seoul National University 2008

**Helen Young Kim-James, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
MD Washington Univ in St. Louis 2001
BA Southern Methodist University 1997

**Rosa Anne Kincaid, MD**
Instructor in Clinical Medicine (primary appointment)

MD Temple University 1984
BA City College 1970

**Donald Kevin King, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Johns Hopkns University Medic 1970
BA Fairfield University 1966

**Kevin Patrick King, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 2006

**Tinna P King**
Instructor in Clinical Medicine (primary appointment)
BA University of Missouri 1988

**Erik Paul Kirk, MS, PHD**
Adjunct Assistant Professor of Medicine (primary appointment)
BS Drury College 1999
MS University of Kansas 2001
PHD University of Kansas 2004

**Nigar Kirmani, MD**
Professor of Medicine (primary appointment)
MD King Edward Medical College 1973

**Sameer M. Kirtane, MD**
Instructor in Clinical Medicine (primary appointment)
MD Jefferson Medical College 2008

**Michael K Klebert, BN, MSN, PHD**
Instructor in Medicine (primary appointment)
BA Southern Illinois University 1979
BN Southern Illinois University 1981
MSN University of Texas Austin 1987
PHD University of MO St Louis 2008

**Robert E Kleiger, MD**
Professor of Medicine (primary appointment)
MD Harvard University 1960
BA Yale University 1956

**Samuel Klein, MD, MS**
Danforth Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology
MD Temple University 1979
BA Brandeis University 1974
MS Mass Inst of Technology (MIT) 1984

**Linda Marie Klutho, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Missouri 1984
BA Washington Univ in St. Louis 1980

**Paula J Knapp-Baker**
Instructor in Clinical Medicine (primary appointment)

**Eric Knoche, MD**
Assistant Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 2006
BS Davidson College 2001

**Carolyn Koenig, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 2002

**Jeffrey Robert Koenitzer, MD**
Instructor in Medicine (primary appointment)
MD University of Pittsburgh 2014

**Adam C Koertner**
Instructor in Clinical Emergency Medicine in Medicine (primary appointment)

**Ismail Kola, PHD, UNKNOWN**
Adjunct Professor of Medicine (primary appointment)
PHD School Not Listed 1985
UNKNOWN Rhodes College 1982
BS Rhodes College 1982

**Marin H Kollef, MD**
Professor of Medicine (primary appointment)
MD University of Rochester 1983
BS US Military Academy 1979

**Hermann M Koller, MD**
Instructor in Medicine (primary appointment)
BS Stanford University 1974
MD Washington Univ in St. Louis 1978

**Sri Devi Kolli, MBBS**
Instructor in Clinical Medicine (primary appointment)
MBBS Guntur Medical College 1989

**Mary E. Koly, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of MO Kansas City 1995
BA University of MO Kansas City 1995

**Ajitha Kommalapati, MD**
Instructor in Medicine (primary appointment)
BS University of Texas Austin 2012
MD Baylor College of Medicine 2016

**Kevin L Konzen, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Illinois 1984
BA University of Notre Dame 1980

**Robert G Kopitsky, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BS Emory University 1978
MD Duke University 1982

**Kevin Marc Korenblat, MD**
Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 1996

**Phillip E Korenblat, MD**
Professor of Clinical Medicine (primary appointment)
MD University of Arkansas 1960
BA University of Arkansas 1957

**Stuart A Kornfeld, MD**

David C and Betty Farrell Professor of Medicine (primary appointment)
Professor of Biochemistry and Molecular Biophysics
BA Dartmouth College 1958
MD Washington Univ in St. Louis 1962

**Alex H Kosloff, MD**
Instructor in Clinical Medicine (primary appointment)
BS Washington Univ in St. Louis 1975
MD Saint Louis University 1980

**Attila Kovacs, MD**
Professor of Medicine (primary appointment)
BS School Not Listed 1981
MD Semmelweis University of Med 1985

**Sandor J Kovacs, MS, PHD, MD**
Professor of Medicine (primary appointment)
Adjunct Professor of Physics
Professor of Biomedical Engineering
Professor of Cell Biology and Physiology
MS California Institute Technolo 1972
PHD California Institute Technolo 1977
BS Cornell University 1969
MD University of Miami 1979

**Mark S Krasnoff, MD**
Instructor in Clinical Medicine (primary appointment)
BA Amherst College 1987
MD Johns Hopkns University Medic 1991

**James Gerard Krings, MD**
Assistant Professor of Medicine (primary appointment)
BS University of Notre Dame 2011
MD Stanford University 2014
BA University of Notre Dame 2009

**Ronald J Krone, MD**
Professor of Medicine (primary appointment)
John E Simon Scholar in Medicine
BS University of Michigan 1962
MD University of Chicago 1966

**Elaine Susan Krul, PHD**
Adjunct Associate Professor of Medicine (primary appointment)
BS McGill University 1977
PHD McGill University 1982

**Thomas Kuciejczyk-Kernan, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1986
BS University of Illinois 1982

**Ralph F Kuhlman, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Illinois 1964

**Frederick Matthew Kuhlmann, MD**
Assistant Professor of Medicine (primary appointment)
MD Emory University 2002
BS Emory University 1998

**Anthony Kulczycki Jr, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Molecular Microbiology
MD Harvard University 1970
BA Princeton University 1966

**Devesha Hrishikesh Kulkarni, PHD**
Instructor in Medicine (primary appointment)
PHD Technische U Braunschweig 2013
BS University of Pune 2006

**Hrishikesh Satish Kulkarni, MBBS**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Molecular Microbiology
MBBS Seth G.S. Medical College 2009

**Robin A. Kundra, MD, PHD, BS1**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 2000
PHD Washington Univ in St. Louis 2000
BS University of Georgia 1992
BS1 University of Georgia 1992

**David I. Kuperman, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Arkansas 2001
BA Hendrix College 1997

**Vasanthan Kuppuswamy, MD**
Instructor in Medicine (primary appointment)
MD Medical University of Sth Car 2017
BA Vanderbilt University 2012

**Howard I. Kurz, MD, BS1, MEE**
Professor of Medicine (primary appointment)
MD New York Medical College 1984
BS Mass Inst of Technology (MIT) 1979
BS1 Mass Inst of Technology (MIT) 1979
MEE Princeton University 1980

**Vladimir Kushnir, MD**
Associate Professor of Medicine (primary appointment)
MD Ohio State University 2006
BS University of Utah 2002

**Jennie H Kwon, DOST**
Assistant Professor of Medicine (primary appointment)
DOST Chicago Coll of OsteopathicMed 2009
BA Univ of IL -Urbana-Champaign 2005
BS Univ of IL -Urbana-Champaign 2005

**George B Kyei, MS, MD, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Molecular Microbiology
MS University of Ghana Medical Sc 2003
MD University of Ghana Medical Sc 1998
PHD University of New Mexico 2007

## L

**Paul B L'Ecuyer, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of MO Columbia 1989

**Albert Max Lai, M PHIL, MS, MA, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Computer Science and Engineering
M PHIL Columbia University 2005
BS Columbia University 2000
MS Columbia University 2001
MA Columbia University 2004
PHD Columbia University 2007

**Brian Joseph Laidlaw, MS, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor Of Pathology and Immunology
MS University of Pennsylvania 2020
PHD Yale University 2020
BA University of Pennsylvania 2020

**Randy Olivier Laine, MD, PHD, MA, MDI**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2017
BA University of Paris 2004
PHD University of Orléans 2013
MA University of Paris 2008
MDI Aquinas Institute of Theology 2006

**Roop Lal, MS**
Instructor in Clinical Medicine (primary appointment)
MS Osmania Medical College 1971

**Michael A. Lane, MD, MS**
Associate Professor of Medicine (primary appointment)
BA Colgate University 1995
MD Drexel University 2004
MS John Hopkins University 2000

**Gabriel David Lang, MD**
Assistant Professor of Medicine (primary appointment)
BA Northwestern University 2004
MD University of Illinois Chicago 2009

**Gregory Mark Lanza, PHD, MD, MS**
Professor of Medicine (primary appointment)
James R Hornsby Family Professor in Biomedical Sciences
Professor of Biomedical Engineering
PHD University of Georgia 1981
MD Northwestern University 1992
BA Colby College 1975
MS University of Georgia 1978

**Gina N LaRossa, MD**
Assistant Professor of Medicine (primary appointment)
BS Yale University 2001
MD Yale University 2007

**John M Lasala, MD, PHD**
Professor of Medicine (primary appointment)
Professor of Surgery (Cardiothoracic Surgery)
MD University of Connecticut 1983
PHD Saint Louis University 1979
BA Drew University 1975

**Kory J. Lavine, PHD, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Developmental Biology
Associate Professor of Pathology and Immunology
PHD Washington Univ in St. Louis 2008
MD Washington Univ in St. Louis 2008
BS University of Rochester 2001

**Steven Jay Lavine, MD**
Professor of Medicine (primary appointment)
MD Temple University 1976
BA Temple University 1972

**Steven J Lawrence, MD, MS**
Professor of Medicine (primary appointment)
BS Rose Hulman Institute 1992
MD Washington Univ in St. Louis 1997
MS University of London 2004

**Eileen May Lee, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Iowa 2006
BA University of Iowa 2002

**Kim Lynette Lee, MD**
Instructor in Clinical Medicine (primary appointment)
BS Washington Univ in St. Louis 1979
MD Saint Louis University 1983

**Wang Sik Lee, PHD, MA**
Assistant Professor of Medicine (primary appointment)
PHD Korea University Medical Coll 1990
MA Korea University Medical Coll 1982
BA Korea University Medical Coll 1978

**Robert B Lehman, MD**
Instructor in Clinical Medicine (primary appointment)
MD Texas Tech University 1982
BA Texas Tech University 1977

**Daniel John Lenihan, BA1, MD**
Professor of Medicine (primary appointment)
BA1 University of Tennessee 1984
BA University of Tennessee 1984
MD University of Tenn Memphis 1988

**Deborah J. Lenschow, MD, PHD**
Professor of Medicine (primary appointment)
Professor of Molecular Microbiology
Professor of Pathology and Immunology
BA Wittenberg University 1990
MD University of Chicago 1998
PHD University of Chicago 1995

**Daisy W Leung, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
Associate Professor of Pathology and Immunology
BS Amherst College 1997
PHD University of Texas Southwest 2005

**Marc Stephen Levin, MD**
Professor of Medicine (primary appointment)
BS Mass Inst of Technology (MIT) 1977
MD Columbia University 1981

**Timothy J Ley, MD**
Lewis T and Rosalind B Apple Professor of Medicine (primary appointment)
Professor of Genetics
BA Drake University 1974
MD Washington Univ in St. Louis 1978

**Ellen Li, PHD, MD**
Adjunct Professor of Medicine (primary appointment)
PHD Washington Univ in St. Louis 1980
BS Stanford University 1974
MD Washington Univ in St. Louis 1980

**Han Li, MD**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2016
BS University of Michigan 2011

**Kevin Kai Li, MD**
Instructor in Medicine (primary appointment)
BS Mass Inst of Technology (MIT) 2013
MD Washington Univ in St. Louis 2017

**Li Li, PHD, MD**
Instructor in Clinical Medicine (primary appointment)
PHD Loyola University Chicago 1998
MD Shanghai Medical University 1988

**Shunqiang Li, PHD**
Assistant Professor of Medicine (primary appointment)
PHD Chinese Academy of Med Science 1999

**Tingting Li, MD**
Associate Professor of Medicine (primary appointment)
MD State Univ of NY Buffalo 1999

**Min Lian, PHD, MD, M PH**
Assistant Professor of Medicine (primary appointment)
PHD Texas Tech University 2006
MD Southeast U Medical School 1995
M PH Fudan University 1999

**Stephen Yuan-Tung Liang, MD, BA1**
Associate Professor of Medicine (primary appointment)
BA Cornell University 1998
MD University of Maryland 2004
BA1 Cornell University 1998

**Charles H Lieu, MD**
Instructor in Clinical Medicine (primary appointment)
MD State Univ of NY Buffalo 1993

**Stephen Bradley Lillard, MD**
Instructor in Clinical Medicine (primary appointment)
MD Univ of Health Sciences KC 1970

**Kian-Huat Lim, MD, PHD**
Associate Professor of Medicine (primary appointment)
MD National Taiwan University 1999
PHD Duke University 2006

**Elizabeth Laura Lin, MD**
Instructor in Medicine (primary appointment)
BS University of CA Davis 2007
MD University of CA Irvine 2011

**Michael Yun Lin, MD**
Associate Professor of Medicine (primary appointment)
BA Harvard University 1990
MD University of Iowa 1994

**Kathryn Jesseca Lindley, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Obstetrics and Gynecology
MD Emory University 2007
BS University of Illinois 2003

**Brian Richard Lindman, MA, MD**
Adjunct Associate Professor of Medicine (primary appointment)
MA Reformed Theological Seminary 2001
BS Duke University 1997
MD Vanderbilt University 2003

**Daniel C Link, MD**
Alan A and Edith L Wolff Distinguished Professor of Medicine (primary appointment)
Professor of Pathology and Immunology
BS Univ of Wisconsin Milwaukee 1981
MD Univ of Wisconsin Milwaukee 1985

**Michael Brayer Lippmann, MD**
Professor of Medicine (primary appointment)
MD State University of New York 1977
BA State University of New York 1973

**Mauricio Lisker-Melman, MD**
Professor of Medicine (primary appointment)
MD National Autonomous U of Mex 1980

**Mary Kathryn Liszewski**
Assistant Professor of Medicine (primary appointment)
BA University of MO St Louis 1971

**Patricia Elizabeth Litkowski, MD**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2013

**Adam Daniel Littich, MD**
Assistant Professor of Medicine (primary appointment)

MD Saint Louis University 2009

**Marina Litvin, MD**
Associate Professor of Medicine (primary appointment)
MD University of MO Columbia 2008
BA Washington Univ in St. Louis 2003

**Jason Liu, MD**
Instructor in Medicine (primary appointment)
BA University of Utah 2013
MD Medical College of Wisconsin 2017

**Jianmei Liu, MD, MS**
Instructor in Clinical Medicine (primary appointment)
MD Shanghai Medical University 1984
MS Shanghai Medical University 1987

**Xinping Liu, MS, PHD**
Instructor in Medicine (primary appointment)
MS Southeast Missouri St Univers 1999
BS School Not Listed 1986
PHD Washington Univ in St. Louis 2005

**Irfan J Lodhi, MS, PHD**
Associate Professor of Medicine (primary appointment)
MS Wayne State University 1996
BS University of Michigan 1993
PHD University of Michigan 2007

**Beverly A Logan-Morrison, MD**
Instructor in Clinical Medicine (primary appointment)
BA Webster University 1976
MD Washington Univ in St. Louis 1982

**Andrea Loiselle, M PH, MD**
Assistant Professor of Medicine (primary appointment)
M PH California State University 1999
BS University of California 1995
MD Drexel University 2005

**Gregory D Longmore, MD, MS**
Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology
MD McGill University 1983
BS University of Western Ontario 1977
MS University of Toronto 1979

**Dwight C Look, MD**
Professor of Medicine (primary appointment)
MD University of MO Kansas City 1985
BA University of MO Kansas City 1985

**Julia Lopez, MPH, MSW, PHD**
Instructor in Medicine (primary appointment)
MPH Saint Louis University 2013
MSW Saint Louis University 2010
BA Saint Louis University 2009
BS Saint Louis University 2009
PHD Saint Louis University 2017

**Herbert Lubowitz, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1958
BA Clark University 1954

**Philip A Ludbrook, MBBS**
Professor Emeritus of Medicine (primary appointment)
Professor Emeritus of Psychiatry
BS School Not Listed 1957
MBBS University of Adelaide 1963

**Kenneth M Ludmerer, MD, MA**
Professor of Medicine (primary appointment)
Mabel Dorn-Reeder Distinguished Professor of the History of Medicine
BA Harvard University 1968
MD Johns Hopkins University 1973
MA Johns Hopkins University 1971

**Lauren Michelle Ludwig Lee, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of MO Kansas City 2008

**Susan L Luedke, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Rochester 1972

**Barbara A Lutey, MLS, MD**
Assistant Professor of Medicine (primary appointment)
BA Indiana University Bloomington 1982
MLS Indiana University Bloomington 1983
MD University of Iowa 1999

**Christopher Raymond Lynch**
Instructor in Clinical Medicine (primary appointment)

**John P Lynch, MD**
Professor of Medicine (primary appointment)
BA Saint Louis University 1983
MD Georgetown University 1989

**Maureen Danielle Lyons, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Chicago 2012

**Patrick G. Lyons Jr, MD**
Instructor in Medicine (primary appointment)
MD University of Chicago 2012
BA University of Notre Dame 2008

**Alan P Lyss, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1972
MD Washington Univ in St. Louis 1976

## M

**Cynthia Xiuguang Ma, PHD, MD**
Professor of Medicine (primary appointment)
PHD University of Cincinnati 1997

MD Beijing Medical University 1990

**Hongming Ma, MS, PHD**
Instructor in Medicine (primary appointment)
MS Fudan University 1996
BA Qufu Normal University 1993
PHD Ocean University of China, Qin 2004

**Liang Ma, PHD**
Associate Professor of Medicine (Dermatology) (primary appointment)
Associate Professor of Developmental Biology
BA University of CA Berkeley 1989
PHD University of CA Los Angeles 1995

**Ningning Ma, MD**
Instructor in Medicine (primary appointment)
BA Washington Univ in St. Louis 2009
MD Case Western Reserve Univ 2013

**Kelly Mackenzie Macarthur, MD**
Assistant Professor of Medicine (Dermatology) (primary appointment)
MD University of missouri 2013
BA Washington Univ in St. Louis 2007

**Julie Kathleen MacPhee, MD**
Instructor in Clinical Medicine (primary appointment)
MD Albert Einstein College of Med 2008
BS Trinity College 2003

**Thomas M Maddox, MD, MS**
Professor of Medicine (primary appointment)
MD Emory University 1999
MS Harvard University 2007
BA Rice University 1993

**William Edwin Magee, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Duke University 1950

**Leonard B Maggi Jr, MSCI, BA1, PHD**
Assistant Professor of Medicine (primary appointment)
BA Cornell College 1995
MSCI Washington Univ in St. Louis 2016
BA1 Cornell College 1995
PHD Saint Louis University 2001

**Jambunathan Mahadevan**
Instructor in Clinical Medicine (primary appointment)

**Christopher A Maher, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Biomedical Engineering
PHD Stony Brook School of Medicine 2006

**Nicole Maher, PHD**
Assistant Professor of Medicine (primary appointment)
BA Ithaca College 1998
PHD Case Western Reserve Univ 2007

**Mohamed Mahjoub, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Cell Biology and Physiology
BS Simon Fraser University 2002
PHD Simon Fraser University 2007

**Robert John Mahoney, MD**
Associate Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 1997
BA Princeton University 1993

**Elaine Michelle Majerus, PHD, MD**
Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology
PHD Washington Univ in St. Louis 1994
BA Washington Univ in St. Louis 1986
MD Saint Louis University 1998
BS Washington Univ in St. Louis 1986

**Majesh Makan, MD**
Professor of Medicine (primary appointment)
MD Univ of Panama School of Med 1984

**Mohsin Ilyas Malik, MBBS**
Instructor in Clinical Medicine (primary appointment)
MBBS Army Medical College 1999

**Andrew F. Malone, MBCHB1**
Assistant Professor of Medicine (primary appointment)
MBCHB1 Royal College of Surgeons 2005
BA Trinity College Dublin 2000

**Kartik Mani, MBBS**
Assistant Professor of Medicine (primary appointment)
MBBS Delhi University 1998

**Shivaprasad Gowda Manjappa, MD, MBBS**
Instructor in Clinical Medicine (primary appointment)
MD University of Illinois 2011
MBBS Medical College of India 2004

**Caroline Mann, MD, MS**
Associate Professor of Medicine (Dermatology) (primary appointment)
MD Indiana University Bloomington 1993
MS Sarah Lawrence College 1988
BS Indiana University Bloomington 1986

**Douglas L. Mann, MD**
Tobias and Hortense Lewin Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology
BA Lafayette College 1973
MD Temple University 1979

**Sarah K Margolis, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD State University of New York 1989
BA Barnard College 1984

**Jonas Marschall, MD**
Adjunct Assistant Professor of Medicine (primary appointment)
MD University of Basel 1996

**Jay Phillips Marshall II, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA De Paul University 1968
MD University of Missouri 1972

**Ann G Martin, MD**
Associate Professor of Medicine (Dermatology) (primary appointment)
MD Case Western Reserve Univ 1981
BS University of Notre Dame 1977

**Nathan Russell Martin, MD**
Assistant Professor of Medicine (primary appointment)
BA University of Pennsylvania 2001
MD University of Texas Southwest 2005

**Thomas F Martin, MD**
Associate Professor of Clinical Medicine (primary appointment)
BS Saint Louis University 1961
MD Saint Louis University 1965

**Wade H Martin III, MD**
Professor of Medicine (primary appointment)
MD University of Kansas 1977
BA University of Kansas 1973

**Jerald Arthur Maslanko, MD**
Instructor in Clinical Medicine (primary appointment)
MD Emory University 1975

**Mary Vest Mason, MD, MBA**
Instructor in Clinical Medicine (primary appointment)
BS University of Illinois 1990
MD Washington Univ in St. Louis 1994
MBA Washington Univ in St. Louis 1999

**Joan Alice Mass, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Temple University 1977
BA Washington Univ in St. Louis 1971

**Stanley Mathew, MBBS**
Instructor in Clinical Medicine (primary appointment)
MBBS Kerala University 1991

**Caline Mattar, MD**
Assistant Professor of Medicine (primary appointment)
MD American University of Beirut 2010
BS American University of Beirut 2006

**Henry E Mattis, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Illinois 1971
MD Washington Univ in St. Louis 1975

**Adam M May, MD**
Assistant Professor of Medicine (primary appointment)
MD Loyola University Chicago 2012

**Kara H Mayes**
Instructor in Clinical Medicine (primary appointment)

**Gabriel Mbalaviele, MA, PHD**
Professor of Medicine (primary appointment)
MA School Not Listed 1987
PHD University of Paris 1992

**Timothy Joseph McCann, MD**
Instructor in Clinical Medicine (primary appointment)
BS Saint Louis University 1980
MD American Univ of the Caribbean 1984

**Donte D McClary, MD**
Instructor in Clinical Medicine (primary appointment)
MD Meharry Med College 1998
BS Xavier University 1993

**Kyle Stephan McCommis, PHD**
Adjunct Professor of Medicine (primary appointment)
PHD University of MO Columbia 2013
BS University of Kansas 2006

**William H. McCoy IV, PHD, BS1, MD**
Instructor in Medicine (primary appointment)
PHD Washington Univ in St. Louis 2013
BS1 University of Pittsburgh 2002
BS University of Pittsburgh 2002
MD Washington Univ in St. Louis 2013

**Leslie Rose McCrary-Etuk, MD**
Instructor in Clinical Medicine (primary appointment)
MD New York Medical College 2001

**Jay R. McDonald, MD**
Associate Professor of Medicine (primary appointment)
BS Portland St University 1994
BA Duke University 1991
MD Oregon Health Science Univers 1998

**Rachel Kathryn McDonald, MD**
Assistant Professor of Medicine (primary appointment)
BS University of Arkansas 2008
MD University of Arkansas 2012

**Peter Joseph McDonnell, MD**
Instructor in Medicine (primary appointment)
BS Seattle University 2012
MD University of Michigan 2016

**Cheryl Riddle McDonough, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Tennessee 2001
BS Vanderbilt University 1997

**Colleen McEvoy, MD**
Assistant Professor of Medicine (primary appointment)
BS Fairfield University 2004
MD University of MO Columbia 2008

**Janet B McGill, MD, MA**
Professor of Medicine (primary appointment)
BS University of Michigan 1972
MD Michigan State University 1979
MA Northern Michigan University 1980

**Mary Clare McGregor, MD**
Assistant Professor of Medicine (primary appointment)
MD Indiana State University 2013
BS University of Notre Dame 2009

**Scott Andrew McHenry, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Toledo 2013

**Tristan Joy McIntosh, MS, PHD**
Instructor in Medicine (primary appointment)
MS University of Oklahoma 2015
PHD University of Oklahoma 2018
BS University of Utah 2013

**Alexis Markey McKee, MD**
Assistant Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
MD Trinity College Dublin 2011

**Oliver McKee, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
BA McGill University 1975
MD School Not Listed 1981

**Clark R McKenzie, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Missouri 1989
BA University of Missouri 1989

**Robert M McMahon, JD, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of California 1971
JD University of California 1974
MD Washington Univ in St. Louis 1989

**Amy McQueen, PHD, MA**
Associate Professor of Medicine (primary appointment)
BA University of CA San Diego 1996
PHD University of Houston 2002
MA University of Houston 1999

**Shail B Mehta, MD**
Assistant Professor of Medicine (primary appointment)
BS Carnegie Mellon University 2003
MD University of Pittsburgh 2008

**Neha Mehta-Shah, MD**
Assistant Professor of Medicine (primary appointment)
MD Northwestern University Med 2009
BA Northwestern University 2005

**Carlos R Mejia Chew, MD**
Instructor in Medicine (primary appointment)
MD Universidad de San Carlos 2008

**Anibal G Melo, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1991

**Gary Jay Meltz, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Miami 1977
BA University of Missouri 1972

**Robert S Mendelsohn, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1954
BA Washington & Lee 1950

**James Patrick Mendoza, MD, MS**
Instructor in Medicine (primary appointment)
MD Commonwealth College 2016
MS Boston University 2012
BS University of Virginia 2009

**Ronald L Mera, MD**
Instructor in Clinical Medicine (primary appointment)
BS School Not Listed 1970
MD School Not Listed 1976

**Massini Alexander Merzkani, MD**
Assistant Professor of Medicine (primary appointment)
MD Univ. Nacional Auto deHonduras 2011

**Manasa M Metireddy, MD**
Assistant Professor of Medicine (primary appointment)
MD Sri Venkateswara University 2006

**Rabya Mian, MBBS**
Instructor in Clinical Medicine (primary appointment)
MBBS King Edward Medical College 1999

**Scott Micek, MD**
Adjunct Instructor in Medicine (primary appointment)
MD University of Iowa 1999

**Gina Michael, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Missouri 1978
MD Duke University 1982

**Andrew Philip Michelson, MD**
Assistant Professor of Medicine (primary appointment)
BS Case Western Reserve Univ 2007
MD Case Western Reserve Univ 2013

**William Samuel Micka, MD**
Instructor in Clinical Medicine (primary appointment)
BA Saint Louis University 1999
MD Saint Louis University 2003

**Charles William Miller, MD**
Assistant Professor of Clinical Medicine (Dermatology) (primary appointment)

BS School Not Listed 1968
MD Washington Univ in St. Louis 1972

**Christopher A Miller, BS1, PHD**
Assistant Professor of Medicine (primary appointment)
BS1 Truman State University 2005
BS Truman State University 2005
PHD Baylor University 2011

**Heidi B Miller, MD**
Instructor in Clinical Medicine (primary appointment)
BS Yale University 1994
MD Harvard University 2000

**Lara Elizabeth Miller, DOST**
Instructor in Clinical Medicine (primary appointment)
DOST Midwestern University 2000
BS Carleton College 1996

**Mark James Miller, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Pathology and Immunology
BS University of California 1991
PHD University of California 1996

**Jeffrey R Millman, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Biomedical Engineering
PHD Mass Inst of Technology (MIT) 2011
BS North Carolina State Universit 2005

**Jason C Mills, MD, PHD, AB, MD1**
Professor of Medicine (primary appointment)
Professor of Developmental Biology
Professor of Pathology and Immunology
MD University of Pennsylvania 1997
PHD University of Pennsylvania 1997
AB Washington Univ in St. Louis 1989
BA Washington Univ in St. Louis 1989
MD1 University of Pennsylvania 1997

**Jaspur J Min, MD**
Instructor in Medicine (primary appointment)
BA Washington Univ in St. Louis 2011
MD Washington Univ in St. Louis 2016

**Graeme Mindel, MBBCH, MS**
Instructor in Clinical Medicine (primary appointment)
MBBCH University of the Witwatersra 1992
MS University of the Witwatersra 1992

**Jeffrey H Miner, PHD**
Eduardo and Judith Slatopolsky Professor of Medicine in Nephrology (primary appointment)
Professor of Cell Biology and Physiology
BA Northwestern University 1985
PHD California Institute Technolo 1991

**Jonathan J Miner, PHD, MD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Molecular Microbiology
Assistant Professor of Pathology and Immunology
PHD University of Oklahoma 2008
MD University of Oklahoma 2010
BS Brigham Young University 2002

**Joshua Delbert Mitchell, MD, BE**
Assistant Professor of Medicine (primary appointment)
MD University of Texas Southwest 2008
BE John Hopkins University 2000

**Makedonka Mitreva, MS, PHD**
Professor of Medicine (primary appointment)
Professor of Genetics
BS University of Skopje - Macedon 1990
MS University of Skopje - Macedon 1994
PHD Wageningen University 2001

**Bettina Mittendorfer, MS, PHD**
Professor of Medicine (primary appointment)
MS University of Vienna 1999
PHD University of Texas Austin 1999

**Aaloke Mody, MD**
Assistant Professor of Medicine (primary appointment)
BA University of CA Berkeley 2006
MD Duke University 2012
BA University of CA Berkeley 2006

**Kahee Agid Mohammed, MPE, MD**
Instructor in Medicine (primary appointment)
MPE Saint Louis University 2015
MD University of Duhok 2010

**Mahshid Mohseni, MD**
Instructor in Medicine (primary appointment)
Instructor in Orthopaedic Surgery
MD Isfahan U of Medical Sciences 2004

**C. Scott Molden, MD**
Instructor in Clinical Medicine (primary appointment)
MD Case Western Reserve Univ 1972
BA De Paul University 1968

**Hector D Molina-Vicenty, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Pathology and Immunology
BS University of Puerto Rico 1982
MD University of Puerto Rico 1985

**Steven M Mondschein, MD**
Instructor in Medicine (primary appointment)
MD Wright State University 1988
BA Grinnell College 1981

**Jennifer Marie Monroy, MD**
Assistant Professor of Medicine (primary appointment)
MD Univ Texas Health Science Ctr 2008
BS Incarnate Word College 2003

**Austin F Montgomery, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Pittsburgh 1954
BA Washington Univ in St. Louis 1950
BS University of Missouri 1952

**Sung Ho Moon, MS, PHD**
Instructor in Medicine (primary appointment)
MS Yonsei University 1999
PHD Washington Univ in St. Louis 2006
BS Yonsei University 1997

**Nathan Moore, MD**
Instructor in Clinical Medicine (primary appointment)
BS Texas College 2007
MD Washington Univ in St. Louis 2013

**Timothy D Moore**
Instructor in Clinical Medicine (primary appointment)

**Jonathan Daniel Moreno, PHD, MD**
Instructor in Medicine (primary appointment)
PHD Weill Cornell Med 2013
BS Univ of Massachusetts Amherst 2006
MD Weill Cornell Med 2013

**Zachary Andrew Morgan, MD**
Instructor in Medicine (primary appointment)
MD Univ of TN - Health Sci Center 2015

**Daniel Morgensztern, MD**
Professor of Medicine (primary appointment)
MD FTE Souza Marques 1995

**Donald G Morris, MD, MS**
Instructor in Clinical Medicine (primary appointment)
MD University of Missouri 1993
MS Saint Louis University 1989
BA Benedictine College 1987

**Aubrey R Morrison, MBBS**
Professor of Medicine (primary appointment)
Professor of Developmental Biology
MBBS University of London 1970

**Jessica Mozersky, PHD, MS**
Assistant Professor of Medicine (primary appointment)
PHD University College London 2010
MS University of Pennsylvania 2017
BS University of Toronto 1998

**Richard Gerard Mrad**
Instructor in Clinical Medicine (primary appointment)
BA University of Missouri 1981

**Brian D. Muegge, PHD, MD**
Instructor in Medicine (primary appointment)
PHD Washington Univ in St. Louis 2013
BA Princeton University 2001
MD Washington Univ in St. Louis 2013

**Faquir Muhammud**
Instructor in Clinical Medicine (primary appointment)

**Daniel Kast Mullady, MD**
Professor of Medicine (primary appointment)
MD University of Connecticut 2001

**Monalisa Mullick, MD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Pediatrics
MD University of MO Kansas City 1997

**Steven Robert Mumm, MS, PHD**
Professor of Medicine (primary appointment)
BS University of Missouri 1978
MS University of Missouri 1984
PHD Saint Louis University 1992

**Junaid Munshi**
Instructor in Clinical Medicine (primary appointment)

**Haris Farooq Murad, MD**
Assistant Professor of Medicine (primary appointment)
MD Aga Khan University 2012

**Ian Campbell Murphy, MD**
Instructor in Medicine (primary appointment)
BA Williams College 2011
MD Tufts University 2017

**Amy Musiek, MD**
Professor of Medicine (Dermatology) (primary appointment)
MD Vanderbilt University 2004
BS College of William and Mary 1999

**Tahsin Mustaque, MBBS**
Instructor in Medicine (primary appointment)
MBBS Dhaka University 2012

**Umadevi Muthyala**
Instructor in Clinical Medicine (primary appointment)

**Anubha Mutneja, MBBS**
Assistant Professor of Medicine (primary appointment)
MBBS Maulana Azad Medical College 2009

**Muithi Mwanthi, BS1, PHD, MD**
Assistant Professor of Medicine (Dermatology) (primary appointment)
BS1 Clearwater Christian College 2004
PHD Indiana State University 2014
MD Indiana State University 2014

**Otha Myles, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Maryland 1998

## N

**Devika Nagaraj**
Instructor in Clinical Medicine (primary appointment)

**Sharmila Nair, PHD, MS**
Instructor in Medicine (primary appointment)
PHD Technische U Braunschweig 2014
MS University of Bristol 2012

**Jyotirmaya Nanda**
Instructor in Clinical Medicine (primary appointment)

**Nicola Napoli**
Adjunct Research Assistant Professor of Medicine (primary appointment)

**Humaira K Naseer, MD**
Instructor in Medicine (primary appointment)
MD Dow Medical College Karachi 1986

**Arjun Natarajan, MBBS, MBBS, MBBS, MBBS, MBBS, MBBS**
Instructor in Medicine (primary appointment)
MBBS Kasturba Medical College 2015
MBBS Kasturba Medical College 2015
MBBS Kasturba Medical College 2015
MBBS Kasturba Medical College 2015
MBBS Kasturba Medical College 2015
MBBS Kasturba Medical College 2015

**Sameera Natarajan, MBBS**
Instructor in Medicine (primary appointment)
MBBS Kasturba Medical College 2016

**Robert F Nease Jr, PHD, MA**
Adjunct Associate Professor of Medicine (primary appointment)
PHD Stanford University 1989
BS University of California 1980
MA Stanford University 1981

**Burton M Needles, MD**
Instructor in Clinical Medicine (primary appointment)
MD Loyola University Chicago 1974
BS City College 1970

**Jeanne M Nerbonne, PHD**
Professor of Medicine (primary appointment)
Alumni Endowed Professor of Molecular Biology and Pharmacology in Developmental Biology
BS Framingham State College 1974
PHD Georgetown University 1978

**Elizabeth P. Newberry, PHD**
Assistant Professor of Medicine (primary appointment)
PHD Washington Univ in St. Louis 1995
BA Knox College 1988

**Rodney D Newberry, MD**
Professor of Medicine (primary appointment)
BA Washington Univ in St. Louis 1987
MD Washington Univ in St. Louis 1991

**Amy C Ney, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
BS Mary Washington College 1997
MD University of Virginia 2001

**Nguyet Minh Nguyen, BS1, MD, MD1**
Assistant Professor of Medicine (primary appointment)
BS University of Michigan 1989
BS1 University of Michigan 1989
MD Wayne State University 1993
MD1 Wayne State University 1993

**Jonas Gottfried Noe, MD**
Instructor in Clinical Medicine (primary appointment)
MD Technische Universitat Darmsta 2014

**Tracy Wynette Norfleet, MD**
Instructor in Clinical Medicine (primary appointment)
MD Louisiana St Univ Hlth Sci 2002
BS Xavier University Lousiana 1998

**Samuel R Nussbaum, MD**
Professor of Clinical Medicine (primary appointment)
MD School Not Listed 1973
BA New York University 1969

**Muhammad Akram Nyazee, UNKNOWN1, UNKNOWN**
Instructor in Clinical Medicine (primary appointment)
UNKNOWN1 Nishtar Medical College Multa 1974
UNKNOWN Govt College Sarhodha 1968

## O

**Frank Joseph O'Brien, MBBCH**
Assistant Professor of Medicine (primary appointment)
MBBCH University College Cork 2006

**G Patrick O'Donnell, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of Kansas 1972
MD School Not Listed 1977

**Jane A O'Halloran, MBBCH**
Assistant Professor of Medicine (primary appointment)
MBBCH National University of Irelan 2006

**Julie O'Neal, PHD**
Assistant Professor of Medicine (primary appointment)
PHD Washington Univ in St. Louis 2009
BS University of MO Columbia 1999

**Andrew John Odden, MD**
Associate Professor of Medicine (primary appointment)
MD University of Minnesota 2007
BS Gustavus Adolphus College 2003

**Devin Christopher Odom, MD**
Assistant Professor of Medicine (primary appointment)
MD Wake Forest University 2010

**Karolyn Ann Oetjen, PHD, MD**
Instructor in Medicine (primary appointment)
BS Univ of Wisconsin Madison 2003

PHD University of Michigan 2011
MD University of Michigan 2011

**Stephen T. Oh, MD, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Pathology and Immunology
MD Northwestern University 2004
PHD Northwestern University 2002
BS Harvard University 1996

**Adewole L. Okunade, PHD**
Associate Professor of Medicine (primary appointment)
PHD University of Ibadan 1981
BS University of Ibadan 1975

**Debra Parker Oliver, PHD**
Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
PHD University of missouri 2020

**George Charles Oliver, MD**
Professor Emeritus of Clinical Medicine (primary appointment)
MD Harvard University 1957
BA Harvard University 1953

**Margaret Olsen, PHD, MPH**
Professor of Medicine (primary appointment)
Professor of Surgery (Public Health Sciences)
BS Southern Illinois University 1976
PHD University of Pennsylvania 1986
MPH Saint Louis University 2001

**Robert F Onder Jr, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1983
MD Washington Univ in St. Louis 1987

**Peter J. Oppelt, MD**
Assistant Professor of Medicine (primary appointment)
MD University of MO Columbia 2008
BS Saint Louis University 2004

**Mateusz Opyrchal, MD, PHD**
Associate Professor of Medicine (primary appointment)
MD Rutgers University 2007
PHD Rutgers University 2005

**S. Michael Orgel, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1965
BA Washington Univ in St. Louis 1960

**Matthew J Orland, MD**
Associate Professor of Clinical Medicine (primary appointment)
BS Yale University 1975
MD University of Miami 1979

**David William Ortbals, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1970
BS Saint Louis University 1966

**Richard E Ostlund Jr, MD**
Professor of Medicine (primary appointment)
BS University of Utah 1966
MD University of Utah 1970

**Theodore Otti, UNKNOWN**
Instructor in Clinical Medicine (primary appointment)
UNKNOWN School Not Listed 1983

**Jiafu Ou, MD**
Associate Professor of Medicine (primary appointment)
MD Sun Yat-Sen University 1995

**Edgar Turner Overton, MD**
Adjunct Assistant Professor of Medicine (primary appointment)
BA University of Tennessee 1992
MD University of Tennessee 1999

**Toshinao Oyama, PHD, MS**
Instructor in Medicine (primary appointment)
PHD Chiba University 2017
MS Chiba University 2002
BS Kitasato University 2000

## P

**Vani Pachalla, MD**
Instructor in Clinical Medicine (primary appointment)
MD School Not Listed 1990

**Russell Kent Pachynski, MD**
Assistant Professor of Medicine (primary appointment)
BS Stanford University 1994
MD Univ of Wisconsin Madison 2003

**Robert C Packman, MD**
Professor of Clinical Medicine (primary appointment)
BS University of Missouri 1954
MD Washington Univ in St. Louis 1956
BA Washington Univ in St. Louis 1953

**Daniel Marc Paget, MD**
Instructor in Medicine (primary appointment)
MD University of CA San Francisco 2013

**Michael Alexander Paley, MD**
Instructor in Medicine (primary appointment)
MD University of Pennsylvania 2014

**Ross Ian Palis, MD**
Instructor in Clinical Medicine (primary appointment)
MD Vanderbilt University 2002
BS Duke University 1998

**Kevin Terrence Palka, MD**
Assistant Professor of Medicine (primary appointment)
BS Duke University 1995
MD University of Texas Southwest 2001

**Anupam S Pande, MS, MBBS**

Assistant Professor of Medicine (primary appointment)
MS University of Texas Houston 2011
MBBS Byramjee Jeejeebhoy Medical Co 2009

**Joseph Pangelinan, MA, PHD**
Assistant Professor in Medicine (primary appointment)
MA Southeast Missouri St Univers 1995
PHD University of MO St Louis 2015

**Kerry Will Pantelis, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of MO Kansas City 2004

**Andrew Yong-Woo Park, MD**
Instructor in Medicine (primary appointment)
MD St. George's University 2006
BA Yale University 1995

**Haeseong Park, MS, MD**
Assistant Professor of Medicine (primary appointment)
MS Johns Hopkns University Medic 2007
BS Seoul National University 2001
MD Seoul National University 2006

**Stephanie Sun-Young Park**
Instructor in Clinical Medicine (primary appointment)

**David A Parks, MBA, MD**
Associate Professor of Clinical Medicine (primary appointment)
MBA Southern Illinois University 1985
BS University of MO Rolla 1979
MD Saint Louis University 1994

**Deborah L Parks, MD**
Professor of Medicine (primary appointment)
MD University of Louisville 1982
BA Washington Univ in St. Louis 1978

**Dilip H. Patel**
Instructor in Clinical Medicine (primary appointment)

**Namrata N Patel, MD**
Instructor in Medicine (primary appointment)
Instructor in Pediatrics
MD University of Tennessee 2013

**Pravinkumar Manjibhai Patel, MD**
Instructor in Medicine (primary appointment)
MD BJ Medical College 1980

**Rajiv Nanu Patel, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saba University School of Med 2001

**Rupa R Patel, M PH, MD**
Associate Professor of Medicine (primary appointment)
M PH Johns Hopkins University 2012
MD Wayne State University 2004
BA University of Michigan 2000

**Urvi Patel, MD**
Assistant Professor of Medicine (Dermatology) (primary appointment)
BA Kent St University 2007
MD University of Tenn Memphis 2011

**Amanullah Pathan, UNKNOWN, MS, UNKNOWN1**
Instructor in Clinical Medicine (primary appointment)
MS School Not Listed 1969
UNKNOWN1 School Not Listed 1969

**Bruce Patterson, PHD**
Professor of Medicine (primary appointment)
PHD University of Illinois 1980
BS Southern Illinois University 1974

**Philip Richard Orrin Payne, PHD, MA**
Professor of Medicine (primary appointment)
Associate Dean for Health Information and Data Science and Chief Scientist for the School of Medicine
Director of the Institute for Informatics
Janet and Bernard Becker Professor of Medicine
Professor of Computer Science and Engineering
BA University of CA San Diego 1999
PHD Columbia University 2006
MA Columbia University 2000

**Chelsea Elizabeth Pearson, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 2013

**Susan E Pearson, PHD, BFA, MS, DOST**
Instructor in Clinical Medicine (primary appointment)
PHD University of Southwestern Lo 1986
BFA Southern Methodist University 1977
MS Central Michigan University 1984
DOST School Not Listed 1992

**Katrina Sophia Pedersen, MS, MD**
Assistant Professor of Medicine (primary appointment)
BA Grinnell College 2003
MS University of Iowa 2005
MD Southern Illinois University 2009

**Marybeth Pereira, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA Swarthmore College 1973
MD University of California 1978

**Julio E Perez, MD**
Professor of Medicine (primary appointment)
MD University of Puerto Rico 1973
BS University of Puerto Rico 1970

**Laurence F Perlstein, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Louisville 1974
BS Tulane University 1967

**Linda R Peterson, MD**
Professor of Medicine (primary appointment)

Professor of Radiology
BS Georgetown University 1986
MD Washington Univ in St. Louis 1990

**Lindsay L Peterson, MD**
Associate Professor of Medicine (primary appointment)
BS Tulane University 2000
MD Tulane University 2006

**Timothy Richard Peterson, PHD**
Assistant Professor of Medicine (primary appointment)
BS University of Michigan 1999
PHD Mass Inst of Technology (MIT) 2010

**Jennifer A Philips, PHD, PHD, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Molecular Microbiology
PHD University of CA San Francisco 2015
BA Columbia University 1991
PHD University of CA San Francisco 1998
MD University of CA San Francisco 2000

**William J Phillips, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA Ohio State University 1959
MD Washington Univ in St. Louis 1963

**Joel Picus, MD**
Professor of Medicine (primary appointment)
BS University of Illinois 1979
MD Harvard University 1984
BA University of Illinois 1979

**Stephen J Pieper, MD**
Instructor in Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1983
MD Washington Univ in St. Louis 1988

**Sytse J Piersma, MS, PHD**
Instructor in Medicine (primary appointment)
MS State University of Utrecht 2003
PHD Leiden University 2010

**Mark Alan Pinkerton II, MD**
Instructor in Medicine (primary appointment)
MD University of Mississippi 2016
BS University of Alabama 2012

**Bryan Douglas Piotrowski, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 2004

**Beatrice Plougastel Douglas, PHD**
Instructor in Medicine (primary appointment)
PHD University of Pierre et Marie 1994

**Nishant Poddar, MBBS**
Associate Professor of Medicine (primary appointment)
MBBS Veer Surendra Sai Medical Coll 2000

**Doug Pogue, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1996

**Donovan Polack, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Cornell University 1979

**Faran Salim Polani, MD**
Instructor in Medicine (primary appointment)
MD Dow Medical College Karachi 2012

**Kenneth S Polonsky, MBBCH**
Adjunct Professor of Medicine (primary appointment)
MBBCH University of the Witwatersra 1973

**Makhawadee Pongruangporn, MD**
Instructor in Clinical Medicine (primary appointment)
MD Chiang Mai University 2001

**Harish Ponnuru, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Missouri 1995
BA University of MO Kansas City 1995

**William J Popovic, MD**
Assistant Professor of Medicine (primary appointment)
BS John Carroll University 1967
MD Saint Louis University 1971

**Lee S Portnoff, MA, MD**
Assistant Professor of Clinical Medicine (Dermatology) (primary appointment)
MA University of California 1974
BS Purdue University 1972
MD Washington Univ in St. Louis 1978

**Yogitha S. Potini, MD, MS**
Instructor in Clinical Medicine (primary appointment)
BS Washington Univ in St. Louis 2009
MD Southern Illinois University 2015
MS Tufts University 2011

**Daniel E Potts, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1972
BS Beaufort Technical College 1968

**William G Powderly, MD**
J. William Campbell Professor of Medicine (primary appointment)
Associate Dean for Clinical and Translational Sciences
Larry J. Shapiro Director of the Institute of Public Health
MD National University of Irelan 1979

**John A Powell, MD**
Assistant Professor of Clinical Medicine (Dermatology) (primary appointment)
BS University of Notre Dame 1967
MD University of Michigan 1971

**Jennifer Lynn Powers Carson, PHD**
Associate Professor of Medicine (primary appointment)

PHD Georgia Tech 1993
BS Union University 1988

**Diana A Prablek, MD**
Instructor in Clinical Medicine (primary appointment)
MD Southwestern University 1988
BA Texas Christian University 1984

**Lawrence Prablek, MD**
Instructor in Clinical Medicine (primary appointment)
BS Southern Methodist University 1984
MD University of Texas Southwest 1988

**Simeon Prager, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of California 1991
BA Yale University 1981

**Vajravel M Prasad**
Adjunct Instructor in Medicine (primary appointment)

**Christopher William Prater, MD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Pediatrics
MD Michigan State University 2017

**David J Prelutsky, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Saint Louis University 1979
BA Northwestern University 1975

**Rachel M. Presti, PHD, MD**
Associate Professor of Medicine (primary appointment)
PHD Washington Univ in St. Louis 2001
BA Scripps College 1990
MD Washington Univ in St. Louis 2001

**Patricia Elizabeth Prusaczyk, PHD, MSSW**
Instructor in Medicine (primary appointment)
BA Webster University 2007
PHD Washington Univ in St. Louis 2017
MSSW Washington Univ in St. Louis 2011

**Aaron J Pugh**
Adjunct Instructor in Medicine (primary appointment)

**Edward Puro, MS, MD, PHD**
Assistant Professor of Clinical Medicine (primary appointment)
MS University of Toronto 1966
MD Washington Univ in St. Louis 1975
BS University of Toronto 1962
PHD University of Toronto 1970

**Iskra Pusic, MD**
Associate Professor of Medicine (primary appointment)
MD University of Zagreb 1997

## Q

**Usman Qayyum**
Instructor in Clinical Medicine (primary appointment)

**Nishath Quader, MD**
Associate Professor of Medicine (primary appointment)
BS University of Illinois Chicago 2002
MD Northwestern University 2007

**Annabel Quinet De Andrade, PHD1, MS, PHD2**
Instructor in Medicine (primary appointment)
BS University of Paris 2007
PHD1 University of Paris 2012
MS University of Paris 2009
PHD2 University of Paris 2012

**Patricia M Quinley, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Illinois 1985
MD University of Illinois 1989

**Abdul H Qureshi, MS**
Instructor in Clinical Medicine (primary appointment)
MS School Not Listed 1992

## R

**Radha Devi Radhakrishna Pillai, MBBS**
Assistant Professor of Medicine (primary appointment)
MBBS Jawaharial Inst of Med Educ 2006

**Srinivasan Raghavan**
Instructor in Clinical Medicine (primary appointment)

**Amaad Bashir Rana, MD**
Instructor in Medicine (primary appointment)
Instructor in Medicine
MD University of Alabama 2017
BA Emory University 2013

**Prabha Ranganathan, MBBS**
Professor of Medicine (primary appointment)
MBBS Kilpauk Medical College 1990

**Srinivasan Dubagunta Rao**
Adjunct Instructor in Medicine (primary appointment)

**Antonella Luisa Rastelli, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Surgery (General Surgery)
BA University of Verona 1984
MD University of Verona 1991

**Keith M Ratcliff**
Instructor in Clinical Medicine (primary appointment)

**Gary A Ratkin, MD**
Associate Professor of Clinical Medicine (primary appointment)
Instructor in Clinical Radiation Oncology
BA Rice University 1963
MD Washington Univ in St. Louis 1967

**Lee Ratner, MD, MA, PHD**
Professor of Medicine (primary appointment)
Alan A and Edith L Wolff Professor of Oncology

Professor of Molecular Microbiology
MD Yale University 1979
BA Harvard University 1973
MA Harvard University 1973
PHD Yale University 1979

**Daniel Rauch, PHD, BS1**
Assistant Professor of Medicine (primary appointment)
BS Augustana College 1996
PHD University of Iowa 2001
BS1 Augustana College 1996

**Michael I. Rauchman, MD**
Professor of Medicine (primary appointment)
Chromalloy Endowed Professor
Professor of Developmental Biology
MD McGill University 1984
BA Tufts University 1980

**Saadia Taufiq Raza, MD**
Assistant Professor of Clinical Medicine (Dermatology) (primary appointment)
BA Emory University 1993
MD Emory University 1997

**Babak Razani, PHD, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Pathology and Immunology
PHD Albert Einstein College of Med 2003
MD Albert Einstein College of Med 2003

**Timothy Patrick Rearden, MD, MS**
Associate Professor of Medicine (primary appointment)
MD University of MO Columbia 1985
BS Southeast Missouri St Univers 1979
MS University of MO Columbia 1981

**Arhaanth D Reddy**
Instructor in Clinical Medicine (primary appointment)

**Katherine Marie Reeder, PHD**
Adjunct Assistant Professor of Medicine (primary appointment)
PHD University of Iowa 2007

**Dominic N Reeds, MD**
Professor of Medicine (primary appointment)
MD Texas Tech University 1996
BA University of Texas Austin 1992

**Susan Robinson Reeds, MD**
Assistant Professor of Medicine (primary appointment)
BS Haverford College 1990
MD University of Rochester 1996

**Lester T Reese, MD**
Professor of Clinical Medicine (Dermatology) (primary appointment)
MD Tulane University 1966
BS Tulane University 1962

**Margaret Reiker, UNKNOWN, MD, PHD**
Instructor in Clinical Medicine (primary appointment)
UNKNOWN Saint Louis University 1986
MD Saint Louis University 1993
PHD Saint Louis University 1991

**Melissa Andrea Reimers, MD**
Assistant Professor of Medicine (primary appointment)
BA Washington Univ in St. Louis 2008
MD Saint Louis University 2013
BA Washington Univ in St. Louis 2008

**Craig K Reiss, MD**
Professor of Clinical Medicine (primary appointment)
MD University of Missouri 1983
BA University of Missouri 1979

**Jacqueline Levy Reiss, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of MO Kansas City 1989
MD University of Missouri 1990

**Maria Sara Remedi, PHD, PHARMD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Cell Biology and Physiology
BS University of Cordoba 1987
PHD University of Cordoba 1999
PHARMD University of Cordoba 1989

**Zhen Ren, MD, PHD, MS**
Instructor in Medicine (primary appointment)
MD Tongji University 2019
PHD City University of NY 2019
MS Shanghai Jiao Tong University 2019

**Hilary Elizabeth Lee Reno, MS, MD, PHD**
Associate Professor of Medicine (primary appointment)
MS University of Illinois 1997
MD University of Illinois 2002
PHD University of Illinois 2000

**Stacey L. Rentschler, MS, MD, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Biomedical Engineering
Associate Professor of Developmental Biology
BS Lehigh University 1995
MS Mount Sinai School of Medicine 2000
MD Mount Sinai School of Medicine 2004
PHD Mount Sinai School of Medicine 2002

**Michael P Rettig, PHD**
Associate Professor of Medicine (primary appointment)
PHD Purdue University 2000
BS Illinois State University 1993

**Michael W Rich, MD**
Professor of Medicine (primary appointment)
BA University of Illinois 1974
MD University of Illinois 1979

**Lois F. Richard, PHD, MD**
Assistant Professor of Medicine (primary appointment)
PHD Saint Louis University 1998
MD Saint Louis University 1999
BS Murray St University 1982

**Nancy Ridenour**
Adjunct Professor of Medicine (primary appointment)

**Amy Elizabeth Riek, MD**
Associate Professor of Medicine (primary appointment)
BS Univ of Wisconsin Madison 2001
MD Washington Univ in St. Louis 2005

**Caron E Rigden, MD, BFA**
Assistant Professor of Medicine (primary appointment)
MD Tulane University 2000
BFA Tulane University 1996

**Christopher Rigell, MD**
Assistant Professor of Medicine (primary appointment)
BA Vanderbilt University 2009
MD University of Alabama 2013

**Tracy Marie Riordan, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 2000
BA Saint Louis University 1996

**Elisha D.O. Roberson, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Genetics
BS Western Kentucky University 2004
PHD Johns Hopkins University 2009

**Paul Arthur Robiolio, MD, M PHIL**
Assistant Professor of Clinical Medicine (primary appointment)
BS Haverford College 1983
MD Washington Univ in St. Louis 1989
M PHIL Cambridge University 1985

**Guillermo Rodriguez Jr, MD**
Assistant Professor of Medicine (primary appointment)
MD National Autonomous U of Mex 1980

**M. Reza Rofougaran, MD**
Instructor in Clinical Medicine (primary appointment)
MD Tehran University 1988

**Benjamin Dale Rogers, MD**
Instructor in Medicine (primary appointment)
MD University of Louisville 2014

**H. Bryan Rogers, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1965

**Felice A Rolnick, MD**
Instructor in Clinical Medicine (primary appointment)
MD School Not Listed 1987
BS Union College New York 1982

**Arthur G. Romero, PHD**
Professor of Medicine (primary appointment)
PHD Univ of Wisconsin Madison 1985
BS Johns Hopkins University 1979

**Richard Rood, MD**
Professor of Medicine (primary appointment)
MD Wright State University 1982

**Bruce A Rosa, PHD, MS**
Assistant Professor of Medicine (primary appointment)
BS Lakehead University 2005
PHD Lakehead University 2012
MS Lakehead University 2007

**Daniel B Rosenbluth, MD**
Professor of Medicine (primary appointment)
Professor of Pediatrics
Tracey C and William J Marshall Professor of Medicine
MD Mount Sinai School of Medicine 1989
BS Columbia University 1985

**Ilana Shaina Rosman, MD**
Associate Professor of Medicine (Dermatology) (primary appointment)
Associate Professor of Pathology and Immunology
MD Washington Univ in St. Louis 2008
BA Brown University 2000

**Ian Ross, MD**
Assistant Professor of Medicine (primary appointment)
MD East Tennessee State Universi 2013

**Bruce J Roth, MD**
Professor of Medicine (primary appointment)
MD Saint Louis University 1980

**Marcos Rothstein, MD**
Professor of Medicine (primary appointment)
MD University of Zulia 1974

**Ernest Tuttle Rouse III, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1971
BA Princeton University 1967

**Jeremy Rower, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Cincinnati 1997
BS University of Cincinnati 1993

**Myra L. Rubio, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1994
MD Indiana University Bloomington 1998

**Paetra Ruddy, MD**
Assistant Professor of Medicine (Dermatology) (primary appointment)
MD University of Iowa 2011

BA Bard College 1997

**Peter G Ruminski, MS**
Instructor in Medicine (primary appointment)
BS Saint Louis University 1975
BS Saint Louis University 1977
MS Washington Univ in St. Louis 1992

**Michael B Rusche**
Adjunct Instructor in Medicine (primary appointment)

**Tonya D Russell, MD1, MD, BS1**
Professor of Medicine (primary appointment)
MD1 University of Florida 1997
BS University of Florida 1993
MD University of Florida 1997
BS1 University of Florida 1993

**Ilaria Russo, MS, PHD, MS**
Adjunct Assistant Professor of Medicine (primary appointment)
MS University of Padua 1998
BS University of Palermo 1998
PHD University of Padua 2005
BS University of Palermo 1998
MS University of Padua 1998

**Joseph F Ruwitch Jr, MD**
Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1966

## S

**Molly Sachdev, M PH, MD**
Assistant Professor of Medicine (primary appointment)
M PH University North Carolina 2000
MD Duke University 2001

**Justin Sadhu, MD**
Assistant Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 2007

**Mehrdad Saeed-Vafa, MD**
Instructor in Clinical Medicine (primary appointment)
MD School Not Listed 2000

**Jose Bernardo Saenz, PHD, MD**
Assistant Professor of Medicine (primary appointment)
PHD Washington Univ in St. Louis 2009
BA Cornell University 2003
BA Cornell University 2003
MD Washington Univ in St. Louis 2011

**Sonny Satnam Saggar**
Instructor in Clinical Medicine (primary appointment)

**Rajan Sah, MD, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Cell Biology and Physiology
MD University of Toronto 1998
PHD University of Toronto 2020

**Sana Saif Ur Rehman, MD**
Assistant Professor of Medicine (primary appointment)
MD King Edward Medical College 2007

**Kaori A. Sakurai, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Pittsburgh 1997

**Maamoun Salam, MD**
Assistant Professor of Medicine (primary appointment)
MD Damascus U. Medical School 2009

**Christine Joan Salter, MD, DC**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1998
DC Logan College of Chiropractic 1991
BS Reading University 1982

**Robert J Saltman, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA Yale University 1976
MD Washington Univ in St. Louis 1980

**Maanasi Samant, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Tennessee 2014

**Robert Van Ness Same, MD**
Assistant Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
MD Johns Hopkns University Medic 2014

**John Mark Samet, MD**
Instructor in Clinical Medicine (primary appointment)
BS Washington & Lee 1964
MD University of Missouri 1968

**Dmitri Samovski, PHD**
Assistant Professor of Medicine (primary appointment)
PHD Hebrew University 2009

**Lawrence E Samuels, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
MD Washington Univ in St. Louis 1976
BA University of Texas Austin 1972

**Guadalupe Sanchez, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
BA Berry College 1974
MD Harvard University 1978

**Mark Steven Sands, PHD**
Professor of Medicine (primary appointment)
Professor of Genetics
PHD State Univ of NY Stonybrook 1990
BS Rochester Institute of Techno 1980

**Kristen Marie Sanfilippo, MD, MHS**
Assiatant Professor of Medicine (primary appointment)

MD University of MO Columbia 2007
BS Washington Univ in St. Louis 2003
MHS Washington Univ in St. Louis 2012

**Sumithra Sankararaman, MS, PHD**
Instructor in Medicine (primary appointment)
MS Indian Institute Of Technology 1997
PHD Institute of Math Sciences 2003
BS Fergusson College 1995

**Daniel Jose Santa Cruz, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
MD Universidad def Buenos Aires 1971

**Evelio E. Sardina, PHD, MS, MD**
Instructor in Clinical Medicine (primary appointment)
PHD University of South Florida 1990
MS University of South Florida 1988
BA Rutgers University 1985
MD University of South Florida 1994

**Gregory Stephen Sayuk, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Psychiatry
MD University of Texas Austin 2000

**Lawrence R Schacht, MD**
Instructor in Clinical Medicine (primary appointment)
MD Oregon Health Science Univers 1975
BA University Wyoming 1971

**Christine Schafer, MD**
Assistant Professor of Medicine (Dermatology) (primary appointment)
MD Rutgers-Robert Wood Johnson Me 2020

**Richard O. Schamp, MD**
Instructor in Clinical Medicine (primary appointment)
BA Emporia State University 1974
MD University of Kansas 1978

**Jennifer Lynn Scheer, MD**
Instructor in Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1994

**Erica Lynn Scheller, PHD, DDENT**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Cell Biology and Physiology
BS Michigan State University 2004
PHD University of Michigan 2011
DDENT University of Michigan 2011

**Mark Scheperle, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of Missouri 1989
MD University of Missouri 1989

**Alvin K Schergen, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1980
BA Washington Univ in St. Louis 1976

**Joel D. Schilling, PHD, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Pathology and Immunology
PHD Washington Univ in St. Louis 2001
BA Colorado College 1996
MD Washington Univ in St. Louis 2003

**Tania L Schmid, MD**
Instructor in Clinical Medicine (primary appointment)
BA University of Mississippi 1981
MD University of Mississippi 1985

**Jennifer Merlo Schmidt, MD**
Assistant Professor of Medicine (primary appointment)
MD Saint Louis University 2012

**Robert Jay Schneider, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Johns Hopkins University 1976
BA Johns Hopkins University 1973

**Erin R. Schockett, MD**
Instructor in Clinical Medicine (primary appointment)
MD Brown University 2005

**Mark Andrew Schroeder, MD**
Associate Professor of Medicine (primary appointment)
MD University of Cincinnati 2003
BS University of Toledo 1999

**Alexander E Schuetz, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1996
BA Saint Louis University 1991

**Stephen Schuman, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1973

**Benjamin D Schwartz, MD, PHD**
Professor of Clinical Medicine (primary appointment)
Adjunct Professor of Medicine
BA Columbia College 1965
MD School Not Listed 1972
PHD School Not Listed 1971

**David B Schwartz, MA, PHD, MD**
Associate Professor of Medicine (primary appointment)
MA Washington Univ in St. Louis 1987
PHD Washington Univ in St. Louis 1986
MD Washington Univ in St. Louis 1987
BS University of Michigan 1980

**Kristen Ann Scullin-Hartman, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of MO Kansas City 1988

**Alyssa Aya Self, MD**

Instructor in Medicine (primary appointment)
Instructor in Medicine
BA Brown University 2013
MD University of Colorado Denver 2017

**Jay R Seltzer, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Missouri 1987
BA University of Missouri 1987

**Clay F Semenkovich, MD**
Irene E and Michael M Karl Professor of Endocrinology and Metabolism in Medicine (primary appointment)
Professor of Cell Biology and Physiology
BA University of Virginia 1977
MD Washington Univ in St. Louis 1981

**Deepali Prabir Sen, MBBS, MD**
Assistant Professor of Medicine (primary appointment)
MBBS Grant Medical College 1999
MD University of Mumbai 2003

**Joseph Michael Seria, MD**
Instructor in Clinical Medicine (primary appointment)
BS St Vincent College 1964
MD Saint Louis University 1968

**Harvey Serota, MD**
Instructor in Clinical Medicine (primary appointment)
BA Johns Hopkins University 1976
MD Johns Hopkins University 1982

**James F Sertl, MD**
Instructor in Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1962
MD Saint Louis University 1966

**Aisha Shaikh, MD**
Associate Professor of Medicine (primary appointment)
MD Dow Medical College Karachi 2001

**Liang Shan, PHD, MS**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Pathology and Immunology
BS Nankai University 2003
PHD Johns Hopkins University 2012
MS Fudan University 2007

**Jieya Shao, PHD**
Assistant Professor of Medicine (primary appointment)
BS Nankai University 1996
PHD Oklahoma St University 2002

**Rajiv Kumar Sharma**
Adjunct Instructor in Medicine (primary appointment)

**Gerald Stephen Shatz, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA Northwestern University 1970
MD Washington Univ in St. Louis 1974

**Nidal Shawahin, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Jordan 1988

**Jonathan Holden Sheehan, PHD**
Associate Professor of Medicine (primary appointment)
BA Harvard University 1988
PHD Vanderbilt University 2006

**Edward Sheen, MD**
Assistant Professor of Medicine (primary appointment)
MD University of CA San Francisco 2008

**David M. Sheinbein, MD**
Associate Professor of Medicine (Dermatology) (primary appointment)
BA University of CA Berkeley 1987
MD Saint Louis University 1995

**Karen Ching-Chieh Shen, MD**
Instructor in Medicine (primary appointment)
MD Washington Univ in St. Louis 2017

**Mounir M Shenouda, UNKNOWN**
Instructor in Clinical Medicine (primary appointment)
UNKNOWN Alexandria University 1984

**Adrian Shifren, MBBCH, MS**
Associate Professor of Medicine (primary appointment)
BS University of the Witwatersra 1993
MBBCH University of the Witwatersra 1996
MS Washington Univ in St. Louis 2011

**Haina Shin, PHD**
Assistant Professor of Medicine (primary appointment)
PHD University of Pennsylvania 2009
BA Northwestern University 2004

**Bernard L Shore, MD**
Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1977
BS Washington Univ in St. Louis 1972

**Robert B Shuman, MD**
Associate Professor of Clinical Medicine (primary appointment)
BA Brandeis University 1977
MD University of Missouri 1981

**Sherry E Shuman, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Wayne State University 1982
BS University of Michigan 1978

**Corey Lamar Shy, MD**
Instructor in Medicine (primary appointment)
BA Prairie View A&M University 2013
MD Texas A&M University 2017

**Christine A Sigman, MD**
Instructor in Clinical Medicine (primary appointment)
BA Saint Louis University 1991

MD Saint Louis University 1996

**Jessica Monique Silva-Fisher, PHD**
Instructor in Medicine (primary appointment)
PHD Mayo Graduate School 2011
BS St Marys University 2005

**Julie Martha Silverstein, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Neurological Surgery
MD Drexel University 2007
BA New York University 2004

**Randy B Silverstein, MD**
Instructor in Clinical Medicine (primary appointment)

**Robert W Sindel, MD**
Instructor in Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1969
MD Washington Univ in St. Louis 1975

**Gary Singer, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Toronto 1987

**Gurcharan J Singh, MD**
Instructor in Clinical Medicine (primary appointment)
BS Delhi University 1968
MD Delhi University 1975

**Jasvindar Singh, MD**
Associate Professor of Medicine (primary appointment)
MD Fiji School of Medicine 1988

**Nathan Singh, MS, MD**
Assistant Professor of Medicine (primary appointment)
BA Haverford College 2006
MS University of Pennsylvania 2013
BA Haverford College 2006
MD University of Pennsylvania 2013

**Sudhir Man Singh, MBBS**
Instructor in Medicine (primary appointment)
MBBS Chittagong Medical College 2004

**Marc Alan Sintek, MD**
Assistant Professor of Medicine (primary appointment)
MD Univ of Nebraska at Kearney 2008

**Donald A Skor, MD**
Professor of Clinical Medicine (primary appointment)
MD Rush University 1978
BA Washington Univ in St. Louis 1973

**Amanda Melanie Smith, PHD**
Instructor in Medicine (primary appointment)
PHD Univ of New Castle Medical Sch 2014

**Gordon Ian Smith, MS, PHD**
Associate Professor of Medicine (primary appointment)
BS University College Chichester 2001
MS University College Chichester 2002
PHD University of Aberdeen 2006

**Raymond P Smith, MD**
Instructor in Clinical Medicine (primary appointment)
BA Vassar College 1980
MD University of Virginia 1984

**Timothy Robert Smith, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Mississippi 1983
MD University of Mississippi 1989

**Timothy W. Smith, MD, PHD**
Professor of Medicine (primary appointment)
MD Duke University 1993
BS Duke University 1986
PHD Oxford University 1989

**Michael C Snyder**
Adjunct Instructor in Medicine (primary appointment)

**Sandeep Sodhi, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Illinois 2010

**Allen D Soffer, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Missouri 1983

**Rand Washburn Sommer, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1980
BS Davidson College 1976

**Hani Charles Soudah, PHD, MD**
Associate Professor of Clinical Medicine (primary appointment)
PHD School Not Listed 1988
MD School Not Listed 1983

**George Souroullas, PHD**
Assistant Professor of Medicine (primary appointment)
BA Ohio Wesleyan University 2004
PHD Baylor University 2010

**William F Southworth, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1969
MD Washington Univ in St. Louis 1975

**James Joseph Spadaro Jr, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Louisiana St University 1976

**Michael L Spearman, MD**
Instructor in Clinical Medicine (primary appointment)
BS Kansas State University 1978
MD University of Kansas Medical 1982

**Andrej Spec, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Illinois 2010

BS Loyola University Chicago 2005

**Abby Lyn Spencer**
Professor of Medicine (primary appointment)
Vice Chair of Education

**David H. Spencer, MD, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Pathology and Immunology
MD University of Washington 2010
BS University of Washington 2001
PHD University of Washington 2008

**John Spertus**
Adjunct Professor of Medicine (primary appointment)

**Michael Spezia**
Instructor in Clinical Medicine (primary appointment)

**Erik Christian Stabell, MD**
Instructor in Clinical Medicine (primary appointment)
BA New College California 1976
MD School Not Listed 1983

**Paul M Stein, MD**
Professor of Clinical Medicine (primary appointment)
BA University of Rochester 1967
MD Saint Louis University 1971

**Phyllis K Stein, M ED, PHD**
Associate Professor of Medicine (primary appointment)
M ED University of Virginia 1987
BA Barnard College 1962
PHD University of Virginia 1990

**Richard Ian Stein, PHD**
Associate Professor of Medicine (primary appointment)
PHD Arizona State University 2000

**Emily Steiner, MD**
Instructor in Medicine (primary appointment)
MD University of Toledo 2013
BA Case Western Reserve Univ 2009

**William F Stenson, MD**
Dr Nicholas V Costrini Professor of Medicine (primary appointment)
BS Providence College 1967
MD Washington Univ in St. Louis 1971

**Barbara B Sterkel**
Adjunct Associate Professor of Medicine (primary appointment)

**Kara Ellen Sternhell-Blackwell, MA, MD**
Associate Professor of Medicine (Dermatology) (primary appointment)
MA Washington Univ in St. Louis 2003
MD Washington Univ in St. Louis 2005
BA Washington Univ in St. Louis 1999

**Nathan O. Stitziel, BA1, PHD, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Genetics
BA1 Washington Univ in St. Louis 1998
PHD University of Illinois Chicago 2006
BA Washington Univ in St. Louis 1998
MD University of Illinois Chicago 2006

**Keith Evan Stockerl-Goldstein, MD**
Professor of Medicine (primary appointment)
BA Washington Univ in St. Louis 1986
MD University of CA Los Angeles 1991

**James Andrew Stokes, MD**
Instructor in Clinical Medicine (primary appointment)
BA Stanford University 1976
MD University of Missouri 1984

**Michael Gary Stone, MD**
Instructor in Clinical Medicine (primary appointment)
MD Kansas Cty Univ Med/Bioscience 2008

**Cristina Strong, PHD**
Assistant Professor of Medicine (Dermatology) (primary appointment)
PHD University of Alabama 2002

**Xinming Su, MS, PHD**
Assistant Professor of Medicine (primary appointment)
BS Shihezi Medical College 1996
MS Nanjing Agriculture Univ 2003
PHD Nanjing Agriculture Univ 2006

**Xiong Su, PHD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Cell Biology and Physiology
BS Beijing University 1998
PHD Washington Univ in St. Louis 2004

**Hamsa Subramanian, UNKNOWN**
Instructor in Clinical Medicine (primary appointment)
BS St. Joseph's Convent - Trichy 1986
UNKNOWN Thanjore Medical College 1990

**Hani Suleiman, MD**
Assistant Professor of Medicine (primary appointment)
MD Regensburg University 2007

**Kaharu Sumino, PHD, M PA, MD**
Associate Professor of Medicine (primary appointment)
PHD Yokohama City Univ Sch Med 1999
M PA Johns Hopkins University 2008
MD Yokohama City Univ Sch Med 1992

**William Craig Summers, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Alabama 1994
MD University of AL Birmingham 1999

**Luis David Sumoza, MD**
Instructor in Medicine (primary appointment)
MD University de Carabobo 1990

**Rama Suresh, MBBS**
Associate Professor of Medicine (primary appointment)
MBBS University of Madras 1993

**Rudee Suwannasri, MD**
Instructor in Clinical Medicine (primary appointment)
MD Chiang Mai University 1973
BS Chiang Mai University 1971

**Reema Hameed Syed, MD**
Associate Professor of Medicine (primary appointment)
MD Dow Medical College Karachi 2019

## T

**Laneshia K Tague, MD**
Instructor in Medicine (primary appointment)
MD Northwestern University Med 2011
BS Northwestern University 2007

**Mohammad Tahir, MD**
Instructor in Clinical Medicine (primary appointment)
MD Dow Medical College Karachi 1976

**Benjamin R Tan, MD**
Associate Professor of Medicine (primary appointment)
MD University of the Philippines 1990
BS University of the Philippines 1985

**Kongsak Tanphaichitr, MD**
Professor of Clinical Medicine (primary appointment)
MD Siriraj Medical School 1970

**Heidi H Tastet, MD**
Instructor in Medicine (primary appointment)
MD Loma Linda University 2005

**Arnold S Tepper, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Missouri 1970
BS School Not Listed 1966

**Wanda T Terrell, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1979
BA Washington Univ in St. Louis 1975

**Larissa Bryka Thackray, PHD**
Associate Professor of Medicine (primary appointment)
PHD U of Colorado Health Sci Ctr 2003
BS Cornell University 1991

**George K. Thampy, MD**
Instructor in Clinical Medicine (primary appointment)
MD Kerala University 1977

**Shaukat Thanawalla**
Instructor in Clinical Medicine (primary appointment)

**J. Allen Thiel, MD**
Associate Professor of Clinical Medicine (primary appointment)
BS Rockhurst College 1956
MD Saint Louis University 1960

**Mark S Thoelke, PHD, MD**
Professor of Medicine (primary appointment)
PHD University of Illinois 1990
MD University of Illinois 1990
BS University of Illinois 1982

**Alex Anthony Thomas, MD**
Instructor in Medicine (primary appointment)
MD University of Louisville 2015

**Benjamin S Thomas, MD**
Adjunct Instructor in Medicine (primary appointment)
BS Georgia Tech 2002
MD Mercer University Macon 2009

**Theodore Seth Thomas, MD, M PH, MS**
Instructor in Medicine (primary appointment)
MD University of MO Columbia 2010
BS University of MO Columbia 2005
M PH Washington Univ in St. Louis 2017
MS University of MO Columbia 2006

**Erik P Thyssen, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD University of Copenhagen 1984
BS University of Copenhagen 1980

**Lawrence S Tierney, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD University of Illinois 1988
BS University of Illinois 1984

**Jeffrey P Tillinghast, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1980
BS State University of New York 1976

**Garry S Tobin, MD**
Professor of Medicine (primary appointment)
BS MO S&T (formerly UofMO Rolla) 1981
MD Washington Univ in St. Louis 1985

**Fadi Tohme, MD**
Adjunct Assistant Professor of Medicine (primary appointment)
MD St. Joseph University, Beirut 2010

**Douglas M Tollefsen, MD, PHD**
Professor of Medicine (primary appointment)
MD Washington Univ in St. Louis 1977
BA Grinnell College 1970
PHD Washington Univ in St. Louis 1977

**Valeria Tosti, MD**
Instructor in Medicine (primary appointment)
MD University of Verona 2009

**Robert R Townsend, PHD, MS, MD**
Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology

PHD Johns Hopkins University 1982
BS Centenary College 1972
MS Tulane University 1976
MD Tulane University 1976

**Elizabeth A Tracy, MD**
Instructor in Clinical Medicine (primary appointment)
MD Univ of Wisconsin Milwaukee 1986
BS Marquette University 1982

**Doris Janet Tribune-Brown**
Instructor in Clinical Medicine (primary appointment)

**Nikolaos Trikalinos, MD, CER, MS**
Assistant Professor of Medicine (primary appointment)
MD UNIVERSITY OF IOANNINA 2005
CER Johns Hopkins University 2015
MS Johns Hopkins University 2019

**Shivani Tripathi, MD**
Assistant Professor of Medicine (primary appointment)
MD Medical College of Wisconsin 2011

**Sandeep Kumar Tripathy, MD, PHD**
Associate Professor of Medicine (primary appointment)
MD University of Chicago 1998
BS University of Illinois 1990
PHD University of Chicago 1995

**Elbert P Trulock III, MD**
Rosemary and I Jerome Flance Professor of Pulmonary Medicine in Medicine (primary appointment)
BS Emory University 1968
MD Emory University 1978

**Thomas F Tse, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Nebraska 1972
MD Univ of Nebraska at Omaha 1976

**David J Tucker, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BS University of Notre Dame 1977
MD Saint Louis University 1981

**Dolores R Tucker, MD**
Assistant Professor of Clinical Medicine (Dermatology) (primary appointment)
MD Washington Univ in St. Louis 1974
BS Saint Mary's College 1958

**Stacey S Tull, MD, M PH**
Assistant Professor of Clinical Medicine (Dermatology) (primary appointment)
BS University of Texas Austin 1993
MD Duke University 1997
M PH Duke University 1997

**John W Turk, MD, PHD**
Professor of Medicine (primary appointment)
Alan A and Edith L Wolff Professor of Endocrinology
Professor of Pathology and Immunology
MD Washington Univ in St. Louis 1976
BA Washington Univ in St. Louis 1970
PHD Washington Univ in St. Louis 1976

## U

**Robert C. Uchiyama, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 1980
BS Stanford University 1976

**Mark C Udey, MD, PHD**
Professor of Medicine (Dermatology) (primary appointment)
MD Washington Univ in St. Louis 1982
BS Univ of Wisconsin Madison 1975
PHD Washington Univ in St. Louis 1982

**Fumihiko Urano, MD, PHD**
Samuel E Schechter Professor of Medicine (primary appointment)
Professor of Pathology and Immunology
MD Keio University 1994
PHD Keio University 1998

**Geoffrey L Uy, BA1, MD, MA**
Professor of Medicine (primary appointment)
BA Cornell University 1996
BA1 Cornell University 1996
MD Washington Univ in St. Louis 2001
MA Washington Univ in St. Louis 2001

## V

**Justin Marinus Vader, MD**
Associate Professor of Medicine (primary appointment)
MD University of Texas Southwest 2006

**Albert Lee Van Amburg IiI, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA Washington Univ in St. Louis 1968
MD Washington Univ in St. Louis 1972

**Brian Andrew Van Tine, MD, PHD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Pediatrics
MD University of AL Birmingham 2005
PHD University of AL Birmingham 2005
BS University of Arizona 1995

**Gil M Vardi, MD**
Assistant Professor of Clinical Medicine (primary appointment)
MD Tel-Aviv University 1988

**Maria Cristina Vazquez Guillamet, MD**
Assistant Professor of Medicine (primary appointment)
MD Carol Davila U of Medicine 2005

**Rodrigo Vazquez Guillamet, MD**
Associate Professor of Medicine (primary appointment)

MD University of Barcelona 2005

**Deborah J Veis, MD, PHD**
Professor of Medicine (primary appointment)
Professor of Pathology and Immunology
MD Washington Univ in St. Louis 1995
BA Princeton University 1987
PHD Washington Univ in St. Louis 1995

**Emmanuel A Venkatesan, MBBS**
Associate Professor of Clinical Medicine (primary appointment)
MBBS CMC, Vellore, India 1990

**Aaron Martin Ver Heul, MD, PHD**
Instructor in Medicine (primary appointment)
MD University of Iowa 2019
PHD University of Iowa 2019

**Amanda K Verma, MD**
Assistant Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
MD Duke University 2013

**Kiran Raj Vij, MD**
Associate Professor of Medicine (primary appointment)
Associate Professor of Pathology and Immunology
MD Gandhi Medical College 1993

**Ravi Vij, MBBS**
Professor of Medicine (primary appointment)
BS Delhi University 1991
MBBS Maulana Azad Medical College 1991

**Anitha Vijayan, MD**
Professor of Medicine (primary appointment)
MD University of the West Indies 1990

**Dennis T Villareal, MD**
Adjunct Associate Professor of Medicine (primary appointment)
BS University of San Carlos 1978
MD CEBU Doctor's College of Med 1982

**Alessandro Vindigni, MS, PHD**
Professor of Medicine (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Pathology and Immunology
MS University of Padua 1992
PHD University of Padua 1995

**John L Visconti, MD**
Assistant Professor of Medicine (primary appointment)
BS University of MO St Louis 1986
MD Univ of Health Sciences KC 1990

**Benjamin Allen Voss, MD, BA1**
Assistant Professor of Clinical Medicine (primary appointment)
MD Creighton University 2007
BA1 Saint Louis University 2003
BA Saint Louis University 2003

**Stanley G Vriezelaar, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of Iowa 1981
BA Simpson College 1977

## W

**Harry Lee Wadsworth, MD**
Instructor in Clinical Medicine (primary appointment)
MD Texas Tech University 1983
BS Texas Tech University 1978

**Stanley M Wald, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1946

**David A Walls, MD**
Instructor in Clinical Medicine (primary appointment)
BA Southern Illinois University 1979
MD Southern Illinois University 1982

**Sarah N. Walsh**
Instructor in Clinical Medicine (Dermatology) (primary appointment)

**Matthew John Walter, MD**
Edward P. Evans Endowed Professor of Myelodysplastic Syndromes (primary appointment)
Professor of Genetics
BS The American University 1990
MD Saint Louis University 1995

**Richard Coburn Walters, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
MD Washington Univ in St. Louis 1973
BS University of Illinois 1969

**Jean S Wang, PHD, MD**
Professor of Medicine (primary appointment)
Professor of Surgery (General Surgery)
PHD John Hopkins University 2009
MD Brown University 1998

**Lawrence L. Wang, PHD, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
BA Harvard University 1993
PHD Washington Univ in St. Louis 2001
MD Washington Univ in St. Louis 2001

**Leyao Wang, PHD, M PH**
Instructor in Medicine (primary appointment)
BA Nankai University 2017
PHD Fudan University 2017
M PH Johns Hopkins University 2017

**Andrea Wang-Gillam, MD, BS1**
Associate Professor of Medicine (primary appointment)
BS Ouachita Baptist University 1993
MD University of AR Little Rock 2001

BS1 Ouachita Baptist University 1993

**Saiama Naheed Waqar, MD**
Associate Professor of Medicine (primary appointment)
MD Aga Khan University 2001

**Jeffrey Peter Ward, PHD, MD**
Assistant Professor of Medicine (primary appointment)
PHD SUNY Upstate Medical Universit 2010
MD SUNY Upstate Medical Universit 2010
BS Wilkes University 2002

**Corinna Hendrell Warren, MD**
Instructor in Clinical Medicine (primary appointment)
BS Southern Ill Univ Edwardsville 1990
MD University of Illinois Chicago 1994

**David K. Warren, MD, MPH**
Professor of Medicine (primary appointment)
BS Pennsylvania State University 1990
MD University of Pittsburgh 1994
MPH Saint Louis University 2005

**Lukas Delbert Wartman, MD**
Assistant Professor of Medicine (primary appointment)
BS Univ of Wisconsin Madison 1998
MD Washington Univ in St. Louis 2005

**Karla Washington, MSW, PHD**
Associate Professor of Medicine (Pending Executive Faculty Approval) (primary appointment)
MSW University of missouri 2000
PHD University of missouri 2009

**Scott P Wasserstrom, MA, MD**
Instructor in Clinical Medicine (primary appointment)
BS University of Illinois 1990
MA Washington Univ in St. Louis 1995
MD Washington Univ in St. Louis 1995

**James Richards Watson, MD**
Instructor in Medicine (primary appointment)
MD Virginia Comm University 2016
BS University of Virginia 2006

**Jason Dean Weber, PHD**
Professor of Medicine (primary appointment)
Professor of Cell Biology and Physiology
PHD Saint Louis University 1997
BS Bradley University 1993

**H. James Wedner, MD**
Phillip & Arleen Korenblat Professor of Allergy and Immunology in Medicine (primary appointment)
BS Cornell University 1963
MD Cornell University 1967

**Xiaochao Wei, PHD**
Assistant Professor of Medicine (primary appointment)
PHD University of Rochester 2007

**Kevin D Weikart, MD**
Instructor in Clinical Medicine (primary appointment)
MD American Univ of the Caribbean 1979

**Gary J Weil, MD**
Professor of Medicine (primary appointment)
Professor of Molecular Microbiology
MD Harvard University 1975
BA Harvard University 1971

**Katherine N Weilbaecher, MD**
Oliver M Langenberg Distinguished Professor of Science and Practice of Medicine (primary appointment)
Professor of Cell Biology and Physiology
Professor of Pathology and Immunology
BA Harvard University 1987
MD Stanford University 1992

**Carla Joy Weinheimer, MS**
Associate Professor of Medicine (primary appointment)
BS University of Illinois 1984
MS Washington Univ in St. Louis 1997

**Leonard B Weinstock, MD**
Associate Professor of Clinical Medicine (primary appointment)
Assistant Professor of Clinical Surgery (General Surgery)
BA University of Vermont 1977
MD University of Rochester 1981

**Steven Jay Weintraub, MS, MD**
Associate Professor of Medicine (primary appointment)
BA State Univ of NY Binghampton 1978
MS University of Virginia 1981
MD University of Virginia 1985

**Edmond Weisbart**
Assistant Professor of Clinical Medicine (primary appointment)

**Alan N Weiss, MD**
Professor of Medicine (primary appointment)
BA Ohio State University 1963
MD Ohio State University 1966

**Edward P Weiss, PHD, MS**
Adjunct Research Assistant Professor of Medicine (primary appointment)
BS Southern Illinois University 1989
PHD University of Maryland 2003
MS Southern Illinois University 1992

**Mia Chana Weiss, MD**
Assistant Professor of Medicine (primary appointment)
BA Smith College 2010
MD Tel-Aviv University 2020

**Peter Douglas Weiss, MD**
Instructor in Clinical Medicine (primary appointment)
MD Case Western Reserve Univ 1980
BA Harvard University 1975

**John Sutton Welch, MD, PHD**
Associate Professor of Medicine (primary appointment)
BS Brigham Young University 1995
MD San Diego St University 2004
PHD University of CA San Diego 2002

**Lynn Ellis Welling, MD**
Adjunct Associate Professor of Medicine (primary appointment)
MD UniformedServUofHealthSciences 1989

**Alvin S Wenneker, MD**
Professor of Clinical Medicine (primary appointment)
MD Washington Univ in St. Louis 1953
BA Washington Univ in St. Louis 1949

**Jennifer Marie Wessels, MD**
Instructor in Clinical Medicine (primary appointment)
MD Saint Louis University 2009

**Peter Westervelt, MD, PHD**
Professor of Medicine (primary appointment)
BA Colby College 1985
MD Washington Univ in St. Louis 1992
PHD Washington Univ in St. Louis 1992

**Patrick White, MD**
Associate Professor of Medicine (primary appointment)
MD Ohio State University 2007
BS Notre Dame College 2002

**Michael Peter Whyte, MD**
Professor of Medicine (primary appointment)
Professor of Genetics
Professor of Pediatrics
MD State University of New York 1972
BA New York University 1968

**Samuel A Wickline, MD**
Terminated Faculty
MD University of Hawaii 1980
BA Pomona College 1974

**John F Wiedner, MD**
Instructor in Clinical Medicine (primary appointment)
MD School Not Listed 1985
BA Knox College 1982

**Deborah A Wienski, MD**
Instructor in Clinical Medicine (primary appointment)
MD Tufts University 1983
BA Smith College 1979

**Dominique S. Williams, MD**
Assistant Professor of Medicine (primary appointment)
BS University of Houston 2008
MD Baylor College of Medicine 2012

**George A Williams III, MD, MA**
Assistant Professor of Clinical Medicine (primary appointment)
MD Univ of Wisconsin Madison 1972
BA University of Notre Dame 1967
MA Columbia University 1968

**Kelley Jo Williams, MD**
Instructor in Medicine (primary appointment)
MD University of Illinois 2018
BS Saint Louis University 2011

**Nancy J Williams, MD**
Instructor in Clinical Medicine (primary appointment)
BA Dartmouth College 1982
MD University of Kansas 1987

**R. Jerome Williams Jr, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD Duke University 1977
BA Harvard University 1973

**Timothy John Williams, MD**
Instructor in Medicine (primary appointment)
BA McKendree College 2008
MD University of Cincinnati 2012

**Patrick H Win**
Instructor in Clinical Medicine (primary appointment)

**Karen Winters, MD**
Associate Professor of Medicine (primary appointment)
Director of the Student and Employee Health Service - Medical Campus
MD Southern Illinois University 1983
BS Illinois State University 1975

**Chad Alan Witt, MD**
Associate Professor of Medicine (primary appointment)
BS Texas Tech University 2001
MD University of Texas Southwest 2005

**Keith Frederic Woeltje, MD, PHD**
Professor of Medicine (primary appointment)
MD Texas Southern University 1991
BS University of Dallas 1984
PHD Texas Southern University 1991

**Edward M Wolfe, MD**
Instructor in Clinical Medicine (Dermatology) (primary appointment)
BA Hobart College 1956
MD Washington Univ in St. Louis 1960

**Gerald Wolff, MD**
Assistant Professor of Clinical Medicine (primary appointment)
BA Harvard University 1955
MD Washington Univ in St. Louis 1961

**John A Wood, MD**
Associate Professor of Clinical Medicine (primary appointment)
MD University of Oklahoma 1968

**Megan Elizabeth Wren, MD**
Professor of Medicine (primary appointment)

BA Washington Univ in St. Louis 1981
MD Washington Univ in St. Louis 1985

**Jeffrey M Wright, MD**
Assistant Professor of Clinical Medicine (primary appointment)
Assistant Professor of Clinical Pediatrics
MD Washington Univ in St. Louis 1979
BS Vanderbilt University 1975

**Haojia Wu, PHD**
Assistant Professor of Medicine (primary appointment)
BS Sun Yat-Sen University 2007
PHD University of Hong Kong 2014

**Kangyun Wu, PHD**
Instructor in Medicine (primary appointment)
PHD Beijing University 2007

**Xiaobo Wu, MD**
Associate Professor of Medicine (primary appointment)
MD Tongji University 1986

**Matthew A Wyczalkowski, MME, PHD**
Instructor in Medicine (primary appointment)
MME University of CA Berkeley 2000
BS Pennsylvania State University 1996
PHD Washington Univ in St. Louis 2009

## X

**Jun Xia, PHD**
Instructor in Medicine (primary appointment)
PHD University of Illinois 2006

**Zhifu Xiang, MD, PHD**
Associate Professor of Medicine (primary appointment)
MD Tongji University 1990
PHD Tongji University 1998

**Yan Xie, MD, MS**
Instructor in Medicine (primary appointment)
MD Tongji University 1986
MS Hubei Medical University 1991

## Y

**Naga M Yalla, MD**
Assistant Professor of Medicine (primary appointment)
MD SRTR Medical College 2005

**Timothy Teng-Kay Yau, MD**
Associate Professor of Medicine (primary appointment)
MD Saint Louis University 2005
BA Saint Louis University 2001

**Derek Yee, MD**
Instructor in Medicine (primary appointment)
MD Rutgers University 2014

**Debra Wendy Yen, MD**
Instructor in Medicine (primary appointment)
BS Washington Univ in St. Louis 2013
MD Washington Univ in St. Louis 2017

**Po-Yin Yen, PHD, MS**
Associate Professor of Medicine (primary appointment)
PHD Columbia University 2010
BS National Cheng Kung University 2001
MS Oregon Health Science Univers 2005

**Wayne M Yokoyama, MD**
Sam and Audrey Loew Levin Professor of Medicine (Rheumatology) (primary appointment)
Professor of Pathology and Immunology
BA University of Rochester 1974
MD University of Hawaii 1978

**Jun Yoshino, PHD, MD**
Assistant Professor of Medicine (primary appointment)
Assistant Professor of Developmental Biology
PHD Keio University 2004
MD Keio University 2000

**Mihoko Yoshino, MD, PHD**
Assistant Professor of Medicine (primary appointment)
MD Keio University 2000
PHD Shimane Medical University 2006

**Danicela Younce, MD**
Instructor in Medicine (primary appointment)
BS University North Carolina 2008
MD University North Carolina 2014

**Eman B Yousif, MD**
Instructor in Medicine (primary appointment)
MD University of Illinois 2017
BA Northwestern University 2013

**Simon Yu, MD**
Instructor in Clinical Medicine (primary appointment)
MD University of MO Columbia 1984

**Roger D. Yusen, MD, MPH**
Associate Professor of Medicine (primary appointment)
MD University of Illinois 1990
MPH Saint Louis University 2002
BS University of Illinois 1986

## Z

**Alan Zajarias, MD**
Professor of Medicine (primary appointment)
Professor of Surgery (Cardiothoracic Surgery)
MD National Autonomous U of Mex 2000

**John F. Zalewski, MD**
Instructor in Clinical Medicine (primary appointment)
MD State Univ of NY Buffalo 1980
BS Clarkson University 1973

**Nichole Gallegos Zehnder, MD**
Associate Professor of Medicine (primary appointment)
Associate Dean for Education Strategy

MD University of Rochester 2006

**Kathleen W Zhang, MD**
Assistant Professor of Medicine (primary appointment)
MD University of Pennsylvania 2013

**Qiang Zhang, PHD, MCHEM**
Instructor in Medicine (primary appointment)
BS Xiamen University 1995
PHD University of CA Santa Barbara 2003
MCHEM Xiamen University 1998

**Rong Mei Zhang, MD**
Instructor in Medicine (primary appointment)
BS University of Wisconsin - Madi 2005
MD Medical College of Wisconsin 2011

**Yong Zhang, MD, MS, PHD**
Assistant Professor of Medicine (primary appointment)
MD Anhui Medical University 1978
MS Sun Yat-Sen University 1983
PHD Albert Ludwig University 1999

**Diana Yi Zhao, PHD, MD**
Instructor in Medicine (primary appointment)
BS University of Chicago 2008
PHD Washington Univ in St. Louis 2017
MD Washington Univ in St. Louis 2017

**Peter Chen Zhao, MD**
Instructor in Medicine (primary appointment)
BS Emory University 2011
MD Washington Univ in St. Louis 2015

**Amy Wei Wei Zhou, MD**
Assistant Professor of Medicine (primary appointment)
MD Wayne State University 2009
BS University of Michigan 2005

**Lisa Ann Zickuhr, MD**
Assistant Professor of Medicine (primary appointment)
MD Northwestern University Med 2012
BS University of Notre Dame 2008

**Robert E Ziegler, MD, PHD**
Assistant Professor of Clinical Medicine (Dermatology) (primary appointment)
BA University of Colorado Boulder 1972
MD Duke University 1980
PHD Duke University 1980

**Ofer Zimmerman, MD**
Instructor in Medicine (primary appointment)
MD Ban-Ilan University 2020

# 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. 172), please refer to the information at the bottom of this section.

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9924 Clinical Sciences Research Building
Phone: 314-362-8925

Research in this translational physiology laboratory is focused on the development of novel antithrombotic approaches for use during acute myocardial infarction, stroke, and surgery in which vascular injury is an underlying mechanism. Current studies are designed to define the efficacy of targeting antithrombotics to the surface of injured vascular cells and activated platelets on thrombus progression. One approach uses nanoparticles covered with epitopes to bind exposed receptors on thrombus and containing inhibitors of coagulation or platelet activation. Students will be expected to participate in experiments using animal models and will develop skills in experiment design, vascular physiology, clinical antithrombotic therapy, coagulation, histopathology and statistics.

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**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.

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**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.

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**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.

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**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.

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**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.

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**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.

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**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.

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**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.

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**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.

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**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 hysterophoros,* a newly recognized allergen.

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## 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

Courses include the following:

- M25 Medicine (p. 172)
- M27 Emergency Medicine (p. 179)

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## M25 Medicine

Visit online course listings to view offerings for M25 Medicine (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M25).

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**M25 Medicine 507 Practice of Medicine I**

POM I is a large course which spans all 3 blocks of the first year. It is composed of three content areas: 1. Clinical Skills 2. Patient, Physician, and Society 3. Clinical Knowledge Each of these three content areas has two or more sections, each run by a faculty section leader. POM I employs a variety of teaching techniques, instructors and venues. This includes lecture, small group discussions, panel sessions, one-on-one hospital interviews, standardized patient sessions, a patient home visit, and visits to both a primary care office and a city clinic. What are the educational goals of POM I? Students will learn to: 1. Perform a complete history and physical examination with thoroughness, accuracy, sensitivity and compassion. 2. Communicate effectively, efficiently and compassionately with patients, families and other health professionals. 3. Describe and analyze the statistical methodology of clinical studies and apply the results to individuals and groups of patients. 4. Identify and investigate ethical, cultural, socioeconomic and political factors relevant to medical interactions. 5. Examine and analyze personal and professional competencies, limitations and behaviors. How do we accomplish these goals? 1. Learning skills and techniques requires a cycle of steps: preparation, background reading, attempts at skill performance, analysis and reflection on performance, discussion of potential improvements and successive performance of the skill with advancement to a new level of expertise. 2. The focus is on learning skills. You practice each skill, such as interviewing, in a variety of venues and situations of varying complexity. This course is for learning about how to do things that you will use for taking care of patients and families. 3. You work in multiple learning environments. a. Academic environments: Small group sessions for discussion, small group practice sessions, peer learning, small group presentations, individual and group writing assignments, and reflections on experiences are the preferred learning locations. b. Clinical environments: Inpatient units with faculty and WUSM IV mentors, standardized patient experiences with videotape review, physicians' offices, patients' homes with and without home care professionals, and a city clinic.
Credit 198.5 units.

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**M25 Medicine 605A Infectious Diseases**

The Infectious Diseases course teaches both organism-specific and organ-specific approaches to disease caused by microbes. The course expands upon the material presented in the first year concerning bacteria, viruses, fungi and parasites and their involvement in causation of human disease. It explores the complex interaction between microbes and host in the individual patient, and at the broader public health level. The course introduces the recognition and initial management of common infectious diseases. Educational methods include lecture, interactive in-class case discussions and review sessions, and student-led clinical case discussions in small groups.
Credit 51 units.

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**M25 Medicine 606A Rheumatology**

A major focus of the course is teaching "how to think like a rheumatologist", emphasizing the concept of clinical diagnosis: the history and physical generate a clinical hypothesis, which is supported by laboratory tests. Inflammatory arthritis (rheumatoid arthritis, spondyloarthropathies, crystalline disorders, and infectious arthritis), classic "autoimmune diseases" (lupus, inflammatory myopathy, and scleroderma), and vasculitic syndromes are presented. A team based learning exercise on rheumatology lab tests gives students a chance to teach one another the details. Two separate sessions with four unknown patients gives students a chance to interview patients and try to make a diagnosis.
Credit 17 units.

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**M25 Medicine 607 Practice of Medicine II**

The goal of The Practice of Medicine (POM) course is to provide students with the knowledge, skills and attitudes essential to patient care regardless of specialty. POM II is a continuation of POM I and will continue to address various interfaces between patients, physicians and society and will also introduce the advanced physical exam and approaches to clinical thinking and decision-making. The sections of POM II include Clinical Skills, Case Development, Communication Skills, Ophthalmology, Radiology, Community and Public Health, Ethics and Health Policy Humanities, and Scientific Methods. The learning objectives for each section of POM II emphasize topics and skills used in all fields of medicine, and the majority of the course work will be taught in small groups or through clinical experiences.
Credit 89 units.

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**M25 Medicine 611B Cardiovascular Disease**

Cardiovascular disease remains the number one cause of death within the United States, although steady advances in the field have greatly reduced both its associated morbidity and mortality. This course provides a foundation for understanding the pathophysiology, diagnosis, and management of cardiovascular conditions commonly encountered in clinical practice, including hypertension, ischemic heart disease, heart failure, arrhythmias, valvular heart disease, pericardial diseases, aortic diseases, peripheral arterial disease, and venous disorders. An emphasis is placed on describing the current state of knowledge in cardiology while also including some of the exciting new developments that are revolutionizing patient care. The course includes lecture overviews of each topic along with small group and team-based learning sessions to solidify and apply knowledge of the material to patient case scenarios. In addition, "EKGs of the Week" allow students to practice a structured approach to the interpretation of EKGs.
Credit 30 units.

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**M25 Medicine 612B Pulmonary Diseases**

The pulmonary pathophysiology course is designed to familiarize medical students with the pathophysiological mechanisms underlying diseases of the pulmonary system. The course begins with a brief review of pertinent pulmonary physiology and pulmonary function, and then explores how pathologic disorders alter normal lung physiology resulting in the clinical presentation of disease. Major categories of clinical pulmonary diseases discussed include obstructive lung diseases, restrictive lung diseases, pulmonary vascular diseases and pleural disease. Educational methods include lectures, team based learning and review sessions.
Credit 22.5 units.

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**M25 Medicine 613B Renal & Genitourinary Diseases**

This course focuses upon the wide variety of renal diseases. It will begin with a brief review of pertinent renal physiology, and then will explore disorders of fluids/electrolytes (abnormalities in plasma water/solute balance), patterns of acute and chronic kidney injury (including nephritic/nephrotic syndromes and renal involvement in systemic disorders), and finally the

options available when end stage kidney disease is reached (hemodialysis, peritoneal dialysis, transplantation). The course contains a mixture of lecture, small group, team based learning, case-based presentations, and patient presentation.
Credit 38 units.

**M25 Medicine 614 Dermatology**
The dermatology second-year course is designed to provide medical students with a foundation in dermatology that will support future learning and improve diagnostic skills in general medicine and a wide variety of specialties. Medical students will learn how to describe skin lesions and the pathophysiologic basis and clinical characteristics of major dermatologic diseases. Major categories of clinical skin diseases and their most prominent constituents will be discussed, including papulosquamous diseases, blistering diseases, infectious diseases, and benign and malignant neoplasms.
Credit 8 units.

**M25 Medicine 615A Endocrinology and Metabolism**
The endocrine pathophysiology course aims to provide an understanding of the pathophysiology and clinical manifestations of common endocrine disorders. Emphasis is placed upon relevant clinical history and physical examination as well as the interpretation of investigations for endocrine disorders. Basic principles of treatment of endocrine disorders will also be discussed. Lectures are supplemented by organ-specific clinical case discussions.
Credit 31 units.

**M25 Medicine 620A Gastroint. and Liver Diseases/Nutrition**
This course discusses the pathophysiological mechanisms underlying diseases of the gastrointestinal tract including esophagus, stomach, small and large intestines, liver, gall bladder and pancreas. A series of lectures related to nutrition and the impact of nutritional disorders on health and disease are also included. Lectures are supplemented by group seminars that include discussion of clinical case presentations.
Credit 32 units.

**M25 Medicine 625A Hematology and Oncology**
The hematology pathophysiology course exposes students to common hematologic disorders and hematologic malignancies. The course utilizes lectures, clinical case discussions and practical sessions involving microscopy.
Credit 39 units.

**M25 Medicine 707 Practice of Medicine III**
Objectives: 1. To review challenges and dilemmas relevant to the practice of clinical medicine. 2. To examine clinical experiences from a variety of perspectives. In this course, themes and topics relevant to students in their clinical stage of training are discussed. Session formats include lecture, panel discussion and/or small group. As students exchange problematic scenarios and questions, the group develops potential solutions and management schemes. *Topics in the past have included: 1) Diversity 3.0 training 2) Business of medicine 3) Individualized Learning Objectives in clinical scenario 4) PSQI 5) Mock Deposition, Risk Management, and Adverse Patient Outcomes 6) Compassion Fatigue, Resilience, and Burnout Part 1 7) Compassion Fatigue, Resilience, and Burnout Part 2 8) Caring for Incendiary Patients 9) Diagnostic Error and Transitions of Care 10) Strategies for Effective Teaching and Mentoring Attendance at 8 out of 10 POM III sessions is required to pass this course. Students may use 2 absences for any reason and are recommended to save them for their ACES rotation, Labor & Deliver rotation, or an emergency.

**M25 Medicine 710 Medicine Clerkship**
The Medicine clerkship provides supervised study of patients in both inpatient and ambulatory settings. For the inpatient rotations, students are assigned as clinical clerks to patients admitted to the general medical teaching services of Barnes-Jewish Hospital and Veterans Administration Medical Center. For the outpatient rotations, students learn primary care in internal medicine and family medicine clinics at Barnes-Jewish hospital or community-based practices. Teaching is provided by the Chief of Service, attending Physicians, House Officers, consultants, Chief Residents and regularly scheduled conferences. Formal instruction is given regarding core internal medicine topics during the clerkship. A minimum of 12 weeks is required: 3 consecutive 4-week rotations.
Credit 462 units.

**M25 Medicine 714 Ambulatory Clerkship: Emergency Medicine**
The Urgent Care area (UCA) serves as our site for the WUSM III Ambulatory Care Rotation. Three students at a time are assigned to this 4 week rotation. Students will spend their first day in an orientation session learning suturing, ECG interpretation and airway management (including intubation skills) in hands-on laboratories. They will also review pelvic examinations and view an education video on domestic violence. On day two, they begin primarily evaluating non-emergent patients in Urgent Care and report directly to an Emergency Medicine attending. There are 4 hours of conferences per week (8:00 - 10:00 AM on Tuesday and Wednesday mornings) - attendance is mandatory. Discussions are currently underway to allow students to participate in helicopter ride-alongs with ARCH Airmedical Services. Students can expect to gain a wide range of skills in evaluating uncomplicated upper respiratory infections, urinary tract infections, sexually transmitted diseases, lacerations, eye problems, rashes, simple extremity trauma--in general, "bread and butter" medical/surgical problems. Students do a case presentation (15 min) at the close of the block.
Credit 154 units.

**M25 Medicine 740 Dermatology Clerkship**
The goal of the dermatology clerkship is to provide a guide for the student to appreciate dermatology within the broader perspectives of medicine and biology. The student will develop familiarity with dermatologic vocabulary, learn to recognize and initiate therapy of common dermatologic disorders and become cognizant of uncommon or complicated dermatologic problems that require specialty care. Emphasis will be placed on careful history taking and physical examination. Students will always work under the direction of the resident physician and the attending physicians in the clinic setting.
Credit 154 units.

**M25 Medicine 750 Geriatrics Clerkship**
The primary goal of this rotation is for students to gain proficiency in the principles of geriatric evaluation and management, including the medical, psychological, social, and functional assessments of older adults. Students are expected to participate in the evaluation of three to five patients per week, in a variety of settings including the outpatient Geriatric

Assessment Clinic, in-patient Geriatric Consult service, Parc Provence nursing home, and the Rehabilitation Institute of St. Louis (TRISL). Students will also have the opportunity to participate in hospice and home care visits, interdisciplinary team meetings, and observe an assessment at the WU Alzheimer's Disease Research Center. Students are expected to attend weekly conferences while on the rotation. The day normally begins at 8:30 a.m. and is usually finished by 5:30 p.m. There is no night or weekend call. Time is provided to read the detailed syllabus/bibliography. Many clinical activities are off-site from the medical campus. Students will be required to coordinate transportation to and from such sites. Students will be expected to give an oral presentation on a topic of their choice once during the rotation.
Credit 154 units.

**M25 Medicine 801 General Medicine Subinternship - BJH**
The purpose of the General Medicine Subinternship is the development of expertise in the care of hospitalized patients in a well-supervised teaching environment. Subinterns act as their patients' interns under the supervision of residents and attending physicians. Subinterns have the same on-call and admitting schedules as the interns on their teams and are assigned up to two new patients on each admitting day. Subinterns are not required to spend call nights in the hospital. Except in emergencies, subinterns are the first individuals to evaluate patients admitted to medical service teams. A diagnostic and therapeutic approach to the patient is planned in consultation with the resident. Subinterns assume primary responsibility for the daily care of their patients, under the supervision of resident and attending physicians. This includes evaluation on daily rounds, scheduling and obtaining results of diagnostic studies, planning therapy, making arrangements for care after discharge and communicating with patients and their families. Subinterns attend the same conferences as the house staff.

**M25 Medicine 805 Rheumatology**
Students will be involved in the diagnostic work-up and management of patients with conditions such as: systemic lupus erythematosus, rheumatoid arthritis, scleroderma, vasculitis (ANCA-associated vasculitis, temporal arteritis, etc.), spondyloarthropathies (ankylosing spondylitis, psoriatic arthritis, reactive arthritis, etc.), and gout; there is less exposure to osteoarthritis and regional musculoskeletal problems. By working closely with a faculty member, fellows and medical residents, students become integral and active members of the rheumatology service for 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 two rheumatology conferences held weekly. A rotation limited to outpatient rheumatology is possible by prior arrangement with the Course Director.

**M25 Medicine 807 General Medicine Subinternship - VA**
The purpose of the General Medicine Subinternship at the VA Medical Center is to develop proficiency in the care of hospitalized patients on an internal medicine ward. Subinterns will have similar responsibilities as interns, with appropriate supervision by the attending and resident physicians. They have the same on-call/admitting schedules as the interns and participate in the same teaching conferences, but they do not take overnight call. Subinterns should admit at least two patients per call day, and they should be the first to evaluate the patients admitted to the medical service, except in emergencies. A diagnostic and therapeutic approach to evaluating each patient is planned in consultation with the resident. Subinterns assume primary responsibility for the daily care of their patients, including evaluating each patient daily, presenting on morning rounds entering orders (discussed with and co-signed by the resident), interpreting results of diagnostic studies, calling consults, collaborating with nurses and social work, organizing post-discharge care, and communicating with patients and their families. Subinterns also attend weekly small group learning sessions during which they discuss, diagnose, and treat patients using example cases. By the end of the VA General Medicine Subinternship, subinterns will be able to independently: - synthesize and succinctly present a patient's history, exam, diagnostic data, assessment, and plan of care. - support differential diagnoses and proposed care plans with clinical reasoning and evidence. - demonstrate how to correctly order diagnostic tests and medications that further patient care. - analyze complex patient cases during interactive small group learning sessions. - integrate feedback from patients, residents, and attending physicians, and formulate a plan for ongoing improvement as a clinician.

**M25 Medicine 810 Geriatric Medicine**
The primary goal of this rotation is for students to gain proficiency in the principles of geriatric evaluation and management, including the medical, psychological, social, and functional assessments of older adults. Students are expected to participate in the evaluation of two to ten patients per day, in a variety of settings including the outpatient Geriatric Assessment Clinic, inpatient Geriatric Consult service, outpatient Geriatric Medicine Primary Care clinics, VA Home-Based Primary Care, and Parc Provence Nursing Home. Students will also have the opportunity to participate in hospice and home care visits, interdisciplinary team meetings, and observe an assessment at the WU Alzheimer's Disease Research Center. Students are expected to attend weekly conferences while on the rotation. The day normally begins at 8:30 am and is usually finished by 5:30 pm. There is no night or weekend call. Time is provided to read the detailed syllabus/bibliography. Many clinical activities are off-site from the medical campus; students will be required to coordinate transportation to and from such sites. Students will be expected to give an oral presentation on a topic of their choice once during the rotation.

**M25 Medicine 811 Hospitalist Subinternship**
This course allows the student to work one-on-one with hospitalist physicians on a patient care team. The student acts as the intern under the direct supervision of the attending physician. Daily responsibilities include admission history and physicals, daily notes and discharge summaries on assigned patients. S/he also will have the opportunity to perform indicated procedures on patients on this service. Students are encouraged to participate in Department of Medicine conferences.

**M25 Medicine 811A Clinical Internal Medicine: Hospitalist**
This course allows the student to work one-on-one with hospitalist physicians on a patient care team. Daily responsibilities include admission history and physicals, daily notes, and discharge summaries for assigned patients. Students will also have the opportunity to perform indicated procedures on patients on this service. Students are encouraged to participate in Department of Medicine conferences.

**M25 Medicine 821 Inpatient Cardiology**
Students will participate as members of the Barnes-Jewish Cardiology at Washington University Consultative Team. They will be part of a team composed of faculty members, fellows, residents, and nurse practitioners that sees a large population of cardiac patients and follows them through all aspects of their in-hospital care. Emphasis will be placed on physical examination and the interpretation of modern cardiac diagnostic tests including electrocardiograms, echocardiograms and coronary angiograms and their role in clinical decision making.

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**M25 Medicine 822 Cardiology Subinternship**
The structure and functioning of the Cardiology subinternship is very similar to the General Medicine Subinternship (M25 801 and M25 807). The basic purpose is to develop expertise in the care of hospitalized patients in a well-supervised teaching environment. The majority of patients admitted to the service will have a cardiology diagnosis as the main reason for admission. Some general medical problems will also be seen. All attendings on the service are cardiology subspecialists. Cardiology fellows act as the chief resident for the service on a monthly basis. Subinterns act as their patients' interns under the supervision of residents and attending physicians. Subinterns have the same on-call and admitting schedules as the interns on their teams and are assigned up to two new patients on each admitting day. Subinterns are not required to spend call nights in the hospital. Except in emergencies, subinterns are the first individuals to evaluate patients admitted to medical service teams. A diagnostic and therapeutic approach to the patient is planned in consultation with the resident. Subinterns assume primary responsibility for the daily care of their patients, under the supervision of resident and attending physicians. This includes evaluation on daily rounds, scheduling and obtaining results of diagnostic studies, planning therapy, making arrangements for care after discharge and communicating with patients and their families. Subinterns attend the same conferences as the internal medicine house staff. There are also several conferences specific to the cardiology service.

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**M25 Medicine 823 Clinical Cardiology - VA Hospital**
The major purpose of this elective in clinical cardiology at the John Cochran VA Hospital is to improve evaluation and management skills for diagnosis and treatment of important cardiovascular conditions such as coronary artery disease including acute myocardial infarction, congestive heart failure, hypertension, and valvular heart disease. The rotation is designed to be flexible enough to accommodate a wide variety of course objectives but includes the opportunity to participate in 1-3 outpatient clinics per week; 1-4 weeks of inpatient intensive care, telemetry, or cardiology consultation rounds; and ECG, stress testing, nuclear imaging, or echocardiographic reading sessions, cardiac catheterization and electrophysiologic procedures. The emphasis will be on improvement of the ability to diagnose and treat cardiovascular disease on the basis of information obtained from a thorough history and physical examination that is integrated with data from appropriate highly targeted laboratory studies in a manner that optimizes patient outcome and minimizes risk and costs.

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**M25 Medicine 825 Cardiac Arrhythmias and Electrophysiology**
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 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.

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**M25 Medicine 827 Heart Failure/Cardiac Transplantation**
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.

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**M25 Medicine 830 Dermatology**
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.

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**M25 Medicine 831 Pediatric Dermatology**
This clinical rotation will be available to students interested in dermatology, pediatrics or both. Students will follow the dermatology rotation (M25 830) with an emphasis on pediatric dermatology by attending pediatric dermatology clinics, seeing consults, etc.

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**M25 Medicine 836 Clinical Gastroenterology and Hepatology**
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.

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**M25 Medicine 836A Treatment of Patients with Inflammatory Bowel Disease**
This elective will allow students to spend an intensive period of time learning about all aspects of the care of patients with IBD (surgical, endoscopic, and medical management). Although a predetermined schedule has been developed, it can be modified based on the student's interest. Alternative options include: - inpatient IBD care (Barnes-Jewish Hospital and Barnes West County) - wound clinic / stoma care - specialized endoscopy (chromoendoscopy, ERCP) - IBD / colorectal surgery - pathology

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**M25 Medicine 838 Medicine Consult Service**
The focus of the Medicine Consult Service elective is the evaluation and management of medically complex patients admitted to the hospital on non-medicine services. The issues involved with perioperative management are particularly stressed. 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 a Hospital Medicine attending and a senior medical resident. Attendance at Department of Medicine and division conferences is encouraged.

**M25 Medicine 844 Hematology and Hemostasis**
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.

**M25 Medicine 847 Bone and Mineral Diseases**
The 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, and more rare disorders of bone development and homeostasis. The student will rotate through clinics of the Division of Bone and Mineral Diseases, and see patients at Barnes-Jewish Hospital, Barnes-Jewish West County Hospital and Shriners Hospital for Children. Acquired and heritable bone diseases will be studied in the context of derangements of mineral homeostasis with emphasis on vitamin D and peptide hormone metabolism and skeletal formation and remodeling. The role of non-invasive methods for measuring bone mass in the diagnosis and management of skeletal diseases also will be stressed. Faculty and medical students will present interesting cases for discussion or the students can present a pertinent topic related to bone metabolism they have researched during their rotation.

**M25 Medicine 849 Sun Protection Outreach Teaching by Students (SPOTS)**
Students will teach public and private middle school and/or high school students in the St. Louis area about skin cancer and sun protection. SPOTS courses are taught in 60- to 90-minute sessions. The program involves delivering a PowerPoint presentation with a prewritten script, interactive games, a video, and hands-on demonstrations. The elective is open to students who are new to this program, as well as students who previously participated in the SPOTS first-year selective. Students new to SPOTS are required to attend two evening training sessions (2.5 hours each) to learn the content of the program, as well as teaching strategies. For students who have taught SPOTS before, only one evening session is required. Training sessions for all enrolled students occur in the fall. A winter training session can be added if needed. Students will teach 4 SPOTS session per week of elective credit (8 sessions total). Students participating in the elective need to arrange for their own transportation to teaching sessions. Sessions are typically taught by students in pairs. Learning objectives: 1. Demonstrate knowledge of basic principles of skin cancer, including how to detect skin cancer and how to decrease risk with photoprotection. 2. Effectively communicate this knowledge to children/adolescents.

**M25 Medicine 853 Bone and Joint Infectious Diseases**
Study of infectious diseases of the bones and joints, including infections in both native and prosthetic joints. The elective is designed to teach students the fundamentals of evaluating clinical orthopedic infections and formulating plans for workup and therapy. Students see consultations in infectious diseases in every part of Barnes-Jewish Hospital under the supervision of a faculty member who rounds with them every day. They work closely with the infectious diseases attending and nurse practitioner, follow their own patients and play an important role in their management. They are expected to read the literature about their patients and participate in clinical conferences. They attend teaching rounds and conferences and lectures in infectious diseases. They also learn appropriate use of antibiotics and antifungal agents. The role of surgical and medical management is discussed, and the students will interact with surgical staff in understanding the risks and outcomes of these common infections. Two weeks of General Inpatient Infectious Disease are a prerequisite to this course.

**M25 Medicine 854 Transplant Infectious Diseases**
Study of infectious diseases in patients who have had bone marrow or solid organ transplants, or who have a hematologic malignancy. The elective is designed to teach students the fundamentals of evaluating clinical infections in these complex and interesting patients and formulating plans for workup and therapy. Students see consultations in every part of Barnes-Jewish Hospital under the supervision of a faculty member who rounds with them every day. They work closely with infectious disease fellows, follow their own patients and play an important role in their management. They are expected to read the literature about their patients and participate in clinical conferences. They attend teaching rounds and conferences and lectures in infectious diseases. They also learn appropriate use of antibiotics, antifungal and antiviral agents in this highly immune suppressed population. A wide distribution of infectious diseases is covered including management of neutropenic fever, invasive fungal infections in the transplant population, acute and chronic infections, infection prophylaxis and monitoring and interactions between immunosuppressive agents and antibiotics.

**M25 Medicine 858 Ambulatory Infectious Diseases**
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 ID fellows and Internal medicine residents. Students will participate in the care of HIV-infected or otherwise immunosuppressed patients as well as general infectious disease patients. The clinic is the primary provider for many HIV-infected patients, 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.

**M25 Medicine 859 General Inpatient Infectious Diseases**
This elective allows students to participate in the management of patients with a wide variety of infections in the inpatient setting. The elective is designed to teach students the fundamentals of evaluating clinical problems in infection and formulating plans for diagnosis and management. Students see consultations in infectious diseases in every part of Barnes-Jewish Hospital under the supervision of a faculty member who rounds with them every day. They work closely with medical residents and infectious disease fellows, follow their own patients and play an important role in their management. They are expected to read the literature about their patients and participate in clinical conferences. They attend teaching rounds, conferences, and lectures in infectious diseases. They see a wide variety of infection diseases including community acquired acute and chronic infections, surgical infections, opportunistic infections in HIV-infected patients and other immunocompromised hosts, hospital-acquired infections, and basic infection control practices. They also learn appropriate use of antibiotics, antifungal and antiviral agents.

**M25 Medicine 861 Oncology - Inpatient Consult Service**
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 bed side teaching and attend tumor boards and lectures focused on the care of patients with solid tumors. 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.

**M25 Medicine 867 Medical Intensive Care**
The Medical Intensive Care Unit Elective is designed to introduce senior medical students to cognitive and procedural aspects of critical care medicine. Students will be expected to learn the basic pathophysiology and treatment approaches to respiratory failure, shock states and metabolic derangements. Participation in procedures will be encouraged as available. Dynamics of difficult conversations with patients and family members will also be modeled and discussed. Clinical responsibilities will occur as a part of a team and students will be expected to participate in admissions and daily follow-up on assigned patients. Teaching will occur via didactic lectures on weekdays and formal patient discussions on rounds.

**M25 Medicine 869 Palliative Medicine**
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. 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 make home visits with hospice 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. In addition, students will be expected to participate in bi-weekly presentations/group discussions on selected aspects of Palliative Medicine with the BJH Palliative Care team. Students will also be required to give a 20-minute presentation to the BJH Palliative Care team at the end of their rotation.

**M25 Medicine 870 Endocrinology, Diabetes, and Metabolism**
In general, the four-week rotation will be divided into two weeks of general endocrinology and two weeks of diabetes. Students taking this elective will perform consultations with fellows and faculty on the inpatient services at Barnes-Jewish Hospital and will also see patients with endocrine and metabolic diseases in the Outpatient Consultation. They will present these cases daily on teaching rounds. They will also participate in case conferences and seminars on a weekly basis. Extensive interaction with patients with diabetes and a diabetes education program are included, as is involvement with patients with thyroid, pituitary, adrenal, gonad, metabolic bone disease, and lipid disorders. Ample opportunities will be provided for discussions of patient problems with the members of the division. A variety of outpatient clinics are offered in the division and interested students should speak with the fellows and faculty members to customize the learning experience to match his or her career goals. At the end of the rotation, it is expected that students will have the ability to initiate inpatient and outpatient management of diabetes including insulin dosing and glucose monitoring, as well as evaluate and treat a variety of endocrine disorders including but not limited to thyroid, pituitary, and adrenal disease. Students will learn to perform effective inpatient and outpatient consultations.

**M25 Medicine 871 Oncology - Outpatient**
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 chemotherapy, 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.

**M25 Medicine 877 Intensive ECG Interpretation**
During this two-week elective, students will read 20-25 ECGs obtained from the Barnes-Jewish Cardiac Diagnostic Laboratory, with an overread by an experienced electrocardiographer. There will also be didactic sessions covering infarction, ventricular hypertrophy, heart block, arrhythmias, and aberrant conduction.

**M25 Medicine 879 Pulmonary Clinic for the Underserved**
Clinical setting: Outpatient Clinic dedicated to providing pulmonary specialty care to patients who are predominantly uninsured or who rely upon public assistance such as Medicaid. Student role: Students independently interview and examine patients and present findings to the attending, tests and imaging are reviewed, and provider and attending develop plan. Common problems/diseases: Asthma, COPD, sarcoidosis, lung cancer, and obstructive sleep apnea are commonly seen. Also, patients are referred for evaluation of abnormal x-rays and for symptoms such as dyspnea. Primary learning objectives: - to understand and practice important history and exam skills in pulmonary medicine: symptoms, smoking history, work and environmental exposures, and important pulmonary physical exam findings. - to understand the basics of pulmonary function tests, chest imaging, and methods for tissue sampling. - to understand the basis of treatment of common pulmonary disorders. Conferences: There is no conference associated with this clinic, but students may attend the usual Thursday morning Medicine Grand Rounds at 8:00 am and the Pulmonary Grand Rounds at 11:00 am if the subject matter is appropriate.

**M25 Medicine 880 Pulmonary Medicine - Barnes-Jewish Hospital**
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 in outpatient Lung Center and attend regular pulmonary and critical care medicine conferences.

**M25 Medicine 884 Bone Marrow Transplantation and Stem Cell Biology**
Intense four-week clinical rotation exposing interested fourth-year medical students to the clinical world of bone marrow transplantation and to the basic science of hematopoiesis, leukemia, stem cell biology, and gene and cellular therapy including chimeric antigen receptor (CAR) Tcell therapies. Students will be primarily responsible for the care of autologous and allogeneic BMT recipients and those patients being treated for a variety of hematologic malignancies such as AML, ALL, multiple myeloma and Non-Hodgkin's Lymphoma. In addition they will be exposed to methods of stem cell harvest, cryopreservation, and immunophenotyping. This rotation plans to provide motivated students with an ideal mix of clinical medicine and basic science.

**M25 Medicine 890 Clinical Nephrology**
Students rotate through inpatient and outpatient experiences to gain exposure to all facets of nephrology. They will spend time 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.

**M25 Medicine 890A Kidney Transplant**
Students participating in this elective will: - gain exposure to end-stage renal disease and the treatment options, - examine kidney transplantation as the most valuable option, - learn about immunosuppression, and - gain exposure to infectious diseases like CMV, BK, and adeno virus that are commonly seen in patients that have had a kidney transplant (and not often seen otherwise).

**M25 Medicine 893 Adult Allergy and Clinical Immunology**
Students will participate in the outpatient Allergy Clinics located in Barnes Jewish Hospital Center for Advanced Medicine, Barnes Jewish West County, and Center for Advanced Medicine South County. Students will participate in allergy skin testing, pulmonary function testing, and drug desensitization. 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.

**M25 Medicine 900 Research Elective - Internal Medicine**
Research opportunities may be available. If interested, please contact the Department of Internal Medicine.

## M27 Emergency Medicine

Visit online course listings to view offerings for M27 Emergency Medicine (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M27).

**M27 EMED 714 Ambulatory Clerkship: Emergency Medicine**
The Urgent Care area (UCA) serves as our site for the WUSM III Ambulatory Care Rotation. Three students at a time are assigned to this four-week rotation. Students will spend their first day in an orientation session learning suturing, ECG interpretation, and airway management (including intubation skills) in hands-on laboratories. They will also review pelvic examinations and view an education video about domestic violence. On day two, they begin primarily evaluating non-emergent patients in Urgent Care and report directly to an

Emergency Medicine attending. There are four hours of conferences per week (8-10 a.m. on Tuesday and Wednesday mornings), and attendance is mandatory. Discussions are currently underway to allow students to participate in helicopter ride-alongs with ARCH Airmedical Services. Students can expect to gain a wide range of skills in evaluating uncomplicated upper respiratory infections, urinary tract infections, sexually transmitted diseases, lacerations, eye problems, rashes, simple extremity trauma -- in general, the "bread and butter" medical/surgical problems. Students do a 15-minute case presentation at the close of the block.
Credit 154 units.

**M27 EMED 801 Emergency Medicine Subinternship**
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 a wide variety of procedural skills such as suturing, splinting, peripheral and central venous access, 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. A core content of lectures will be provided. Students will gain an understanding of other disciplines closely associated with Emergency Medicine by doing rotations with either social work, nursing, physical therapy, or respiratory therapy. Students will also gain knowledge of the triage system during their time in the department. If schedules allow, students interested in EM will be doing 1:1 shifts with a single attending during their last two weeks of the rotation. Students desiring a letter of recommendation from any EM attending should take this WUMS-IV Emergency Medicine Subinternship. 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 at a different time during the year. Days off during the rest of the year will conform to university policy. Days off should be requested from the Course Coordinator at least two weeks prior to the beginning of the rotation for scheduling purposes.

**M27 EMED 810 Medical Toxicology**
This rotation offers practical experience in the evaluation and management of the acutely ill, poisoned, or intoxicated patient. Students will function as subinterns and either report to a senior resident, a fellow, or directly to the toxicology attending. Students will gain familiarity and experience evaluating and treating patients who have intentionally and unintentionally overdosed on medications or illicit drugs or who have substance use disorders, been envenomated (such as by spiders, snakes, or other reptiles), or been exposed to toxic substances or chemicals. Students will also gain experience in administering antidotes and learning to properly decontaminate someone after an ingestion or exposure. There are no overnight or weekend shifts. While not required, students are welcome to come in during their off hours to see new consults and enhance their experience and learning. Daily activities start in the morning and are generally concluded by the early afternoon. A core content of lectures will be provided. The students will also be assigned small projects during their rotation that will enhance their experience, particularly in environmental and occupational toxicology. Opportunities to increase their experience with occupational toxicology and addiction medicine also exist during this rotation; students will be able to rotate in the outpatient toxicology and addiction medicine clinic. Students will also have the opportunity to go to the Missouri Poison Center. Students desiring a letter of recommendation from one of the toxicology attendings (who are also Emergency Medicine attendings) or who are interested in Emergency Medicine or Medical Toxicology should take this elective. Also, students considering other specialties such as Pediatrics or Internal Medicine should consider this rotation, as they will be responsible for evaluating these patients as part of their inpatient or outpatient practice. Please be advised that there is a limit to the number of days off that can be taken while on this rotation during interview season; otherwise, students should arrange to take the elective at a different time during the year. Days off should be requested from the course coordinator at least two weeks prior to the beginning of the rotation for scheduling purposes.

**M27 EMED 820 Emergency Ultrasound**
Point-of-care ultrasound has became an integral diagnostic and procedural tool for nearly every clinical specialty. Ultrasound examination at the bedside is noninvasive, painless, and repeatable, unlike many other common diagnostic tests. However, like all procedures, developing ultrasound skills takes a significant amount of practice and experience. This rotation will focus on clinical ultrasound image acquisition and interpretation at the bedside. Students will participate in the performance of bedside ultrasound of patients in the Emergency Department. Common applications of emergency ultrasound include the FAST exam, pelvic ultrasound, abdominal aortic aneurysm (AAA), vascular access, renal, ocular, cardiac ultrasound, and DVT. Students will be involved in direct patient care during this rotation as part of the ultrasound team in the Emergency Department. In general, the student will be in the Emergency Department during weekdays to perform these exams. In addition, the student will meet with the elective instructor approximately once per week to review images or for direct hands-on instruction. At the end of the rotation, the student should be able to obtain images for basic point-of-care ultrasound examinations and to interpret those images for diagnostic purposes. Students may also have opportunity to practice ultrasound-guided procedures during the rotation.

# 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) (http://www.dbbs.wustl.edu/Pages/) program in Molecular Microbiology and Microbial Pathogenesis (http://www.dbbs.wustl.edu/divprograms/micro/Pages/default.aspx), 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

## Interim Department Chair

**Shabaana Abdul Khader, PhD (http://microbiology.wustl.edu/Bio_Sketches/khaderCV_2014.html)**

## Program Director

**Christina L. Stallings, PhD (http://microbiology.wustl.edu/Bio_Sketches/stallingsCV_2014.html)**

Visit our website for more information about our faculty (http://www.microbiology.wustl.edu/faculty_research_2014.htm) and their appointments.

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**Shabaana Abdul Khader, PHD**
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PHD Madurai Kamaraj University 2002

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**Sean P. J. Whelan, PHD**
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Head of the Department of Molecular Microbiology
PHD University of Reading 1993

# Research Electives

## Molecular Biology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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**Stephen M. Beverley, PhD**
McDonnell Pediatric Research Building, 9th Floor
Phone: 314-747-2630

Molecular genetics of protozoan parasites and tropical diseases; biosynthesis of the parasite surface, genomics, virulence and drug action or resistance.

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**Michael Caparon, PhD**
McDonnell Pediatric Research Building, 10th Floor
Phone: 314-362-1485

Molecular genetics and pathogenicity of the streptococci and other pathogenic gram-positive bacteria.

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**Tamara L. Doering, MD, PhD**
McDonnell Pediatric Research Building, 10th Floor
Phone: 314-747-5597

The Doering lab studies the opportunistic fungal pathogen *Cryptococcus neoformans,* with the dual motivations of elucidating basic biology and identifying potential drug targets. Projects include studies of the synthesis and regulation of the main cryptococcal virulence factor, its polysaccharide capsule, and host-fungal interactions. Current approaches include those of biochemistry, cell and molecular biology, and genetics; studies also include high-throughput analysis of host-pathogen interactions and computational approaches to reconstructing the capsule regulatory network.

**Daniel Goldberg, MD, PhD**
McDonnell Pediatric Research Building, 9th Floor
Phone: 314-362-1514

Biochemistry of malaria.

**Henry Huang, PhD**
McDonnell Pediatric Research Building, 8th Floor
Phone: 314-362-2755

RNA virus evolution; molecular biology of alphaviruses; alphavirus gene expression vectors; antiviral drug design.

**Scott J. Hultgren, PhD**
McDonnell Pediatric Research Building, 10th Floor
Phone: 314-362-6772

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.

**Amanda Lewis, PhD**
BJC Institute of Health, 10th Floor
Phone: 314-286-0016

The focus of this lab is polymicrobial infection and women's health. Our lab is using biochemical, cellular and animal models to study infectious processes of the female urogenital tract that involve multiple bacterial species. For example, bacterial vaginosis (BV) is a polymicrobial imbalance of the vaginal flora characterized by reductions in beneficial lactobacilli and an overgrowth of mostly gram-negative bacteria. BV is the most common of all vaginal infections, and it is associated with increased risks of adverse pregnancy outcomes and greater susceptibility to sexually transmitted infections. We are collaborating with clinical investigators to define molecular and biochemical processes of BV and to identify patient groups most at risk for adverse events. Another active area of study in the lab involves polymicrobial UTI. We have developed a mouse model of polymicrobial UTI and are currently defining novel processes, bacterial factors and host factors that contribute to susceptibility.

**Jennifer Lodge, PhD**
McDonnell Pediatric Research Building, 10210A
Phone: 314-286-2125

Our focus is antifungal therapy and vaccine development against a fungal pathogen: *Cryptococcus neoformans.* This is a significant fungal pathogen, particularly in immunocompromised patients, that causes pulmonary infections and meningoencephalitis. It has been estimated that more than 1,000,000 new cases of *Cryptococcus* infection occur annually, resulting in more than 650,000 deaths per year, primarily in Africa. Our lab focuses on understanding the structure and synthesis of the fungal cell wall. We are working on it as a target for antifungal therapies and for vaccine development.

**David Sibley, PhD**
McDonnell Pediatric Research Building, 9th Floor
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We study the intracellular survival mechanisms of protozoan parasites, focusing on the model parasite *Toxoplasma gondii.* Current approaches include high-resolution microscopy, genetic mapping of virulence traits, comparative genomic analyses, and the development of animal models for studying pathogenesis and resistance.

**Christina L. Stallings, PhD**
McDonnell Pediatric Research Building, 8th 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.

**Niraj H. Tolia, PhD**
McDonnell Pediatric Research Building, 8th Floor
Phone: 314-286-0134

This lab's focus is on the structural and mechanistic studies of malaria pathogenesis. Our lab is interested in the molecular events that occur during erythrocyte invasion by *Plasmodium* parasites. We use the tools of structural biology, biochemistry and biophysics to examine proteins and protein complexes associated with these events.

**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 picronaviruses — are currently under investigation.

## Courses

Visit online course listings to view offerings for M30 MolMB (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M30).

**M30 MolMB 526 Microbes and Pathogenesis**
The course will familiarize the student with the diversity of pathogenic microbes and the different ways they can survive and cause disease. It is a concepts-based course, emphasizing the general principles of microbial pathogenesis. Selected pathogenic microbes are used as models to describe pathogen-host interactions in molecular detail. The laboratory will introduce the student to the principles and the basic techniques of diagnostic bacteriology.
Credit 30 units.

**M30 MolMB 900 Research Elective - Molecular Microbiology**
Research opportunities may be available. If interested, please contact the Department of Molecular Microbiology.

# Department of Neurology

Neurology concerns itself with the diseases of the brain, spinal cord, peripheral nerves and muscles. An introduction to the anatomy and physiology of the nervous system is presented in the first-year neuroscience course by faculty from the Department of Neuroscience (http://neurosci.wustl.edu/), with participation of faculty from the Department of Neurology (http://neuro.wustl.edu/). A first-year selective titled Clinical Correlations in Neurosciences (FYSelect 5017) is available, which is an opportunity for interested students to shadow physicians in neuro-related fields and to attend basic science or clinical conferences. During the second year, the Department of Neurology presents the course Diseases of the Nervous System (Neurol 632) in conjunction with the departments of Pathology & Immunology (http://pathology.wustl.edu/), Neurosurgery (http://neurosurgery.wustl.edu/) and Ophthalmology & Visual Sciences (http://ophthalmology.wustl.edu/). The course emphasizes the pathophysiology, pathology, clinical manifestations and treatment of the major neurological and neurosurgical diseases. The department also participates in the Practice of Medicine course, providing lectures, demonstrations and teaching exercises with patients in neurological physical diagnosis.

For more information about the Department of Neurology and its 13 divisions, please visit the department website.

**Website:** https://neuro.wustl.edu/education

## Faculty

### Department Chair

**David Holtzman, MD (https://wuphysicians.wustl.edu/for-patients/find-a-physician/david-michael-holtzman/)**

Visit our website for more information about our faculty (https://neuro.wustl.edu/Faculty/) and their appointments.

### A

**Aninda Bhat Acharya, MD1, MD**
Instructor in Clinical Neurology (primary appointment)
MD1 University of Kansas 1996
MD University of Kansas 1996
BS University of Kansas 1992

**Shannon Christine Agner, PHD, MD1, MS, MS**
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PHD Rutgers University 2011
MD1 Rutgers University 2013
MS Rutgers University 2004
BA Dartmouth College 2002
MS UMDNJ- Robert Wood Johnson Med 2004

**Muhammad Taher Al-Lozi, MD, MS**
Professor of Neurology (primary appointment)
MD University of Panjab 1980
MS University of Jordan 1985

BA University of Panjab 1976

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PHD University of AL Birmingham 2011
BS University of Wyoming 2005
MD University of AL Birmingham 2013
BS1 University of Wyoming 2005
MS University of Wyoming 2007

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**Beau Mark Ances, MD, MS, PHD**
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PHD University of Pennsylvania 2000

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## B

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## C

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## D

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MS Walden University 2016

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MD University of San Francisco 1993

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BA Colorado College 2005
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BS Saint Louis University 1954
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## E

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BS Johns Hopkins University 1988
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BS School Not Listed 1985
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MD Smolensk State Medical Academy 1996

## F

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## G

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## H

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BS Washington Univ in St. Louis 2007
MS Rosalind Franklin University 2008
MD CHICAGO MEDICAL SCHOOL 2012

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BSW University of Illinois 1981
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## I

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## J

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PHD Saint Louis University 1996
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**Yo-El S Ju, MD**
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## K

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Professor of Developmental Biology
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## L

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## M

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BS State Univ of NY at Albany 2009

**Pietro Mazzoni, MD, PHD**
Associate Professor of Neurology (primary appointment)
BS University of CA San Diego 1988
MD Harvard University 1995
PHD Mass Inst of Technology (MIT) 1994

**Eric Martin McDade, DOST**
Associate Professor of Neurology (primary appointment)
BA Canisius College 1998
DOST Chicago Coll of OsteopathicMed 2004

**Timothy M Miller, PHD, MD**
Clayson Professor of Neurology (primary appointment)
PHD Washington Univ in St. Louis 1998
MD Washington Univ in St. Louis 1998

**John Carl Morris, MD**
Harvey A and Dorismae Hacker Friedman Distinguished
Professor of Neurology (primary appointment)
Professor of Occupational Therapy
Professor of Pathology and Immunology
Professor of Physical Therapy
BA Ohio Wesleyan University 1970
MD University of Rochester 1974

**Stephanie Morris, MD**
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Assistant Professor of Pediatrics
BS University of Arizona 2007
MD University of Phoenix 2011

**Michael Justin Morrissey, PHD**
Instructor in Clinical Neurology (primary appointment)
PHD Saint Louis University 2005

**Krista L Moulder, PHD**
Associate Professor of Neurology (primary appointment)
PHD Washington Univ in St. Louis 2001
BA Northwestern University 1993

**Erik S Musiek, PHD PMCG, MD**
Associate Professor of Neurology (primary appointment)
PHD PMCG Vanderbilt University 2005
MD Vanderbilt University 2007
BS College of William and Mary 1999

## N

**Robert T Naismith II, MD**
Professor of Neurology (primary appointment)
MD Case Western Reserve Univ 1998
BS Case Western Reserve Univ 1994

**Jeffrey J Neil, PHD, MD**
Professor of Neurology (primary appointment)
Professor of Pediatrics
PHD Washington Univ in St. Louis 1984
MD Washington Univ in St. Louis 1984

**Susan Searles Nielsen, MA, PHD**

Associate Professor of Neurology (primary appointment)
MA University of Washington 2000
BA Evergreen St College 1992
PHD University of Washington 2004

**Anne Fagan Niven, PHD**
Professor of Neurology (primary appointment)
PHD University of CA San Diego 1992
BA Wellesley College 1984

**Michael Justin Noetzel, MD**
Professor of Neurology (primary appointment)
Professor of Pediatrics
Vice Chair of Pediatric and Developmental Neurology
MD University of Virginia 1977
BA Yale University 1973

**Scott Norris, MD**
Associate Professor of Neurology (primary appointment)
Associate Professor of Radiology
MD University of MO Columbia 2008
BA Washington Univ in St. Louis 2000

## P

**Sheel Jitendra Pathak, MD**
Assistant Professor of Neurology (primary appointment)
Assistant Professor of Pediatrics
BS University of Texas Austin 2004
MD University of Texas Galveston 2008

**Robert Harris Paul, PHD, MS**
Adjunct Assistant Professor of Neurology (primary appointment)
BS California State Long Beach 1993
PHD Oklahoma St University 1998
MS Oklahoma St University 1995

**Toni Shih Pearson, B MUS, MD**
Associate Professor of Neurology (primary appointment)
B MUS University of Adelaide 2000
MD University of Adelaide 1998

**David M Peeples, MD**
Instructor in Clinical Neurology (primary appointment)
MD University of Chicago 1986
BA Vanderbilt University 1982

**Lindsay M Peglar, MS, MD**
Assistant Professor of Neurology (primary appointment)
Assistant Professor of Pediatrics
BS Tulane University 2008
MS Tulane University 2009
MD University of MO Columbia 2013

**Karen J Pentella, MD**
Assistant Professor of Clinical Neurology (primary appointment)
BS Ohio State University 1975
MD Ohio State University 1979

**Joel S Perlmutter, MD**
Professor of Neurology (primary appointment)
Professor of Neuroscience
Professor of Occupational Therapy
Professor of Physical Therapy
Professor of Radiology
BA Princeton University 1975
MD University of MO Columbia 1979

**Alan Pestronk, MD**
Professor of Neurology (primary appointment)
Professor of Pathology and Immunology
BA Princeton University 1966
MD Johns Hopkns University Medic 1970

**Daniel Phillips, BE, MD**
Assistant Professor of Clinical Neurology (primary appointment)
BE Northwestern University 1982
BS Northwestern University 1976
MD Washington Univ in St. Louis 1980

**Chia Ling Phuah, MD, MS1, MS**
Assistant Professor of Neurology (primary appointment)
BS Cambridge University 2003
MD Cambridge University 2006
MS1 Cambridge University 2007
MS Harvard University 2016

**Laura Piccio, MD**
Associate Professor of Neurology (primary appointment)
MD University of Milan 1997

**Stephanie K Powell, MS, PHD**
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BS University of Notre Dame 1994
MS Univ of Wisconsin Milwaukee 2000
PHD Univ of Wisconsin Milwaukee 2004

**William John Powers, MD**
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MD Cornell University 1975
BA Dartmouth College 1971

## R

**Brad Alan Racette, MD**
Robert Allan Finke Professor of Neurology (primary appointment)
Executive Vice Chair of Clinical Affairs, Department of Neurology
MD Northwestern University 1992
BA Princeton University 1988

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BA Harvard University 1957
MD Washington Univ in St. Louis 1961
M PH Johns Hopkns University Medic 1971

**Dave A Rengachary, MD**
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BA Northwestern University 1996

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PHD Southern Illinois University 1992
BA Purdue University 1986
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**James R Rohrbaugh, MD**
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MD Ohio State University 1974
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**Robert John Rudock, MBA1, MD**
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MBA1 University of Miami 2011
BS John Hopkins University 2006
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**Rimma Ruvinskaya, MD**
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BA School Not Listed 1979
MD Leningrad Inst of Peds Med 1985

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PHD Vanderbilt University 2004
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## S

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B VET Karnatak University 2004
MS Indian Vet Research Institute 2006
PHD University of Vermont 2013

**Chihiro Sato, MS, PHD**
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MS University of Tokyo 2005
BS University of Tokyo 2003
PHD University of Tokyo 2008

**Andrew David Sauerbeck, PHD**
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PHD University of Kentucky 2011

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JD Washington Univ in St. Louis 1988
PHD Washington Univ in St. Louis 2001
BBA Washington Univ in St. Louis 1985

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BS Millsaps College 1999
PHD Washington Univ in St. Louis 2008
MD Washington Univ in St. Louis 2008

**Bradley L Schlaggar, MD, PHD**
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BS Brown University 1986
MD Washington Univ in St. Louis 1994
PHD Washington Univ in St. Louis 1994

**Kathleen Marie Schoch, PHD**
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BS Bradley University 2007
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BS University of Missouri 1953
BA Southeast Missouri St Univers 1952
MD Washington Univ in St. Louis 1955

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MS Korea University 2006
PHD University of Texas Austin 2015

**Christian T Sheline, PHD**
Adjunct Research Associate Professor of Neurology (primary appointment)
BA Dartmouth College 1983
PHD University of California 1989

**Todd B Silverman**
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**Barry A. Singer**
Associate Professor of Clinical Neurology (primary appointment)

**Alyssa Erin Smith, MD**
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Assistant Professor of Pediatrics
MD Rush University 2014
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**Christopher D Smyser, MD**
Associate Professor of Neurology (primary appointment)
Associate Professor of Pediatrics
Associate Professor of Radiology
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**Barbara Joy Snider, PHD, MD**
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BA Northwestern University 1979
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**Michael Snyder, MD**
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**Richard Brian Sommerville, MD**
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**Tara V. Spevack, PHD, MS**
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BS McGill University 1987
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**Katherine Caroline White Stenson, MD**
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PHD University of Texas Arlington 2015
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## T

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MD Southern Illinois University 1987

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Professor of Pediatrics
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**Jeffrey B. Titus, MA, PHD**
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BS Evangel College 1997
MA University of Northern Colora 1999
PHD Ball State University 2002

**Jonathan Bryan Tiu, MD**
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**Norman Edwin Trevathan III, MS, MD**
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## U

**Keisuke Ueda, MD**
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**Jason Daniel Ulrich, PHD**
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BS Quincy College 2004
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MS Washington Univ in St. Louis 2007
BS University of Pittsburgh 2000
MD Washington Univ in St. Louis 2007

## V

**Renee Bailey Van Stavern, MD**
Professor of Neurology (primary appointment)
BA Texas A&M University 1991
MD Univ Texas Health Science Ctr 1997

**Arun S. Varadhachary, PHD, MD**
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MD Vanderbilt University 2006
PHD Vanderbilt University 2004
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Professor of Medicine
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## W

**Yan Wang, MD**
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MD University of Chicago 2016

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BS University of CA Riverside 1989

MD University of Missouri 1993

**Ling Wei, MD**
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MD Beijing Medical University 1977

**Conrad Christian Weihl, MD, PHD**
Professor of Neurology (primary appointment)
MD University of Chicago 2001
PHD University of Chicago 1998
BS University of Illinois 1993

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**Howard I Weiss, MD**
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**Nicole Joy Werner, MS, PHD**
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MS Saint Louis University 2000
BS Univ of Minnesota Twin Cities 1997
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**Kyle Byron Womack, MD, MS**
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**Michael Wong, MD, PHD**
Allen P and Josephine B Green Professor of Pediatric Neurology (primary appointment)
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MD University of Texas Southwest 1995
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**Gregory Frederick Wu, MD, PHD**
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MD University of Iowa 2001
PHD University of Iowa 2001
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## Y

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MD University North Carolina 2014
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## Z

**Craig Mitchell Zaidman, MD**
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MD University of Virginia 2001

**Allyson R Zazulia, MD**
Professor of Neurology (primary appointment)
Associate Dean for Continuing Medical Education
Professor of Radiology
MD Georgetown University 1994
BS University of Maryland 1990

**John M Zempel, MD, PHD**
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Professor of Pediatrics
MD Washington Univ in St. Louis 1995
PHD Washington Univ in St. Louis 1995
BS Univ of Wisconsin Madison 1985

**Lirong Zhu, MD, PHD**
Assistant Professor of Clinical Neurology (primary appointment)
MD Fudan University 2000
PHD Baylor College of Medicine 2006

# Research Electives

## Neurology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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**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.

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**Randall Bateman, MD**
Biotechnology Center, Room 304
Phone: 314-747-7066

Central nervous system protein metabolism in aging and dementia. 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 admission to a research hospital unit. 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, enzyme-linked immunosorbent assay and Western gel methods. Quantitation, analysis and modeling of the data will be taught in the context of data interpretation and study design.

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**Anne H. Cross, MD, and Laura Piccio, MD, PhD**
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) or Dr. Piccio (picciol@neuro.wustl.edu) several weeks in advance before signing up for this research to allow for sufficient planning.

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**Robert T. Naismith, MD**
McMillan, Room 310B
Phone: 314-747-0432

Clinical imaging research in multiple sclerosis. The student will learn about neuroimaging, imaging analyses, data collection, data management and clinical study endpoints in multiple sclerosis. They will observe patient participants undergoing a detailed evaluation of disability measures, such as ambulation, symptom scales, cognition, vision, upper extremity function, and so on. They will witness the entire process of image acquisition, processing, analysis and data extraction. They will have the opportunity to interact with many people who are vital to the research, including research coordinators, imaging technologists, imaging physicists/chemists and specialized research clinicians (i.e., neurocognitive and physical therapy research specialists).

The student will assist with hands-on clinical investigative research. They will gain an excellent appreciation of multiple sclerosis, from its pathophysiology within the central nervous system to how it affects the neurological function of individuals. Through detailed and quantitative imaging analysis, the student will become very adept at analyzing brain MRI scans. They will mark and track lesions to determine their effects on clinical function and learn to identify normal-appearing white matter, cortex and gray-matter structures. They will become familiar with Amira Imaging Analysis Software, SPSS Statistical Analysis Software, SIENA Volume Analysis Software and Matlab Imaging Analysis Software.

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**Steven E. Petersen, PhD**
East Building, Room 2108
Phone: 314-362-3319

This lab is interested in brain organization and function, particularly for language, attention and memory. Our main approach to these issues is through functional MRI and large-scale network analysis.

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**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 investigate mechanisms of action of deep brain stimulation, which is a dramatic new treatment. These studies combine PET, cognitive testing and quantified measures of movement. We also test new drugs that might rescue injured nigrostriatal neurons (a model of PD). For these, we use PET to measure dopamine pathways and also 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. We have an active program that combines a variety of approaches to developing biomarkers and investigating the pathophysiology of dementia associated with PD. We use PET to measure radioligand binding and sensorimotor processing in dystonia. We developed a new animal model of dystonia to investigate pharmacologic and physiologic changes. We use PET to investigate drug-mediated pathways in the brain and to parse out the effects of selective dopaminergic agonists. We are also working to develop MR-based methods including diffusion tensor imaging and resting-state functional connectivity to investigate the brain mechanisms underlying PD and dystonia.

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**Brad A. Racette, MD**
McMillan, 9th Floor
Phone: 314-362-5291

Our lab is primarily interested in environmental risk factors associated with Parkinson's disease. We use a variety of techniques to study these risk factors, including traditional field epidemiology, in which we evaluate workers exposed to metals in the United States and residents living near a smelter in South Africa; neuroimaging, in which we study the pathophysiology of toxin-mediated parkinsonism; geographic information systems research, in which we associate environmental toxin exposures

with the incidence and prevalence of Parkinson's disease in the United States and Finland; and neuropathologic studies, in which we evaluate manganese-exposed workers from South Africa. There are numerous opportunities available for students to be involved with any of these projects. Students will receive some clinical exposure as well to familiarize them with pertinent clinical syndromes.

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**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. Refer also to the listing on this page for Steven E. Petersen, PhD.

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**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.

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## Courses

Visit online course listings to view offerings for M35 Neurol (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M35).

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**M35 Neurol 632 Diseases of the Nervous System**
The goal of this course is to provide an introduction to the diseases of the central and peripheral nervous systems, including their clinical manifestations, pathology, pathophysiology and pharmacotherapy. The course includes reading assignments, lectures, laboratories, team activities, and clinical presentations.
Credit 53 units.

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**M35 Neurol 720 Neurology Clerkship**
During the four week Neurology clerkship, students will gain proficiency in understanding diseases of the nervous system, the neurologic work-up, localization and differential diagnosis generation, and devising a treatment plan. A variety of settings are available, which could include adults or pediatric services, with both inpatient and outpatient experiences. Students will provide care for patients with neurologic problems under the supervision of residents, fellows, and attendings.
Credit 154 units.

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**M35 Neurol 730 Physical Medicine and Rehabilitation Clerkship**
Clerkship in PM & R for 3-rd year medical students provides an opportunity to gain basic knowledge and clinical skills in evaluation and management of wide range of neurological and musculoskeletal diseases and conditions that require specialized rehabilitative medical and therapeutic care. Students spend 2 weeks on Spinal Cord Injury Unit (SCI) and 2 weeks on Brain Injury (BI) & Stroke Unit at The Rehabilitation Institute of St. Louis. Students are expected to be a part of the rehabilitation team, follow 2 to 3 patients, participate in daily morning rounds, participate in performing consults, attend team meetings and family conferences. Students are required to attend several outpatient clinics such as SCI, BI, Amputee and Stroke. During the entire rotation, students work together with PM&R residents and fellows, and under direct guidance of the NeuroRehabilitation faculty. The usual duty hours are 7-7:30AM to 5PM during weekdays, and 8AM -12NN on Saturdays. There is no night call. Students are required to attend all PM&R curriculum lectures and conferences. On the first day of rotation, students meet with the PM&R program director to go over goals, objectives and schedules. Upon completion of the rotation students are required to fill out the evaluation form to provide feedback regarding rotation experience.
Credit 154 units.

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**M35 Neurol 827 Neurology Subinternship for WUSM Students**
This four-week elective will be customized to include inpatient and outpatient experiences desired by WUSM students who have completed the WUSM Neurology Clerkship. Students may choose this elective to further improve their neurology knowledge and skills. Students considering neurology as a career may also desire additional exposure to supplement their prior clerkship experience. The elective is split into two two-week rotations, which may include the following: (1) Adult Inpatient General Service (with one clinic/week); (2) Adult Inpatient Stroke Service (with one clinic/week); (3) Adult Inpatient Consult Service (with one clinic/week); (4) Pediatric Neurology Consult Service (with one clinic/week); (5) Adult Neurology ICU (with one clinic/week); and (6) Outpatient Clinics (with eight to 10 clinics/week).

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**M35 Neurol 827A Special Elective in Adult Inpatient Clinical Neurology**
Special Elective in Adult Inpatient Clinical Neurology

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**M35 Neurol 828 Neurology Subinternship for Visiting Medical Students**
This four-week elective for fourth-year visiting students from a US medical school provides the option (space permitting) of four weeks of Adult Inpatient Service (Stroke for 2 weeks, General Neurology for 2 weeks), or two weeks on an Adult Inpatient Service and two weeks on the Adult Consult Service. Students on the inpatient service will function as a subintern under the supervision of their junior resident, chief resident, and attending physician. The student will also attend weekly clinical conferences and a weekly outpatient clinic experience. This elective is suitable for visiting fourth-year students interested in Neurology, who wish to improve their Neurology knowledge and skills.

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**M35 Neurol 830 Neuro-Oncology**
This elective provides an outpatient-oriented pediatric and adult neuro-oncology experience for fourth-year medical students. Students will: - attend multidisciplinary adult and pediatric neuro-oncology clinics and case conferences (tumor boards), - attend adult and pediatric radiation oncology clinics, - attend neuropathology brain tumor review, - participate in subspecialty brain tumor clinics, and - attend monthly brain tumor research conferences.

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**M35 Neurol 851 Clinical Aspects of Aging and Dementia**
This elective provides the opportunity to learn about clinical research and clinical care in healthy brain aging and dementia. Students are encouraged to contact the Course Directors (Dr. B. Joy Snider and/or Dr. John Morris) before the elective begins to discuss their interests, as this elective is customized based on student interests. This can be a two-week or four-week elective. Students can gain proficiency in interviewing techniques and in the neurologic examination of the geriatric patient, and are introduced to neuropsychology, neuropathology, biomarkers, neuroimaging, genetics, and other biomedical procedures important in the diagnostic evaluation of older adults. The Knight ADRC is an interdisciplinary group, so students have the opportunity to interact with physicians, nurse clinicians, psychologists, and social workers, and to explore the neuropsychology, neuropathology, biomarkers, neuroimaging, genetics, and other biomedical procedures used in the diagnosis of dementing disorders such as Alzheimer's disease, dementia with Lewy bodies, frontotemporal dementias, cerebrovascular disorders, and affective disorders.

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**M35 Neurol 859 Neonatal Neurology**
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 skill necessary to effectively evaluate infants with neurological disorders, including encephalopathy, stroke, seizures, hypotonia, intraventricular hemorrhage, and periventricular leukomalacia, 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.

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**M35 Neurol 860 Pediatric Neurology**
The senior 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: 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 have a different role than the third-year student on pediatrics. The fourth-year student will focus solely on neurology patients and work closely with the pediatric neurology resident to develop neurology-specific care plans. 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

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**M35 Neurol 861 Neurointensive Care Unit**
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 pay participate in some procedures under supervision. Didactic sessions will be provided as conferences or lectures from the ICU attending and fellow.

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**M35 Neurol 865 Adult and Pediatric Epilepsy**
Students will learn how epileptologists diagnose and manage epilepsy in adults and children. They will learn how to use the history and physical exam and laboratory 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 surgery, the vagus nerve stimulator, and the ketogenic diet. 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 attending epilepsy clinics and rounding on the inpatient epilepsy service with the epilepsy team at Barnes-Jewish Hospital and St. Louis Children's Hospital. They will attend the Adult Epilepsy Conference, the Pediatric Epilepsy Conference, and Neurology Grand Rounds. Students will also have the opportunity to observe epilepsy surgery if they wish. They will have the option to present one 15-30 minute talk on a topic relevant to epilepsy.

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**M35 Neurol 872 MS Center/Outpatient - Missouri Baptist**
Students will develop their skills in taking histories and performing neurological examinations on patients with multiple sclerosis under direct supervision of multiple sclerosis specialists. Localization of neurological findings and symptoms to the neuro-axis will be emphasized. A major goal for the students will to increase the understanding of comprehensive patient management including disease treatment, symptom management, adjunctive therapy services, and psychosocial issues. The outpatient rotation will be four weeks at The MS Center for Innovations in Care at Missouri Baptist Medical Center with Dr. Barry Singer and Dr. Mark Tullman. An additional goal for students will be to understand process of clinical research and translation into approved therapies. The center has been a leader in clinical trial development of therapeutics that have been or will soon be FDA-approved as new medications for multiple sclerosis.

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**M35 Neurol 900 Research Elective - Neurology**
Research opportunities may be available. If interested, please contact the Department of Neurology.

# Department of Neuroscience

The Department of Neuroscience plays a key role in the development and teaching of basic sciences in the Medical School Phase 1 Gateway curriculum (https://sites.wustl.edu/gatewaycurriculum/), 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 (http://neuroscience.wustl.edu/Program/-Curriculum/). 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://neurosci.wustl.edu

## Faculty

### Interim Department Chair

**Paul H. Taghert, PhD (http://neurosci.wustl.edu/People/Faculty/paul-taghert/)**

Visit our website for more information about our faculty (http://neurosci.wustl.edu/People/Faculty/) and their appointments.

### A

**Kari Leigh Allen, MA, PHD**
Assistant Professor of Anatomy (primary appointment)
Assistant Professor of Anthropology (Courtesy)
MA New Mexico St University 2008
PHD Duke University 2014
BA State Univ of NY Potsdam 2005

### B

**Amy Lynn Bauernfeind, PHD, M PHIL**
Associate Professor of Anatomy (primary appointment)
Associate Professor of Anthropology (Courtesy)
BS Vanderbilt University 2004
PHD George Washington University 2014
M PHIL George Washington University 2011

**Paul C Bridgman, PHD, MS**
Professor of Neuroscience (primary appointment)
Associate Professor of Biomedical Engineering
BA University of San Diego 1974
PHD Purdue University 1980
MS University of CA San Diego 1976

**Andreas H Burkhalter, PHD, MS**
Professor of Neuroscience (primary appointment)
Associate Professor of Biomedical Engineering
Associate Professor of Neurobiology in Neurological Surgery
PHD University of Zurich 1977
MS University of Zurich 1973

**Harold Burton, PHD**
Professor of Neuroscience (primary appointment)
Professor of Biomedical Engineering
Professor of Cell Biology and Physiology
Professor of Radiology
PHD Univ of Wisconsin Madison 1968
BA University of Michigan 1964

### C

**Valeria Cavalli, MS, PHD**
Professor of Neuroscience (primary appointment)
MS University of Geneva 1992
PHD University of Geneva 2000
BS University of Geneva 1991

**Yao Chen, MS, PHD**
Assistant Professor of Neuroscience (primary appointment)
Assistant Professor of Cell Biology and Physiology
MS Cambridge University 2006
BS Cambridge University 2002
PHD Harvard University 2009

### D

**Krikor T Dikranian, PHD, MD**
Professor of Anatomy (primary appointment)
Professor of Physical Therapy
PHD Medical University - Sofia 1992
MD Medical University - Varna 1978

### F

**James Alexander John Fitzpatrick, PHD**
Professor of Neuroscience (primary appointment)
Professor of Cell Biology and Physiology
BS King's College London 2000
PHD University of Bristol 2003

**Susan M Fitzpatrick, PHD**
Adjunct Associate Professor of Neuroscience (primary appointment)
Adjunct Associate Professor of Occupational Therapy
PHD Cornell University 1984
BS St Johns University 1978

### G

**Harrison W. Gabel, AB, PHD**
Assistant Professor of Neuroscience (primary appointment)
AB Princeton University 2001
PHD Harvard University 2008

### H

**Edward B. Han, PHD**
Assistant Professor of Neuroscience (primary appointment)
Assistant Professor of Anesthesiology
BS Cornell University 1995

PHD University of CA San Diego 2004

**Martha B. Han, PHD**
Assistant Professor of Neuroscience (primary appointment)
PHD University of CA San Diego 2008
BS Yale University 2000

**Timothy E. Holy, MA, PHD**
Professor of Neuroscience (primary appointment)
Alan A and Edith L Wolff Professor of Neuroscience
BA Rice University 1991
MA Princeton University 1992
PHD Princeton University 1997

## J

**Ahmad Jezzini, MS, PHD**
Instructor in Neuroscience (primary appointment)
MS Univ Claude Bernard Lyon 1 2004
PHD University of Parma 2010
BS Lebanese Univ Med Science 2003

## K

**Adam Kepecs, PHD**
Professor of Neuroscience (primary appointment)
Professor of Psychiatry
Robert J Terry Professor of Neuroscience
BS Eötvös Loránd University 1997
PHD Brandeis University 2002

## L

**Qingyun Li, PHD**
Assistant Professor of Neuroscience (primary appointment)
Assistant Professor of Genetics
BA China Agriculture University 2006
PHD Duke University 2015

## M

**Ilya E. Monosov, MS, PHD**
Associate Professor of Neuroscience (primary appointment)
Associate Professor of Neurological Surgery
MS NewSchool Architecture Design 2005
PHD Brown University 2009
BS University of CA San Diego 2004

**Ashley C. Morhardt, PHD, MS**
Assistant Professor of Anatomy (primary appointment)
BS Illinois College, Jacksonville 2006
PHD Ohio University 2016
MS Western Illinois University 2009

## N

**Michael L Nonet, PHD**
Associate Professor of Neuroscience (primary appointment)
PHD Mass Inst of Technology (MIT) 1989
BS University of CA Davis 1984

## O

**Karen Laurel O'Malley, PHD, MS**
Professor of Neuroscience (primary appointment)
PHD University of Texas Austin 1980
MS Portland St University 1973
BA Sonoma State University 1971

## P

**Camillo Padoa-Schioppa, PHD, MS**
Professor of Neuroscience (primary appointment)
Professor of Biomedical Engineering
Professor of Economics (Courtesy)
PHD Mass Inst of Technology (MIT) 2002
MS La Sapienza University 1996

**Thomas J Papouin, PHD, MS**
Assistant Professor of Neuroscience (primary appointment)
BS Ecole Normale Superieure Lyon 2005
PHD University of Bordeaux 2 2011
MS Ecole Normale Superieure Lyon 2007

**Carlos Ramon Ponce, MD, PHD**
Assistant Professor of Neuroscience (primary appointment)
BS University of Utah 2001
MD Harvard University 2010
PHD Harvard University 2008

## R

**Linda J Richards, PHD**
Edison Professor of Neurobiology (primary appointment)
Head of the Department of Neuroscience
PHD Walter & Eliza Hall Institute 1994
BS Walter & Eliza Hall Institute 1990

**Terrence Bradley Ritzman, MA, PHD**
Assistant Professor of Anatomy (primary appointment)
Assistant Professor of Anthropology
BA University of Illinois 1999
MA Colorado St University 2005
PHD Arizona State University 2014

## S

**Lawrence B Salkoff, PHD**
Professor of Neuroscience (primary appointment)
Professor of Genetics
BA University of CA Los Angeles 1967
PHD University of CA Berkeley 1979

**Paul Joseph Shaw, PHD, MA**
Professor of Neuroscience (primary appointment)
PHD University of Chicago 1996
MA San Jose State University 1990
BA Niagara University 1985

**Lawrence H Snyder, PHD, MD, MS, AB**
Professor of Neuroscience (primary appointment)

Professor of Psychological & Brain Sciences
PHD University of Rochester 1992
MD University of Rochester 1992
MS University of Rochester 1992
AB Princeton University 1982

## T

**Paul H Taghert, PHD**
Professor of Neuroscience (primary appointment)
PHD University of Washington 1981
BA Reed College 1975

**Gaia Tavoni, PHD**
Assistant Professor of Neuroscience (primary appointment)
Assistant Professor of Medicine
BS Polytechnic University of Turi 2010
PHD Ecole Normale Superieure Lyon 2015

## V

**David C Van Essen, PHD**
Alumni Endowed Professor of Neurobiology (primary appointment)
Professor of Biomedical Engineering
BS California Institute Technolo 1967
PHD Harvard University 1971

## Y

**Jason Yi, PHD**
Assistant Professor of Neuroscience (primary appointment)
BS Dickinson College 2001
PHD Duke University 2009

## Z

**Guoyan Zhao, MS, PHD**
Assistant Professor of Neuroscience (primary appointment)
MS School Not Listed 1998
PHD Washington Univ in St. Louis 2003
BS School Not Listed 1995

# Research Electives

## Neuroscience Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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**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

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**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

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**Amy Bauernfeind, PhD**
North Building, 3rd Floor
Phone: 314-747-6566

Biological bases of human cognition; comparative neurobiology of primates

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**Paul Bridgman, PhD**
McDonnell Medical Sciences Building, 8th Floor
Phone: 314-362-3449

Cell biology of the developing nervous system

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**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 changes due to unilateral deafness or strabismus

---

**Valeria Cavalli, PhD**
McDonnell Medical Sciences Building, 9th Floor
Phone: 314-362-3540

Cellular, molecular and epigentic 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.

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**Krikor Dikranian, MD, PhD**
North Building, 3rd Floor
Phone: 314-362-3548

Development and morphology of the amyloid plaques in experimental animals; neuropathological changes after head trauma

---

**James Fitzpatrick, PhD**
McKinley Research Building, Basement
Phone: 314-747-0838

Optical and charged particle multiscale microscopy application method development

---

**Harrison Gabel, PhD**
McDonnell Medical Sciences Building, 8th Floor
Phone: 314-362-3531

Gene regulation in the developing nervous system; molecular mechanisms of neurodevelopmental disorders

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**Edward Han, PhD**
McDonnell Medical Sciences Building, 9th Floor
Phone: 314-747-2505

Learning-related hippocampal network activation

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**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.

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**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.

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**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: 314-362-3530

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

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**Carlos Ponce, MD, PhD**
East McDonnell Building, 2nd Floor
Phone: 314-273-2746

The goal of our lab is to define how neurons from different cortical areas interact to realize our perception of shape and motion.

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**Terry Ritzman, PhD**
North Building, 3rd Floor
Phone: 314-273-1861

Comparative anatomy of the skull in primates as it relates to human evolution

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**Lawrence B. Salkoff, PhD**
McDonnell Medical Sciences Building, 9th Floor
Phone: 314-362-3644

Roles of ion channels in neuronal long-term excitability changes

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**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

**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

Visit online course listings to view offerings for M05 Neurosci (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M05).

**M05 Neurosci 501B Human Body: Anatomy, Embryology, Imaging**
The course is primarily lab-based, focusing on dissection of the human body. Lectures on functional and topographic anatomy emphasize the principles of organization of the various systems of the body. Lectures on developmental anatomy stress organogenesis as an adjunct to understanding the normal and abnormal anatomy. Small group discussions emphasize radiological anatomy and clinical correlations. Frequent use of CT, MRI, and X-ray images aid in the synthesis of knowledge gained through dissection. Cross-listed with L41 (Bio) 501.
Credit 140 units.

**M05 Neurosci 502A Histology and Cell Biology**
The structures of cells, tissues, and major organ systems are studied in relationship to their functions. Lectures integrate histology with cell biology and physiology. The laboratories consist of the study of prepared slides and electron micrographs using an iBook or eBook (ePub) guide. An extensive online digital annotated atlas (Slide-atlas.org) and a video library are used to supplement the slides and electron micrographs. Presentations of case studies provide examples of clinical relevance. A dual-view microscope and slide set will be issued for each pair of students. Limited space is available for non-medical students, who must have permission from the course director to enroll. The topics in this course are timed to integrate with the physiology course and span the fall and winter semesters.
Credit 66 units.

**M05 Neurosci 554 Neural Science**
This is an intensive seven-week course that covers the structure, development, and function of the nervous system as seen from molecular, cellular, and systems-oriented perspectives. The emphasis is on the organization and function of the nervous system in health, but there is frequent reference to the clinical relevance of the material presented. The course includes regular lectures, conference sessions, and laboratories (including a team based learning session), plus a number of clinically oriented presentations and special topics sessions that address selected issues in greater depth. Computer-aided instructional programs, which are accessible from a variety of locations, provide auxiliary modes of self-paced learning and review. Exams emphasize the core body of important facts and principles presented in the lectures and laboratories. Limited space is available for non-medical students with the instructor's permission. Non-medical students should register under the cross-listed number L41 554. Spring only.
Credit 109 units.

**M05 Neurosci 810 Advanced Dissection**
Different regions of the body will be dissected in detail. A period of four weeks should be allowed for each region: head and neck, thorax and abdomen, and superior and inferior limbs. Surgical approaches, cross-sections, X-rays, and CT scans can be studied.

# 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 (http://neurosci.wustl.edu/), with the participation of the neurosurgery faculty. During the second year, the Department of Neurosurgery (http://www.neurosurgery.wustl.edu) 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

### Department Head

**Ralph G. Dacey, MD (http://www.neurosurgery.wustl.edu/patient-care/find-a-physician/clinical-faculty/ralph-g-dacey-jr-md-229/)**

Visit our website for more information about our faculty (http://www.neurosurgery.wustl.edu/patient-care/find-a-physician/clinical-faculty-243/) and their appointments.

## B

**Peter Brunner, PHD, MS**
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Neurology
PHD University of Graz 2013
BS University of Graz 2004
MS University of Graz 2005

## C

**Michael R Chicoine, MD**
Professor of Neurological Surgery (primary appointment)
August A. Busch, Jr. Distinguished Professor
BS University of Illinois 1985
MD University of California 1990

## D

**Ralph G Dacey Jr, MD**
Henry G and Edith R Schwartz Professor of Neurological Surgery (primary appointment)
MD University of Virginia 1974
BA Harvard University 1970

**Ian G Dorward, MD**
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Orthopaedic Surgery
BS University of Colorado Boulder 2000
MD Washington Univ in St. Louis 2005

**Joshua L Dowling, MD**
Professor of Neurological Surgery (primary appointment)
MD Tulane University 1989
BA Yale University 1985

**Gavin P. Dunn, PHD, MD**
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Neurology
Associate Professor of Pathology and Immunology
PHD Washington Univ in St. Louis 2006
MD Washington Univ in St. Louis 2006
BA Princeton University 1998

## H

**Gabriel E. Haller, PHD**
Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Genetics
Assistant Professor of Neurology
PHD Washington Univ in St. Louis 2013
BS University of Chicago 2008

## K

**Albert H Kim, MA, PHD, MD**
Professor of Neurological Surgery (primary appointment)
Professor of Developmental Biology
Professor of Neurology
MA Washington Univ in St. Louis 1999
PHD New York U. School of Medicine 2002
MD New York U. School of Medicine 2003
BA Harvard University 1994

## L

**Eric Claude Leuthardt, MD**
Shi Hui Huang Professor of Neurological Surgery (primary appointment)
Professor of Mechanical Engineering and Applied Science.
Professor of Neuroscience
BS Saint Louis University 1995
MD University of Pennsylvania 1999

**David D Limbrick Jr, PHD, MD**
Professor of Neurological Surgery (primary appointment)
Professor of Pediatrics
T.S. Park, MD, Chair in Pediatric Neurosurgery
PHD Virginia Comm University 2001
MD Virginia Comm University 2001
BS College of William and Mary 1995

## M

**Matthew R. MacEwan, PHD**
Assistant Professor of Neurological Surgery (primary appointment)
PHD Washington Univ in St. Louis 2015
BS Case Western Reserve Univ 2004

**James Patterson McAllister, PHD**
Professor of Neurological Surgery (primary appointment)
BA Earlham College 1970
PHD Purdue University 1976

**Sean David McEvoy, MD, MHS**
Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Pediatrics
MD Yale University 2010
BS University of Iowa 2005
MHS Yale University 2010

**Camilo Alejandro Molina, MD**
Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Orthopaedic Surgery
MD Johns Hopkins University 2013
BA Miami University 2008

## O

**Joshua William Osbun, MD**
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Neurology
Associate Professor of Radiology
BA Texas A&M University 2002
MD University of Texas Southwest 2007
BA Texas A&M University 2002

## P

**Tae Sung Park, MD**
Margery Campbell Fort Professor of Neurological Surgery (primary appointment)
Professor of Neuroscience
Professor of Pediatrics
BS Yonsei University 1967
MD Yonsei University 1971

**Brenton Henry Pennicooke, MS, MD**
Assistant Professor of Neurological Surgery (primary appointment)
Assistant Professor of Orthopaedic Surgery
BS John Hopkins University 2008
MS John Hopkins University 2008
MD Harvard University 2012

**Allegra Petti, PHD**
Assistant Professor of Neurosurgery (primary appointment)
BS Lawrence University 2003
PHD Emory University 2005

## R

**Wilson Z Ray, MD**
Professor of Neurological Surgery (primary appointment)
Professor of Biomedical Engineering
Professor of Orthopaedic Surgery
MD University of Iowa 2004

## S

**Paul Santiago, MD**
Professor of Neurological Surgery (primary appointment)
Professor of Orthopaedic Surgery
MD Yale University 1995
BS Stanford University 1990

**Matthew D Smyth, MD**
Appoline Blair Endowed Chair Professor of Neurological Surgery (primary appointment)
Professor of Pediatrics
BA Cornell University 1992
MD University of CA San Francisco 1996

**Jennifer Mae Strahle, MD**
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Orthopaedic Surgery
Associate Professor of Pediatrics
BS Bates College 2002
MD University of Minnesota 2008

## W

**Jon T. Willie, PHD, MD**
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor Neurology
Associate Professor of Neuroscience
Associate Professor of Psychiatry
PHD University of Texas Southwest 2005
MD University of Texas Southwest 2005
BA University of Texas Austin 1996

## Y

**Hiroko Yano, MS, PHD**
Associate Professor of Neurological Surgery (primary appointment)
Associate Professor of Genetics
Associate Professor of Neurology
BS Science University of Tokyo 1991
MS University of Tokyo 1993
PHD University of Tokyo 1996

**Liya Yuan, PHD, MS**
Instructor in Neurological Surgery (primary appointment)
PHD Tongji University 1994
MS Tongji University 1987

## Z

**Gregory Joseph Zipfel, MD**
Ralph G Dacey Distinguished Professorship of Neurological Surgery (primary appointment)
Head of the Department of Neurological Surgery
Professor of Neurology
BS University of Illinois 1991
MD Northwestern University Med 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 craniosynostosis 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

Visit online course listings to view offerings for M40 NeurSurg (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M40).

## 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.

**M40 NeurSurg 805 Neurosurgery Subinternship**
The goal of this elective is to provide an overview of neurological surgery. The fourth-year medical student will participate in patient work-ups, pre-, intra- and postoperative care, and diagnostic procedures. Students will also scrub in cases with senior level and chief residents assisting with neurosurgical procedures and observing the more critical portions of these procedures. It is expected that they will learn how to perform basic neurosurgical procedures such as lumbar punctures, ICP monitor placement, and ventricular drain placement. Fourth-year medical students are encouraged to participate in Grand Rounds, Neurosurgery Resident Curriculum conference, and Journal Club with the neurosurgery residents. At least one day/week is spent in an outpatient neurosurgery office setting. A week spent on the pediatric service at St. Louis Children's Hospital is a component of this fourth-year elective.

**M40 NeurSurg 900 Research Elective - Neurosurgery**
Research opportunities may be available. If interested, please contact the Department of Neurosurgery.

# Department of Obstetrics and Gynecology

The Department of Obstetrics and Gynecology (http://www.obgyn.wustl.edu/) has clinical teaching services located at Barnes-Jewish Hospital and Missouri Baptist Medical Center under the following director:

**Dineo Khabele, MD, FACOG, FACS**
Mitchell and Elaine Yanow Professor and Head, Department of Obstetrics and Gynecology

In addition, for the purposes of teaching, clinical care and research, the Department of Obstetrics and Gynecology is divided into subspecialty divisions under the following directors:

**Gynecologic Oncology**
Matthew A. Powell, MD

**Maternal-Fetal Medicine**
Jeffrey M. Dicke, MD

**Fetal Care Center**
Michael W. Bebbington, MD, MHSc

**Imaging**
Jeffrey M. Dicke, MD

**Reproductive Endocrinology and Infertility**
Randall R. Odem, MD

**General Obstetrics and Gynecology**
Eric A. Strand, MD

**Female Pelvic Medicine and Reconstructive Surgery**
(formerly Uro-Gynecology)
Jerry L. Lowder, MD, MSc

**Family Planning**
Tessa Madden, MD, MPH

**Pediatric and Adolescent Gynecology**
Holly R. Hoefgen, MD

**Minimally Invasive Gynecologic Surgery**
Scott W. Biest, MD

**Research, Vice Chair**
Sarah K. England, PhD

**Clinical Research Director**
Ebony B. Carter, MD, MPH

**Reproductive Health Sciences Center, Director**
Indira U. Mysorekar, PhD, MS

**Residency Program Director**
Eric A. Strand, MD

**Residency Program Associate Director**
Shelby M. Dickison, MD

**Vice Chair for Education & WUSM III Clerkship Director**
Tammy S. Sonn, MD

**Course Director**
Kenan R. Omurtag, MD

**Website:** http://www.obgyn.wustl.edu

# Faculty

## Department Head

**Dineo Khabele, MD, FACOG, FACS**

## OB-GYN Student Clerkship Director

**Tammy Sonn, MD (https://obgyn.wustl.edu/about/directory/tammy-l-sonn-md-facog/)**

Visit our website for the most updated information about our faculty (http://www.obgyn.wustl.edu/content/199/faculty_listing.aspx) and their appointments.

### A

**John K Appelbaum, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD Washington Univ in St. Louis 1984
BA Saint Louis University 1980

**Tomas Ismael Aquino**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)

### B

**Elise Cosette Bardawil, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
BA University of Pennsylvania 2007
MD Drexel University 2013

**Margaret Elizabeth Baum, BA1, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA1 Saint Louis University 1997
MD John Hopkins Univeresity 2001
BA Saint Louis University 1997

**Michael William Bebbington, MHS, BE, MD**
Professor of Obstetrics and Gynecology (primary appointment)
MHS University of British Columbia 1993
BE McMaster University 1979
BS McMaster University 1978
MD McMaster University 1982

**Robert L Becker, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD Washington Univ in St. Louis 1969
BA Cornell University 1965

**James E Belcher, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS University of Texas Austin 1972
MD Washington Univ in St. Louis 1976

**Joe E Belew, MD**
Associate Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD Saint Louis University 1957
BA Central Methodist College 1953

**Scott W Biest, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
MD University of MO Kansas City 1989
BS University of MO Kansas City 1985

**Jeffrey D Bloss**
Adjunct Associate Professor of Obstetrics and Gynecology (primary appointment)

**Richard Gerald Bolanos**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Lawrence V Boveri, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD University of Missouri 1988

**Robert J Brown, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BS St Peters College 1977
MD Washington Univ in St. Louis 1983

**Bruce L Bryan, BE, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BE Purdue University 1973

### C

**Ebony Boyce Carter, M PH, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
Assistant Professor of Social Work
Assistant Professor of Surgery (Public Health Sciences)
BS Stanford University 2000
M PH University of Michigan 2002
MD Duke University 2006

**Emma Elizabeth Cermak, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA University of Pennsylvania 2005
MD Case Western Reserve Univ 2010

**Michael B Chen**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)

**Ronald J Chod, MD**
Adjunct Associate Professor of Obstetrics and Gynecology (primary appointment)
MD Southwestern University 1983
BA University of Texas Austin 1978

**Christine M Chu, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD Jefferson Medical College 2009

**Vicente M Colon-Alcaraz, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BA University of Puerto Rico 1978
MD School Not Listed 1982

## D

**Jessica Despotovic**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Michelle R Devera, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Washington Univ in St. Louis 1985
MD Washington Univ in St. Louis 1993

**Jeffrey M Dicke, MD**
Professor of Obstetrics and Gynecology (primary appointment)
BA University of Toledo 1975
MD Ohio State University 1978

**Shelby Marie Dickison, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD University of MO Columbia 2011
BS University of MO St Louis 2004

**Justin T Diedrich, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Case Western Reserve Univ 2004
MD Case Western Reserve Univ 2008

**Russell B Dieterich, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Knox College 1965
MD University of Illinois 1970

**Michael Mckinley Dombrowski, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
Assistant Professor of Anesthesiology
MD Wayne State University 2011
BS University of Michigan 2006

## E

**David Louis Eisenberg, M PH, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
M PH Northwestern University 2009
MD University of Alabama 2003
BS University of Pittsburgh 1999

**Josiah O. Ekunno, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS School Not Listed 1965
MD School Not Listed 1974

**Sarah K England, PHD**
Professor of Obstetrics and Gynecology (primary appointment)
Alan A and Edith L Wolff Professor of Medicine
Professor of Cell Biology and Physiology
PHD Medical College of Wisconsin 1993
BA Carleton College 1988

**Renee D Ewing, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Southern Illinois University 1984
BA University of MO St Louis 1979

## F

**Cathleen Rae Faris, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BA University of Kansas 1977
MD University of Kansas 1982

**Laurel D Fendrich**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Megan Elizabeth Foeller, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
BS University of Colorado Boulder 2008
MD Loyola University Chicago 2012

**Antonina I Frolova, MD, PHD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD Washington Univ in St. Louis 2013
PHD Washington Univ in St. Louis 2013
BS Univ of IL -Urbana-Champaign 2005

**Katherine C Fuh, MD, PHD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
BA Johns Hopkins University 1999

MD Georgetown University 2005
PHD Stanford University 2013

## G

**Andrew E Galakatos, MD**
Professor of Clinical Obstetrics and Gynecology (primary appointment)
BS St Louis College of Pharmacy 1960
MD University of Missouri 1965

**Chiara G.I. Ghetti, MD, MSCI**
Associate Professor of Obstetrics and Gynecology (primary appointment)
MD Indiana University Indianopoli 1997
BA Cornell University 1992
MSCI University of Pittsburgh 2013

**Diana Lee Gray, MD**
Professor of Obstetrics and Gynecology (primary appointment)
Associate Dean for Faculty Affairs
Professor of Engineering
Professor of Radiology
BS University of Illinois 1977
MD University of Illinois 1981

**Margaret Rosanna Gray-Swain, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Washington Univ in St. Louis 2002

## H

**Andrea Ruth Hagemann, AB, MD, MSCI**
Associate Professor of Obstetrics and Gynecology (primary appointment)
AB Princeton University 2000
MD Washington Univ in St. Louis 2004
MSCI Washington Univ in St. Louis 2015

**Richard Alan Hartman, MD**
Associate Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD University of Missouri 1978
BS Mass Inst of Technology (MIT) 1974

**Kenneth Edmond Hemba, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Jefferson Medical College 2011

**Holly R Hoefgen, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD Southern Illinois University 2008
BS Southern Ill Univ Edwardsville 2002

**Kathleen M Hogan, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD University of Missouri 1989
BA Westminster College 1985

**William Edward Houck, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD University of Cincinnati 1981
BS Brown University 1977

**Laura Hulbert, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Washington Univ in St. Louis 1981
BA Washington Univ in St. Louis 1976

## J

**Saji Jacob, DIP, MD, MS, UNKNOWN**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
DIP School Not Listed 1998
MD School Not Listed 1993
MS Kerala University 1989
UNKNOWN School Not Listed 1996

**Kathleen E Jaeger, MD, PHD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Miami University 2007
MD Loyola University Chicago 2014
PHD Loyola University Chicago 2014

**Eboni C January**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Patricia T. Jimenez, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD University of Texas Southwest 2005
BA Rice University 2001

**Michael K Johnson, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS Ohio State University 1970
MD Saint Louis University 1975

**Sandy Lynn Jost**
Adjunct Instructor in Obstetrics and Gynecology (primary appointment)

**Mark J Jostes, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD University of Missouri 1981
BS Rockhurst College 1976

## K

**Mary Bridget Keegan, MD**

Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Northwestern University 2004
MD University of MO Columbia 2010

**Sarah Lynn Keller, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
MD Southern Illinois University 1989
BA University of Notre Dame 1985

**Jeannie Chen Kelly, AB, MD, MS**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
AB Duke University 2005
BS Duke University 2020
MD Columbia University 2009
MS Tufts University 2017

**Dineo Khabele, MD**
Mitchell and Elaine Yanow Professor of Obstetrics and Gynecology (primary appointment)
Head of the Department of Obstetrics and Gynecology
Professor of Biochemistry and Molecular Biophysics
MD Columbia University 1994
BS Columbia University 1989

**Erin L King, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Stanford University 1997
MD Washington Univ in St. Louis 2003

**Phillip Lee Kintner, MD**
Instructor in Cinical Obstetrics and Gynecology (primary appointment)
MD Southern Illinois University 1986

**Laurie Klabi, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA University of Missouri 1987
MD University of Missouri 1991

**Jacob Klein, MD**
Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD School Not Listed 1968
BS Muhlenberg College 1964

**Yosuke Komatsu**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Ramakrishna Kommagani, PHD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
PHD Wright State University 2009

**Claudia Krasnoff, MD, MA**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Goucher College 1986
MD University of Maryland 1994
MA Johns Hopkins University 1990

**Lindsay M Kuroki, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
BS Brown University 2004
MD Brown University 2009

## L

**Christine Marie Ladd, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Saint Louis University 1986
MD University of Missouri 1990

**Bobbi Omori Lakin, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Univ of Oklahoma Health Sci 2015
BA University of Oklahoma 2010

**Patricia Lazaroff, BN, MSN**
Adjunct Instructor in Obstetrics and Gynecology (primary appointment)
BN School Not Listed 1972
MSN Saint Louis University 1974

**Edward S Levy, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Duke University 1987
MD Washington Univ in St. Louis 1991

**Jerry L Lowder, MS, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
BS University of North Carolina 1995
MS University of Pittsburgh 2006
MD East Carolina University 1999

**Kerith Lucia Lucco**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

## M

**Tessa E Madden, M PH, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
BS Smith College 1995
M PH Johns Hopkns University Medic 2006
MD Washington Univ in St. Louis 2001

**Carolyn Marie Martin, MD**

Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BA Lindenwood College 1970
MD Washington Univ in St. Louis 1976

**Katherine Mae Massa, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD Temple University 2013
BS Northwestern University 2008

**Leslie Stewart Massad, MD**
Professor of Obstetrics and Gynecology (primary appointment)
MD Duke University 1984
BS Williams College 1980

**Jennifer Ann McCabe, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS Saint Louis University 2001
MD Saint Louis University 2005

**Carolyn Kay McCourt, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
BS Creighton University 1997
MD Creighton University 2001

**Daniel S McDonald, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS Yale University 1984
MD University of Missouri 1989

**Denise Andrea Meckler, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Ohio State University 1992
BA Duke University 1988

**Jerry N Middleton, MD**
Instructor Emeritus in Clinical Obstetrics and Gynecology (primary appointment)
MD Washington Univ in St. Louis 1963
BA Westminster College 1959

**Cory Scott Miller, MD**
Assistant Professor of Obstetrics and Gynecology (Pending Executive Faculty Approval) (primary appointment)
BS University of missouri 2006
MD Saint Louis University 2010

**Kelle Harbert Moley, MD**
Adjunct Professor of Obstetrics and Gynecology (primary appointment)
MD Yale University 1988
BA Wellesley College 1984

**Jeffrey Stuart Mormol**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS Indiana University Bloomington 1986

**Nathaniel H Murdock, MD**
Associate Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD Meharry Med College 1963
BS Howard University 1958

**Helen I-Yun Mussemann, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Beaufort Technical College 1996
BA Rice University 1992

**David G Mutch, MD**
Ira C and Judith Gall Professor of Obstetrics and Gynecology (primary appointment)
BA Carleton College 1976
MD Washington Univ in St. Louis 1980

**Indira U Mysorekar, PHD, MS**
James P Crane Professor of Obstetrics and Gynecology (primary appointment)
Professor of Pathology and Immunology
PHD Washington Univ in St. Louis 2002
MS University of Lund 1995
BS University of Lund 1994

## N

**Sarah Ayesha Nazeer, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
BA University of MO Kansas City 2017
MD University of MO Kansas City 2017

**Jessica A Norton, MD**
Instructor in Obstetrics and Gynecology (primary appointment)
MD Boston University 2015
BA Yale University 2011

## O

**Micaela E O'Neil, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Univ of Wisconsin Madison 2010
BS Univ of Wisconsin Madison 2006

**Kenan Rifat Omurtag, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
BA University of MO Kansas City 2006
MD University of MO Kansas City 2006

**Margaret McCarthy Ormonde**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

BS University of Missouri 1983

## P

**Meera Raman Patel, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD University of MO Kansas City 1996
BA University of MO Kansas City 1995

**Marta J Perez, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD Vanderbilt University 2014
BA Georgetown University 2010

**Timothy Charles Philpott, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BA Carleton College 1987
MD Washington Univ in St. Louis 1994

**Genie Marie Pierson**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Aaron Juan Pile, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Norfolk State University 1980
MD School Not Listed 1983

**Jorge Pineda, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD School Not Listed 1972

**Matthew A Powell, MD**
Professor of Obstetrics and Gynecology (primary appointment)
MD Michigan State University 1995
BS Washington St University 1990

## R

**Janet Sue Rader, MD**
Adjunct Professor of Obstetrics and Gynecology (primary appointment)
MD University of Missouri 1983
BA Drake University 1978

**Nandini Raghuraman, MS, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
BS University of AL Birmingham 2007
MS University of AL Birmingham 2007
MD University of Alabama 2011

**Jodie Rai, MD**
Associate Professor of Clinical Obstetrics and Gynecology (primary appointment)
BA Harvard University 1983
MD University of Illinois 1988

**Roxane M. Rampersad, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
MD Emory University 1998
BS Emory University 1994

**Valerie Ratts, MD**
Professor of Obstetrics and Gynecology (primary appointment)
Associate Dean for Admissions
MD Johns Hopkns University Medic 1987
BS University of Illinois 1983

**Angela Mary Reining**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Lee A Rigg, PHD, MD**
Associate Professor of Clinical Obstetrics and Gynecology (primary appointment)
PHD University of Colorado Boulder 1965
BA Arizona State University 1961
MD Washington Univ in St. Louis 1971

**Joan K. Riley, MS, PHD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
Associate Professor of Medicine
Associate Professor of Pediatrics
MS University of Leeds 2015
PHD Washington Univ in St. Louis 1998
BS University of Illinois 1992

**Ann Marie Rockamann, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Saint Louis University 1987
MD Saint Louis University 1991

**Chinda Vanasin Rojanasathit, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD School Not Listed 1967

**Whitney T Ross, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
BS East Tennessee State Universi 2010
BA East Tennessee State Universi 2010
MD East Tennessee State Universi 2014

**Sharman M Russell, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD CHICAGO MEDICAL SCHOOL 2010

**Bridget Scheve Rutledge**

Instructor in Clinical Obstetrics and Gynecology (primary appointment)

## S

**Jerome D Sachar, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD University of Missouri 1979
BA Amherst College 2000

**Celia Maria Santi Grau Perez, PHD, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
Associate Professor of Neuroscience
BS Instituto de Montevideo 1979
PHD National Autonomous U of Mex 1998
MD Instituto de Montevideo 1992

**Gillian Brit Schivone, MD, MS**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD University of Minnesota 2011
BA Boston University 2005
MS Stanford University 2017

**Leslie A Scott**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Anne R Seyer, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Saint Louis University 2006
BA Saint Louis University 2002

**Clayton D. Skaggs, DC**
Adjunct Instructor in Obstetrics and Gynecology (primary appointment)
DC Logan College of Chiropractic 1987
BS Southwest Misouri St Universi 1984

**Jennifer H. Smith, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS University of California 1995
MD Washington Univ in St. Louis 1999

**Tammy Shim Sonn, MD**
Professor of Obstetrics and Gynecology (primary appointment)
BS University of Chicago 1999
MD Rush University 2004

**Chotchai Srisuro, MD**
Associate Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD School Not Listed 1967

**Andrea L Stephens, MS, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA University of CA San Diego 1982
MS University of CA Los Angeles 1983
MD University of CA Los Angeles 1987

**John A Stopple, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Grinnell College 1962
MD Univ of Wisconsin Madison 1969

**Eric A Strand, MD**
Professor of Obstetrics and Gynecology (primary appointment)
MD Johns Hopkns University Medic 1995

**Abbe L Sudvarg**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

## T

**Melissa Dawn Tepe, MS, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS Yale University 1999
MS Columbia University 2004
MD Albert Einstein College of Med 2005

**Premal H Thaker, MS, MD**
Professor of Obstetrics and Gynecology (primary appointment)
BA Villanova University 1995
MS University of Texas Houston 2004
MD Allegheny College 1997

**Jean Alfred Thomas Sr., MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD School Not Listed 1972

**Jeffrey Bryant Thompson, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BS Vanderbilt University 1989
MD University of Missouri 1994

**M. Bryant Thompson, MD**
Associate Professor of Clinical Obstetrics and Gynecology (primary appointment)
BA Eastern New Mexico University 1957
MD University of California 1961

**Albro C Tobey, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BS Butler University 1965
MD School Not Listed 1972

**Randall W Tobler, MD**

Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BA University of Missouri 1980
MD Washington Univ in St. Louis 1984

**Jacqueline Sue Turner, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Mass Inst of Technology (MIT) 1979
MD Tulane University 1983

**Kanika A Turner**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

## V

**Ashley Veade, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
BS Louisiana State University, Co 2010
MD Louisiana Health Sciences Cent 2014

**Zevidah Vickery, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD Ben-Gurion Univ of the Negev 2005

## W

**Daniel G Wagner, MD, BA1**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA Holy Cross College 1985
MD Saint Louis University 1989
BA1 Holy Cross College 1985

**Yong Wang, PHD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
Associate Professor
Associate Professor of Radiology
PHD Washington Univ in St. Louis 2009

**Gary Michael Wasserman, MD**
Assistant Professor of Clinical Obstetrics and Gynecology (primary appointment)
BA University of MO Kansas City 1978
MD University of Missouri 1980

**Mark S Wasserman, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
BA University of Missouri 1980
MD University of Missouri 1984

**David L Weinstein, MD**
Associate Professor of Clinical Obstetrics and Gynecology (primary appointment)
MD Saint Louis University 1985
BS University of Michigan 1981

**Denise Michelle Willers, MD**
Associate Professor of Obstetrics and Gynecology (primary appointment)
MD Southern Illinois University 2000
BS Drake University 1996

**Holly L Wright, MD**
Assistant Professor of Obstetrics and Gynecology (primary appointment)
MD Southern Illinois University 2009
BS Southern Ill Univ Edwardsville 2005

**Heather E. Wuebker, MD**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)
MD University of MO Kansas City 1998
BA University of MO Kansas City 1996

## Z

**Sandra G.H. Zakroff**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

**Peinan Zhao, PHD, MS**
Instructor in Obstetrics and Gynecology (primary appointment)
PHD Wuhan University 2011
MS University of MO Columbia 2016

**Darryl Thomas Zinck**
Instructor in Clinical Obstetrics and Gynecology (primary appointment)

# Research Electives

## Obstetrics and Gynecology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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**Sarah England, PhD**
**Indira Mysorekar, PhD**
**Celia Santi, PhD**
**Ramakrishma Kommagani, PhD**
**Katherine Fuh, MD, PhD**

BJC Institute of Health, 10th Floor
Phone: 314-286-1775

During this six-week elective, students will have the opportunity to immerse themselves in bench research in reproductive science.

- Dr. England's laboratory focuses on uterine contractility and ion channels in the uterine myometrium.
- The Mysorekar lab studies the dynamics of tissue regeneration in the adult mammalian urinary bladder, the pathogenesis of a common infectious disease in women (namely, recurrent urinary tract infections), and the potential infectious etiology of preterm birth in pregnant women.
- Dr. Santi's work focuses on ion channels in mouse and human sperm.
- Dr. Fuh investigates cell signaling in ovarian cancer and the biology of ovarian cancer metastasis.

The main criteria for this rotation is that the student must have prior experience as an undergraduate or postgraduate in a laboratory, not including class work. 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. Prior to signing up for this course, the student must contact Dr. England to discuss the schedule and expectations of the rotation.

## Courses

Visit online course listings to view offerings for M45 ObGyn (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M45).

**M45 ObGyn 635B Obstetrics and Gynecology**
The obstetric component of this course emphasizes the physiologic basis of normal pregnancy, parturition, and labor and delivery, and adaptations of other organ systems to pregnancy. Pathophysiology of pregnancy and deviations from normal labor will also be introduced. The gynecologic component of the course reviews embryology, and includes the topics pediatric and adolescent gynecology, amenorrhea, abnormal uterine bleeding, infertility, menopause, and diagnosis and treatment of gynecologic neoplasms.
Credit 16 units.

**M45 ObGyn 730 OB/GYN Clerkship**
All third-year medical students participate in a six-week clinical clerkship in Obstetrics and Gynecology. This is divided into three two-week components of outpatient OB/GYN, inpatient obstetrics and inpatient gynecology. Comprehensive study of the reproductive health needs of women in both the office setting and the surgical setting is the focus of the curriculum. Students are actively involved in all settings of health care delivery: outpatient faculty clinics within all specialties, resident ambulatory clinics, operating rooms for all obstetric or gynecologic cases, inpatient floors of L&D and Gynecology, and the emergency department/hospital inpatient consults. Faculty, fellows, residents, and nurse practitioners provide teaching for this rotation. Student-directed didactics include the faculty and chief resident lecture series, procedural skill station session and faculty-assigned preceptor groups that meet throughout their six-week rotation.
Credit 231 units.

**M45 ObGyn 804 OB/GYN Generalist Outpatient Care Subinternship**
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 subintern will spend the majority of time attending half day clinics and private offices. Overnight OB call is required (approximately 2 evening shifts) to acquaint the student with the house staff and hospital, providing opportunity to participate in deliveries. 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.

**M45 ObGyn 810 OB/GYN Reproductive Endocrinology & Infertility Subinternship**
The subintern 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.

**M45 ObGyn 830 Gynecologic Oncology Subinternship**
The subintern will take part in the work-up of tumor patients prior to surgery and/or radiotherapy, assist in pelvic operations, help render perioperative care, and review pathology specimens and slides. The student will participate in GYN Tumor Clinic sessions, make hospital rounds with house staff, accompany chief residents on consultations, and attend OB/GYN conferences. Opportunities for clinical or basic research projects in gynecologic malignancy are also available.

**M45 ObGyn 833 Special Topics in Reproductive Health**
Students will attend a variety of outpatient clinics to interact with patients seeking different reproductive health services. These topics include family planning and abortion services at the Hope Clinic and BJH; general gynecology services at our faculty practice GYN clinic (WHC) and OB/GYN resident clinic (COH 3); specialized reproductive health services including STI testing and contraception at the St. Louis STD clinic, the SPOT, and C3 Clinic; and OB and pregnancy centering clinics at the Center for Outpatient Health and Affinia. There may also be an opportunity to attend an adolescent and pediatric gynecology clinic, a women's cardiology clinic, and an adult transgender care clinic. Clinical experiences will be mainly ambulatory, but there is potential to work with the Family Planning faculty physicians in the operating room at Barnes Jewish Hospital. The student will prepare a 15-20 minute presentation on a reproductive health topic of their choice to present at the end of the rotation.

**M45 ObGyn 843 Maternal-Fetal Medicine Outpatient Care Subinternship**
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. 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 created in PowerPoint and on a topic of their choice, inspired by a patient-related clinical condition that piqued their interest during the block. In addition, the student will have the option to take overnight call or call in the Pregnancy Assessment Center in order to gain more hands-on experience with inpatient obstetrics; this is voluntary and not a requirement.

**M45 ObGyn 844 Maternal-Fetal Medicine Inpatient (Antepartum) Subinternship**
Areas of patient care will include the Women's Assessment Center (WAC), the Antepartum Unit, and Labor & Delivery. The primary team will be the Antepartum Team, which includes a second-year and third-year OB/GYN resident, an MFM fellow, and the MFM attending. Students are expected to become functioning members of the antepartum team, with their own patients whom they will be responsible for rounding on and completing day-to-day tasks. Our patients include those who are admitted to the Antepartum Unit, various intensive care units, and other services with complications in pregnancy. The student will prepare a brief talk on a topic of their interest during the course of the rotation.

**M45 ObGyn 856 OB/GYN Ultrasound: Genetics**
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.

**M45 ObGyn 861 Female Pelvic Medicine & Reconstructive Surgery Subinternship**
The subintern will take part in the office evaluation of patients with pelvic floor disorders (including pelvic organ prolapse, urinary incontinence, fecal incontinence, and birth injuries), assist in pelvic floor reconstructive surgical procedures, and participate in perioperative care. The subintern will participate in office sessions, surgical cases, and will be responsible for rounding with the Urogynecology resident on service, as well as participating in consultations. The subintern will attend FPMRS didactic educational sessions and OB/GYN conferences. The subintern will be required to do a 45-minute presentation on an Urogynecologic topic of choice by the end of the rotation. Opportunities for clinical research projects in Urogynecology are also available.

**M45 ObGyn 875 Affinia Ambulatory OB/GYN Subinternship**
Subinterns will be working one-on-one with a small subset of Affinia OB/GYN physicians at their office locations spread throughout St. Louis city. These federally-qualified health center sites will allow for a broad array of outpatient obstetrical and gynecologic exposures. Beyond general OB/GYN practice, this rotation will lend more perspective on access to care challenges and various aspects of health inequities.

**M45 ObGyn 900 Research Elective - Obstetrics and Gynecology**
Research opportunities may be available. If interested, please contact the Department of Obstetrics and Gynecology.

# John F. Hardesty, MD, Department of Ophthalmology and Visual Sciences

The John F. Hardesty, MD, Department of Ophthalmology and Visual Sciences has a strong legacy and is a national leader in clinical ophthalmology and research. It is ranked among the top ten best overall programs in the United States, and it is also considered one of the top ten best research programs by *U.S. News & World Report.* Our ophthalmology department is fourth in National Institutes of Health funding for research and has one of the nation's largest ophthalmology research faculty. The department's mission is as follows: "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 hope that students will join us to enrich their medical education and to experience the collaborative culture of ophthalmology.

Although only a small percentage of physicians in the United States specialize in ophthalmology, there is no doubt that all physicians need a basic understanding of the eye and what it can reveal about a patient's condition. In a recent article published in the journal *Ophthalmology,* it was stated that "ophthalmology-related issues arise in the diagnosis and treatment of inpatients and outpatients on internal medicine, pediatrics, trauma surgery, neurology, endocrinology, neurosurgery, otolaryngology, dermatology, oncology, and rheumatology services."[1]

The article went on to state that "[m]ost primary care program directors believe fewer than 50% of incoming residents have sufficient ophthalmology skills when entering the internship period of medical education. Ophthalmoscopy is one of many ophthalmic skills in which there seems to be a gap in the training of medical students. [A study] demonstrated that emergency medicine physicians often do not perform an ophthalmoscopic examination when it is indicated, and when they do, they are unlikely to detect abnormal findings. This presents a serious issue, because patients with visual impairments are more likely to be hospitalized, and from 2006 through 2011, there were 12 million eye-related emergency department visits nationwide. If

they are unable to view or interpret fundus findings with either an ophthalmoscope or fundus photography, the students must know when it is necessary to refer their patients to an ophthalmologist for further evaluation." In other words, even if a physician does not plan to make ophthalmology their career, deepening their knowledge of this field will enhance their skills as a physician in any field.

At Washington University School of Medicine, ophthalmology-based instruction begins during the first year with examination of the eye and a lecture on various aspects of ocular disease. During the second year, students will receive a refresher lecture and lab on direct ophthalmoscopy as well as a lecture on ophthalmic manifestations of systemic disease and primary ocular disease. During the third year, students are given the opportunity during the surgery clerkship to spend four weeks on the ophthalmology services; in addition, there are lectures given to students during the Internal Medicine rotations. During the fourth year, a four-week intensive clinical rotation is tailored to students interested in pursuing ophthalmology as a career. Research electives are available under the guidance of numerous ophthalmology faculty members for fourth-year students.

[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 ocular tumors, oculoplastics and uveitis. We have a very healthy mix of senior established faculty and junior members.

## Alan A. and Edith Wolff Distinguished Professor and Chairman

**Todd Margolis, MD, PhD (https://ophthalmology.wustl.edu/people/todd-margolis-md-phd/)**

## Pediatric Ophthalmology Director

**R. Lawrence Tychsen, MD (https://wuphysicians.wustl.edu/for-patients/find-a-physician/lawrence-tychsen/)**

## Adult Ophthalmology Clinical Director

**P. Kumar Rao, MD (https://profiles.wustl.edu/en/persons/kumar-rao/)**

## Ophthalmology Research Director

**Peter Lukasiewicz, PhD (https://profiles.wustl.edu/en/persons/peter-lukasiewicz/)**

## Ophthalmology Director of Translational Research

**Rajendra Apte, MD, PhD (https://profiles.wustl.edu/en/persons/rajendra-apte/)**

Visit our website for more information about our faculty (http://ophthalmology.wustl.edu/Faculty/) and their appointments.

## A

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MS Delhi University 1972
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Professor of Medicine
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## B

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MD University of Miami 2016

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## N

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## O

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## P

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## R

**Rithwick Rajagopal, MD**
Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
MD New York University 2007

**Mark S Rallo, OD**
Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS Saint Louis University 1986
OD University of Missouri 1990

**Prabakar Kumar Rao, MD**
Professor of Ophthalmology and Visual Sciences (primary appointment)
MD University of Southern Calif 1995
BA University of CA San Diego 1991

**V. Nathan Ravi, PHD, MD, MS**
Professor of Ophthalmology and Visual Sciences (primary appointment)
Professor of Energy, Environmental and Chemical Engineering
PHD Virginia Tech 1980
BS University of Bombay 1972
MD University of Miami 1988
MS University of Bombay 1975

**Margaret Mary McGlynn Reynolds, MD**
Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
BS Creighton University 2010
MD Cornell University 2014

**Michael Dennis Rohde, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD University of Missouri 1987
BS Valparaiso Universty 1983

**Louis J Rosenbaum, MD**
Associate Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Washington Univ in St. Louis 1963

BA University of Michigan 1959

**Mark A Rothstein, MD**
Assistant Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD University of Utah 1991
BA Williams College 1986

**Michael B Rumelt, MD**
Assistant Professor Emeritus of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Washington Univ in St. Louis 1966
BS Lamar University 1962

**Philip A Ruzycki, PHD**
Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
PHD Washington University in St. L 2018
BS Davidson College 2008

## S

**Scott Geoffrey Sagett**
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)

**Jonathan C Schell, MD**
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)
BS Saint Louis University 2001
MD Saint Louis University 2005

**Frederick W Schwagger, OD, BS1**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS Illinois College of Optometry 1957
OD Illinois College of Optometry 1957
BS1 Washington Univ in St. Louis 2000

**Christopher G Seep, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BA University of Missouri 1971
OD University of MO St Louis 1984

**David Brian Seibel, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD University of Missouri 1987

**James Banks Shepherd III, MD**
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
MD Columbia University 1997
BA Amherst College 1992

**Priya Saigal Shetty, MD**
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)
MD University of Michigan 2007

**Arsham Sheybani, MD**
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
MD Washington Univ in St. Louis 2008

**Steven M Shields, MD**
Assistant Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
BS Washington Univ in St. Louis 1981
MD Washington Univ in St. Louis 1986

**Alan Shiels, PHD**
Professor of Ophthalmology and Visual Sciences (primary appointment)
Professor of Genetics
BS School Not Listed 1979
PHD University of London 1983

**Howard Newton Short, MD**
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Saint Louis University 1978
BA Washington Univ in St. Louis 1974

**Erin Gwen Sieck, MD**
Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
MD University of MO Kansas City 2015
BA University of MO Kansas City 2013

**Charles D Signorelli, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS School Not Listed 1957
OD School Not Listed 1957

**Claud Randall Snowden, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS Illinois College of Optometry 1972
OD Illinois College of Optometry 1974

**Craig H Sorce, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BA Southern Illinois University 1988
OD University of Missouri 1992

**Florentina Soto Lucas, PHD**
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
PHD University of Alicante 1992

**Mark H Spurrier, MD**
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)
BA Kansas State University 1976
MD Washington Univ in St. Louis 1980

**Joseph Steska, OD**

Instructor in Ophthalmology and Visual Science (primary appointment)
OD Illinois College of Optometry 2009

**Michael Vincent Stock, BE, BE1, MD**
Instructor in Ophthalmology and Visual Sciences (primary appointment)
BE Vanderbilt University 2008
BE1 Vanderbilt University 2008
MD Washington Univ in St. Louis 2012

**James F Strieter, OD, MBA**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD School Not Listed 1954
BS School Not Listed 1953
MBA Southern Ill Univ Edwardsville 1988

**Leanne Denise Stunkel, MD**
Assistant Professor of Ophthalmology & Visual Science (primary appointment)
Assistant Professor of Neurology
BA Johns Hopkins University 2008
MD Cornell University 2014
BA Johns Hopkins University 2008

**Brian Patrick Sumner, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD Illinois College of Optometry 1978

**Kenneth V Swanson**
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)

## T

**Paul M Tesser, MD, PHD**
Associate Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD State Univ of NY Stonybrook 1991
BS Mass Inst of Technology (MIT) 1981
PHD State Univ of NY Stonybrook 1990

**Matthew A Thomas, MD**
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Harvard University 1991
BS Harvard University 1977

**Linda Mei-Lin Tsai, MD**
Professor of Ophthalmology and Visual Sciences (primary appointment)
MD Northwestern University 1995
BA Northwestern University 1990

**Robert Lawrence Tychsen, MD**
Professor of Ophthalmology and Visual Sciences (primary appointment)
John F Hardesty MD Distinguished Professor of Ophthalmology and Visual Sciences
Professor of Neuroscience
Professor of Ophthalmology and Visual Sciences in Pediatrics
MD Georgetown University 1979
BS Georgetown University 1975

## V

**Gregory Paul Van Stavern, MD**
Professor of Ophthalmology and Visual Sciences (primary appointment)
Professor of Neurology
BS La Salle University 1989
MD Pennsylvania State University 1993

**Gary Lee Vogel, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BA University of Iowa 1970
OD Ohio State University 1977

## W

**James J Wachter, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS Illinois College of Optometry 1990
BA Saint Louis University 1987
OD Illinois College of Optometry 1991

**Donald E Walter Jr, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS University of Houston 1971
OD University of Houston 1972

**William Lee Walter, MD**
Assistant Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Ohio State University 1954
BA De Paul University 1950

**Stephen R Waltman, MD, MBA**
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
MD Yale University 1964
BS Mass Inst of Technology (MIT) 1961

**Stephen Alan Wexler, MD**
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)
BS University of Michigan 1977
MD University of Michigan 1982

**Richard Harris Wieder, MD**
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)
BS University of Illinois 1982

MD University of Illinois 1986

**Philip Raymond Williams, PHD**
Assistant Professor of Ophthalmology and Visual Sciences (primary appointment)
Assistant Professor of Neuroscience
PHD Washington Univ in St. Louis 2009

**Michael L Wolf, OD**
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)
OD University of Missouri 1987
BS University of Missouri 1979

**Ming-Fong Agnes Wong, MD, PHD**
Adjunct Professor of Ophthalmology and Visual Sciences (primary appointment)
MD McGill University 1994
BA Boston University 1990
PHD University of Toronto 2001

# Research Electives

## Ophthalmology and Visual Sciences Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Further descriptions of our research labs can be found on the Vision Core Researchers webpage (http://vrcore.wustl.edu/residentstudentresearchopportunities/RSROHome/).

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**Usha P. Andley, PhD**
1114-C McMillan
Phone: 314-362-7167

Molecular basis of cataract; the function of molecular chaperones in cataract; proteomics, imaging and biochemical studies on cell culture and mouse models for crystallin gene mutations linked with cataract; testing drugs to inhibit cataract.

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**Rajendra S. Apte, MD, PhD**
apte@vision.wustl.edu

Innate immunity and immune effector mechanisms in the retina; oxidative stress and cell death; models of developmental angiogenesis and neovascularization; inflammation and photoreceptor survival; macular degeneration.

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**Steven Bassnett, PhD**
1114 McMillan
Phone: 314-362-1604

Eye development; stochastic models of lens growth; stem cell biology; age-related cataract; UV-induced somatic mutation; ocular manifestations of Marfan syndrome; cell death suppression on the optic axis; cell biology of transparent tissues.

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**Anjali Bhorade, MD**
Phone: 314-362-5343

Evaluating the effect of glaucoma on visual function in older adults in the home; understanding the relationship between vision and driving in older adults with glaucoma.

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**Shiming Chen, PhD**
618 McMillan
Phone: 314-747-4350

Our primary interests are molecular mechanisms regulating photoreceptor gene expression and the implications in understanding photoreceptor development and disease. We are focusing on three transcription factors (CRX, NRL and NR2E3) linked to photoreceptor degenerative diseases. Molecular genetics and biochemical approaches are used to identify the regulatory pathways associated with each factor. Mouse models are used to understand why mutations in these factors cause disease and to develop therapeutic strategies, including AAV gene therapy.

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**Steven M. Couch, MD**
couch@vision.wustl.edu

Orbital inflammatory diseases; surgical techniques and novel treatments of periocular/orbital disease.

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**Susan M. Culican, MD, PhD (Adjunct Professor)**
culican@wustl.edu

*Clinical:* Development of a low-cost, simple visual function task for screening for macular disorders in the primary care setting. *Education:* Examination of the utility of assessment tools for evaluating resident clinical progression during residency training; development of new metrics to gauge resident progress.

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**Philip L. Custer, MD**
custer@vision.wustl.edu

Enucleation and anophthalmic socket disorders; orbital fractures and implants; hemorrhagic complications during oculoplastic procedures.

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**Thomas A. Ferguson, PhD**
1207 McMillan
Phone: 314-362-3745

Molecular basis of immune tolerance and how apoptotic cells tolerize the immune response; role of immune privilege in the pathogenesis of eye diseases such as age-related macular degeneration; role of basal autophagy in the cells of the eye by using the cre-loxP system to delete essential autophagy genes from specific cell types in the eye.

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**Mae Gordon, PhD**
Phone: 314-362-3716

Ocular hypertension; glaucoma; keratoconus; adenoviral conjunctivitis; randomized clinical trial methodology; patient-reported outcome measures and measurement reliability.

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**George J. Harocopos, MD**
harocopos@vision.wustl.edu

Age-related cataract; ophthalmic pathology.

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**Andrew Huang, MD, MPH**
106 McMillan
Phone: 314-362-0403

Ocular surface stem cell biology; molecular therapy for corneal dystrophies and corneal neovascularization; oxidative stress of corneal endothelium; clinical research on dry eye and ocular surface disease.

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**Humeyra Karacal, MD**
karacal@vision.wustl.edu

Treatment of uveitis; prevention of cataracts with antioxidants; antioxidants in age-related macular degeneration; retinal imaging and analysis using data mining techniques; designing operating room equipment to facilitate ophthalmic surgery.

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**Michael A. Kass, MD**
kass@vision.wustl.edu

Principal Investigator of the Ocular Hypertension Treatment Study; diagnosis, treatment and public health aspects of glaucoma.

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**Vladimir Kefalov, PhD**
625 McMillan
Phone: 314-362-4376

Our primary interests are photoreceptor neurobiology and retinal degeneration. We are a sensory neurobiology lab interested in the function of mammalian rod and cone photoreceptors. In addition, we are interested in the mechanisms of neurodegeneration in the retina, and we are working on developing pharmacological and gene therapy tools for preventing photoreceptor cell death.

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**Daniel Kerschensteiner, MD**
kerchensteinerd@vision.wustl.edu
(kerschensteinerd@vision.wustl.edu)

Our primary interest is in understanding the principles that guide the assembly of neural circuits and deciphering the way they process information. We hope to identify features of the retinal circuit architecture that perform particular computations and characterize how they arise during development. We will then probe underlying mechanisms of circuit assembly and function through genetically targeted manipulations of specific cells in the retina.

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**John T. Lind, MD, MS**
lindj@vision.wustl.edu

Glaucoma education; resident education; pharmacologic and surgical treatment of glaucoma; ophthalmic microbiology.

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**Gregg T. Lueder, MD**
lueder@vision.wustl.edu

Retinoblastoma; eye misalignment (strabismus); retinopathy of prematurity; abnormal tearing; nasolacrinal disorders; cataracts; glaucoma.

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**Peter Lukasiewicz, PhD**
1003C McMillan
Phone: 314-362-4284

Neurotransmitters; synapses; retinal function in health and disease; retinal information processing.

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**Todd P. Margolis, MD, PhD**
margolist@vision.wustl.edu

Cellular and molecular mechanisms that regulate herpes simplex infection neurons; inexpensive telemedicine for reducing blindness in underserved populations.

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**Josh Morgan, PhD**
jlmorgan@wustl.edu

Our primary interest in in the synaptic connectivity of visual circuits. Our goal is to understand the structure, development and pathology of the synaptic connectivity that gives rise to vision. Our core approach is to reconstruct neural circuits in the retina and visual thalamus using large-scale 3D electron microscopy.

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**John R. Pruett Jr., MD, PhD**
pruettj@wustl.edu

We use fcMRI to study the development of large-scale functional brain networks in infants at risk for autism spectrum disorder. We are specifically interested in fcMRI correlates of visual joint attention. Our collaborative projects involve fcMRI studies of visual-motor integration.

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**Kumar Rao, MD**
rao@vision.wustl.edu

Surgical and medical therapies for disorders of retina and choroid; novel intraocular markers in uveitis and lymphoma; ultrasound therapy for choroidal melanoma.

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**Nathan Ravi, MD, PhD, MS, FAAO**
ravi@vision.wustl.edu

Our research is directed toward understanding the pathophysiology of presbyopia and developing medical or surgical treatments for this condition.

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**Alan Shiels, PhD**
1128 McMillan
Phone: 314-362-1637
shiels@vision.wustl.edu

Our primary interest is in the molecular genetic mechanisms underlying cataract, glaucoma and associated eye disorders. Specifically, we are interested in the following: (1) genome-wide linkage analysis and targeted (exome, amplicon) sequencing for the discovery of causative or susceptibility genes; and (2) genotype-phenotype and functional expression studies of naturally occurring and gene-targeted mouse models to characterize pathogenic mechanisms.

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**Carla J. Siegfried, MD**
siegfried@vision.wustl.edu

Our research is focused on ocular oxygen metabolism and the development of open-angle glaucoma. We are studying how the oxygen gradient in the eye is altered in disease states as well as noninvasive methods of measuring corneal oxygen consumption.

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**Florentina Soto, PhD**
sotolucasf@vision.wustl.edu

Studies in our laboratory aim to identify the molecular basis of dendrite and axon lamination and synapse formation during development and in the adult retina. In addition, we investigate how these molecules could be involved in the development of retinal pathologies, including retinal degeneration.

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**Larry Tychsen, MD**
2S89 Eye Clinic, St. Louis Children's Hospital
Phone: 314-454-6026

Principal Investigator of NIH-funded studies of visual brain maldevelopment and repair in infant primates as well as of clinical studies of visuomotor abnormalities in cerebral palsy and pediatric refractive surgery.

---

**Gregory P. Van Stavern, MD**
vanstaverng@vision.wustl.edu

Neuroimaging of the visual pathways; idiopathic intracranial hypertension; evidence-based medicine and clinical decision making; using the visual system as a model to study neurologic disorders.

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## Courses

Curriculum courses for Ophthalmology and Visual Sciences are listed below (p. 231).

Visit online course listings to view offerings for M50 Ophth (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M50).

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### First Year

Introduction to clinical ophthalmology begins during the first year with a lecture and practicum (peer exam) on taking an ocular history and performing an ocular exam. Emphasis is on ophthalmoscopy. The lectures and the practicum session will be led by Dr. Andrew Lee.

### Second Year

During the second year, students will receive a refresher lecture and lab on direct ophthalmoscopy as well as a lecture on ophthalmic manifestations of systemic disease and primary ocular diseases.

### Third Year

#### Third-Year Clerkship Opportunities

During the third year, students are given the opportunity to spend four weeks of their surgery rotation on the ophthalmology service. The students work closely with the ophthalmology residents and review the differential diagnosis of the "red eye," how to interpret an ophthalmologic consult note, and how to handle ocular emergencies. During this rotation, there is again emphasis on the use of the ophthalmoscope. Additional clinical skills introduced to rotating students include the use of the slit lamp and indirect ophthalmoscopy. All third-year students must complete the "Case Studies in Ophthalmology for Medical Students" with rotating faculty and attend the periodic "feedback/oral exam" session with Dr. Andrew Lee.

## Third Year/Fourth Year

The Ophthalmology Sub-Internship Rotation occurs during this time. During the month of June prior to their fourth year, students interested in pursuing a career in ophthalmology are encouraged to complete this intensive four-week rotation. Students will have personal indirect ophthalmoscopy lenses available for use on the rotation. Formal didactic sessions and workshops will be used to teach students how to perform a detailed ophthalmic history and exam, including the mastery of advanced slit lamp techniques and indirect fundoscopy. There will be an intense schedule of both live and recorded lectures delivered by ophthalmology faculty members, with post-lecture quizzes. Students will be expected to perform daily required reading. Retention and understanding of reading materials will be gauged by frequent quizzes. Students are strongly encouraged to present a case at the department's grand rounds. By the end of the rotation, students will be expected to function at the level of a first-year ophthalmology resident.

## Curriculum Courses

**M50 Ophth 801 Ophthalmology**
This elective is for senior students who plan to apply for a residency in Ophthalmology. In accordance with any subinternship, medical students will be expected to function at the level of a beginning first-year ophthalmology resident on this rotation. The students will rotate through the resident eye clinic and the subspecialty clinics of the full time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (e.g., neuro-ophthalmology service, cornea/external disease service, etc.). Students may opt to check out indirect ophthalmoscopy lenses that may be used for the month to facilitate the acquisition of fundoscopy skills. During the rotation, the student's responsibilities range from observation (including observing surgery) to working at a resident level and completing full eye examinations. There will be a rigorous academic curriculum for the rotation, including a weekly case presentation, bi-monthly wet lab sessions with a resident, weekly attendance at grand rounds, and a mix of medical student-oriented and resident-oriented conferences. On day one, students will receive a rotating call schedule for the entire month. A medical student is expected to be present at all times to assist the primary call ophthalmology resident during the rotation. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy. All students interested in this senior elective must meet with a Course Director in March of year WUMS-III. The final grade of the student is determined by input from the director of the particular service(s) through which the student rotated, plus the case presentations.

**M50 Ophth 816 Away Rotation in Ophthalmology**
This four-week elective is for senior students from medical schools across the United States who are in good standing at their home institution and who are planning to apply for a residency in ophthalmology. To enroll in this elective, students must first apply online for the elective via the visiting student application service (VSAS). These applications will be reviewed and invitations will then be sent to individuals to enroll in the elective. Due to large demand, not all eligible away students will be accepted for the rotation. The dates for this elective are not flexible. The students will rotate through the resident eye clinic and the subspecialty clinics of the full time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (e.g., neuro-ophthalmology service, cornea/external disease service, etc.). In exchange for a refundable deposit, students may opt to check-out indirect ophthalmoscopy lenses that may be used for the month to facilitate the acquisition of fundoscopy skills. During the rotation, the student's responsibilities range from observation (including observing surgery) to working at a resident level and completing full eye examinations. Didactics will include weekly case presentation sessions, weekly attendance at grand rounds, and a mix of medical student-oriented and resident-oriented conferences. Also, there will be medical student-oriented workshops to learn the basics of the slit lamp and indirect ophthalmoscopy. On day one, students will receive a schedule of conferences that they are expected to attend during the month. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy.

**M50 Ophth 900 Research Elective - Ophthalmology**
Research opportunities may be available. If interested, please contact the Department of Ophthalmology.

# 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

### Department Chair

**Regis O'Keefe, MD, PhD (https://www.ortho.wustl.edu/content/Patient-Care/3683/FIND-A-PHYSICIAN/Physician-Directory/Regis-OKeefe-MD/Bio.aspx)**

Visit our website for more information about our faculty (http://www.ortho.wustl.edu/content/Patient-Care/2295/Find-a-Physician/Physician-Directory.aspx) and their appointments.

### A

**Yousef Abu-Amer, PHD, MS**
Dr J Albert Key Professor of Orthopaedic Surgery (primary appointment)
Professor of Cell Biology and Physiology

BS Hebrew University 1985
PHD Hebrew University 1993
MS Hebrew University 1987

**Muyibat A Adelani, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MD Vanderbilt University 2008

**Alexander William Aleem, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MD Washington Univ in St. Louis 2010
BS Johns Hopkins University 2006

## B

**Jonathon David Backus, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
BS University of Urbana IL 2005
MD Duke University 2010

**Robert L Barrack, MD**
Charles F and Joanne Knight Distinguished Professor of Orthopaedic Surgery (primary appointment)
MD Vanderbilt University 1980

**Donald R Bassman, MD**
Instructor in Clinical Orthopaedic Surgery (primary appointment)
MD Washington Univ in St. Louis 1975
BA Washington Univ in St. Louis 1971

**Marschall Brantling Berkes, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MD Vanderbilt University 2008

**Terra Rupert Blatnik, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
BS Allegheny College 2003
MD Case Western Reserve Univ 2007

**Martin I Boyer, MD, MS**
Carol B and Jerome T Loeb Professor of Orthopaedic Surgery (primary appointment)
MD University of Toronto 1988
MS University of Toronto 1993

**Keith Happ Bridwell, MD**
J Albert Key Distinguished Professor of Orthopaedic Surgery (primary appointment)
Professor of Neurological Surgery
MD Washington Univ in St. Louis 1977
BA Washington Univ in St. Louis 1973

**David Micah Brogan, MS, BE, MD, MS1**
Assistant Professor of Orthopaedic Surgery (primary appointment)
Assistant Professor of Neurological Surgery
MS University College London 2004
BE Vanderbilt University 2003
MD Washington Univ in St. Louis 2009
MS1 University of London 2005

**Robert Henry Brophy IV, MD, MS**
Professor of Orthopaedic Surgery (primary appointment)
BS Stanford University 1994
BA Stanford University 1994
MD Washington Univ in St. Louis 2001
MS Stanford University 1995

**Jacob M Buchowski, MS, MD**
Lawrence G and Elizabeth A Lenke Distinguished Professor of Orthopaedic Surgery (primary appointment)
Professor of Neurological Surgery
MS Yale University 1996
MD Johns Hopkins University 2000
BS Yale University 1996

## C

**Ryan Patrick Calfee, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
BS University of Virginia 1997
MD Washington Univ in St. Louis 2001

**Eric Ward Carson, MD**
Professor of Orthopaedic Surgery (primary appointment)
BS Tufts University 1982
MD University of Illinois Chicago 1989

**Aaron Mark Chamberlain, B MUS, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
B MUS University of Utah 2002
MD University of CA San Francisco 2006

**Abby Ling Lee Cheng, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
Assistant Professor of Neurology
Assistant Professor of Surgery (Public Health Sciences)
MD Washington Univ in St. Louis 2013

**Cara Alessandra Cipriano, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
BS Williams College 2003
MD University of Pennsylvania 2007

**John C Clohisy, MD**
Daniel C. and Betty B. Viehmann Distinguished Professor of Orthopaedic Surgery (primary appointment)
MD Northwestern University 1989
BA Northwestern University 1985

**Berdale S. Colorado, MS, DOST**

Assistant Professor of Orthopaedic Surgery (primary appointment)
Assistant Professor of Neurology
BS University of Iowa 2004
MS Des Moines Universtiy 2009
DOST Des Moines Universtiy 2009

## D

**Kayla E Daniel, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
BA Washington Univ in St. Louis 2011
MD RUSH MEDICAL COLLEGE 2016

**Gregory M Decker, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
Assistant Professor of Neurology
MD American Univ of the Caribbean 2014

**Laura C DePalma, DOST**
Assistant Professor of Orthopaedic Surgery (primary appointment)
DOST Phil Coll of Osteopathic Med 2009

**Christopher J. Dy, M PH, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
Assistant Professor of Surgery (Public Health Sciences)
M PH University of Miami 2008
BS University of Miami 2004
MD University of Miami 2008

## E

**Lawrence Glennon Evans Jr**
Instructor in Orthopaedic Surgery (primary appointment)

## F

**Roberta Faccio, PHD**
Professor of Orthopaedic Surgery (primary appointment)
Professor of Cell Biology and Physiology
PHD University of Bari 2000

## G

**Richard H Gelberman, MD**
Professor of Orthopaedic Surgery (primary appointment)
BA University of North Carolina 1965
MD University of Tennessee 1969

**Charles A Goldfarb, MD**
Professor of Orthopaedic Surgery (primary appointment)
MD University of Alabama 1996
BA Williams College 1992

**Matthew Lawrence Goodwin, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
Assistant Professor of Neurological Surgery
MD Cornell University 2013

**J. Eric Gordon, MD**
Professor of Orthopaedic Surgery (primary appointment)
MD University of CA Davis 1988
BS University of California 1983

**Farshid Guilak, MPH, PHD, MS**
Professor of Orthopaedic Surgery (primary appointment)
Professor of Biomedical Engineering
Professor of Developmental Biology
Professor of Mechanical Engineering and Materials Science
MPH Columbia University 1990
PHD Columbia University 1992
BS Rensselaer Poly Institute 1985
MS Rensselaer Poly Institute 1987

**Munish C Gupta, MD**
Mildred B. Simon Distinguished Professor of Orthopaedic Surgery (primary appointment)
BS Northwestern University 1982
MD Northwestern University Med 1986

## H

**Mark E. Halstead, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
Associate Professor of Pediatrics
MD Univ of Wisconsin Madison 1998
BS Univ of Wisconsin Madison 1994

**Jeremy A Hartman, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MD Saint Louis University 2013

**Damon Joseph Louis Hays, MD**
Instructor in Clinical Orthopaedic Surgery (primary appointment)
BS Truman State University 1998
MD Ohio University 2003

**Pooya Hosseinzadeh, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MD Isfahan U of Medical Sciences 2004

**Devyani M. Hunt, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
Associate Professor of Neurology
MD University of Texas Houston 2000
BS University of Texas Austin 1995

## J

**Deeptee Jain, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)

Assistant Professor of Neurological Surgery
MD Duke University 2013

**Kirsten A Jansen**
Instructor in Orthopaedic Surgery (primary appointment)

## K

**Jay Donovan Keener, MD**
Professor of Orthopaedic Surgery (primary appointment)
MD West Virginia University 1998
BS West Virginia University 1991

**Brian Adams Kelly, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
Assistant Professor of Neurological Surgery
MD Columbia University 2009
BA Williams College 2002

**Michael Patrick Kelly, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
Associate Professor of Neurological Surgery
BS Boston College 1999
MD University of Massachussetts 2005

**Sandra E. Klein, MD, BE**
Associate Professor of Orthopaedic Surgery (primary appointment)
MD Washington Univ in St. Louis 2001
BE University of Missouri 1994

**Robert S Kramer, MD**
Instructor in Clinical Orthopaedic Surgery (primary appointment)
BA Harvard University 1979
MD Washington Univ in St. Louis 1983

## L

**Adam J. LaBore, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
Associate Professor of Neurology
BS Louisiana College 1994
MD Loyola University Chicago 1998

**Charles Murray Lawrie, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MD Baylor College of Medicine 2012

**Scott J Luhmann, MD**
Professor of Orthopaedic Surgery (primary appointment)
Professor of Neurological Surgery
MD University of Minnesota 1991
BA Gustavus Adolphus College 1986

**Paul Sherman Lux, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
MD Tulane University 1983

## M

**Matthew J Matava, MD**
Professor of Orthopaedic Surgery (primary appointment)
Professor of Physical Therapy
MD University of MO Kansas City 1987
BA University of MO Kansas City 1986

**Audrey McAlinden, PHD**
Associate Professor of Orthopaedic Surgery (primary appointment)
Associate Professor of Cell Biology and Physiology
PHD University of London 1998

**Christopher M McAndrew, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
MD University of Tennessee 2004

**Sarah Howe McBride, PHD, MS**
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BS Clemson University 2004
PHD Case Western Reserve Univ 2011
MS Case Western Reserve Univ 2008

**Jeremy James McCormick, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
BS Dartmouth College 1999
MD Loyola University Chicago 2003

**Douglas J. McDonald, MD**
Professor of Orthopaedic Surgery (primary appointment)
BS St Johns University 1978
MD University of Minnesota 1982

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Associate Professor of Orthopaedic Surgery (primary appointment)
Associate Professor of Neurology
BS Texas A&M University 1991
MD University of Texas Galveston 1995

**Laura L Meyers, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
MD Vanderbilt University 1993
BS Washington Univ in St. Louis 1988

**Anna Noel Miller, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
MD Baylor University 2005
BA Rice University 2001

**Gary Arthur Miller, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)

BA University of Chicago 1973
MD Jefferson Medical College 1977

**Mark L. Miller, MD, BE**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MD Harvard University 2008
BE Stanford University 2004

## N

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BS Truman State University 2003
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## O

**Regis James O'Keefe, MD, PHD**
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BA Yale University 1981
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PHD University of Rochester 2000

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Assistant Professor of Neurology
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## P

**Julia Partin, DPM**
Instructor in Orthopaedic Surgery (primary appointment)
DPM Kent St University 2001
BS University of MO St Louis 1997

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MD Saint Louis University 1975
BA Saint Louis University 1971

## R

**Muhammad Farooq Rai, PHD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
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PHD University of North Carolina 2013
SCM Johns Hopkins University 2009
BS University of Maryland 2007

## S

**Perry Lee Schoenecker, MD**
Professor of Orthopaedic Surgery (primary appointment)
BS Univ of Wisconsin Madison 1964
MD Univ of Wisconsin Madison 1968

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Instructor in Orthopaedic Surgery (primary appointment)
BS1 Banaras Hindu University 1990
MS1 Banaras Hindu University 1992
PHD1 Banaras Hindu University 2000

**Hua Shen, PHD, MD, MS**
Assistant Professor of Orthopaedic Surgery (primary appointment)
PHD University of Konstanz 2002
MD Capital U of Medical Sciences 1991
MS Chinese Academy of Med Science 1996

**Jie Shen, MS, PHD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MS University of Rochester 2011
PHD University of Rochester 2012
BS Nanjing University 2005

**Matthew J Silva, PHD, ME**
Julia and Walter R Peterson Professor of Orthopaedic Research (primary appointment)
Assistant Professor of Biomedical Engineering
Professor of Mechanical Engineering and Materials Science
PHD Mass Inst of Technology (MIT) 1996
ME Cornell University 1984
BS Cornell University 1982

**Scott A. Simpson, MD**
Assistant Professor of Orthopeadic Surgery (primary appointment)
Assistant Professor of Neurology
BA Columbia University 2005
MD University of Rochester 2010

**Matthew Vernon Smith, MD**
Associate Professor of Orthopaedic Surgery (primary appointment)
MD Virginia Comm University 2002

**Gaurav Swarnkar, PHD**

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PHD CENTRAL DRUG RESEARCH INSTITUT 2011

## T

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Associate Professor of Neurology
MD University of North Carolina 2004

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BS University of CA Berkeley 2003
PHD Rensselaer Poly Institute 2007
MS Rensselaer Poly Institute 2005

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PHD University of AR Med Sciences 2018

## W

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BS Duke University 2002
MD Washington Univ in St. Louis 2006

## Y

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MD George Washington University 1989
BA University of California 1983
MS University of California 1985

## Z

**Benjamin Matthew Zmistowski, MD**
Assistant Professor of Orthopaedic Surgery (primary appointment)
MD 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 (orthsurg@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

Visit online course listings to view offerings for M96 Ortho (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M96).

**M96 Ortho 801A Orthopedic Surgery Subinternship: Sports**
This clinical elective is available for four weeks during which the student participates in orthopedic conferences, outpatient clinics, surgical cases, and patient rounds on the Sports Medicine service.

**M96 Ortho 801B Orthopedic Surgery Subinternship: Sports**
This clinical elective is available for four weeks during which the student participates in orthopedic conferences, outpatient clinics, surgical cases, and patient rounds on the Sports Medicine service.

**M96 Ortho 801C Orthopedic Surgery Subinternship: Sports**
This clinical elective is available for four weeks during which the student participates in orthopedic conferences, outpatient clinics, surgical cases, and patient rounds on the Sports Medicine service.

**M96 Ortho 805 Geriatric Musculoskeletal Medicine**
Students will participate in nonoperative and operative treatment of common geriatric musculoskeletal issues, including degenerative, traumatic, and metabolic disorders. Selected research articles and other readings will be provided to guide self-directed study of relevant topics. At the end of the course, participants should be familiar with the following: hip, knee, and shoulder arthritis (conservative management and arthroplasty); femur fracture (fixation versus arthroplasty); distal radius fracture (casting versus open reduction internal fixation); spinal degeneration, including lumbar and cervical (nonoperative management and injections); anesthesia preoperative evaluation (risk stratification and optimization); perioperative inpatient management (medical and pain management); and bone health outpatient management (osteopenia and osteoporosis). Please note that this elective is designed for students who are not applying for residency in orthopedic surgery and that it may be particularly relevant for those pursuing fields such as internal medicine, family practice, emergency medicine, and so on.

**M96 Ortho 810A Orthopedic Surgery Subinternship: Foot/ Ankle**
This four-week clinical elective is available to medical students looking to further their knowledge/experience in orthopedics, specifically foot and ankle surgery. Students will participate in surgical cases, outpatient clinics, inpatient care and weekly didactic sessions/conferences. At the completion of the elective, students should have gained a basic knowledge of foot and ankle problems as well as their operative and nonoperative care.

**M96 Ortho 810B Orthopedic Surgery Subinternship: Foot/ Ankle**
This four-week clinical elective is available to medical students looking to further their knowledge/experience in orthopedics, specifically foot and ankle surgery. Students will participate in surgical cases, outpatient clinics, inpatient care and weekly didactic sessions/conferences. At the completion of the elective, students should have gained a basic knowledge of foot and ankle problems as well as their operative and nonoperative care.

**M96 Ortho 820A Orthopedic Surgery Subinternship: Hand**
Clinical elective available, during which time the student will work with attending surgeons primarily at Chesterfield and Center for Advanced Medicine. The service includes care of adult patients with traumatic, sports (arthroscopy), nerve, and degenerative disease. Activities will include participation in outpatient procedures, attendance at faculty clinic office hours, and attendance at orthopedic conferences.

**M96 Ortho 823A Orthopedic Surgery Subinternship: Hand/ Pediatric Hand**
Clinical elective available during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital, St Louis Children's Hospital, and Shriner's Hospital. The service includes care of adult and pediatric patients with congenital, traumatic, sports (arthroscopy), nerve, and degenerative disease. Activities will include participation in outpatient procedures, attendance at faculty clinic office hours, attendance at orthopedic conferences, and dissection of upper-extremity anatomical specimens.

**M96 Ortho 823B Orthopedic Surgery Subinternship: Hand/ Pediatric Hand**
Clinical elective available during which time the student will work with attending surgeons primarily at St. Louis Children's Hospital, Shriner's Hospital, Chesterfield, Center for Advanced Medicine and St. Louis Children's Specialty Care Center. The service includes care of adult and pediatric patients with congenital, traumatic, sports (arthroscopy), nerve, and degenerative disease. Activities will include participation in outpatient procedures, attendance at faculty clinic office hours, attendance at orthopedic conferences, and dissection of upper-extremity anatomical specimens.

**M96 Ortho 825A Orthopedic Surgery Subinternship: Hand/ Nerve**
Clinical elective available during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital, St. Louis Children's Hospital, Washington University Orthopedics at Center for Advanced Medicine and South County. The service includes care of adult and pediatric patients with traumatic, sports (arthroscopy), nerve, and degenerative disease. The rotation will cover general hand surgery as well as brachial plexus and peripheral nerve surgery. Activities will include participation in outpatient procedures, attendance at faculty clinic office hours, and attendance at orthopedic conferences.

**M96 Ortho 827A Orthopedic Surgery Subinternship: Hand/ Microsurgery**
Clinical elective available during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital, Center for Advanced Medicine and the Chesterfield office. The service includes care of adult and pediatric patients with traumatic, sports (arthroscopy), nerve, and degenerative disease. Activities will include participation in outpatient procedures, attendance at faculty clinic office hours, and attendance at orthopedic conferences.

**M96 Ortho 830A Orthopedic Surgery Subinternship: Shoulder/Elbow**
Clinical elective available during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopedic conferences, and dissection of upper-extremity anatomical specimens.

**M96 Ortho 840A Orthopedic Surgery Subinternship: Trauma**
Clinical elective available for a four-week period during which time the student will work in orthopedic trauma at Barnes-Jewish Hospital. The student will work with a team of attendings, residents, PAs, and NPs to provide care for orthopedic trauma patients. Activities include participation in the care of hospitalized inpatients, inpatient surgical procedures, outpatient office visits and daily conferences.

**M96 Ortho 840B Orthopedic Surgery Subinternship: Trauma**
Clinical elective available for a four-week period during which time the student will work in orthopedic trauma at Barnes-Jewish Hospital. The student will work with a team of attendings, residents, PAs, and NPs to provide care for orthopedic trauma patients. Activities include participation in the care of hospitalized inpatients, inpatient surgical procedures, outpatient office visits and daily conferences.

**M96 Ortho 850A Orthopedic Surgery Subinternship: Pediatrics**
Clinical elective available for four weeks during which time the student will work with the attending surgeon primarily at St. Louis Children's Hospital observing and assisting in outpatient and inpatient care. To be included are activities in the OR, ER, and outpatient clinics. Attendance at and participation in the weekly pediatric orthopedic conference activities required.

**M96 Ortho 850B Orthopedic Surgery Subinternship: Pediatrics**
Clinical elective available for four weeks during which time the student will work with the attending surgeon primarily at St. Louis Children's Hospital observing and assisting in outpatient and inpatient care. To be included are activities in the OR, ER, and outpatient clinics. Attendance at and participation in the weekly pediatric orthopedic conference activities required.

**M96 Ortho 860A Orthopedic Surgery Subinternship: Spine**
This clinical elective is available for four weeks during which time the student will work with the attending surgeon primarily at Barnes-Jewish Hospital observing and assisting, when appropriate, in outpatient and inpatient care. To be included are activities in the OR, ER, and outpatient clinics. Attendance at and participation in the weekly orthopedic conference activities is required. The spine fellow assigned to this service will serve as a primary contributor to the student's education experience on this rotation.

**M96 Ortho 860B Orthopedic Surgery Subinternship: Spine**
This clinical elective is available for four weeks during which time the student will work with the attending surgeon primarily at Barnes-Jewish Hospital observing and assisting, when appropriate, in outpatient and inpatient care. To be included are activities in the OR, ER, and outpatient clinics. Attendance at and participation in the weekly orthopedic conference activities is required. The spine fellow assigned to this service will serve as a primary contributor to the student's education experience on this rotation.

**M96 Ortho 860C Orthopedic Surgery Subinternship: Spine**
This clinical elective is available for four weeks during which the student will work with the attending surgeon primarily at Barnes-Jewish Hospital, Barnes-Jewish West County Hospital, and Washington University Orthopedics - Center for Advanced Medicine observing and assisting, when appropriatem in outpatient and inpatient care. To be included are activities in the OR, ED, and outpatient clinics. Attendance at and participation in the weekly orthopedic conference activities is required. The spine fellow assigned to this service will serve as a primary contributor to the student's education experience on this rotation.

**M96 Ortho 863A Orthopedic Surgery Subinternship: Pediatric Spine**
Clinical elective available for four weeks during which time the student will work with the attending surgeon primarily at St. Louis Children's Hospital observing and assisting in outpatient and inpatient care. To be included are activities in the OR, ER, and outpatient clinics. Attendance at and participation in the weekly pediatric orthopedic conference activities required.

**M96 Ortho 863B Orthopedic Surgery Subinternship: Pediatric Spine**
Clinical elective available for four weeks during which time the student will work with the attending surgeon primarily at St. Louis Children's Hospital observing and assisting in outpatient and inpatient care. To be included are activities in the OR, ER, and outpatient clinics. Attendance at and participation in the weekly pediatric orthopedic conference activities required.

**M96 Ortho 870A Orthopedic Surgery Subinternship: Joint Preservation & Recon**
Clinical elective available, during which time the student will work with the attending physician on the Adult Reconstruction and Joint Preservation/Replacement service. This rotation is primarily centered at Barnes-Jewish Hospital and includes care of hospitalized inpatients, participant in inpatient and outpatient procedures, attendance at designated office hours, and attendance at and participation in orthopedic educational conferences and anatomy sessions.

**M96 Ortho 870B Orthopedic Surgery Subinternship: Joint Preservation & Recon**
Clinical elective available, during which time the student will work with the attending physician on the Adult Reconstruction and Joint Preservation/Replacement service. This rotation is primarily centered at Barnes-Jewish Hospital and includes care of young patients with hip impingement pathology and older patients with end stage joint arthritis, hospitalized inpatients, participant in inpatient and outpatient procedures, attendance at designated office hours, and attendance at and participation in orthopedic educational conferences and anatomy sessions.

**M96 Ortho 870C Orthopedic Surgery Subinternship: Joint Preservation & Recon**
Clinical elective available, during which time the student will work with the attending physician on the Adult Reconstruction and Joint Preservation/Replacement service. This rotation is primarily centered at Barnes-Jewish Hospital and includes care of young patients with hip impingement pathology and older patients with end stage joint arthritis, hospitalized inpatients, participant in inpatient and outpatient procedures, attendance at designated office hours, and attendance at and participation in orthopedic educational conferences and anatomy sessions.

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**M96 Ortho 875A Orthopedic Surgery Subinternship: Joint Reconstruction**
Clinical elective available, during which time the student will work with the attending physician on the Adult Reconstruction and Joint Preservation/Replacement service. This rotation is primarily centered at Barnes-Jewish Hospital and includes care of hospitalized inpatients, participant in inpatient and outpatient procedures, attendance at designated office hours, and attendance at and participation in orthopedic educational conferences and anatomy sessions.

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**M96 Ortho 880A Orthopedic Surgery Subinternship: Oncology/Joint Reconstruction**
Clinical elective available for four weeks, during which time the student will work with the attending physicians on the Musculoskeletal Oncology service. The student will participate in orthopedic conferences, outpatient clinics, surgical cases and patient rounds.

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**M96 Ortho 880B Orthopedic Surgery Subinternship: Oncology/Joint Reconstruction**
Clinical elective available for four weeks, during which time the student will work with the attending physicians on the Musculoskeletal Oncology service. The student will participate in orthopedic conferences, outpatient clinics, surgical cases and patient rounds.

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**M96 Ortho 890 Orthopedic Surgery Externship**
Students rotate on orthopedic services in four-week blocks. During their rotations, students are assigned to two different services for two weeks each. Students may rotate on a variety of subspecialties, including trauma sports medicine, hand and upper extremity, foot and ankle, musculoskeletal oncology, adult reconstructive surgery, pediatric orthopaedics, shoulder and elbow, and spine. For more information about the Orthopedic Surgery Externship Program, visit https://www.ortho.wustl.edu/content/Education/2905/Training-Programs/Med-Student-Programs/Externship-Program/Overview.aspx.

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**M96 Ortho 900 Research Elective: Orthopedic Surgery**
Research opportunities may be available. Contact the Department of Orthopedic Surgery for additional information.

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# Department of Otolaryngology

The Department of Otolaryngology-Head & Neck Surgery (http://oto.wustl.edu/) at Washington University in St. Louis has a rich, 130-year history of leadership in our 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; and, presently, Craig A. Buchman, MD, FACS. 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 Washington University physicians and team, together with our Honor Roll Award-winning hospital, Barnes-Jewish Hospital (*U.S. News*, 2018-19), 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 (T32 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 Washington University in St. Louis is a really outstanding place!

## CID at Washington University School of Medicine

The consortium of graduate education, research and clinical programs known today as CID at Washington University School of Medicine was 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 CID's school building opened two years later, its auditory/oral methods for instructing deaf children were groundbreaking.

Washington University and CID first joined forces in 1931, when 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.

CID's research efforts began in the 1930s to study the anatomy and science of hearing. During World War II, CID's research on hearing loss in military personnel laid the foundation for the field of audiology. 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 CID's graduate degree programs, research programs and adult audiology clinic — along with its building — to Washington University School of Medicine. The CID school continues to operate on the School of 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

## Department Head

**Craig A. Buchman, MD, FACS (https://oto.wustl.edu/people/craig-a-buchman-md/)**

Visit our website for more information about our faculty (http://oto.wustl.edu/About-Us/Faculty-Physicians/) and their appointments.

## A

**Azadeh Afshari, DDENT, MS**
Instructor in Clinical Otolaryngology (primary appointment)
BS West Virginia University 2004
DDENT Univ of Texas Med Sch Houston 2014
MS Univ of Texas Med Sch Houston 2013

## B

**Sean B Bailey, MS, MD**
Instructor in Clinical Otolaryngology (primary appointment)
MS Tulane University 1988
BS Tulane University 1981
MD Tulane University 1987

**Jianxin Bao, PHD**
Adjunct Associate Professor of Otolaryngology (primary appointment)
PHD University of Florida 1992

**Lynda Cheryl Berkowitz, MS**
Instructor in Otolaryngology (primary appointment)
Instructor in Audiology and Communication Sciences
MS Washington Univ in St. Louis 1983
BS University of Illinois 1981

**Pablo M Blazquez Gamez, PHD**
Associate Professor of Otolaryngology (primary appointment)
PHD University of Seville 1998

**Andrew E Bluher, MD**
Assistant Professor of Otolaryngology (primary appointment)
MD University of Maryland 2014
BS Princeton University 2009

**Joseph P Bradley, MD**
Assistant Professor of Otolaryngology (primary appointment)
BS Washington Univ in St. Louis 2003
MD University of Kansas Medical 2008

**Gregory Harris Branham, MD**
Professor of Otolaryngology (primary appointment)
BS University of South Carolina 1979
MD University of South Carolina 1983

**Craig Alan Buchman, MD**
Lindburg Professor of Otolaryngology (primary appointment)
Head of the Department of Otolaryngology
BA University of Georgia 1986
MD University of Florida 1990

## C

**John Jeonhwan Chi, MS, MD**
Associate Professor of Otolaryngology (primary appointment)
MS City College 2003
BS Columbia University 2001
MD SUNY DOWNSTATE MED BROOKLYN 2007

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Professor of Developmental Biology
PHD University of Minnesota 1977
MD University of Southern Calif 1969

**William W. Clark, MS, PHD1, PHD**
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Professor of Audiology and Communication Sciences
Professor of Education
MS University of Michigan 1973
PHD1 University of Michigan 1975
PHD University of Michigan 1975
BA University of Michigan 1969

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BS Washington Univ in St. Louis 1973
DDENT Southern Illinois University 1976

## D

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BS East Tennessee State Universi 1985

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MD University of Michigan 2002

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MD University of Illinois 1970
BA Washington Univ in St. Louis 1967

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MD Brown University 2012
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MA Brown University 2012

## F

**Nyssa F Farrell, MD**
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BS University of South Carolina 2010
MD University of South Carolina 2014

**Charles Coleman Finley**
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MS University of Illinois 1982
PHD University of Illinois 1998
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## G

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MD University of Virginia 1993
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PHD Washington Univ in St. Louis 2009
BA Emory University 1995
M ED Smith College 2005

**Michael Anne Gratton, PHD**
Professor of Otolaryngology (primary appointment)
PHD State Univ of NY Buffalo 1989

**Christine Hilleary Gustus, MS**
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MS Washington Univ in St. Louis 1975
BS Purdue University 1973

## H

**Jason M. Hanson, MD**
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**Eugenio Guidote Herbosa**
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**Jacques A Herzog, MD**
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BA University of Missouri 1980
MD University of MO Kansas City 1980

**Keiko Hirose, MD**
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Professor of Audiology and Communication Sciences
Professor of Pediatrics
Vice Chairman for Pediatrics Dept of Otolaryngology
MD Harvard University 1993

**Lawrence M Hoffman, DDENT**
Instructor in Clinical Otolaryngology (DMD) (primary appointment)
BA Indiana University Bloomington 1972
DDENT Washington Univ in St. Louis 1976

**Dee Jay Hubbard, PHD, MA1, MA**
Adjunct Assistant Professor of Otolaryngology (Speech Pathology) (primary appointment)
BS Kansas State University 1962
PHD University of Iowa 1967
MA1 University of Missouri 1999
MA University of Iowa 1965

**Margaret Naunheim Huston, MD**
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MD University of Chicago 2013
BA Duke University 2009

## J

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MD Saint Louis University 2009
BA Saint Louis University 2004

**Arnold Scott Jacobson, DDENT, MS**
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DDENT Washington Univ in St. Louis 1976
BA University of Missouri 1970

MS University of Missouri 1977

**Susan Jerger**
Adjunct Research Professor of Otolaryngology (primary appointment)

## K

**Dorina Kallogjeri, M PH, MD**
Assistant Professor of Otolaryngology (primary appointment)
M PH Saint Louis University 2007
MD University of Tirana 1997

**Eugenia Kardaris**
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**Cristine Nicole Klatt-Cromwell, MD**
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BS University of Oklahoma 2007
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## L

**Carl Wesley Lee, MD**
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MD Case Western Reserve Univ 1992
BA Stanford University 1998

**David Seamus Leonard, MHA, MBCHB**
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MHA Harvard University 2012
MBCHB National University of Irelan 2000
BA Dartmouth College 1995

**Judith E Lieu, MD**
Professor of Otolaryngology (primary appointment)
Vice Chairman Education Department of Otolaryngology
BS University of CA Davis 1988
MD Washington Univ in St. Louis 1992

## M

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BS Muhlenberg College 1981

**Marshall S Manne, DDENT, MS**
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DDENT Washington Univ in St. Louis 1960
MS Indiana University Bloomington 1964
BA Washington Univ in St. Louis 1956

**Claire Matthews, PHD, MA**
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BA University of Kansas 1969
PHD University of Kansas 1980
MA University of Kansas 1978

**Angela Liu Mazul, PHD, MS**
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Assistant Professor of Surgery (Public Health Sciences)
BS Georgia Tech 2009
PHD University of North Carolina 2016
MS Tulane University 2010

**Murray D McGrady, MD**
Instructor in Clinical Otolaryngology (primary appointment)
BS University of Illinois 1982
MD University of Illinois 1986

**Maithilee D Menezes, MD**
Associate Professor of Otolaryngology (primary appointment)
MD Grinnell College 2002
BS Grinnell College 1997

**David W. Molter, MD**
Professor of Otolaryngology (primary appointment)
MD Duke University 1988
BS Duke University 1980

**Gerald William Moritz, MD**
Instructor in Otolaryngology (primary appointment)
BS University of California 1965
MD Saint Louis University 1970

**Nancy Tye Murray, MS, PHD**
Professor of Otolaryngology (primary appointment)
Professor of Audiology and Communication Sciences
BS Texas Christian University 1977
MS University of Iowa 1979
PHD University of Iowa 1984

## O

**Margaret A Ogden, MD**
Professor of Otolaryngology (primary appointment)
Vice Chairman for Clinical Operations Dept of Otolaryngology
MD Washington Univ in St. Louis 2002
BA Amherst College 1997

**Kevin Kenneth Ohlemiller, PHD**
Associate Professor of Otolaryngology (primary appointment)
Associate Professor of Audiology and Communication Sciences
BS Indiana University Bloomington 1983
PHD Northwestern University 1990

**Amanda J Ortmann, PHD, MS**
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Assistant Professor of Audiology and Communication Sciences
Director of Audiology Studies in Audiology and Communication Sciences
BS Missouri Baptist College 2001
PHD University of Pittsburgh 2012
MS Washington Univ in St. Louis 2003

## P

**Randal C Paniello, BS1, MD, MS, MBA**

Professor of Otolaryngology (primary appointment)
BS1 University of Illinois 1979
MD University of Illinois 1984
MS University of Illinois 1980
BS University of Illinois 1979
MBA Washington Univ in St. Louis 1999

**Margaret Grace Peak, MA, PHD**
Adjunct Assistant Professor of Otolaryngology (Audiology) (primary appointment)
BS Maryville University 1959
MA Saint Louis University 1961
PHD Columbia University 1975

**Jonathan Erik Peelle, BAS, PHD, MS PSYC**
Associate Professor of Otolaryngology (primary appointment)
Associate Professor of Psychological & Brain Sciences
BAS Houghton College 1999
PHD Brandeis University 2005
MS PSYC Brandeis University 2002

**Jay Francis Piccirillo, MD**
Professor of Otolaryngology (primary appointment)
Professor of Biostatistics
Professor of Medicine
Professor of Occupational Therapy
Vice Chairman for Research, Dept of Otolaryngology
BA University of Vermont 1979
MD University of Vermont 1985

**Patrik Pipkorn, MD**
Assistant Professor of Otolaryngology (primary appointment)
MD University of Gothenburg 2007

**Gerald Raymond Popelka**
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Assistant Professor of Otolaryngology (primary appointment)
Assistant Professor of Audiology and Communication Sciences
BS Southern Illinois University 1988
PHD Washington Univ in St. Louis 2006
MS Washington Univ in St. Louis 1991

**Sidharth Venkata Puram, PHD, MD**
Assistant Professor of Otolaryngology (primary appointment)
PHD Harvard University 2011
MD Harvard University 2013
BS Mass Inst of Technology (MIT) 2005

## R

**Casey Krauss Reimer, PHD**
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PHD Washington Univ in St. Louis 2019

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BS Brigham Young University 2000
MD Ohio State University 2004

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Assistant Professor of Otolaryngology (primary appointment)
BS University of MO St Louis 1999
PHD University of Oregon 2005

## S

**Alec N Salt, MS, PHD**
Professor of Otolaryngology (primary appointment)
MS University of Birmingham 1974
PHD University of Birmingham 1977
BS University of East Anglia 1973

**John Stone Schneider, M PP, MD, BBA**
Associate Professor of Otolaryngology (primary appointment)
M PP University of Chicago 2007
MD University of Chicago 2007
BBA University of Chicago 1997

**Allen Sclaroff, DDENT**
Professor of Clinical Otolaryngology (Oral Surgery) (primary appointment)
BA University of Colorado Boulder 1968
DDENT Temple University 1972

**Karl Shanker, DDENT**
Instructor in Clinical Otolaryngology (DDS) (primary appointment)
DDENT University of Missouri 1978
BA Washington Univ in St. Louis 1975

**Lavinia Sheets, PHD**
Assistant Professor of Otolaryngology (primary appointment)
Assistant Professor of Developmental Biology
BS Pacific University 1996
PHD Oregon Health Science Univers 2007

**Emily A. Spataro, MD**
Assistant Professor of Otolaryngology (primary appointment)
MD Washington Univ in St. Louis 2012
BS Duke University 2007

## T

**Isolde E Thalmann, PHD, MA**
Professor Emeritus of Otolaryngology (primary appointment)
PHD California Western 1982
BS Washington Univ in St. Louis 1968
MA Washington Univ in St. Louis 1973

## U

**Rosalie May Uchanski, MS, PHD**
Assistant Professor of Otolaryngology (primary appointment)
Assistant Professor of Audiology and Communication Sciences
MS Mass Inst of Technology (MIT) 1981
BS University of Illinois Chicago 1978
PHD Mass Inst of Technology (MIT) 1988

## W

**Mark Edward Warchol, PHD**
Professor of Otolaryngology (primary appointment)
Professor of Audiology and Communication Sciences
Professor of Neuroscience
BS University of Washington 1981
PHD Northwestern University 1989

**Cameron Connelly Wick, MD**
Assistant Professor of Otolaryngology (primary appointment)
MD Wright State University 2010
BS Washington & Lee 2006

## Y

**Tatyana Aleksandrovna Yakusheva, PHD, MS**
Assistant Professor of Otolaryngology (primary appointment)
PHD Russian U of Friendship of Ppl 2002
MS Saratov State University 1997

## Z

**Jose Pedro Zevallos, MD, MPH**
Dr Joseph B Kimbrough Chair for Maxillofacial Surgery and Prosthodontics in the Washington University Department of Otolaryngology (primary appointment)
MD Rutgers University 2005
BS Middlebury College 2000
MPH Univ of Texas Med Sch Houston 2014

# 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.

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**Pablo M. Blazquez, PhD**
East McDonnell Science Building
4566 Scott 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 the vestibulocerebellum during visual and vestibular stimulation; (2) neuronal computations performed by the anterior and posterior cerebellar vermis for spatial navigation in mice; and (3) the role of the cerebellum-brainstem loop in motor learning in the vestibulo-ocular reflex.

Students will be instructed in one or several techniques and are expected to contribute significantly to the development of specific lab projects.

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**Judith E.C. Lieu, MD, MSPH**
3S35 Children's Hospital; and McMillan, 9th Floor
Phone: 314-747-8205

Our focus is clinical outcomes research in pediatric otolaryngology. The Clinical Outcomes Research office performs clinical epidemiology and health services research. (Please reference the research elective offered by Dr. Jay Piccirillo for more details.) These techniques and methodologies are applied to investigate clinical problems in children. Projects currently underway include the evaluation of the quality of life of young children with hearing loss, the evaluation of hearing loss on the perception of fatigue in children, and the use of MRI to investigate the effects of hearing loss in children. Potential studies include evaluating changes in the quality of life of children who begin using hearing amplification devices. Other projects of the student's choosing that would utilize these research techniques may also be pursued.

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**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, immunohistochemistry, and Western blots. We also collaborate to map and perform the expression profiling of genes that underlie traits we have discovered. 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. Neural presbycusis can be modeled by mutations that alter the function of cholinergic receptors. Although we are not sure what types of genes and mutations can lead to strial presbycusis, we have discovered four mouse strains that show the key feature of this disease (age-related endocochlear potential reduction) and that also show distinct types of strial pathology.

We have shown that some of the same gene alleles and mutations that promote presbycusis also promote cochlear noise injury. Such findings point to an interpretation of sensory presbycusis as principally cumulative injury. We

have also published evidence for one or more quantitative trait loci that impact the qualitative character of noise injury. Important implications of our findings are (1) that there exists no single "mammalian" archetype of cochlear noise injury and (2) that injury to the organ of Corti and the lateral wall are mechanistically and genetically independent.

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, immunohistochemistry, histopathology and cellular/molecular techniques.

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**Jay F. Piccirillo, MD**
McMillan, 9th Floor
Phone: 314-362-8641

The Clinical Outcomes Research Office performs clinical epidemiology and health services research. Clinical epidemiology is the study of diagnosis, prognosis and the evaluation of treatment. Health service research is the study of the delivery of health care. The scientific methodology of clinical epidemiology is based on the architecture of clinical research, biostatistics and data processing. Current projects include studying the impact of comorbidities on the treatment and outcomes of patients with cancer. We also conduct research into the neurobiology, treatment and outcomes of patients with tinnitus. One method that we employ is the use of smartphone technology to capture ecological momentary assessments of tinnitus. Additional projects include exploiting neuroplasticity as part of olfactory training for patients with anosmia. With the use of clinical epidemiology methodology, we can also study a variety of other diseases.

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## Courses

Visit online course listings to view offerings for M55 Oto (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M55).

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**M55 Oto 660B Clinical Topics In Otolaryngology**
This course consists of nine introductory lectures on common diseases of the head and neck, including voice disorders, head and neck cancer, hearing loss, management of vertigo, pediatric otolaryngology, salivary gland disorders, sinusitis, otolaryngologic emergencies and facial trauma. Additionally, there is a case-based roundtable focusing on otolaryngology disorders affecting the geriatric population and the involvement of allied health care disciplines in the evaluation and management of these patients. Each lecture is highlighted by case presentations and treatment options in addition to pathophysiology. This course follows the physical examination practicum given earlier in the academic year.
Credit 9 units.

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**M55 Oto 801 Otolaryngology Subinternship**
Four-week rotation includes evaluation of ENT problems presented to specialist for diagnosis and treatment. The student participates in the clinic, hospital, and operating room. This may also include time on the Pediatric ENT Service, Audiology, Voice Laboratory, and Vestibular Evaluation Laboratory. Option of rotation on the ENT Service at VAMC is possible.

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**M55 Oto 803 Pediatric Otolaryngology**
The student will actively participate in the clinical office, inpatient consultations, and surgery with the attending staff at St. Louis Children's Hospital. Care would be taken to provide experience in the common problems one would see in primary care pediatrics or family practice. Participation in sub-specialty/multidisciplinary clinics such as the Cleft and Craniofacial clinic is encouraged. Opportunity will be provided to learn the fundamentals of audiological evaluation. Students participating in this elective will attend academic conferences in both the pediatric and adult divisions.

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**M55 Oto 833 Ambulatory Otolaryngology for the Primary Care Physician**
This course offers a four-week exposure to ambulatory care of patients with diseases of the head and neck. Eight half-day sessions per week will be offered in attending clinics for general otolaryngology, head and neck cancer, otology, and pediatric otolaryngology. Two half-day sessions are reserved for audiology, vestibular lab, and voice lab experience. Surgical exposure is available for selected cases as identified by the student and attending physician, but the main goal of this rotation is outpatient diagnosis and management.

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**M55 Oto 900 Research Elective - Otolaryngology**
Research opportunities may be available. If interested, please contact the Department of Otolaryngology.

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# Department of Pathology & Immunology

The Department of Pathology & Immunology (http://pathology.wustl.edu/) 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 (https://pathology.wustl.edu/divisions/amp/), Immunobiology (https://pathology.wustl.edu/divisions/immunobiology/), Laboratory and Genomic Medicine (http://pathology.wustl.edu/divisions/lgm/) and Neuropathology (http://pathology.wustl.edu/divisions/neuropathology/) have faculty

involved in teaching, clinical service and research. Prominent areas of research include experimental diabetes, hematology, bone pathophysiology, cancer, and gastrointestinal and vascular pathology.

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 clerkships. The course director of the second-year Pathology course is Erika C. Crouch, PhD, MD. Students can take clerkships in Autopsy Pathology, Surgical Pathology or Laboratory Medicine, or they may participate in the research activities of the faculty.

The Division of Immunobiology (https://pathology.wustl.edu/divisions/immunobiology/) integrates immunobiology activities at the school. It is responsible for the teaching of immunology during the first year of the curriculum (Brian T. Edelson, MD, PhD, is the course director) and 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 (http://dbbs.wustl.edu/Pages/). The department has strong participation in the Immunology graduate program.

**Website:** https://pathology.wustl.edu

# Faculty

## Anatomic and Molecular Pathology Division Head

**Joseph Gaut, MD, PhD (https://pathology.wustl.edu/people/joseph-gaut-md-phd/)**

## Immunobiology Division Head

**Robert Schreiber, PhD (https://pathology.wustl.edu/people/robert-schreiber-phd/)**

## Laboratory and Genomic Medicine Division Head

**Charles Eby, MD (https://pathology.wustl.edu/people/charles-eby-md/)**

## Neuropathology Division Head

**Robert E. Schmidt, MD, PhD (https://pathology.wustl.edu/people/robert-schmidt-md-phd/)**

Visit our website for more information about our faculty (https://pathology.wustl.edu/people/) and their appointments.

## A

**Michael Alberti, MD**
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
BS California Lutheran Universit 2005
MD University of Alabama 2013

**Paul M Allen, MS, PHD**
Robert L. Kroc Professor of Pathology and Immunology (primary appointment)
MS University of Michigan 1977
BS University of Michigan 1974
PHD University of Michigan 1981

**Gaya K Amarasinghe, PHD**
Professor of Pathology and Immunology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Molecular Microbiology
PHD University of Maryland 2001
BS City College 1997

**Ferdinand Enginco Amarillo, PHD**
Associate Professor of Pathology and Immunology (primary appointment)
PHD Florida State University 2010

**Neil William Anderson, BS1, MD**
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Pediatrics
BS1 University of Wisconsin-Madiso 2005
MD University of Wisconsin-Madiso 2009

**Maksym Artomov, PHD, MS**
Assocate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biomedical Engineering
PHD Mass Inst of Technology (MIT) 2009
MS University of Chicago 2005

## B

**Samuel James Ballentine, MD**
Assistant Professor of Pathology & Immunology (primary appointment)
MD New York University 2013

**Michael James Barratt, PHD**
Associate Professor of Pathology and Immunology (primary appointment)
PHD KINGS COLLEGE LONDON 1994

**Cory Thomas Bernadt, MD, PHD**
Associate Professor of Pathology and Immunology (primary appointment)
MD University of Nebraska 2006
PHD University of Nebraska 2004
BS Nebraska Wesleyan University 1998

**Deepta Bhattacharya, PHD**
Adjunct Associate Professor of Pathology and Immunology (primary appointment)
PHD University of CA Berkeley 2001

BS Indiana University Bloomington 1996

**Fouad Ismat Boulos, BS1, MD**
Associate Professor of Pathology and Immunology (primary appointment)
BS1 American University of Beirut 1996
MD American University of Beirut 2001

**Victor Borisovich Brodsky, MD**
Associate Professor of Pathology and Immunology (primary appointment)
BS Boston University 2001
MD Boston University 2005

**Elizabeth M Brunt, MD**
Professor Emeritus of Pathology and Immunology (primary appointment)
MD University of Texas Galveston 1981
BS Georgetown University 1974

**Melissa Marie Budelier, PHD**
Instructor in Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 2018
BS Marquette University 2013

**Carey-Ann Dawn Burnham, PHD**
Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
Professor of Molecular Microbiology
Professor of Pediatrics
Vice Chair for Faculty Development Department of Pathology and Immunology
PHD University of Alberta 2007
BS University of Alberta 2002

**Kathleen Byrnes, MD**
Assistant Professor of Pathology and Immunology (primary appointment)
BS Washington Univ in St. Louis 2008
MD Tulane University 2013

## C

**Yang Cao, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Univ of Wisconsin Madison 2014

**Marina Cella, MD**
Professor of Pathology and Immunology (primary appointment)
MD University of Genova 1989

**Jiye Cheng, MS, PHD**
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
MS Ohio State University 2010
PHD Ohio State University 2011

**Rebecca D Chernock, MD**
Professor of Pathology and Immunology (primary appointment)
Professor of Otolaryngology
MD University of Pennsylvania 2004
BS Brown University 1999

**Kyunghee Choi, PHD, MS**
Professor of Pathology and Immunology (primary appointment)
BS Seoul National University 1982
PHD University of Illinois 1988
MS Seoul National University 1984

**John Spellman Aranake Chrisinger, MD**
Assistant Professor of Pathology and Immunology (primary appointment)
BA Washington Univ in St. Louis 2004
MD Washington Univ in St. Louis 2012

**Marco Colonna, MD**
Robert Rock Belliveau MD Professor of Pathology (primary appointment)
Professor of Medicine
MD Parma University 1983

**Leigh Anne Compton, MD, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
MD Vanderbilt University 2008
BS Centenary College Louisiana 1998
PHD Vanderbilt University 2005

**Joseph C. Corbo, AB, MD, PHD**
Professor of Pathology and Immunology (primary appointment)
Professor of Genetics
Professor of Ophthalmology and Visual Sciences
AB Stanford University 1990
MD University of California 1999
BS Stanford University 1990
PHD University of California 1997

**Richard James Cote, MD**
Professor of Pathology and Immunology (primary appointment)
Head of the Department of Pathology and Immunology
MD University of Chicago 1980

**Erika C Crouch, PHD, MD**
Professor of Pathology and Immunology (primary appointment)
Vice Chair for Education Department of Pathology and Immunology
PHD University of Washington 1978
MD University of Washington 1979

## D

**Sonika M Dahiya, MD**
Professor of Pathology and Immunology (primary appointment)
MD Kasturba Medical College 2000

**Gautam Dantas, PHD**
Professor of Pathology and Immunology (primary appointment)
Professor of Biomedical Engineering
Professor of Molecular Microbiology

PHD University of Washington 2005
BS Macalester College 2000

**Louis P Dehner, MD**
Professor of Pathology and Immunology (primary appointment)
Professor of Pathology in Pediatrics
MD Washington Univ in St. Louis 1966
BA Washington Univ in St. Louis 1962

**George J Despotis, MD**
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Anesthesiology
MD Saint Louis University 1985
BA Greenville College 1981

**Dennis J. Dietzen, PHD**
Professor of Pathology and Immunology (primary appointment)
Professor of Pediatrics
BS Marian College 1986
PHD Indiana University Bloomington 1992

**Eric James Duncavage, MD**
Professor of Pathology and Immunology (primary appointment)
BS Vanderbilt University 1998
MD University of Tennessee 2004

**William Michael Dunne Jr, PHD**
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PHD Univ of Wisconsin Madison 1981
BS Univ of Wisconsin Madison 1975

## E

**Charles S Eby, MD**
Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
BS Duke University 1977
MD Vanderbilt University 1981

**Brian T. Edelson, MD, PHD, UNKNOWN**
Associate Professor of Pathology and Immunology (primary appointment)
MD Washington Univ in St. Louis 2004
PHD Washington Univ in St. Louis 1995
UNKNOWN Brown University 1995

**Takeshi Egawa, PHD, MD**
Associate Professor of Pathology and Immunology (primary appointment)
PHD Osaka University 2002
MD Osaka University 1994

**David Eisenstein, MD**
Associate Professor of Pathology and Immunology (primary appointment)
MD University of Cincinnati 1989

**Ali Hassan Ellebedy, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
Assistant Professor of Medicine
Assistant Professor of Molecular Microbiology
BS Cairo University 2004
PHD Univ of TN - Health Sci Center 2011

## F

**Christopher William Farnsworth, PHD**
Assistant Professor of Pathology & Immunology (primary appointment)
BS Roberts Wesleyan College 2009
PHD University of Rochester 2017

**John Lawrence Frater, MD**
Associate Professor of Pathology and Immunology (primary appointment)
MD Medical College of Ohio 1996
BS University of Notre Dame 1992

**Daved H Fremont, PHD**
Professor of Pathology and Immunology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Molecular Microbiology
BS Univ of Wisconsin Madison 1986
PHD University of CA San Diego 1993

## G

**Joseph P. Gaut, PHD, MD**
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Medicine
PHD Washington Univ in St. Louis 2004
BA Washington Univ in St. Louis 1996
MD Washington Univ in St. Louis 2004

**Susan Gilfillan, PHD**
Associate Professor of Pathology and Immunology (primary appointment)
BA University of Denver 1982
PHD Stanford University 1990

**Juan G Gonzalez, MD, BS1**
Professor of Pathology and Immunology (primary appointment)
MD Universidad Autonoma De Nuevo 1978
BS1 New Mexico St University 1971

**Jeffrey I Gordon, MD**
Professor of Pathology and Immunology (primary appointment)
Director of the Center for Genome Sciences
Dr Robert J Glaser Distinguished University Professor
Professor of Developmental Biology
Professor of Medicine
Professor of Molecular Microbiology
BA Oberlin College 1969
MD University of Chicago 1973

**Ann Marie Gronowski, MS, PHD**

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Professor of Obstetrics and Gynecology
Vice Chair for Faculty Development Department of Pathology and Immunology
MS Iowa State University 1988
PHD Univ of Wisconsin Madison 1992
BS University of Illinois 1985

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Professor of Medicine
MD Medical College Georgia 1980
BS Ohio University 1976
MS Saint Louis University 2003

## H

**Ian Sean Hagemann, MD, PHD**
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MD Washington Univ in St. Louis 2008
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PHD Washington Univ in St. Louis 2008

**Scott A Handley, PHD**
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**Thomas Joseph Hannan, BA1, DVM**
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BA1 Georgetown University 1989
BA Georgetown University 1989
DVM Tufts University 1995

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Associate Professor of Pathology and Immunology (primary appointment)
MD Aga Khan University 1989
MD1 School Not Listed 1989

**Mai He, PHD, MD**
Associate Professor of Pathology and Immunology (primary appointment)
PHD Rutgers University 2001
MD Fudan University 1993

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BS University of Cologne (Koln) 2000
PHD University of Cologne (Koln) 2008
MS University of Cologne (Koln) 2004

**Jonathan W Heusel, MD, PHD**
Professor of Pathology and Immunology (primary appointment)
Professor of Genetics
MD Washington Univ in St. Louis 1995
PHD Washington Univ in St. Louis 1995

**Matthew Charles Hibberd, PHD**
Instructor in Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 2016
BS Lincoln School of Commerce 2007

## J

**Ronald R Jackups Jr, PHD, MD**
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Associate Professor of Pediatrics
BS Washington Univ in St. Louis 2000
PHD University of Illinois Chicago 2008
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**Umang Jain, PHD, MS**
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PHD Dalhousie University 2015
BS Manipal University 2007
MS Manipal University 2009

## K

**Jonathan Kipnis, MS, PHD**
Professor of Pathology and Immunology (primary appointment)
Alan A and Edith L Wolff Distinguished Professor
Professor of Neurological Surgery
Professor of Neurology
Professor of Neuroscience
MS Weizmann Institute of Science 1999
BS Tel-Aviv University 1998
PHD Weizmann Institute of Science 2004

**Eynav Yafit Klechevsky, PHD**
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PHD Baylor University 2007

**Hannah Rachel Krigman, MD**
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MD University of North Carolina 1988
BA Amherst College 1983

**Kilannin Cathleen Krysiak, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 2014
BS University of Illinois 2006

## L

**Jack H Ladenson, PHD**
Oree M Carroll and Lillian B Ladenson Professor of Clinical Chemistry in Pathology and Immunology (primary appointment)
Professor of Clinical Chemistry in Medicine

BS Pennsylvania State University 1964
PHD University of Maryland 1971

**Yi-Shan Lee, PHD, MD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Duke University 2008
MD National Taiwan University 2000

**Cheryl Faye Lichti, D SC, BAS**
Assistant Professor in Pathology and Immunology (primary appointment)
D SC Duke University 1993
BAS Hendrix College 1988

**Chieh-Yu Lin, PHS, MD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHS Stanford University 2014
MD National Taiwan University 2009

**Heide Maria Lind, MD**
Associate Professor in Pathology and Immunology (primary appointment)
MD University of Iowa 1979

**Chang Liu, PHD, MD**
Associate Professor of Pathology and Immunology (primary appointment)
PHD Oregon Health Science Univers 2010
MD Peking Union Medical College 2004

**Ta-Chiang Liu, PHD, MD**
Associate Professor of Pathology and Immunology (primary appointment)
PHD Imperial College 2003
MD National Yang-Ming University 1997

## M

**Mena Magdi Zaki Mansour, MD1**
Assistant Professor of Pathology and Immunology (primary appointment)
MD1 Alexandria University 2005

**Denis Mogilenko, MS1, PHD, BS1**
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
MS1 St Petersburg State University 2007
PHD Academy of Sciences of USSR 2011
BS1 St Petersburg State University 2005

**Nima Mosammaparast, MD, PHD**
Associate Professor of Pathology and Immunology (primary appointment)
MD University of Virginia 2006
PHD University of Virginia 2005
BS University of Rochester 1998

**Kenneth M Murphy, MD, PHD**
Professor of Pathology and Immunology (primary appointment)
Eugene Opie First Centennial Professor of Pathology and Immunology
MD Johns Hopkins University 1984
PHD Johns Hopkins University 1984

**Theresa L Murphy, PHD**
Professor of Pathology and Immunology (primary appointment)
PHD Johns Hopkns University Medic 1983
BS University of Arizona 1978

## N

**Rakesh Nagarajan, MD, PHD, BA1**
Adjunct Associate Professor of Pathology and Immunology (primary appointment)
MD Washington Univ in St. Louis 2002
PHD Washington Univ in St. Louis 2002
BA University of Virginia 1994
BA1 University of Virginia 1994

**Pooja P Navale, MD**
Assistant Professor of Pathology and Immunology (primary appointment)
MD Tata Inst of Fundamental Resch 2013

**Julie Ann Neidich, MD**
Associate Professor of Pathology and Immunology (primary appointment)
MD George Washington University 1983

**Christopher A Nelson, PHD**
Associate Professor of Pathology and Immunology (primary appointment)
BS Univ of Wisconsin Madison 1985
PHD Washington Univ in St. Louis 1995

## O

**Eugene Merle Oltz, PHD**
Adjunct Professor of Pathology and Immunology (primary appointment)
BS Cornell University 1982
PHD Columbia University 1987

## P

**Vijayalakshmi Padmanabhan, MBBS, M PH**
Professor of Pathology and Immunology (PEFA) (primary appointment)
MBBS Kasturba Medical College 1988
M PH Dartmouth College 2015

**Bijal A. Parikh, MD, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
MD U Medical-Dental Of New Jersey 2006
PHD Rutgers University 2004

**Jonathan Robert Brestoff Parker, MD, MS, PHD**

Assistant Professor of Pathology and Immunology (primary appointment)
BS Skidmore College 2008
MD University of Pennsylvania 2016
MS University College Cork 2010
PHD University of Pennsylvania 2015

**Jacqueline Elise Payton, MD, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
MD University of Illinois 2004
BS Bradley University 1996
PHD University of Illinois 2002

**Richard J. Perrin, MD, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
BS Yale University 1992
MD University of Illinois Chicago 2004
PHD University of Illinois 2001

**Stephen P. Persaud, PHD, MD**
Instructor in Pathology & Immunology (primary appointment)
PHD Washington Univ in St. Louis 2015
BS Cornell University 2005
MD Washington Univ in St. Louis 2015

**John David Pfeifer, PHD, MD**
Professor of Pathology and Immunology (primary appointment)
Professor of Obstetrics and Gynecology
PHD University of California 1987
BA University of California 1981
MD University of California 1988

## R

**Gwendalyn Jan Randolph, PHD**
Unanue Distinguished Professof of Immunology (primary appointment)
Professor of Medicine
BS Temple University 1991
PHD State University of New York 1995

**Alejandro Reyes**
Adjunct Assistant Professor of Pathology and Immunology (primary appointment)

**Jon H Ritter, MD**
Professor of Pathology and Immunology (primary appointment)
BA Mankato St University 1983
MD University of Minnesota 1988

**Nidhi Rohatgi, PHD**
Instructor in Pathology and Immunology (primary appointment)
PHD All-India Inst of Medical Sci 2005

**Stephen Matthew Roper, PHD, MS**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Medical University of Sth Car 2015
MS Texas Tech University 2007
BS Texas Tech University 2004

**Marianna B Ruzinova, PHD, MD**
Associate Professor of Pathology and Immunology (primary appointment)
PHD Cornell University 2004
MD Cornell University 2005

## S

**Robert Edward Schmidt, PHD, MD**
Professor of Pathology and Immunology (primary appointment)
BA Washington Univ in St. Louis 1969
PHD Washington Univ in St. Louis 1976
MD Washington Univ in St. Louis 1976

**Robert D Schreiber, PHD**
Andrew M Bursky and Jane M Bursky Distinguished Professor (primary appointment)
Professor of Molecular Microbiology
PHD State University of New York 1973
BA State University of New York 1968

**Molly Schroeder, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD Baylor College of Medicine 2012
BS Saint Louis University 2006

**Mitchell G Scott, PHD, MS**
Professor of Pathology and Immunology (primary appointment)
Clinical Research Assistant Professor of Medicine
PHD Washington Univ in St. Louis 1982
MS University of Missouri 1977
BS Washington Univ in St. Louis 1974

**Andrey S Shaw, MD**
Adjunct Professor of Pathology and Immunology (primary appointment)
BA Columbia University 1979
MD Columbia University 1984

**Kathleen C Sheehan, PHD**
Professor of Pathology and Immunology (primary appointment)
BS University of Notre Dame 1980
PHD Saint Louis University 1986

**Igor Smirnov, DVM**
Assistant Professor of Pathology and Immunology (primary appointment)
DVM Moscow Veterinary Academy 1993

**Sanjay Joshua Swamidass, MA, PHD, MD**
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Biomedical Engineering
MA University of California 2006
PHD University of California 2007
MD University of California 2009

BS University of California 2000

## T

**Steven L Teitelbaum, MD**
Messing Professor of Pathology and Immunology (primary appointment)
Professor of Medicine
BA Columbia University 1960
MD Washington Univ in St. Louis 1964

**Suzanne Renee Thibodeaux, MD, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
MD Univ Texas Health Sci San Anto 2013
PHD Univ Texas Health Sci San Anto 2011
BS Tulane University 2005

## U

**Emil Raphael Unanue, MD**
Paul and Ellen Lacy Professor of Pathology and Immunology (primary appointment)
MD Havana University 1960
BS Institute of Secondary Educati 1952

## V

**Steven John Van Dyken, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of San Diego 2006
BS Calvin College 1998

**Siddarth Venkatesh, PHD, PHD**
Instructor in Pathology and Immunology (Pending Dean's Approval) (primary appointment)
PHD Auburn University 2015
PHD Rockefeller University 2015

**William Vermi**
Adjunct Assistant Professor of Pathology and Immunology (primary appointment)

**Herbert W Virgin IV, MD, PHD**
Adjunct Professor of Pathology and Immunology (primary appointment)
MD Harvard University 1985
PHD Harvard University 1985
BA Harvard University 1977

## W

**Xiaoxiao Wan, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of MO Columbia 2015

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PHD University of Pennsylvania 2015
BS Peking University 2008

**Mark A Watson, MD, PHD**
Associate Professor of Pathology and Immunology (primary appointment)
MD Washington Univ in St. Louis 1992
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BA University of Pennsylvania 1985

**Cody Hudson Weimholt, BS1, DOST**
Assistant Professor of Pathology and Immunology (primary appointment)
BS1 University of MO Columbia 2005
DOST Kirksville College of Osteopat 2013

**George Randolphe Wettach, MD, MS**
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BS University of CA Berkeley 1995
MD Eastern Virginia Med School 2006
MS Eastern Virginia Med School 2002

**Frances V White, MS, MD**
Associate Professor of Pathology and Immunology (primary appointment)
Associate Professor of Pediatrics
MS University of North Carolina 1978
BA Princeton University 1975
MD University of North Carolina 1989

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MD Medical University of Sth Car 2013
PHD Medical University of Sth Car 2013
BS Johns Hopkins University 2005

**Terry A Woodford-Thomas, MS, PHD**
Adjunct Assistant Professor of Pathology and Immunology (primary appointment)
BS Eastern Illinois University 1975
MS Purdue University 1977
PHD Va Polytechnic Inst & State U 1982

**Chao Wu, PHD**
Instructor in Pathology and Immunology (primary appointment)
PHD Washington Univ in St. Louis 2016
BS China Agriculture University 2008

## Y

**Melanie Leann Yarbrough, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of Texas Southwest 2009

## Z

**Ray Zhang, MD, PHD**

Instructor in Pathology and Immunology (primary appointment)
MD University of Pennsylvania 2016
PHD University of Pennsylvania 2015

**Bernd Heinrich Zinselmeyer, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
PHD University of Strathclyde 2006

**Wei Zou, MA, PHD**
Assistant Professor of Pathology and Immunology (primary appointment)
MA Qingdao University 1994
PHD Hebrew University 2003

# Research Electives

## Pathology and Immunology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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**Paul M. Allen, PhD**
BJC Institute of Health, 8th Floor
Phone: 314-362-8758

This lab's focus is on research in immunology and the recognition of antigen by T cells. We are investigating how the T cell receptor functions developmentally, biochemically and structurally. We utilize in vivo models to study the role of T cells in alloreactivity/graft rejection and inflammatory bowel disease.

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**Jacques U. Baenziger, MD, PhD**
Kingshighway Building, 2nd Floor, Room 2423
Phone: 314-362-8730

Glycobiology; informational role of carbohydrates in protein targeting and reproductive endocrinology.

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**Jeffrey I. Gordon, MD**
4444 Forest Park, 5th Floor
Phone: 314-362-7243

Genomic and metabolic foundations of symbiotic host-microbial interactions in the human gut; impact on obesity and malnutrition.

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**Michael McDaniel, PhD**
3709 West Building
Phone: 314-362-7435

The focus of this laboratory is to study the function and growth of pancreatic islets in Types 1 and 2 diabetes. Mammalian target of rapamycin (mTOR) is a protein kinase that integrates signals from growth factors and nutrients to regulate DNA and protein synthesis. G-protein–coupled receptor agonists such as GLP-1 have been shown to enhance proinsulin biosynthesis and secretion and to stimulate cellular growth and proliferation. Our objective is to further explore the mechanisms of action of GLP-1 to enhance DNA and protein synthesis via mTOR in rodent and human islets. These studies are of fundamental interest for optimizing mTOR to induce cellular growth and proliferation, to enhance pre- and post-islet transplantation in Type 1 diabetes, and to prolong b-cell compensation in response to insulin resistance in Type 2 diabetes. The failure of b-cells in obesity-associated Type 2 diabetes is believed to correlate with the intracellular accumulation of lipids that contribute to defects in insulin secretion and the maintenance of b-cell mass. Our studies have identified lipoprotein lipase in b-cells; this is a key enzyme for catalyzing the hydrolysis of lipoprotein-associated TAG to produce free fatty acids (FFAs) for local cellular uptake. We are also characterizing the effects of enhanced FFA uptake through fatty acid transporters and determining the regulation of lipid droplet synthesis and breakdown by lipid droplet–associated proteins. Recent studies suggest that FFAs upregulate mitochondrial uncoupling proteins proposed to dissipate the proton gradient across the mitochondrial inner membrane. The objective of this study is to delineate the link between FFAs and b-cell mitochondrial dysfunction in Type 2 diabetes.

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**Kenneth M. Murphy, MD, PhD**
Clinical Sciences Research Building, 7th Floor, Room 7766
Phone: 314-362-2009

Function of dendritic cells in T cell responses and anti-tumor vaccines.

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**Robert D. Schreiber, PhD**
BJC Institute of Health, 8th Floor
Phone: 314-362-8747

Tumor immunology and cancer immunoediting; research on natural and therapeutically induced responses to tumors; definition of the molecular roles of interferon-gamma and interferon-alpha/beta in these processes.

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**Carl H. Smith, MD**
St. Louis Children's Hospital
Phone: 314-454-6029

Placental transport; surface membrane structure and function.

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**Thaddeus S. Stappenbeck, MD, PhD**
Clinical Sciences Research Building, North Tower, Room 1020
Phone: 314-362-4214

My lab studies the cause of inflammatory bowel disease, a condition that leads to spontaneous inflammation of the intestine. We study the mechanisms of host gene mutations as well as abnormalities in host-microbial interactions that drive this disease.

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**Steven Teitelbaum, MD**
Barnes-Jewish Hospital
Phone: 314-454-8463

This lab studies the cellular and molecular mechanisms of bone remodeling, with particular emphasis on osteoclast biology as it relates to the pathogenesis and prevention of diseases such as osteoporosis. We focus on integrin and cytokine biology utilizing a variety of genetically manipulated mice.

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**John Turk, MD, PhD**
6609 Wohl
Phone: 314-362-8190

This lab looks at phospholipase A2 (PLA2) enzymes in the regulation of insulin secretion from pancreatic islet cells (e.g., a novel iPLA2 that does not require Ca2+ cloned from rat and human islets that is involved in cell secretion and proliferation). We also perform studies of iPLA2, its post-translational modifications, and its interactions with other proteins involving mice that are iPLA2-deficient globally or in selected tissues, transgenic mice that overexpress iPL2 in -cells, and insulinoma cells with genetically manipulated iPLA2 expression. The mass spectrometric characterization of proteins and complex lipids is an important tool in these studies.

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**Emil R. Unanue, MD**
BJC Institute of Health, 8414
Phone: 314-362-8748

Our focus is research that involves immunobiology and immunopathology. We examine cellular interactions that result in immune induction and cellular immunity. These cellular interactions are examined in normal immune responses and in autoimmune diseases. The focus is to identify the proteins responsible for the activation of lymphocytes in Type 1 diabetes.

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**Herbert Virgin, MD, PhD**
Clinical Sciences Research Building, Room 8849
Phone: 314-362-9223

We work on issues at the interface of virology and immunology by analyzing aspects of viral immunity, viral pathogenesis and viral genetics that contribute to virulence and disease.

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**Mark A. Watson, MD, PhD**
Clinical Sciences Research Building, North Tower, Room 1029
Phone: 314-454-7919

Our laboratory is interested in defining patterns of somatic gene mutation, gene expression and quantitative tumor clonality that can be used to predict distant site metastases and therapeutic vulnerability in patients with lung and breast cancer. Experimental approaches use histopathological review as well as the next-generation DNA exome and RNA sequencing (NGS) of primary cancer patient tissues, coupled with bioinformatics and statistical modeling, to identify candidate biomarker patterns that may be useful for the clinical management of cancer patients.

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## Courses

Visit online course listings to view offerings for M60 Path (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M60).

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**M60 Path 523 Immunology**
The course consists of lectures, laboratory exercises and clinical correlations. It covers all aspects of the immune response - general properties of the immune system, effector molecules, cells and their function, cellular interactions, vaccines, and immunological diseases. Two laboratory exercises focus on blood typing and allergy. Students will also meet in groups (20-25 students) with clinicians to discuss a variety of clinical cases that relate to the course material.
Credit 37 units.

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**M60 Path 665 Pathology**
This course is a comprehensive survey of the biology and morphology of human disease through a combination of lectures and laboratory sessions. The year begins with a review of basic disease mechanisms at the cellular and molecular level. Subsequently, the pathogenesis and characteristics of important diseases involving each organ system of the body are presented. During the year, students will become familiar with the methods of contemporary pathologic analysis. They will also learn how the results of pathologic studies are used in the clinical setting to establish diagnoses, to assess prognosis and response to therapy, and to evaluate the quality of patient care.
Credit 115 units.

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**M60 Path 702 Laboratory Medicine Clerkship**
This elective 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 four-week elective includes rotations through laboratories in clinical chemistry, clinical microbiology, transfusion medicine, molecular diagnostics and hematopathology. During the elective the student will have a daily schedule, which includes didactic sessions with senior staff and house staff. Particularly useful clinical skills to be acquired include: morphology of peripheral blood smears and bone marrow biopsies; interpretation of coagulation tests, biomarkers of cardiac damage and serum protein electrophoresis patterns. Also covered are appropriate use of blood component therapy, and therapeutic apheresis and identification of infectious organisms. Students will attend quality assurance meetings with senior staff, participate in microbiology rounds and present case discussions during this elective.
Credit 154 units.

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**M60 Path 750 Surgical Pathology Clerkship**
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 and (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. The daily schedule for students begins at 8:00 a.m. with morning conference. In general, the student will be able to complete all gross examination and sign-out activities by 4:30 p.m. Students are welcome to stay beyond 4:30 p.m. to participate in any of the academic or other working activities of the Division. Student time distribution: Clinical duties 85%, Conference/Lectures 15%; Major teaching responsibility: Attending staff, residents and fellows; Patients seen/weekly: N/A; On call/weekend responsibility: None

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**M60 Path 805 Autopsy Pathology**
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 weekly autopsy case conferences. Students will be under the direction of senior pathology faculty. Note that this elective is not available during the COVID-19 pandemic.

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**M60 Path 807 Dermatopathology**
The student will be involved in all activities of the dermatopathology service. These include review, discussion and signout of microscopic skin specimens. Signout 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 signout. Dermatology Grand Rounds is held on Thursday mornings and is mandatory. In addition, dermatopathology slide review conferences are held on Friday mornings and are mandatory. Other learning opportunities include informal unknown slide sessions, weekly Inpatient Dermatology Clinicopathologic Conference and monthly Cutaneous Lymphoma Conference. The primary goal of this elective is to acquire basic competence in the diagnosis of skin diseases at the microscopic level. A secondary goal is to acquire understanding of the structure and function of the laboratory at the technical, administrative and medical professional level as it pertains to skin specimens.

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**M60 Path 812 General Cytopathology**
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, and (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 cytopathologist. There are text books and extensive study sets to permit students to focus on specific areas of interest. The daily schedule for student begins previewing the cytology cases at 8:00 am. The student will attend daily pathology noon didactic conferences. In general, the student will be able to complete sign-out activities by 4:30 pm.

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**M60 Path 813 Molecular Pathology**
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.

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**M60 Path 815 OB/GYN Pathology**
This elective is a subinternship in Ob/Gyn pathology. The expectation is that the student participate in the service along with house officer rotating on the service. The elective stresses the principles of anatomic pathology when applied to operative material in obstetrics and gynecology. The sub-intern will examine gross and microscopic specimens in the Ob/Gyn Pathology Lab and review the histology along with pertinent literature with a senior pathologist. The elective is appropriate both for students intending a career in pathology, and those intending careers in other specialties. The student will gain familiarity with the diagnosis of more common OB/Gyn diagnoses, including malignancy, and premalignant conditions, as well as placental conditions. Ample time will be available for attending conferences in both OB/Gyn and Pathology.

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**M60 Path 820 Surgical Pathology**
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, and (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 allow. At the end of the rotation, students are required to do a formal case presentation for the residents, fellows, and attending staff. The daily schedule for students begins at 8:00 am with morning conference. In general, the student will be able to complete all gross examination and sign-out activities by 4:30 pm. Students are welcome to stay beyond 4:30 pm to participate in any of the academic or other working activities of the Division.

**M60 Path 825 Introduction to Neuropathology**
The course is structured to give the student a full-time immersion in the specialty of Neuropathology, including both Neurosurgical and Neuroautopsy derived material. 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 neuro-anatomy, 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.

**M60 Path 860 Clinical Laboratory Medicine**
This elective 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 four-week elective includes rotations through laboratories in clinical chemistry, clinical microbiology, transfusion medicine and hematopathology. During the elective the student will have a daily schedule, which includes didactic sessions with senior staff and house staff. Particularly useful clinical skills to be acquired include: morphology of peripheral blood smears and bone marrow biopsies; interpretation of coagulation tests, biomarkers of cardiac damage and serum protein electrophoresis patterns; appropriate use of blood component therapy and therapeutic apheresis; and identification of infectious organisms. Students will attend quality assurance meetings with senior staff, participate in microbiology rounds, and present case discussions during this elective.

**M60 Path 900 Research Elective - Pathology**
Research opportunities may be available. If interested, please contact the Department of Pathology and Immunology.

# Edward Mallinckrodt Department of Pediatrics

The primary aim of the teaching program of the Department of Pediatrics (http://pediatrics.wustl.edu/) 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 (http://www.stlouischildrens.org/), and the newborn services are at the Women and Infants Center (http://www.stlouischildrens.org/women-and-infants/). 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 a year. Nearly 4,000 infants are born annually at the Washington University Medical Center.

**Website:** http://pediatrics.wustl.edu

## Faculty

### Department Chair

**Gary Silverman, MD, PhD (http://pediatrics.wustl.edu/Faculty/gsilverman/)**

### Department Vice Chairs

**F. Sessions Cole, MD (http://pediatrics.wustl.edu/Faculty/cole_francis_sessions/)**
**Alexis Elward, MD, MPH (http://pediatrics.wustl.edu/Faculty/elward_alexis_m/)**
**Mark Lowe, MD, PhD (http://pediatrics.wustl.edu/Faculty/Lowe_M/)**
**Andrew J. White, MD (http://pediatrics.wustl.edu/Faculty/White_A/)**

### Division Chiefs

**Ana Maria Arbeláez, MD, MSCI (http://pediatrics.wustl.edu/Faculty/arbelaez_a/)**
**F. Sessions Cole, MD (http://pediatrics.wustl.edu/Faculty/cole_francis_sessions/)**
**Vikas Dharnidharka, MD, MPH (http://pediatrics.wustl.edu/Faculty/dharnidharka_v/)**
**Thomas Ferkol, MD (http://pediatrics.wustl.edu/Faculty/ferkol_thomas/)**
**Anthony French, MD, PhD (http://pediatrics.wustl.edu/Faculty/French_Anthony_R/)**
**David Hunstad, MD (http://pediatrics.wustl.edu/Faculty/hunstad_david_a/)**
**Lisa Moscoso, MD, PhD (http://pediatrics.wustl.edu/Faculty/moscoso_l/)**

**Katie Plax, MD (http://pediatrics.wustl.edu/Faculty/plax_katie/)**
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**Shalini Shenoy, MD (http://pediatrics.wustl.edu/Faculty/Shenoy_Shalini/)**
**Gregory Storch, MD (http://pediatrics.wustl.edu/Faculty/storch_gregory_a/)**
**Phillip Tarr, MD (http://pediatrics.wustl.edu/Faculty/tarr_phillip/)**
**Michael Turmelle, MD (http://pediatrics.wustl.edu/Faculty/turmelle_m/)**
**George Van Hare, MD (http://pediatrics.wustl.edu/Faculty/vanhare_g/)**
**Juliane Bubeck Wardenburg, MD, PhD (http://pediatrics.wustl.edu/Faculty/Wardenburg_J/)**

Visit our website for more information about our faculty (http://pediatrics.wustl.edu/directory/) and their appointments.

## A

**Mohamed Shebl Abdelbaki, MD**
Associate Professor of Pediatrics (primary appointment)
MD Cairo University 2002

**Katherine Barnes Abell, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Mississippi Med 2015
BS St Olaf College 2011

**Manjusha Abraham, MD**
Instructor in Pediatrics (primary appointment)
MD University of Cologne (Koln) 2011

**Philip Mulayara Abraham, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Boston College 2006
MD Ross Univ School of Medicine 2010

**Susan E Adams, PHD, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
PHD University of Kansas Medical 1984
MD Washington Univ in St. Louis 1991
BA University of Kansas 1977
BS University of Kansas 1977

**William S Adams, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
MD University of Missouri 1989
BA Washington Univ in St. Louis 1985

**Oloruntosin Adepeju Ifedadepo Adeyanju, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Williams College 2008
MD Emory University 2012

**Sophia E. Agapova, MD**
Instructor in Pediatrics (primary appointment)
MD Columbia University 2017
BA Washington Univ in St. Louis 2011

**Manish Aggarwal, MD**
Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Radiology
BS University of Iowa 2008
MD U of IA Carver College of Med 2012

**Randy Agolia, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD St. Louis University Group of 1995

**Fahd Aqeeb Ahmad, MD**
Associate Professor of Pediatrics (primary appointment)
BA University of MO Columbia 1998
MD University of MO Columbia 2006

**Etihad S. Al-Falahi**
Instructor in Clinical Pediatrics (primary appointment)

**Duha Naser Al-Zubeidi, MBBS**
Assistant Professor of Pediatrics (primary appointment)
MBBS University of Jordan 2005

**Danielle Nicole Alfano, MD**
Instructor in Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2011
BS Univ of Minnesota Twin Cities 2007

**Ardis Kay Allison, DOST**
Instructor in Clinical Pediatrics (primary appointment)
DOST Oklahoma St University 1980

**Patricia J Amato, MD**
Professor of Clinical Pediatrics (primary appointment)
BS Notre Dame College 1979
MD School Not Listed 1982

**Mohamad T Amjad, MD**
Professor of Clinical Pediatrics (primary appointment)
BS School Not Listed 1957
MD School Not Listed 1961

**Jagruti Shah Anadkat, MD**
Associate Professor of Pediatrics (primary appointment)
MD Northeastern University 2005
BS Ohio State University 2000

**Kristen Minette Andersen**
Instructor in Clinical Pediatrics (primary appointment)

**George Christopher Anderson, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Saint Louis University 1993

**Dana E Ankney, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 2001
MD Wake Forest University 2005

**Frances Naa Lamiley Annan-Fohtung, MD**

Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD Indiana University Indianopoli 2017
BS Hampton University 2010

**Amal F. Antoun**
Instructor in Clinical Pediatrics (primary appointment)

**Ana Marie Arbelaez Perez, UNKNOWN, MD**
Associate Professor of Pediatrics (primary appointment)
UNKNOWN Universidad del Valle Med Sch 1990
MD Universidad Nacional de Columb 1996

**Amy Elizabeth Armstrong, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD Virginia Comm University 2012

**Jennifer L. Arter, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of Iowa College of 1998
BS University of Iowa 1993

**Elizabeth G Atkinson, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Hahnemann University 1994

**Robert K Atteberry, MD**
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**Adrienne Denise Atzemis, MD**
Associate Professor of Pediatrics (primary appointment)
BS John Carroll University 1996
MD Creighton University 2000

**Sarah Elizabeth Aubuchon, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of MO Kansas City 2008
BA University of MO Kansas City 2007

**Katherine Lea Austin, MD**
Instructor in Pediatrics (primary appointment)
BS University of MO Columbia 1994
MD University of MO Columbia 1998

**Sara Ayers, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Missouri 1998

**Fariba Azarpour, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD School Not Listed 1971

## B

**Jill M Baer, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS University of Kentucky 1972
MD University of Kentucky 1975

**Dustin M Baldridge, PHD, MD**
Instructor in Pediatrics (primary appointment)
BS University of Dallas 2002
PHD Baylor University 2010
MD Baylor University 2011

**David T Balzer, MD**
Professor of Pediatrics (primary appointment)
BS University of MO Columbia 1981
MD Saint Louis University 1985

**Angela L Bard, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BS Indiana University Bloomington 1976
MD Indiana University Bloomington 1981

**David Lawrence Bark Jr, PHD**
Assistant Professor of Pediatrics (primary appointment)
PHD Georgia Tech 2010

**Alan Roy Barnette**
Adjunct Instructor in Pediatrics (primary appointment)

**Kevin Barton, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Haverford College 2000
MD Tulane University 2006

**Kevin W Baszis, MD**
Associate Professor of Pediatrics (primary appointment)
MD University of MO Kansas City 2004

**Maria S Baszis**
Instructor in Clinical Pediatrics (primary appointment)

**Aimee M Baumann-Dudenhoeffer, MD**
Assistant Professor in Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2005
BA Cornell University 2000

**Susan L Baumer, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
MD University of Pennsylvania 1975
BA University of Oregon 1969

**Christie A. Bayer, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Saint Louis University 1986
MD University of MO Columbia 1990

**Julia M. Becker, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Missouri 1997
BS University of Missouri 1993

**Jeffrey John Bednarski, PHD, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Duke University 1995
PHD Davenport University 2003
MD Davenport University 2003

**Earl C Beeks Jr, MD**
Associate Professor of Clinical Pediatrics (primary appointment)

MD University of Missouri 1981
BS Howard University 1977

**Avraham Beigelman, MD**
Associate Professor of Pediatrics (primary appointment)
MD Hebrew University 2000

**Walter F Benoist, MD**
Professor of Clinical Pediatrics (primary appointment)
BA University of Pennsylvania 1968
MD Washington Univ in St. Louis 1972

**Stephanie Ann Berdy, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD Georgetown University 2013
BS University of Georgia 2009

**Mary Elizabeth Bernardin, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD Loyola University Chicago 2013
BS Saint Louis University 2009

**Peter M Bess**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Michelle Louise Beumer, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of MO Columbia 1999

**Shobha Bhaskar, MBBS**
Assistant Professor of Pediatrics (primary appointment)
MBBS Bangalore University 1994

**Sima Thakkar Bhatt, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Rush University 2010

**Jean E Birmingham, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Ohio Wesleyan University 1984
MD University of Missouri 1988

**Huldah C Blamoville, MD, MD1**
Associate Professor of Clinical Pediatrics (primary appointment)
MD Meharry Med College 1965
MD1 University of London 1969
BS Queens College 1959

**Kevin J Blanton**
Instructor in Clinical Pediatrics (primary appointment)

**Joshua Andrew Blatter, M PH, MD**
Assistant Professor of Pediatrics (primary appointment)
BA Macalester College 1996
M PH University of Pittsburgh 2014
MD University of Pittsburgh 2008

**Trina Blythe, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Harvard Radcliff 1992
MD Albany Medical College 1996

**Joshua P Boldt**
Instructor in Clinical Pediatrics (primary appointment)

**Rachael Jane Bradshaw, MS**
Adjunct Assistant Professor of Pediatrics (primary appointment)
MS University of Cincinnati 2004
BS Earlham College 2000

**Robert J Bradshaw, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Emory University 1976
MD Saint Louis University 1980
BS Emory University 1976

**Sarah Nicole Bram, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD Saint Louis University 2015

**Celeste Capers Brancato, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Iowa 2002
BS Wellesley College 1997

**Colleen Catherine Brennan, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Missouri 2017

**Steven Kyle Brennan, MD**
Assistant Professor of Pediatrics (primary appointment)
BA University Victoria 2007
MD University of Queensland 2013

**Kelleigh Elizabeth Briden, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Connecticut 2012
BS New York University 2008

**Nicole Marie Brossier, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD University of AL Birmingham 2013
BS Missouri Univ of Science & Tec 2004

**Earline A Brownridge, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Missouri 1982
BA Washington Univ in St. Louis 1978

**Seth J Brownridge, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1978
MD Washington Univ in St. Louis 1982

**Beverly Sobchak Brozanski, MD**
Professor of Pediatrics (primary appointment)
Vice Chair of Quality and Safety in Pediatrics
MD University of Pittsburgh 2019

**Kristen Ingrid Bruno, MD**

Instructor in Clinical Pediatrics (primary appointment)
MD Washington University School o 2019

**Juliane Bubeck-Wardenburg, PHD, MD**
Donald B Strominger Professor of Pediatrics (primary appointment)
PHD Washington Univ in St. Louis 2017
MD Washington Univ in St. Louis 2017

**Tara M. Budetti**
Instructor in Clinical Pediatrics (primary appointment)

**Lorena Buffa, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of MO Columbia 1998

**Rebecca Kay Bullivant, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS Eastern Illinois University 1988
MD University of Illinois 1992

**Max H Burgdorf, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1970
MD Washington Univ in St. Louis 1974

**David Franklin Butler, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD Creighton University 2013

## C

**Kelley S. Caddel, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD George Washington University 2008
BA Indiana University Bloomington 1998

**Archna Calfee, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Case Western Reserve Univ 1997
MD Washington Univ in St. Louis 2001

**Cecelia Lela Calhoun, MD**
Assistant Professor of Pediatrics (primary appointment)
BA University of Michigan 2006
MD Wayne State University 2011

**Joseph Edward Cangas**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Charles E Canter, BS1, MD**
Professor of Pediatrics (primary appointment)
BS Brown University 1974
BS1 Brown University 1976
MD Saint Louis University 1979

**John R Carlile, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of Kansas Medical 1975
BS University of Kansas 1972

**Michael J. Carney, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS University of Notre Dame 1987
MD University of MO Columbia 1991

**Erin Elizabeth Casey, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS University of Rochester 2008
MD University of Rochester 2012

**Rubilinda Q Casino, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Santo Tomas 1979
BS University of Santo Tomas 1979

**Marta Celorrio Navarro, PHD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
PHD University of Navarra 2015

**Allison Leigh Chalupa, MD**
Instructor in Pediatrics (primary appointment)
MD University of Cincinnati 2015
BS University of Dayton 2011

**Deepa Hasmukhlal Chand, MD, MS**
Instructor in Pediatrics (primary appointment)
MD University of missouri 1996
MS Xavier University 2002

**Tattamangalam P Chandrika, MS**
Associate Professor of Clinical Pediatrics (primary appointment)
MS University of Calcutta 2000

**William T Chao, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Illinois 1979
BS University of Illinois 1975

**Jonathan C Chiles, MD**
Associate Professor of Pediatrics (primary appointment)
MD University of MO Kansas City 2004
BA University of MO Kansas City 2004

**Eileen Anna Ciccia, MD**
Assistant Professor of Pediatrics (Pending Dean's Approval) (primary appointment)
MD Saint Louis University 2019

**Amy Lynn Clark, DOST**
Instructor in Pediatrics (primary appointment)
DOST Kirksville College of Osteopat 2009
BA Saint Louis University 2004

**Regina A Clemens, PHD, MD**
Assistant Professor of Pediatrics (primary appointment)
PHD University of Pennsylvania 2007
MD University of Pennsylvania 2007

**Lindsay Davidson Clukies, MD**
Assistant Professor of Pediatrics (primary appointment)

MD New York Medical College 2011
BS McGill University 2006

**Andrew Stephen Cluster, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Texas Southwest 2010
BS University of Maryland 2006

**Darryl S Cohen, DOST**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA University of North Texas 1976
DOST School Not Listed 1981

**Barbara A Cohlan, MD**
Professor of Pediatrics (primary appointment)
MD New York University 1978
BA University of Michigan 1974

**F. Sessions Cole, MD**
Park J White, M.D. Professor of Pediatrics (primary appointment)
Executive Vice Chair of the Department of Pediatrics
Professor of Cell Biology and Physiology
MD Yale University 1973
BA Amherst College 1969

**John C. Cole, PHD, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1995
PHD Washington Univ in St. Louis 2003
MD Washington Univ in St. Louis 2003

**Lora Pearlman Collier**
Instructor in Clinical Pediatrics (primary appointment)

**Jamie Nicole Colombo, DOST**
Assistant Professor of Pediatrics (primary appointment)
DOST Rocky Vista University College 2019

**Eve Ruth Colson, MED, MD**
Professor of Pediatrics (primary appointment)
Associate Dean of Program Evaluation and Continuous Quality Improvement
MED University of Illinois Chicago 2014
MD Yale University 1989

**Bryanne Noel Colvin, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Saint Louis University 2010
BA University of Dallas 2006

**Susan Conger**
Instructor in Clinical Pediatrics (primary appointment)

**Jonathan David Cooper, PHD**
Professor of Pediatrics (primary appointment)
Professor of Genetics
Professor of Neurology
PHD University of Bristol 1990

**Megan A Cooper, MD, PHD**
Associate Professor of Pediatrics (primary appointment)
Associate Professor of Pathology and Immunology
MD Ohio State University 2004
PHD Ohio State University 2002
BA College of Wooster 1995

**Tara Conway Copper, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Miami 2017

**Andrea Michele Coverstone, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Gonzaga University 2004
MD Saint Louis University 2009

**Mary Michaeleen Cradock**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Rice University 1987

**Andrew Cronyn, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Albert Einstein College of Med 1996
BA Princeton University 1987

**Betty Cross, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS University of Kansas 1979
MD University of Kansas 1983

**Clayton Cummings, MD, BSBA**
Assistant Professor of Pediatrics (primary appointment)
MD University of MO Columbia 2000
BSBA University of MO Columbia 1996

## D

**Aarti Sudhir Dalal, DOST**
Assistant Professor of Pediatrics (primary appointment)
BA Boston University 2002
DOST Rowan College 2007

**Raja Sekhar Dandamudi, MBBS, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MBBS NTR University of Health Scien 2002
MD University of the West Indies 2017

**Michael E Danter, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS University of Missouri 1983
MD University of Illinois 1987

**Yasmeen Daud, MD**
Associate Professor of Pediatrics (primary appointment)
MD University of MO Kansas City 2000

**Jesse Alan Davis, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD American University of Integra 2019

**John C Davis, MD**

Associate Professor of Clinical Pediatrics (primary appointment)
MD University of Michigan 1980

**Kasey L. Davis, PHD, MS**
Assistant Professor of Clinical Pediatrics (primary appointment)
PHD University of Indianapolis 2007
BS McKendree College 2002
MS University of Indianapolis 2004

**Ray S Davis, MD**
Professor of Clinical Pediatrics (primary appointment)
MD University of Louisville 1978

**Jeffrey G Dawson, MD**
Professor of Pediatrics (primary appointment)
MD University of Louisville 1982
BA Northwestern University 1982

**Brian J. DeBosch, PHD, MD**
Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Cell Biology and Physiology
PHD Washington Univ in St. Louis 2008
MD Washington Univ in St. Louis 2008
BS University of Michigan 2001

**Dana Marie DeCuffa, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD Saint Louis University SOM 2019

**Jane E. Defalco, MS, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MS Rutgers University 1978
BA Rutgers University 1977
MD Case Western Reserve Univ 1984

**Leanne Michelle DePalma, MD**
Assistant Professor of Pediatrics (primary appointment)
BS University of Notre Dame 2004
MD University of Louisville 2008

**Nicole Catherine Deptula, MD**
Assistant Professor of Pediatrics (primary appointment)
MD American Univ of the Caribbean 2009

**Gerry Deschamps, MD, PHS**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Missouri 1983
PHS School Not Listed 1978
BA Washington Univ in St. Louis 1976

**Vikas Ramnath Dharnidharka, UNKNOWN, MBBS, MD**
Professor of Pediatrics (primary appointment)
UNKNOWN St Xavier's College 1982
MBBS Topiwala National Med College 1988
MD Topiwala National Med College 1991

**Jorge Andres Di Paola, MD**
Professor of Pediatrics (primary appointment)
MD University of Buenos Aires, Ar 2019

**Patricia Irene Dickson, AB, MD**
Centennial Professor of PediatricsCentennial Professor of Pediatrics (primary appointment)
Centennial Professor of Genetics
AB University of Chicago 1995
MD Columbia College of Phy & Surg 1999

**Lizbeth H Didriksen**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Mary C Dinauer, MD, PHD**
Professor of Pediatrics (primary appointment)
Professor of Pathology and Immunology
BA Lawrence University 1975
MD University of Chicago 1981
PHD University of Chicago 1979

**Tulay F Dincer, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD School Not Listed 1977

**Alla Dorfman, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Cheruovtsy State School of Med 1986

**Julie R Dorfman, MD**
Instructor in Pediatrics (primary appointment)
MD St. Louis University School of 2015

**Catherine J Doty**
Instructor in Clinical Pediatrics (primary appointment)

**Charles H Dougherty, MD**
Professor of Clinical Pediatrics (primary appointment)
BA Holy Cross College 1969
MD University of Rochester 1973

**Matthew P Dougherty**
Instructor in Clinical Pediatrics (primary appointment)

**Joan Catherine Downey, M PH, MD**
Professor of Pediatrics (primary appointment)
Assistant Dean, College of Arts & Sciences
BA Boston University 1979
M PH Harvard University 1985
MD Harvard University 1985

**Todd Druley, PHD, MD**
Associate Professor of Pediatrics (primary appointment)
Associate Professor of Developmental Biology
Associate Professor of Genetics
PHD University of Illinois Chicago 2002
BS University of Illinois 1994
MD University of Illinois Chicago 2002

**Jennifer Gries Duncan, MD**
Associate Professor of Pediatrics (primary appointment)
MD University of Chicago 1997
BS Vanderbilt University 1993

**Jennifer M Dunn, MD**

Assistant Professor of Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2000
BS Duke University 1996

## E

**Adam C. Eaton, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS University of Illinois 1992
MD Washington Univ in St. Louis 1997

**Lori L Eberhart**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Nathalie El Ters, MD**
Assistant Professor of Pediatrics (primary appointment)
MD American University of Beirut 2018
BS American University of Beirut 2006

**Alysa G. Ellis, MD**
Associate Professor of Pediatrics (primary appointment)
BA University of MO Kansas City 2004
MD University of MO Kansas City 2005

**Omar Hani Elsayed-Ali, MD**
Instructor in Pediatrics (primary appointment)
MD Vanderbilt University 2017

**Alexis M Elward, MPH, MD**
Professor of Pediatrics (primary appointment)
MPH Saint Louis University 2006
MD University of Maryland 1994
BA Loyola College 1988

**Amanda R. Emke, MD**
Associate Professor of Pediatrics (primary appointment)
BS St Marys University 1998
MD University of MO Rolla 2002

**Jay S Epstein, MD, MS**
Professor of Clinical Pediatrics (primary appointment)
MD Emory University 1983
MS Emory University 1978
BA Emory University 1977

**Laura Ann Esswein, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1987
MD University of Missouri 1991

**Michele Marie Estabrook, MA, MD**
Professor of Pediatrics (primary appointment)
MA Stanford University 1979
MD Case Western Reserve Univ 1983
BA Bates College 1976

**Timothy Robert Evans, MD**
Instructor in Pediatrics (primary appointment)
Instructor in Medicine
MD Creighton University 2016

## F

**Elliott H Farberman, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Saint Louis University 1973
BA University of Rochester 1969

**Richard A. Felkel Jr, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Saint Louis University 1997
BS Saint Louis University 1993

**Thomas W Ferkol, MD**
Professor of Pediatrics (primary appointment)
Alexis Hartmann MD Professor of Pediatrics
Professor of Cell Biology and Physiology
MD Ohio State University 1985
BA Case Western Reserve Univ 1981

**Isabel Fernandez-Holtzman, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Michigan State University 2019

**Margaret Ashley Ferris, MD**
Instructor in Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2013
BS Carnegie Mellon University 2005

**Melanie Erin Fields, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Tulane University 2003
MD Univ of Texas Med Sch Houston 2008

**Mayte Ideliz Figueroa, MD**
Associate Professor of Pediatrics (primary appointment)
MD Mount Sinai School of Medicine 1992

**Gregory K Finn, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Hendrix College 1985
MD Washington Univ in St. Louis 1992

**Kayleigh A Fischer, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Cornell University 2009
MD Stony Brook University 2013

**Emily Faith Fishman, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Northeast Ohio Medical U 2009
BS Youngstown St University 2005

**Jennifer Foersterling, MD**
Assistant Professor in Clinical Pediatrics (primary appointment)
MD Saint Louis University 1997

**Rebecca Hope Foster**
Asst Prof of Clinical Pediatrics (primary appointment)

**Mary E Fournier, MD, M PH**

Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
BS Rockhurst College 1998
MD Saint Louis University 2002
M PH Harvard University 2008

**Elizabeth Anne Bozaan Fox, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
BS University of Iowa 2011
MD University of Iowa 2016

**Sharon Glave Frazee**
Adjunct Assistant Professor of Pediatrics (primary appointment)

**Anthony Raymond French, MS, PHD, MD**
Professor of Pediatrics (primary appointment)
Professor of Biomedical Engineering
Professor of Pathology and Immunology
BS University of Minnesota 1989
MS University of Illinois 1993
PHD University of Illinois 1995
MD University of Illinois 1997

**Hayley Friedman, MS, MD**
Assistant Professor of Pediatrics (primary appointment)
BA Northwestern University 2004
MS Drexel University 2006
MD George Washington University 2015

**Stuart Howard Friess, MD**
Associate Professor of Pediatrics (primary appointment)
BS Brown University 1985
MD Mount Sinai School of Medicine 1999

**Stephanie Ann Fritz, MS, MD**
Associate Professor of Pediatrics (primary appointment)
MS Washington Univ in St. Louis 2008
BS Univ of Wisconsin Milwaukee 1997
MD Medical College of Wisconsin 2001

## G

**John P Galgani Jr, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BS Massachusetts College of Phar 1977
MD Saint Louis University 1982

**Tessa D Gardner, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS Mass Inst of Technology (MIT) 1968
MD Harvard University 1972

**Caryn Garriga**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Sarah Kathryn Garwood, MD**
Associate Professor of Pediatrics (primary appointment)
BS Truman State University 1998
MD University of MO St Louis 2002

**Karen J Garzia**
Instructor in Clinical Pediatrics (primary appointment)

**Avihu Gazit, MD**
Professor of Pediatrics (primary appointment)
MD Technion - Israel Inst. of Tec 1997

**Elliot Field Gellman, MD**
Professor of Clinical Pediatrics (primary appointment)
MD University of MO Columbia 1961
BA Iowa State University 1957

**Nicole Marie Gilbert, PHD**
Instructor in Pediatrics (primary appointment)
PHD Saint Louis University 2011

**Thomas J Girard, PHD**
Assistant Professor of Pediatrics (primary appointment)
BS Univ of Wisconsin Oshkosh 1979
PHD Iowa State University 1985

**Sarah Katherine Girresch-Ward, PHD**
Assistant Professor of Clinical Pediatrics (primary appointment)
PHD Tennessee State University 2018

**John F Gleeson Jr, MD**
Instructor in Pediatrics (primary appointment)
MD Saint Louis University 2007

**Lakshmi Gokanapudy Hahn, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
BS University of CA Los Angeles 2008
MD St George's University 2014

**Joseph K Goldenberg, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BA University of MO Kansas City 1980
MD University of MO Kansas City 1980

**Matthew I Goldsmith, MD, MS**
Professor of Pediatrics (primary appointment)
Assistant Professor of Genetics
MD University of Toronto 1995
MS University of Toronto 1990
BS University of Toronto 1987

**Catherine Frances Gooch, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Tennessee 2016

**Misty Lynn Good, MD**
Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Pathology and Immunology
MD American U of Carribean SchMed 2005
BS University of Southern Calif 2001

**Gary M Goodman, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of Michigan 1981
BS Wayne State University 1977

**Gary S Gottesman**
Associate Professor of Clinical Pediatrics (primary appointment)

**Ronald M Grady, MD, MA**
Professor of Pediatrics (primary appointment)
BA Princeton University 1984
MD Washington Univ in St. Louis 1989
MA Washington Univ in St. Louis 1989

**Laquita A Graham, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Saint Louis University 1996
BA Washington Univ in St. Louis 1991

**Jorge Luis Granadillo De Luque, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Univ Industrial de Santander 2007

**Andrea Granados, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Universidad Nacional de Columb 2015

**Dorothy K. Grange, MD**
Professor of Pediatrics (primary appointment)
MD University of Florida 1981
BA Mount Holyoke College 1976

**Cori L Grant, MD**
Instructor in Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2015

**Crystal Jean Gravatte, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD University of Nevada Reno 2013
BS University of Nevada Reno 2008

**Abby Margaret Green, MD**
Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Pathology and Immunology
MD NYU School of Medicine 2019

**Ted Allen Green, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Illinois 1994
BS Eastern Illinois University 1990

**Lauren Waldholtz Gregory, MD, MS**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD Eastern Virginia Med School 2017
BA Washington Univ in St. Louis 2011
MS Eastern Virginia Med School 2013

**Heidi Morgan Griffiths, MD**
Instructor in Pediatrics (primary appointment)
BS State Univ of NY Buffalo 2008
MD State Univ of NY Buffalo 2012

**Georgeann Keh-Teng Groh, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Baylor College of Medicine 2006
BS Rice University 2001

**Jesse Brookshire Groh, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Rice University 2002
MD Baylor University 2006

**Santosh K Gupta, DC, UNKNOWN1, UNKNOWN**
Associate Professor of Clinical Pediatrics (primary appointment)
DC University of London 1966
UNKNOWN1 University of London 1970
UNKNOWN School Not Listed 1963

## H

**Allah B Haafiz**
Adjunct Associate Professor of Pediatrics (primary appointment)

**Kimberly Noelle Hackney, DOST**
Assistant Professor of Clinical Pediatrics (primary appointment)
DOST Des Moines Universtiy 2009

**Justin T Hagen**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Michelle Lynn Hagene, MD**
Instructor in Pediatrics (primary appointment)
BS Southern Illinois University 2010
MD Southern Illinois University 2014

**Carmen Marie Halabi, MD, PHD**
Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Cell Biology and Physiology
BS University of Iowa 2001
MD University of Iowa 2009
PHD University of Iowa 2009

**Laura Evelyn Hall, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Allegheny College 2005
MD University of Toledo 2010

**Kim P Hamlin, MD**
Associate Professor of Pediatrics (primary appointment)
BS University of MO St Louis 1997
MD University of MO St Louis 2001

**Melanie G Hampton, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS Georgetown College 1976
MD University of Louisville 1981

**Elinor F Hancock, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Meharry Med College 1982
BA Fisk University 1975

**Robin D Hanson, MD, PHD**
Instructor in Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 1993

PHD Washington Univ in St. Louis 1993
BA Johns Hopkins University 1985

**Suzanne M Hanson, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Johns Hopkins University 1989
MD Northwestern University 1993

**Michael Raymond Harris, PHD, MS, MD**
Professor of Pediatrics (primary appointment)
BA Saint Louis University 1973
PHD Saint Louis University 1981
MS Saint Louis University 1976
MD Saint Louis University 1991

**Elizabeth Avis Harrison, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2006
BA Vanderbilt University 2002

**Thomas J. Harrison Jr, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Saint Louis University 1970
MD University of Missouri 1979

**David E Hartenbach, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BA Saint Louis University 1983
MD University of Missouri 1987

**Laura Hartman**
Instructor in Clinical Pediatrics (primary appointment)

**Mary E Hartman, MD, M PH**
Associate Professor of Pediatrics (primary appointment)
MD University of Rochester 1999
BA Mount Holyoke College 1994
M PH University of Pittsburgh 2006

**John Edward Hartweger**
Instructor in Clinical Pediatrics (primary appointment)

**Robert J Hayashi, MD**
Professor of Pediatrics (primary appointment)
MD Washington Univ in St. Louis 1986
BS Stanford University 1982

**Ericka V. Hayes, MD**
Associate Professor of Pediatrics (primary appointment)
BS Washington Univ in St. Louis 1994
MD Washington Univ in St. Louis 1998

**Katherine Quinn Hefner**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Kara E Hennelly, MD**
Associate Professor of Pediatrics (primary appointment)
MD UMICCSOM 2015

**Mary Jo Hernandez-Zipfel, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Florida 2001
BS University of North Carolina 1996

**Christina Kim Ahn Hickey, MS, MD**
Instructor in Pediatrics (primary appointment)
BS Stanford University 2003
MS Washington Univ in St. Louis 2009
MD Washington Univ in St. Louis 2009

**Tunde Hidvegi, PHD, MS**
Associate Professor of Pediatrics (primary appointment)
PHD Eötvös Loránd University 1988
MS Eötvös Loránd University 1980

**Laura Hill, MD**
Instructor in Pediatrics (primary appointment)
BS Northwestern University 1998
MD University of Illinois Chicago 2002

**Jennifer M Hinton**
Instructor in Clinical Pediatrics (primary appointment)

**Stanley P Hmiel, MD, M PHIL, PHD**
Professor of Pediatrics (primary appointment)
MD Case Western Reserve Univ 1989
BS Case Western Reserve Univ 1980
M PHIL Cambridge University 1981
PHD Case Western Reserve Univ 1987

**Hieu Dinh Hoang, PHD**
Instructor in Pediatrics (primary appointment)
BS San Jose State University 2009
PHD University of Alabama 2015

**Sandra Jean Hodel**
Instructor in Clinical Pediatrics (primary appointment)

**Erik R Hoefgen, MD, MS**
Assistant Professor of Pediatrics (primary appointment)
MD Southern Illinois University 2012
MS University of MO St Louis 2004
BS University of MO St Louis 2001

**Jacqueline L. Hoffman, MA, MD, PHD**
Instructor in Pediatrics (primary appointment)
MA Harvard University 1974
BS University of California 1973
MD Washington Univ in St. Louis 1994
PHD Harvard University 1979

**Russell G. Hoffmann, PHD**
Instructor in Clinical Pediatrics (primary appointment)
PHD University of Florida 1995

**Nicholas Alan Holekamp, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Dartmouth College 1982
MD Saint Louis University 1987

**Abby Solomon Hollander, MD**
Professor of Pediatrics (primary appointment)
MD University of Cincinnati 1986

BA Cornell University 1982

**Nancy E Holmes, MD**
Professor of Clinical Pediatrics (primary appointment)
BA University of Kansas 1972
MD University of Missouri 1976

**Lori Rachel Holtz, MD, MS**
Associate Professor of Pediatrics (primary appointment)
BS Tulane University 1999
MD Ohio State University 2003
MS Saint Louis University 2014

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Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Cell Biology and Physiology
MD Hebrew University-Hadassah Med 2004
BS Hebrew University-Hadassah Med 2015

**Caroline Clare Horner, MD**
Associate Professor of Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1993
MD Saint Louis University 2000

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MD University of Missouri Columbi 2007
BS University of Missouri Columbi 2003

**Christine M Hrach, BSW, MD**
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BSW Saint Louis University 1998
MD Saint Louis University 2002

**Keith A Hruska, MD**
Professor of Pediatrics (primary appointment)
Professor of Cell Biology and Physiology
Professor of Medicine
BS Creighton University 1965
MD Creighton University 1969

**Paul W. Hruz, PHD, MD**
Associate Professor of Pediatrics (primary appointment)
Associate Professor of Cell Biology and Physiology
PHD Medical College of Wisconsin 1993
BS Marquette University 1987
MD Medical College of Wisconsin 1994

**Frederick Szujuei Huang, MD**
Associate Professor of Pediatrics (primary appointment)
MD Baylor University 1994
BA Washington Univ in St. Louis 1990

**Huiyan Huang, PHD**
Instructor in Pediatrics (primary appointment)
PHD Stony Brook University 2017

**Anna Payton Huger, MD**
Instructor in Clinical Pediartics (primary appointment)
MD University of Missouri School 2019

**Monica L Hulbert, MD**
Associate Professor of Pediatrics (primary appointment)
BS Indiana University Bloomington 1996
MD Washington Univ in St. Louis 2000

**Laura Kathleen Hulteen, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD University of Illinois 2015

**David A Hunstad, MD**
Professor of Pediatrics (primary appointment)
Professor of Molecular Microbiology
BA Carleton College 1991
MD Washington Univ in St. Louis 1995

**Jane Alyce Hunt, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Washington Univ in St. Louis 2014
MD Washington Univ in St. Louis 2014

## I

**Richard J Iken, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of MO Columbia 1978
BA Univ of Wisconsin Madison 1972

**Carl S Ingber, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Boston University 1972
BA University of Rochester 1968

**Tracy Lynn Ivy, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Virginia 2009
BS Washington Univ in St. Louis 2004

## J

**Andrew Bok Seng Janowski, MD**
Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Molecular Microbiology
MD University of Wisconsin 2017

**Shannon M. Joerger, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Southern Ill Univ Edwardsville 1995
MD University of Missouri-Columbi 2007

**William Beck Johansen, MD**
Assistant Professor of Pediatrics (primary appointment)
MD West Virginia University 2016

**Denise R Johnson, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BA Oakwood College 1979
MD Loma Linda University 1984

**Joyce D Johnson, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)

BS Oberlin College 1977
MD Case Western Reserve Univ 1982

**Mark C Johnson, MD**
Professor of Pediatrics (primary appointment)
BA University of Rochester 1978
MD Johns Hopkins University 1982

**William Lee Johnson, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
Adjunct Associate Professor of Pediatrics
BS University of Missouri 1977
MD University of Missouri 1981

**Angela Marie Jones, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Universidad Nacional de Columb 1989

**Katherine McMullin Jones, MD**
Assistant Professor of Pediatrics (primary appointment)
BA Amherst College 2001
MD Washington Univ in St. Louis 2007

**Larry A Jones, MBA, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MBA Washington Univ in St. Louis 1999
BA Johns Hopkins University 1972
MD Johns Hopkns University Medic 1976

**Heather Robin Joyce, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of MO Columbia 2006
BS University of MO Columbia 2002

**Samuel F. Julian, MD**
Associate Professor of Pediatrics (primary appointment)
BS University of Texas Austin 2001
MD University of Texas Southwest 2007

**Erzsebet Jung, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD School Not Listed 1987

## K

**Carol M Kao, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Ohio State University 2008
MD Ohio State University 2012

**Thomas J Kasper**
Instructor in Clinical Pediatrics (primary appointment)

**Jenny E Kaufman, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2004
BS University of Michigan 1999

**Robert S Kebler, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS Muhlenberg College 1980
MD Saint Louis University 1984

**Danielle Renee Keebaugh, MD**
Instructor in Pediatrics (primary appointment)
MD Rush University 2016
BS University of CA San Diego 2016

**Robert V Kellow**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Brian J Kelly, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD School Not Listed 1972
BS School Not Listed 1964

**James Scott Kemp, MD**
Professor of Pediatrics (primary appointment)
MD Creighton University 1976
BS Creighton University 1972

**Michele E Kemp, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 1981
BA Washington Univ in St. Louis 1977

**Robert M Kennedy, MD**
Professor of Pediatrics (primary appointment)
MD Medical College Georgia 1980
BS Georgia Tech 1975

**Kaitlin Gabrielle Kenney, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD University of Louisville SOM 2019

**Kent Leon Killian, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Saint Louis University 1990
BA Saint Louis University 1986

**Ellen Eunhae Kim, MD**
Associate Professor of Pediatrics (primary appointment)
BS Northwestern University 1996
MD Northwestern University 2000

**Maleewan Kitcharoensakkul, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Mahidol University 2002

**Richard D Knight**
Instructor in Clinical Pediatrics (primary appointment)

**Shirley M Knight, MD**
Professor of Clinical Pediatrics (primary appointment)
BA Dillard University 1976
MD Washington Univ in St. Louis 1980

**Joel S Koenig, MD**
Professor of Clinical Pediatrics (primary appointment)
MD Vanderbilt University 1982
BS Yale University 1978

**Amanda Kolmar, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of California San F 2019

**Nikoleta S. Kolovos, MD**
Associate Professor of Pediatrics (primary appointment)
BS University of Pittsburgh 1991
MD University of Pittsburgh 1996

**Jamie L Kondis, MD**
Associate Professor of Pediatrics (primary appointment)
BS Westminster College 2002
MD Indiana University South Bend 2006

**Amanda Ann Kopydlowski, MD**
Instructor in Pediatrics (primary appointment)
BS Kalamazoo College 2011
MD Oakland University 2015

**Valerie Rose Kover, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Drexel University 2006

**Beth Ann Kozel, MD, PHD**
Adjunct Associate Professor of Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2004
PHD Washington Univ in St. Louis 2004
BA Washington Univ in St. Louis 1996

**James M Krafcik**
Instructor in Clinical Pediatrics (primary appointment)

**Theodore Raymond Kremer, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Saint Louis University 2015
BS Saint Louis University 2011

**Katherine L Kreusser, MD**
Professor of Clinical Pediatrics (primary appointment)
BS University of Pennsylvania 1973
MD Indiana University Bloomington 1978

**Cadence Amber Kuklinski, DOST**
Assistant Professor of Pediatrics (primary appointment)
BS Maryville University 2001
DOST Des Moines University College 2012
BS Saint Louis University 2004

**Sakil Subhash Kulkarni, MD**
Assistant Professor of Pediatrics (primary appointment)
MD PGIMER 2010

**Denise Kung, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA University of Missouri 1986
MD Yale University 1991

## L

**Jennifer S Ladage, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Saint Louis University 1991
BS Valparaiso Universty 1987

**Stacie Sharon Laff, MD, B MUS**
Instructor in Clinical Pediatrics (primary appointment)
BA Lawrence University 1989
MD School Not Listed 1993
B MUS Lawrence University 1989

**Alexandra Lahart, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Lake Forest College 2009
MD University of Maryland 2013

**Li-Ling Lai**
Instructor in Clinical Pediatrics (primary appointment)

**Russell K Lawrence, MD**
Adjunct Instructor in Pediatrics (primary appointment)
MD Baylor College of Medicine 2002
BS University of Texas Austin 1998

**Leland M Laycob, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Missouri 1968
BA Washington Univ in St. Louis 1964

**Richard Lee Lazaroff, MD**
Professor of Clinical Pediatrics (primary appointment)
BA Brown University 1974
MD Saint Louis University 1978

**Caroline Kim Lee, MD**
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BA Wellesley College 1995
MD University of Virginia 1999

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PHD University of North Carolina 2009
BS Knox College 2003
MD University of North Carolina 2011

**Kathryn B Leonard, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Saint Louis University 2006
MD Saint Louis University 2010

**Jared Rubin Levin, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD Albany Medical College 2014

**Kenneth C Levy, MD**
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MD University of Chicago 1988
BA Emory University 1983

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Adjunct Instructor in Pediatrics (primary appointment)
MD Tel-Aviv University 2003

BS Rutgers University 2001

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Assistant Professor of Pediatrics (primary appointment)
MD University of Texas 2017

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Assistant Professor of Pediatrics (primary appointment)
PHD Peking University 2008
BS Yantai University 2003

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Associate Professor of Pediatrics (primary appointment)
MD Saint Louis University 2003
BS University of CA Los Angeles 1999

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Associate Professor of Pediatrics (primary appointment)
MD Jagiellonian University 1988

**John Chao-Chun Lin, MD**
Associate Professor of Pediatrics (primary appointment)
MD University of Virginia 1998
BS University of Virginia 1994

**Kim Hung Ho Liss, MD**
Instructor in Pediatrics (primary appointment)
BS Northwestern University 2007
MD Northwestern University 2011

**David Liu, MD**
Instructor in Pediatrics (primary appointment)
MD Saint Louis University 2007

**Alina M. Lopez, MD**
Assistant Professor of Pediatrics (primary appointment)
BA Washington Univ in St. Louis 2006
MD University of Miami 2010

**Mark E Lowe, MD, PHD**
Harvey R Colten Professor of Pediatric Science (primary appointment)
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MD University of Miami 1984
BA Washington Univ in St. Louis 1973
PHD University of Pennsylvania 1977

**Margaret Lozovatsky, MD**
Associate Professor of Pediatrics (primary appointment)
MD University of Wisconsin 2006
BA Marquette University 2001

**Ilana Rebecca Luft-Barrett**
Instructor in Clinical Pediatrics (primary appointment)

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Associate Professor of Pediatrics (primary appointment)
BS University of Liverpool 1994
PHD University of Surrey 1999

## M

**John C. Madden, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2002
BS Yale University 1994

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Associate Professor of Pediatrics (primary appointment)
Associate Professor of Genetics
BS Univ of Wisconsin Madison 1997
PHD Washington Univ in St. Louis 2005
MD Washington Univ in St. Louis 2005

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Assistant Professor of Pediatrics (primary appointment)
BS University of Oklahoma 2005
MD University of Oklahoma 2009
MS Creighton University 2012

**Mark John Manary, MD**
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BS Mass Inst of Technology (MIT) 1977
MD Washington Univ in St. Louis 1982

**Arushi Manga, MD**
Assistant Professor of Pediatrics (primary appointment)
MD McGill University 2011
BS Franklin & Marshall 2007

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Professor of Pediatrics (primary appointment)
Professor of Cell Biology and Physiology
MD Vanderbilt University 1986
BS Vanderbilt University 1982

**Megan Spokes Martin, BA1, MD**
Assistant Professor of Pediatrics (primary appointment)
BA University of Notre Dame 2007
BA1 University of Notre Dame 2007
MD University of Kansas 2012

**Shakila Mathew, DOST, DOST**
Assistant Professor of Pediatrics (primary appointment)
BS Missouri Univ of Science & Tec 2004
DOST Kirksville College of Osteopat 2009
DOST Southern Illinois University 2012

**Patrice Mathews, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Trinity University 1984
MD University of Oklahoma 1988

**Dzmitry Matsiukevich, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Gomel State Medical University 2003

**Marvin M Maurer Jr, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)

BA Washington Univ in St. Louis 1968
MD Washington Univ in St. Louis 1972

**Ariane E May, M PH, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BA Tufts University 1983
M PH Boston University 1992
MD School Not Listed 1993

**Gillian Sloane Mayersohn**
Instructor in Clinical Pediatrics (primary appointment)

**Jina L McAtee**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Megan McBride**
Instructor in Clinical Pediatrics (primary appointment)

**Maggie Steffen McCormick, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Loyola University Chicago 2004

**Mark E. McGranahan, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS Marquette University 1993
MD Saint Louis University 1997

**Thomas Casey McKinney, MD**
Professor of Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 1980
BA Illinois Wesleyan University 1976

**William A McManus, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Saint Louis University 1986
BA Carroll College 1980

**Kyle P McNerney, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Case Western Reserve Univ 2014
BS University of Chicago 2010

**Christopher Clayton McPherson**
Associate Professor of Clinical Pediatrics (primary appointment)

**Shilpa Menolascino, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Missouri 2019

**Sarah J. Mermelstein, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Drexel University 2007
BA Indiana University Bloomington 2002

**Elizabeth Sarah Messer, MD**
Instructor in Pediatrics (primary appointment)
BS Washington Univ in St. Louis 2009
MD University of Illinois Chicago 2013

**Mary Shaughnessy Meyer, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Saint Louis University 2003
BA Saint Louis University 1999

**Jenny Lynn Miele, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of Illinois at Chic 2005
BS Valparaiso University 2001

**Donna C Miller, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS Boston College 1978
MD University of Miami 1982

**Elena Minakova, MS, MD**
Assistant Professor of Pediatrics (primary appointment)
BS University of CA San Diego 2004
MS University of CA San Diego 2006
MD University of CA Davis 2011

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Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
RN 2008
BN David Lipscomb University 2007
MNS Vanderbilt University 2009
PHD University of MO Columbia 2017

**Deepa Mokshagundam, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Louisville 2013
BS Mass Inst of Technology (MIT) 2009

**Christopher Molitor**
Instructor in Clinical Pediatrics (primary appointment)

**Gail Lynn Moolsintong, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS University of MO Columbia 1997
MD University of MO Columbia 2001

**Darlene A. Moore, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Illinois 1978
BS Eastern Illinois University 1974

**Lauren Rogowski Moran, MD**
Instructor in Pediatrics (primary appointment)
BS Univ of IL -Urbana-Champaign 2010
MD University of Illinois Chicago 2014

**Diane M Morie, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Missouri 1993
BA Saint Louis University 1989

**Sharon Celeste Morley, PHD, MD**
Associate Professor of Pediatrics (primary appointment)
Associate Professor of Pathology and Immunology
PHD Harvard University 2002
MD Harvard University 2002

**Daniel R. Morra, MD**

Instructor in Pediatrics (primary appointment)
MD U Medical-Dental Of New Jersey 1996

**Lisa Mae Moscoso, MD, PHD**
Professor of Pediatrics (primary appointment)
Associate Dean for Student Affairs
MD Washington Univ in St. Louis 1998
BS Univ of Wisconsin Madison 1989
PHD Washington Univ in St. Louis 1998

**Janet Gwen Mueller, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 1992
BA Kansas State University 1985

**Margaret M Mueller**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Steven Mueth, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Illinois 1994

**Shalaka Ajit Mulherkar, MS, PHD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MS University of Mumbai 2004
BS Mumbai University 2002
PHD National Brain Research Centre 2011

**Jonathan E. Mullin, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Case Western Reserve Univ 2010
BS Washington Univ in St. Louis 2005

**Maria Ganninger Mura, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of MO Kansas City 2000

**Mark C. Murawski, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS Villanova University 1995
MD Saint Louis University 1999

**Kevin J Murphy, MD**
Professor of Clinical Pediatrics (primary appointment)
MD Saint Louis University 1978
BS Birmingham Southern College 1974

**Gian Marco Musarra, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Miami 2003
BS University of Central Florida 1998

**John A Myers, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Southern Illinois Universtiy S 1997
BA Washington Univ in St. Louis 1993

## N

**Stephen Jeffrey Nageotte, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of CA Irvine 2012

**Venkata S. Nagireddi**
Instructor in Clinical Pediatrics (primary appointment)

**Tasnim A Najaf, MD**
Associate Professor of Pediatrics (primary appointment)
MD Dow Medical College Karachi 1991

**Alison C Nash, MD**
Professor of Clinical Pediatrics (primary appointment)
MD Baylor University 1981
BS Howard University 1977

**Ameera Farhat Nauman**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Lynn G Nelms**
Instructor in Clinical Pediatrics (primary appointment)

**Tara Marie Neumayr, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Univ South Dakota Vermillion 2003
BA Duke University 1999

**Jason Guy Newland, MD, MS**
Professor of Pediatrics (primary appointment)
MD University of Oklahoma 2000
MS University of Cincinnati 2011

**Hoanh Thi Nguyen, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Tulane University 2003

**Ellen Margaret Nicastro**
Instructor in Clinical Pediatrics (primary appointment)

**Ramzi T Nicolas**
Adjunct Associate Professor of Pediatrics (primary appointment)

**Julie Margaret Nogee, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
BS Tufts University 2007
MD Johns Hopkns University Medic 2011

**David Craig Norman, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD School Not Listed 1992
BS University of Illinois 1988

**Karen K Norton, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BS Loyola University 1985
MD Louisiana St University 1989

**Douglase Susumu Nozaki, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA University of CA San Diego 1991
MD Saint Louis University 1996

## O

**Kevin Sullivan O'Bryan, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Michigan 2010

**Shawn David O'Connor, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Medical College Georgia 2010
BS University of Georgia 2006

**Sarah Grace O'Grady**
Instructor in Clinical Pediatrics (primary appointment)

**Jerome H O'Neil Jr, MBA, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MBA Univ of Massachusetts Amherst 2007
MD Saint Louis University 1981
BA University of Missouri 1977

**Justin O Ogbevoen, MBBS**
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MBBS University of Lagos 1982

**Erin Engelhardt Orf, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
BS Georgetown University 2010
MD University of MO Columbia 2015

**Andrea Cohron Orr, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS University of Georgia 2007
MD Medical College Georgia 2013

**William B Orr, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Medical College Georgia 2013
BS University of Georgia 2009

**Rachel C. Orscheln, MD**
Associate Professor of Pediatrics (primary appointment)
MD University of MO Columbia 1998
BS University of MO Columbia 1994

**Cynthia M. Ortinau, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of MO Kansas City 2005

**Irma I Ortiz-Arroyo, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS University of Puerto Rico 1981
MD University of Puerto Rico 1985

**Anthony Walter Orvedahl, PHD, MD**
Instructor in Pediatrics (primary appointment)
PHD University of Texas 2017
MD University of Texas 2017

**Alison H Oswald, UNKNOWN**
Instructor in Clinical Pediatrics (primary appointment)
UNKNOWN University of Cape Town 1982

## P

**Pamela B Padda, MD**
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BA University of Michigan 1986
MD University of Illinois 1990

**Stephen Pak, PHD**
Associate Professor of Pediatrics (primary appointment)
PHD University of New South Wales 1996
BS University of Sydney 1990
BS University of Sydney 1990

**Jennifer Ann Panasci**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Purvi R Patel, MD**
Associate Professor of Pediatrics (primary appointment)
MD Baylor University 2000
BA Rice University 1996

**Rinkal Raj Patel**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Diliane Charles Pelikan, MD**
Instructor in Pediatrics (primary appointment)
BA University of MO Kansas City 1997
MD University of MO Kansas City 1997

**Meryl Kersten Perlman, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Chicago 2001
BA Harvard University 1996

**Gillian Clare Pet, MD, MS**
Assistant Professor of Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2011
BA University of CA Berkeley 2006
MS Washington Univ in St. Louis 2010

**Christopher James Pingel, MD**
Instructor in Pediatrics (primary appointment)
BS Washington Univ in St. Louis 2003
MD Saint Louis University 2007

**Jessica E Pittman, M PH, MD**
Associate Professor of Pediatrics (primary appointment)
M PH University North Carolina 2009
MD Washington Univ in St. Louis 2004
BS Oberlin College 1998

**Daniel S Plax, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Brown University 1988
MD Washington Univ in St. Louis 1993

**Kathryn L. Plax, MD**
Ferring Family Chair Professor of Pediatrics (primary appointment)

MD University of Rochester 1996
BA Brown University 1989

**Santiago Boye Plurad Jr, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1982
MD School Not Listed 1987

**Juanita C Polito-Colvin, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BA University of Dallas 1975
MD Southwest Texas State Univers 1979

**Brooke Ivan Polk, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Colorado Boulder 2012
BS Colorado St University 2008

**Claudia Preuschoff, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Wake Forest University 1983

**Cassandra Michelle Pruitt, MD**
Associate Professor of Pediatrics (primary appointment)
BA Emory University 1994
MD Texas Tech University 1999

**Peter J Putnam, MD**
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BS Williams College 1993
MD Dartmouth College 2007

**Jenna M Putzel**
Instructor in Clinical Pediatrics (primary appointment)

## Q

**Robert Louis Quaas, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS University of South Dakota 1973
BA Cornell College 1970
MD University of Chicago 1975

**Kimberly S Quayle, MD**
Professor of Pediatrics (primary appointment)
BA University of MO Columbia 1984
MD Washington Univ in St. Louis 1988

**Jennifer Quinn, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA University of Kentucky 1982
MD University of Kentucky 1986

## R

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UNKNOWN School Not Listed 1960

**Pathmawathy T Ramesvara, MS**
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MS School Not Listed 1972

**Rakesh Rao, MBBS, MD**
Associate Professor of Pediatrics (primary appointment)
MBBS University College of Med Sci 1992
MD Maulana Azad Medical College 1996

**Emanuel Rashet, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS University of Illinois 1958
MD Saint Louis University 1962

**Sheryl S Ream, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Saint Louis University 1986
BA Saint Louis University 1982

**Shawn Robert Reathaford, MD**
Assistant Profess of Pediatrics (primary appointment)
MD University of Illinois 1999
BS University of Evansville 1993

**Timothy Reed**
Instructor in Clinical Pediatrics (primary appointment)

**Patrick Joseph Reich, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Saint Louis University 2011
BS Saint Louis University 2007

**Phillip D Reichert, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Saint Louis University 1996
BA Saint Louis University 1992

**Catherine R Remus, MD, MSN**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Luther College 1975
MD School Not Listed 1983
MSN Rush University 1978

**Elizabeth A Remus**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Kenneth Eugene Remy, MD**
Associate Professor of Pediatrics (primary appointment)
Associate Professor of Medicine
MD Jefferson Medical College 2004

**George H Rezabek, DOST**
Instructor in Clinical Pediatrics (primary appointment)
DOST School Not Listed 1988
BS St Louis College of Pharmacy 1982

**Noor Riaz, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2008

**Melissa Marie Riley, MD**
Associate Professor of Pediatrics (primary appointment)
MD Northeast Ohio Medical U 2005

**Katherine Rivera-Spoljaric, MS, MD**
Associate Professor of Pediatrics (primary appointment)
BS University of Puerto Rico 1997
MS Washington Univ in St. Louis 2008
MD University of Puerto Rico 2001

**William L. Rives, MS, MD**
Associate Professor of Pediatrics (primary appointment)
MS University of Missouri 1992
MD University of Missouri 1996

**Kris Ann Roberts, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Midland Lutheran College 1991
MD Kirksville College of Osteopat 1995

**Janis B Robinson, MD, MA**
Associate Professor of Clinical Pediatrics (primary appointment)
BA St Joseph College 1969
MD University of Pennsylvania 1977
MA Yale University 1972

**Justin William Robison, DOST**
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DOST Nova Southeastern University 2013

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MD U Medical-Dental Of New Jersey 1993
BA Saint Louis University 1989

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Assistant Professor of Pediatrics (primary appointment)
Assistant Professor of Molecular Microbiology
MD Washington Univ in St. Louis 2010
BS Davenport University 2002
PHD Washington Univ in St. Louis 2010

**Joan Lee Rosenbaum, MS, MD**
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MS University of California 1980
BA Rice University 1978
MD University of Texas Austin 1983

**Isabel L Rosenbloom, MD**
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MD University of Maryland 1984
BA Goucher College 1979

**Kelly Ross, MD**
Associate Professor of Pediatrics (primary appointment)
BS University of MO Kansas City 1991
MD University of MO Columbia 1996

**William J Ross, MD**
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MD Washington Univ in St. Louis 1972
BA Miami University 1968

**Ella Rozin**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Ronald Craig Rubenstein, MD, PHD**
Professor of Pediatrics (primary appointment)
MD University of Texas Southwest 1991
BS Mass Inst of Technology (MIT) 1984
PHD University of Texas Southwest 1990

**Joshua Bennett Rubin, MS, MD, PHD**
Professor of Pediatrics (primary appointment)
Professor of Neurology
Professor of Neuroscience
BS Yale University 1982
MS Albert Einstein College of Med 1992
MD Albert Einstein College of Med 1994
PHD Albert Einstein College of Med 1994

**Christina M Ruby-Ziegler, MD**
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MD Northwestern University Med 1994
BS Loyola University 1990

**Martin D Rudloff, MD**
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BA Central Methodist College 1977
MD Washington Univ in St. Louis 1981

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Associate Professor of Developmental Biology
PHD Washington Univ in St. Louis 1994
MD Washington Univ in St. Louis 1994
BS University of Illinois 1987

**Daniel G. Rudolph, MD**
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BS Saint Louis University 1988
MD Saint Louis University 1992

**Diane Mary Rup, MD, MA**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA State University of New York 1976
MD Case Western Reserve Univ 1986
MA State University of New York 1979

**Brigida Agnese Rusconi, MS, PHD**
Instructor in Pediatrics (primary appointment)
BS University of Fribourg 2007
MS University of Zurich 2009
PHD UNIVERISTY OF LAUSANNE 2014

**Lisa A Ryan, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Nebraska College 2019

## S

**Brooke E. Sadler, PHD, MS**

Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
PHD Arizona State University 2014
BA George Washington University 2006
MS Arizona State University 2010

**Ahmed Sameh Said, MD, PHD**
Assistant Professor of Pediatrics (primary appointment)
MD Ain Shams University 2000
PHD Ain Shams University 2009

**Surbhi Saini, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD Panjab University 2007

**Rebecca Greene Same, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Johns Hopkins University 2014
BA Georgetown University 2007

**Charles Michael Samson, MD**
Associate Professor of Pediatrics (primary appointment)
BS University of North Carolina 1998
MD University of Washington 2003

**Gretchen A Sander, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Vanderbilt University 2000
MD Loyola University Chicago 2004

**Heidi L Sandige, MA1, MD, MA**
Assistant Professor of Pediatrics (primary appointment)
MA1 Washington Univ in St. Louis 2003
MD Washington Univ in St. Louis 2005
BA Northwestern University 1991
MA Yale University 1993

**Marco Sardiello, MD**
Associate Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD University of Bari 2003

**Scott Saunders, MD, PHD**
Associate Professor of Pediatrics (primary appointment)
Associate Professor of Developmental Biology
MD Stanford University 1990
BS University of Minnesota 1983
PHD Stanford University 1990

**Krishnasamy Savadamuthu**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Brian J. Saville, MD**
Instructor in Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2001
BS Washington Univ in St. Louis 1997

**Blaine M Sayre, M PH, MD**
Professor of Clinical Pediatrics (primary appointment)
M PH University of CA Berkeley 1972
MD Washington Univ in St. Louis 1968

**Joseph Schachter, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Indiana University Bloomington 1979
BA Indiana University Bloomington 1974

**Janet Nagel Scheel, MD**
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BS Georgetown University 1980
MD Georgetown University 1985

**Howard J Schlansky, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of MO Kansas City 1978
BA University of MO Kansas City 1976

**Margaret Ann Schmandt, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BA University of Iowa 1982
MD Saint Louis University 1987

**Jacquelyn C Schnidman, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA University of Missouri 1975
MD Saint Louis University 1979

**Laura Graves Schuettpelz, MD, PHD**
Associate Professor of Pediatrics (primary appointment)
Associate Professor of Developmental Biology
MD Northwestern University Med 2005
PHD Northwestern University 2000

**Carly Rae Schuetz, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
BS Marshall University 2010
MD Marshall University 2014

**Alan L Schwartz, PHD, MD**
Alumni Endowed Professor of Pediatrics (primary appointment)
Professor of Developmental Biology
BA Case Western Reserve Univ 1970
PHD Case Western Reserve Univ 1974
MD Case Western Reserve Univ 1976

**Colleen Erika Seematter, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Saint Louis University 1998

**Anchal Sethi, MD**
Instructor in Pediatrics (primary appointment)
MD University of MO Kansas City 2017

**Neel Shah, MD**
Assistant Professor of Pediatrics (primary appointment)
MD St. George's University 2019

**Snehal Paresh Shah, MD**
Assistant Professor of Pediatrics (primary appointment)

MD Ross Univ School of Medicine 2010
BA Boston College 2003

**Rachel E. Shakofsky, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS University of MO Columbia 2003
MD University of MO Columbia 2007

**Jaiprakash Sharma, PHS**
Instructor in Pediatrics (primary appointment)
BS University of Rajasthan 2002
PHS National Brain Research Centre 2011

**Margaret Suhail Shatara, MD**
Assistant Professor of Pediatrics (primary appointment)
MD University of Jordan 2010

**Eleanor Maria Shaw, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of Missouri 1983
BA University of Missouri 1978

**Susan Shea, D SC, MS**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
D SC Georgia Tech 2017
BS Georgia Tech 2013
MS Georgia Tech 2016

**Megan Elizabeth Shelton**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Sarah Frederick Shelton, MD, M PH**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD Wake Forest University 2016
M PH University of North Carolina 2014
BS Davidson College 2011

**Shalini Shenoy, MD, MBBS**
Professor of Pediatrics (primary appointment)
BS M.G.R. Medical University 1981
MD Kasturba Medical College 1985
MBBS Kasturba Medical College 1981

**Ross William Shepherd, MBBS, MD**
Adjunct Professor of Pediatrics (primary appointment)
MBBS University of Queensland 1970
MD University of Queensland 1979

**Marwan Shinawi, MD**
Professor of Pediatrics (primary appointment)
BS Hebrew University 1989
MD Technion - Israel Inst. of Tec 1996

**Min-Yi Katherin Shiue, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS Washington Univ in St. Louis 1992
MD Washington Univ in St. Louis 1996

**Jennifer N Silva, MD**
Associate Professor of Pediatrics (primary appointment)
BA Union College New York 1997
MD St. George's University 2002

**Gary Arthur Silverman, PHD, MD**
Harriet B Spoehrer Professor of Pediatrics (primary appointment)
Head of the Department of Pediatrics
Professor of Cell Biology and Physiology
Professor of Genetics
PHD University of Chicago 1982
MD University of Chicago 1984
BS Washington Jefferson College 1978

**Connie Darlene Simmons**
Instructor in Clinical Pediatrics (primary appointment)

**Paul S Simons, MD**
Associate Professor of Pediatrics (primary appointment)
BA University of Texas Austin 1963
MD Washington Univ in St. Louis 1967

**Bryan Anthony Sisk, MD**
Assistant Professor of Pediatrics (primary appointment)
BS University of MO Columbia 2007
MD Case Western Reserve Univ 2013

**Kelsey Alayne Sisti, MD**
Assistant Professor of Pediatrics (primary appointment)
BS University of Alaska 2005
MD University of Arkansas 2009

**Alan Joseph Skoultchi, MD, MS**
Assistant Professor of Clinical Pediatrics (primary appointment)
BS Duke University 1989
MD U Medical-Dental Of New Jersey 1995
MS University of Pennsylvania 1990

**Patrick Edward Sloan, MD, MS**
Assistant Professor of Pediatrics (primary appointment)
MD University of Illinois 2013
BS University of Illinois 2005
MS University of Illinois 2006

**Joshua C Smith**
Instructor in Clinical Pediatrics (primary appointment)

**Sherea Monica Smith, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD University of MO Columbia 2014

**Nareshkumar J Solanki, MD, UNKNOWN**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of Nairobi 1975
UNKNOWN University of Nairobi 1975

**David Stuart Sonderman, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Loyola University Chicago 2012

**Kathryn August Spectorsky, MD**

Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
BS Georgetown University 2010
MD University of Cincinnati 2014

**Robert D Spewak, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Drake University 1975
MD Saint Louis University 1979

**Craig A Spiegel, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1978
MD Case Western Reserve Univ 1982

**Philip Charles Spinella, MD**
Professor of Pediatrics (primary appointment)
BS Tufts University 1991
MD New York Medical College 1995

**Jennifer E. Sprague, MD, PHD**
Assistant Professor of Pediatrics (primary appointment)
BS Indiana University Bloomington 2000
MD Washington Univ in St. Louis 2007
PHD Washington Univ in St. Louis 2007

**Mythili Srinivasan, MD, PHD, MS**
Professor of Pediatrics (primary appointment)
MD Saint Louis University 1996
PHD Saint Louis University 1991
MS Madurai Kamaraj University 1983
BS University of Madras 1981

**Danielle R St Leger**
Instructor in Clinical Pediatrics (primary appointment)

**Kristin Voellinger Stahl, MD**
Instructor in Clinical Neurology (primary appointment)
BA Johns Hopkins University 1992
MD University of Missouri 1996

**Sarah A Stanage, MD**
Assistant Professor of Pediatrics (primary appointment)
BS Washington Univ in St. Louis 2001
MD University of Louisville 2008

**Ashley L. Steed, MD, PHD**
Assistant Professor of Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2008
BS Duke University 2001
PHD Washington Univ in St. Louis 2008

**Norman P Steele, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Indiana University Bloomington 1972
BA Indiana University Bloomington 1968

**Miriam Bathia Steinham, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MD Washington Univ in St. Louis 2015
BS Washington Univ in St. Louis 2011

**Randall S Sterkel, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
BA Duke University 1989
MD Washington Univ in St. Louis 1993

**Anita R Stiffelman, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1983
MD New York Medical College 1987

**Jeffrey R Stokes, MD**
Professor of Pediatrics (primary appointment)
MD KANSAS U SCHOOL OF MEDICINE 1991
BS Kansas State University 1987

**Janis Marie Stoll, MD**
Associate Professor of Pediatrics (primary appointment)
MD Eastern Virginia Med School 2004
BA Washington Univ in St. Louis 2012

**Stephen I Stone, MD**
Instructor in Pediatrics (primary appointment)
BS University of Illinois Chicago 2005
MD Rosalind Franklin University 2010

**Gregory A Storch, MD**
Ruth L. Siteman Professor of Pediatrics (primary appointment)
Professor of Medicine
Professor of Molecular Microbiology
BA Harvard University 1969
MD New York University 1973

**Brian Ross Stotter, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD Tufts University 2019

**Robert H Strashun, MA, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
BA Yeshiva University 1978
MA Yeshiva University 1978
MD New York University 1982

**M. Anne Street, MA, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MA University of Connecticut 1970
BS Defiance College 1968
MD University of Illinois 1976

**Rosa M Suarez-Solar, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA University of Puerto Rico 1990
MD School Not Listed 1991

**Lisa Suffian, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of MO Kansas City 1996

BS University of MO Kansas City 1990

**Christopher Alan Sumski, MD**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD Kansas Cty Univ Med/Bioscience 2013

**Stuart C Sweet, MD, PHD**
W. Mckim O. Marriott Professor of Pediatrics (primary appointment)
BS University of Michigan 1981
MD University of Michigan 1990
PHD University of Michigan 1989

**Amanda Sweetland**
Instructor in Clinical Pediatrics (primary appointment)

**Susan C. Sylvia**
Instructor in Clinical Pediatrics (primary appointment)

## T

**Linda Ann Tackes, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of MO Kansas City 1993

**Jie Tang, MD, MS**
Assistant Professor of Pediatrics (Pending Executive Faculty Approval) (primary appointment)
MD Washington Univ in St. Louis 2013
MS University of Pennsylvania 2009
BS University of Pennsylvania 2009

**Phillip Irwin Tarr, MD**
Melvin E Carnahan Professor of Pediatrics (primary appointment)
Professor of Molecular Microbiology
MD Yale University 1980
BA Brown University 1975

**Kristen A Terrill**
Instructor in Clinical Pediatrics (primary appointment)

**Donna T Thackrey, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Wright State University 1994
BS John Carroll University 1990

**Stephen Thierauf**
Instructor in Clinical Pediatrics (primary appointment)

**Kimberly Anne Thomas, PHD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
PHD University of AL Birmingham 2013
BS California Lutheran Universit 2005

**Michael D Thompson, MD, PHD**
Assistant Professor of Pediatrics (primary appointment)
BS Washington Univ in St. Louis 2003
MD University of Pittsburgh 2012
PHD University of Pittsburgh 2012

**Mary A Tillman, MD**
Professor of Clinical Pediatrics (primary appointment)
MD Howard University 1960

**Robert W Tolan Jr., MD, MA**
Instructor in Clinical Pediatrics (primary appointment)
BA Indiana University Bloomington 1982
MD Washington Univ in St. Louis 1987
MA Indiana University Bloomington 1983

**Tomi Toler, MS**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
BA University of MO Columbia 2007
MS Univ North Carolina Greensboro 2009

**Jose Antonio Torres Garcia, MD**
Assistant Professor of Pediatrics (primary appointment)
MD The Ohio State University 2019

**Garland R Tschudin, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD University of Missouri 1975
BA University of Missouri 1971

**Michael P Turmelle, MD**
Professor of Pediatrics (primary appointment)
BA Bowdoin College 1994
MD Johns Hopkins University 1998

**Yumirle Padron Turmelle, MD, AA**
Associate Professor of Pediatrics (primary appointment)
BA University of Miami 1995
MD University of Florida 2000
AA Miami Dade Community College 1993

**Ashlyn Brooke Turner, MD**
Assistant Professor of Pediatrics (primary appointment)
BS University of Iowa 2008
MD University of Illinois College 2012

**April L Tyus**
Instructor in Clinical Pediatrics (primary appointment)
BA Washington Univ in St. Louis 1995

## U

**Elizabeth C Utterson, MD**
Associate Professor of Pediatrics (primary appointment)
MD Creighton University 1998
BA University of Notre Dame 1994

## V

**Pablo Ezequiel Valguarnera, MSB, D SC, MS**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
MSB Universidad del Buenos Aires 2009
BS Universidad del Buenos Aires 2009

D SC Universidad Nacional de San Ma 2015
MS Universidad del Buenos Aires 2009

**George Van Hare, MD**
Louis Larrick Ward Professor of Pediatrics (primary appointment)
MD University of Connecticut 1980
BS Bates College 1976

**Yasasvi Vasili, MD**
Instructor in Pediatrics (primary appointment)
MD East Tennessee State Universi 2015

**Laird Henry Vermont**
Instructor in Clinical Pediatrics (primary appointment)

**Sharon D Vermont, MD**
Instructor in Pediatrics (primary appointment)
BA University of MO Kansas City 1991
MD University of MO Kansas City 1993

**Zachary Andrew Vesoulis, MD**
Assistant Professor of Pediatrics (primary appointment)
MD Ohio State University 2009
BS Miami University 2005

## W

**Jean V Wagner**
Assistant Professor of Clinical Pediatrics (primary appointment)

**Colleen M Wallace, MD**
Associate Professor of Pediatrics (primary appointment)
Director, Humanities Program
MD Washington Univ in St. Louis 2001
BS University of Notre Dame 1997

**Jennifer Anne Wambach, MD**
Associate Professor of Pediatrics (primary appointment)
BS Vanderbilt University 1997
MD Vanderbilt University 2001

**Barbara B. Warner, MS, MD**
Professor of Pediatrics (primary appointment)
BS University of Dayton 1976
MS University of Massachussetts 1981
MD University of Cincinnati 1985

**Michael S Watson, MS, PHD**
Adjunct Professor of Pediatrics (primary appointment)
MS University of Alabama 1978
BS The American University 1974
PHD University of Alabama 1981

**Jennifer Corinne Wessman, MD**
Instructor in Pediatrics (primary appointment)
BS College of William and Mary 2001
MD Commonwealth College 2005

**Andrew J White, MS, MD**
James P Keating Professor of Pediatrics (primary appointment)
Vice Chair of Medical Education in Pediatrics
BA Brandeis University 1986
MS University of Chicago 1989
MD University of Texas Southwest 1994

**Neil Harris White, MD**
Professor of Pediatrics (primary appointment)
Professor of Medicine
MD Albert Einstein College of Med 1975
BS State Univ of NY at Albany 1971

**Halana Victoria Whitehead, MD**
Assistant Professor of Pediatrics (primary appointment)
BS University of Pennsylvania 2009
MD Case Western Reserve Univ 2013

**Karen Whiteside, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 1998
BS Washington Univ in St. Louis 1993

**Rae Alexandra Wilkerson Maixner**
Instructor in Clinical Pediatrics (primary appointment)

**Kristine G Williams, MPH, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MPH Saint Louis University 2001
BA Georgetown University 1989
MD Georgetown University 1994

**Marcia Christine Willing, MD, MS, D SC**
Professor of Pediatrics (primary appointment)
BS Goucher College 1973
MD University of Virginia 1982
MS University of Michigan 1976
D SC George Washington University 1981

**Daniel Nathan Willis, MD**
Asst Prof of Pediatrics (primary appointment)
MD University of Kansas Medical 2013
BS Benedictine College 2009

**David B Wilson, MD, PHD**
Professor of Pediatrics (primary appointment)
Professor of Developmental Biology
BA Kalamazoo College 1980
MD Washington Univ in St. Louis 1986
PHD Washington Univ in St. Louis 1986

**Timothy Andrew Wilson, MD**
Instructor in Pediatrics (Pending Dean's Approval) (primary appointment)
BS Lubbock Christian University 2012
MD Texas Tech University 2017

**Loralee Jane Wold, MD**
Instructor in Clinical Pediatrics (primary appointment)
BA Saint Louis University 1993
MD Saint Louis University 1997

**Kel Vin Woo, MD, PHD**

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MD Vanderbilt University 2012
PHD Vanderbilt University 2010

**Mark Norman Woolley, MD**
Instructor in Pediatrics (primary appointment)
MD Saint Louis University 2013
BS Rockhurst College 2009

**Ronald Edward Worthington**
Adjunct Professor of Pediatrics (primary appointment)

**Linda Xiao-Chen Wu, MD**
Instructor in Pediatrics (primary appointment)
BS University of Waterloo 2007
MD Midwestern University 2011

**Kathie R Wuellner, MD**
Associate Professor of Clinical Pediatrics (primary appointment)
MD Saint Louis University 1978
BS University of Illinois 1973

**Hayley Wurzel, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 1999
BS Brown University 1995

**Kristine M Wylie, PHD**
Assistant Professor of Pediatrics (primary appointment)
BA Southern Ill Univ Edwardsville 1996
PHD Saint Louis University 2009

**Todd N Wylie**
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BS Southern Ill Univ Edwardsville 1995

## X

**Xunjun Xiao, PHD, MS**
Assistant Professor of Pediatrics (primary appointment)
PHD Virginia Tech 2005
BS China Agriculture University 1998
MS China Agriculture University 2001

## Y

**Mona Yassin, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD School Not Listed 1979

**Aecha Marion Ybarra, MS, MD**
Assistant Professor of Pediatrics (primary appointment)
MS Barry University 2007
BS University of Miami 2003
MD St. George's University 2012

**Kentaro Yomogida, MBBCH**
Instructor in Pediatrics (primary appointment)
MBBCH Nippon Medical School 2008

**Julia Catherine Young, MD**
Instructor in Clinical Pediatrics (primary appointment)
MD Saint Louis University 1999

**Staci R. Young, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS Truman State University 1997
MD Southern Illinois University 2002

**Cecilia H Yu, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD University of Texas Southwest 1992
BS Brown University 1987

## Z

**Ritu L Zei, MD**
Instructor in Pediatrics (primary appointment)
MD Medical College of Wisconsin 2013
BS Washington Univ in St. Louis 2008

**Bo Zhang, PHD**
Instructor in Pediatrics (primary appointment)
PHD Chinese Academy of Sciences 2013
BS Wuhan University 2020

**Daisy Zhou, MD**
Assistant Professor of Clinical Pediatrics (primary appointment)
MD Washington Univ in St. Louis 2016

**Amy Christine Zimmermann, MD**
Instructor in Clinical Pediatrics (primary appointment)
BS University of MO Columbia 1998
MD University of MO Columbia 2003

**Andrew C. Zuckerman**
Instructor in Clinical Pediatrics (primary appointment)

# Research Electives

## Pediatrics Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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**Ana Maria Arbelaez, 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

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**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.

**Vikas Dharnidharka, MD, MPH**
Northwest Tower, 10th Floor
Phone: 314-286-1574

The focus of this lab is on clinical and translational research in childhood kidney disease. Our group is involved in several different types of clinical and translational research, including multicenter clinical intervention trials to improve teen adherence with transplant medications and to test new medications in children on dialysis; translational biomarker studies in transplant acute and chronic rejection and genomic studies or post-transplant lymphoproliferative disease; and large transplant database epidemiological analyses for associations of immunosuppressive regimens with efficacy and morbidity balance.

**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.

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**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.

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**Alan L. Schwartz, PhD, MD**
St. Louis Children's Hospital, Suite 3S36
Phone: 314-454-6005

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.

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**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

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**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.

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**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.

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**Neil H. White, MD, CDE**
St. Louis Children's Hospital, Northwest Tower, 9th 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.

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**David B. Wilson, MD, PhD**
McDonnell Pediatric Research Building, Room 3102
Phone: 314-286-2834

Our research is focused on the molecular switches that regulate control genes during early embryonic development and differentiation.

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## Courses

Visit online course listings to view offerings for M65 Peds (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M65).

**M65 Peds 640 Pediatrics: Physicians, Patients & Society**
Students are introduced to the unique nature of pediatrics as a subspecialty through a series of clinically oriented lectures and Team-Based Learning sessions focusing on the unique physiology and pathophysiology of pediatric patients. These sessions demonstrate the longitudinal nature of pediatrics by addressing normal and pathologic aspects of human growth and development as well as the unique role of the physician in assessing and managing pediatric patients at all stages of development.
Credit 27 units.

**M65 Peds 760 Pediatric Clerkship**
This is a 6-week clerkship divided into two 2-week rotations and two 1-week rotations. This course emphasizes pediatric pathophysiology and normal growth and development from birth through adolescence. Two weeks are spent inpatient at St. Louis Children's Hospital in general pediatrics on 10.100 or 11.100. Two weeks are spent in pediatric acute care in one of the following: Acute Care at St. Louis Children's Hospital, Acute Care at Missouri Baptist Medical Center (community hospital) or Acute Care at Progress West Hospital (community hospital). One week is spent on newborn nursery in one of the following: assessment nursery at 6800 Parkview Tower or Missouri Baptist Medical Center nursery (community hospital). One week is spent in outpatient ambulatory clinic in one of the following: St. Louis Children's Hospital sub-specialty clinics or Children's Specialty Care Center (CSCC) on Mason Road. Emphasis is on performing a pediatric history and physical examination and developing an appropriate differential diagnosis. Daily rounds with house staff and attending physicians as well as weekly case management conferences and bedside teaching further this emphasis.
Credit 231 units.

**M65 Peds 801 General Pediatrics Subinternship**
This is the general pediatric subinternship. The student will be assigned patients on one of three inpatient pediatric floor teams. They will follow patients from initial evaluation and for continuing care until discharge. Students work directly under the supervision of the senior resident and manage their own patients without co-coverage by an intern. Teaching rounds are conducted by the faculty. The elective will provide experience in the management of many pediatric medical conditions (variable depending on floor) and will include the care of patients with various diseases including pulmonary, infectious diseases, gastrointestinal, renal, neurological, endocrine, and rheumatologic issues. Additionally, patients with failure to gain appropriate weight, status asthmaticus, ingestions, fever of unknown origin, and undiagnosed conditions may be seen.

**M65 Peds 808 Pediatric Asthma and Allergy**
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.

**M65 Peds 809 Pediatric Pulmonary Subinternship**
On the 7100 Respiratory Unit, the subintern is an active member of a multidisciplinary care team, which consists of attending pulmonologist, advanced practice nurses, second-year pediatric residents, unit nurses, and other care providers. The subintern takes responsibility for children with acute and chronic lung diseases admitted to the unit. The student will be co-managed and directly supervised by senior pediatric residents and attending physician in the daily care of patients. The rotation is structured to provide students with a clinical experience to allow them to gain exposure to the breadth of repiratory diseases seen at St. Louis Children's Hospital. The volume of patients on the 7100 Respiratory Unit and number covered by the subintern varies. He or she will typically be responsible for the care of two to six patients at any given time, and will be exposed to children with wide-ranging lung diseases and breathing disorders, such as asthma, cystic fibrosis, bronchopulmonary dysplasia, bronchiolitis, pneumonia, chronic respiratory insufficiency, and congenital lung anomalies during this rotation. The student will also have the opportunity to participate in tests and procedures essential to the practice of pulmonary medicine, including pulmonary function studies, flexible bronchoscopy, and overnight polysomnography. Subinterns do not have evening coverage responsibilities, and weekend responsibilities are limited to two days during the four-week block. They are strongly encouraged to attend departmental and divisional conferences.

**M65 Peds 811 Pediatric Critical Care Subinternship**
This elective is designed to familiarize the student with the diagnosis and treatment of critical illness in infants and children. To this end, each student is made responsible for a small number of assigned cases under the direct supervision of pediatric residents, pediatric critical care fellows, and faculty. The teaching activities emphasize the understanding of pathophysiological processes that lead to respiratory, circulatory, and central nervous system dysfunction and their therapy in the developing subject. Students are expected to participate in all the daily activities of the Pediatric Intensive Care Unit at St. Louis Children's Hospital and be on occasional call after hours.

**M65 Peds 813 Pediatric Cardiac Catheterization**
This elective will focus on the interpretation of hemodynamic and angiographic data acquired in the cardiac catheterization laboratory.

**M65 Peds 819 Pediatric Cardiology - Outpatient Service**
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, and preventative cardiology clinic. Students will independently evaluate clinic patients referred for a variety of cardiac complaints, such as cardiac murmurs, chest pain, syncope, arrhythmia, as well a wide variety of congenital cardiac lesions, 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 and the Children's Specialty Care Center in West County. Students also have the option to participate in outreach clinics that occur on a monthly basis (locations include Cape Girardeau, Poplar Bluff, 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.

**M65 Peds 826 Genetics and Genomic Medicine**

The goal of this senior elective is to facilitate the acquisition of clinical skills and knowledge in genetics and genomic medicine. The student will actively participate in the diagnosis and management of pediatric and adult patients with genetic disease in both the ambulatory and inpatient settings. Emphasis will be placed on application of the science of genetics to the bedside and will include a broad exposure to patients with biochemical, metabolic, structural and complex genetic diseases. Students will have an opportunity to visit clinical laboratories involved with diagnosis of genetic disorders, including the cytogenetics, molecular genetics, and biochemical genetics laboratories. Students will be expected to participate in the weekly clinical case conference.

**M65 Peds 827 Pediatric Hematology/Oncology Subinternship**

Students will assume the responsibilities of a pediatric resident on the inpatient Hematology/Oncology service at St. Louis Children's Hospital. Serving in a classic subintern role, the student will perform evaluations and manage, under the supervision of a senior resident, patients who span the scope of diseases in our discipline. Additional educational activities include: regularly held didactic lectures, participation in our weekly "tumor board" conference, reviewing peripheral smears and bone marrow aspirate specimens obtained from our patients.

**M65 Peds 836 Pediatric Rheumatology**

Opportunities are available to care for children with a variety of immunologic and rheumatologic 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), autoinflammatory/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.

**M65 Peds 838 Pediatric Gastroenterology, Hepatology, and Nutrition**

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 and in the hospital. 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, 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 as well as seeing patients on the pediatric gastrointestinal consultation service. Students participate in diagnostic and therapeutic endoscopic procedures. At weekly divisional conferences, faculty, fellows, and students review pathology slides from current cases and discuss difficult patient problems and topics of interest.

**M65 Peds 839 Antimicrobial Use, Resistance, and Stewardship**

In 2013, the CDC estimated that 23,000 Americans die annually from antibiotic-resistant infections, and an additional two million are infected with one of these difficult-to-treat pathogens. The primary driver of this resistance is the use -- and, more importantly, the misuse -- of antibiotics. In 2015, the White House published the National Action Plan for Combating Antibiotic-Resistant Bacteria. This plan calls for improvement in antimicrobial use in human and agricultural medicine, better diagnostics, increased collaboration domestically and internationally, and the accelerated development of new antibiotic agents. This fourth-year elective rotation will be focused on educating the student on the current state of domestic and global antibiotic resistance and the mechanisms by which health care systems are addressing this problem. The student will participate in the daily antimicrobial stewardship activities conducted at St. Louis Children's Hospital, attend weekly stewardship and clinical infectious diseases meetings both at the hospital and BJC system levels, review antimicrobial use data, and participate in hands-on activities in the microbiology laboratory. At the end of this rotation, the student will be able to do the following: (1) List the antimicrobials and the pathogens they effectively treat; (2) Analyze bacteria for genotypic and phenotypic resistance through standard and rapid microbiologic techniques; (3) Describe the antimicrobial stewardship interventions that can be implemented in different health care settings; (4) List the social determinants that impact antimicrobial stewardship programs; and (5) Explain how the microbiome and resistome are important in our efforts to improve antimicrobial use.

**M65 Peds 840 Pediatric Infectious Diseases**

This elective is designed to introduce students to 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 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 group, a weekly pediatric ID research conference, and weekly clinical microbiology teaching rounds in the bacteriology and molecular diagnostics labs.

**M65 Peds 845 Pediatric Emergency Medicine Subinternship**
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 subintern 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. Examples include: respiratory distress, abdominal pain, lacerations, bone injuries, rashes, fever, etc. Students will work either a day shift (7:30 am - 3:00 pm) or an evening shift (3:00 pm - 11:00 pm) in rotation. Daily teaching conferences are provided by the attending staff. A weekly meeting of the students and senior faculty will occur to review interesting cases. Also, attending staff and senior pediatric residents provide 24-hour on-site supervision. Each medical student will be asked to prepare a 20-minute presentation on a topic of his/her choosing.

**M65 Peds 846 Child Abuse Pediatrics**
The medical student will work with the Child Protection (CPP) team at St. Louis Children's Hospital, which consists of two Child Abuse Pediatrics attending physicians, one Child Abuse Pediatrics fellow, a Pediatric nurse practitioner, a clinic nurse, and 3 social workers. Pediatric residents 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 and watch expert witness testimony by the CPP physicians/nurse practitioner. The student may see acute sexual assault cases conducted by the Sexual Assault nurse practitioners. 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.

**M65 Peds 849 Pediatric Endocrinology and Diabetes**
This elective is designed to include broad clinical experience in pediatric endocrinology and diabetes. The student will have an opportunity to evaluate both patients admitted to St. Louis Children's Hospital and patients referred for consultation in our three outpatient clinics each week. In addition to a divisional conference to review referred patients, several joint conferences with the adult Endocrinology and Diabetes Division (clinical rounds, journal club/research seminar, case conference) are held weekly.

**M65 Peds 852 Clinical Pediatric Pulmonary Medicine**
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 an inpatient and outpatient setting. 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 bronchoscopy with biopsy and lavage, and 4. learn to apply therapeutic interventions to common lung diseases. Unique aspects of this rotation include, a broad exposure to children with asthma, cystic fibrosis, ciliopathies, interstitial lung diseases, chronic lung disease of infancy, congenital lung malformations, and end-stage cardiopulmonary diseases referred for lung transplantation. Weekly didactic sessions, as well as divisional clinical conferences, provide opportunities for the trainee to develop his or her presentation skills.

**M65 Peds 861 Newborn Medicine**
The goal of this course is to allow students the opportunity to assume primary responsibility for patients in the Neonatal Intensive Care Unit (NICU) under the direct supervision of first or second year residents as well as fellows and attendings. Students will participate in formulation of diagnostic and treatment plans, coordination of care and communication with families. Throughout the rotation the students will broaden their understanding of pathophysiology as it relates to the transition from fetal to neonatal life and in common disease states affecting neonates. There will be emphasis on improving clinical problem-solving skills, communication within the team as well as with ancillary staff and families. Students during each rotation will have the option to rotate through the Neonatal Intensive Care Unit at St. Louis Children's Hospital and/or the Neonatal Assessment Center /Labor and Delivery services at Parkview Tower -Barnes-Jewish Hospital. Students assigned to the Labor and Delivery Service will routinely be involved in normal newborn care and delivery room management. Expectations during the rotation in the NICU (please check with your attending - schedules will vary): Arrive between 6:30 and 7 am (arrange timing with resident), daily Examine assigned patients and review your plan with the supervising resident/ fellow on the team prior to rounds 8:00-8:30 am: attend NICU teaching rounds, Monday through Thursday. Location: West Conference Room 8:30 to 8:45 am: Radiology rounds, Monday through Thursday 8:45 to 10 am: Patient care rounds, daily (please check expectations for presentations with your attending/ fellow) 12 noon: All resident conference in SLCH auditorium 1:00 to 2:00 pm: Division conferences (Case Conferences, M&M and core lectures), Wednesdays only. Location: verify with fellow/ attending

**M65 Peds 870 Pediatric Immunology**
Students in the two-week or four-week pediatric immunology elective will learn to apply immunology knowledge to clinical practice by participation in caring for immunology patients in various settings, including pediatric immunodeficiency, allergy, and rheumatology clinics. They will also participate in inpatient rounds with faculty and fellows in the immunology service.

**M65 Peds 875 Pediatric Renal Disease**
This course is designed to provide the student with a wide exposure to all aspects of pediatric renal disease and an opportunity to explore a desired aspect of the field in-depth. The student will be an integral part of the Renal Team and as such will see both inpatients and outpatients. Students will have an opportunity to follow the courses of patients with acute renal disease as well as those with more chronic problems and will help to plan the evaluation and therapeutic management of these patients. 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 sessions. These include renal attending rounds, pediatric nephrology educational conferences, renal research rounds and grand rounds, which are conducted weekly in conjunction with the Renal Division of Barnes-Jewish Hospital.

Renal 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.

**M65 Peds 876 Pediatric Lung Transplantation**
St. Louis Children's Hospital has the largest pediatric lung transplantation experience in North America. This unique clinical rotation will enable students to be exposed to the process of transplantation from referral and listing to the actual surgery and post-operative care. Both inpatient and twice weekly outpatient clinics will be available for participation and learning. The use of diagnostic tests, including flexible fiberoptic bronchoscopy with biopsies and bronchoalveolar lavage, histopathology of infection and graft rejection, and the complexities of immunosuppression will all be explored. Weekly multidisciplinary meetings with our team, as well as didactic, psychosocial, and ethical meetings will be available. Our patient referral base is worldwide, and includes infants and children with cystic fibrosis, pulmonary hypertension, complex congenital heart defects, surfactant protein defects and alveolar proteinosis.

**M65 Peds 878 Clerkship In Rural Primary Care Pediatrics**
The clerkship in rural primary care pediatrics is designed to provide the student with first-hand experience in general pediatric practice in a rural community setting. Students will have the opportunity to see patients in a private office, participate in delivery room resuscitation, evaluate patients in the emergency department, and provide pediatric consultation to family practitioners, obstetricians, and surgeons. The objective of this elective is to provide the student with the experience of serving as a general pediatrician providing comprehensive health services in a rural community. Students assume responsibility for ongoing care of patients and have opportunities to perform procedures.
Credit 154 units.

**M65 Peds 900 Research Elective-Pediatrics**
Research opportunities may be available. If interested, please contact the Department of Pediatrics.

# Department of Psychiatry

Instruction in psychiatry is given during the second, third and fourth years of 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 to recognize these illnesses and understand the basic principles of treatment.

## William Greenleaf Eliot Division of Child & Adolescent Psychiatry

The Division of Child & Adolescent Psychiatry (http://wuchild.wustl.edu/) offers a varied teaching program for medical students, residents in psychiatry, and fellows at St. Louis Children's Hospital and the Child Psychiatry Center. The center provides outpatient services to children with an array of mental disorders. Trainees are assigned to these various 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

### Department Chair

**Charles F. Zorumski, MD (https://psychiatry.wustl.edu/people/charles-zorumski-md/)**

Visit our website for more information about our faculty (http://www.psychiatry.wustl.edu/Faculty/) and their appointments.

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MA University of Barcelona 2008
BA University of Barcelona 2007
PHD University of Barcelona 2015
BA University of Barcelona 2007

**Yukitoshi Izumi, PHD**
Professor of Psychiatry (primary appointment)
PHD Yamagata University 1989

## J

**Aleksandar Janca, MD**
Adjunct Professor of Psychiatry (primary appointment)

**Michael R Jarvis, MD, PHD, MS**
Professor of Psychiatry (primary appointment)
Vice Chairman for Clinical Affairs, Department of Psychiatry
MD Washington Univ in St. Louis 1985
PHD University of Illinois 1982
BS University of Minnesota 1977
MS University of Illinois 1980

**Emma Covey Johnson, MS PSYC, PHD**
Instructor in Psychiatry (Pending Dean's Approval) (primary appointment)
MS PSYC University of Colorado Boulder 2016
BS University North Carolina 2013
PHD University of Colorado Boulder 2017

**Mark C. Johnson, MD**
Associate Professor of Clinical Psychiatry (primary appointment)
BA Eckerd College 1972
MD University of Kentucky 1980

## K

**Celeste Marie Karch, PHD**
Associate Professor of Psychiatry (primary appointment)
PHD University of Florida 2009

**Nicole Renee Karcher, MA, PHD**
Instructor in Psychiatry (Pending Dean's Approval) (primary appointment)
MA University of MO Columbia 2012
BA College of William and Mary 2008
PHD University of MO Columbia 2017

**Saaid Khojasteh, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
MD School Not Listed 1981

**Neha Navsaria Kirtane, PHD, MA**
Assistant Professor of Psychiatry (primary appointment)
BA Bryn Mawr College 1999
PHD Temple University 2008
MA Columbia University 2003

**Valerie S. Knopik, MA, PHD**
Adjunct Assistant Professor of Psychiatry (primary appointment)
MA University of Colorado Boulder 1998
PHD University of Colorado Boulder 2000
BA Wesleyan College 1994

**Maria Kovacs**
Visiting Professor of Psychiatry (primary appointment)

**Alexxai V Kravitz, PHD**
Associate Professor of Psychiatry (primary appointment)
Associate Professor of Anesthesiology
Associate Professor of Neuroscience
PHD University of Pennsylvania 2019
BA Wesleyan University 2019

## L

**Suzanne Nicole L'Ecuyer, MD**
Assistant Professor of Psychiatry (primary appointment)
MD University of Louisville 2016

**Rachel Emma Lean, PHD1**
Instructor in Psychiatry (primary appointment)
PHD1 Washington Univ in St. Louis 2015

**Eric J Lenze, MD**
Wallace and Lucille K Renard Professor of Psychiatry (primary appointment)
Professor of Anesthesiology
MD Washington Univ in St. Louis 1994

**Shannon N Lenze, MA, PHD**

Associate Professor of Psychiatry (primary appointment)
MA University of Pittsburgh 2003
PHD University of Pittsburgh 2007
BA University of Urbana IL 1995

**Christina Lessov-Schlaggar, PHD**
Adjunct Associate Professor of Psychiatry (primary appointment)
PHD Oregon Health Science Univers 2000

**Collins E Lewis, MD, M PH**
Associate Professor Emeritus of Psychiatry (primary appointment)
MD Harvard University 1971
BA Rutgers University 1967
M PH Harvard University 1975

**Penelope Alathea Lind**
Adjunct Instructor in Psychiatry (primary appointment)

**Joan L Luby, MD**
Professor of Psychiatry (Child Psychiatry) (primary appointment)
MD Wayne State University 1985
BA Brown University 1981

**Federica Lucantonio, D SC**
Instructor in Psychiatry (primary appointment)
D SC University of Maryland 2013

**Patrick Joseph Lustman, PHD, MSW**
Professor of Psychiatry (primary appointment)
Professor of Psychological & Brain Sciences
PHD Michigan State University 1980
BA University of Illinois 1972
MSW Univ of Wisconsin Madison 1974

**Michael T. Lynskey, MS, PHD**
Adjunct Professor of Psychiatry (primary appointment)
MS University of Canterbury 1989
BS School Not Listed 1987
PHD School Not Listed 1997

## M

**Pamela A Madden, MS, PHD**
Professor of Psychiatry (primary appointment)
BS University of Pittsburgh 1978
MS University of Pittsburgh 1983
PHD University of Pittsburgh 1992

**Susan Eileen Maloney, PHD, MA**
Assistant Professor of Psychiatry (primary appointment)
BA University of MO St Louis 2003
PHD University of MO St Louis 2012
MA University of MO St Louis 2007

**Daniel T. Mamah, MD**
Associate Professor of Psychiatry (primary appointment)
MD Semmelweis University of Med 1998

**Scott Allen Marek, PHD**
Instructor in Psychiatry (Pending Dean's Approval) (primary appointment)
PHD University of Pittsburgh 2017
BS John Carroll University 2012

**Lauren Ashley Marks, PHS**
Instructor in Psychiatry (primary appointment)
PHS Washington Univ in St. Louis 2015

**Natasha M.V. Marrus, MD, PHD**
Assistant Professor of Psychiatry (primary appointment)
BS University of Southern Calif 1999
MD Washington Univ in St. Louis 2007
PHD Washington Univ in St. Louis 2007
BA University of Southern Calif 1999

**Nicholas Gordon Martin**
Adjunct Instructor in Psychiatry (primary appointment)

**Gregory Warren Mattingly, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
MD Washington Univ in St. Louis 1989
BS University of Missouri 1985

**Marcia June McCabe, MA, PHD**
Professor of Psychiatry (primary appointment)
MA University of Missouri 1987
BA Washburn University 1985
PHD University of Missouri 1991

**Kimberli McCallum, MD**
Assistant Professor of Clinical Psychiatry (Child Psychiatry) (primary appointment)
BS Brown University 1981
MD Yale University 1986

**Vivia Van Dyne McCutcheon, MS, PHD**
Associate Professor of Psychiatry (primary appointment)
MS Washington Univ in St. Louis 2001
BA Ohio State University 1985
PHD Washington Univ in St. Louis 2005

**Steven James Mennerick, PHD**
John P Feighner Professor of Neuropsychopharmacology (primary appointment)
Interim Associate Dean for Biology and Biomedical Sciences
Professor of Neuroscience
Vice Chair of Research Psychiatry
PHD Washington Univ in St. Louis 1995
BA Earlham College 1988

**Jay L Meyer, MD**
Associate Professor of Clinical Psychiatry (primary appointment)
BA Washington Univ in St. Louis 1956
MD Saint Louis University 1960

**Ruth Huang Miller, BS1, MS1, PHD**
Adjunct Instructor in Psychiatry (primary appointment)
BS1 University of Houston 1994
MS1 Rice University 1999

PHD University of Houston 2011

**Susan Minchin, MD, PHD**
Instructor in Clinical Psychiatry (primary appointment)
MD University of Iowa 1991
PHD University of Iowa 1991
BS Oregon St University 1981

**Carrie M Mintz, MD**
Assistant Professor of Psychiatry (primary appointment)
MD Washington Univ in St. Louis 2013
BA Harvard University 2005

**David M Montani, MD**
Instructor in Clinical Psychiatry (primary appointment)
MD Washington Univ in St. Louis 1996
BA Harvard University 1991

**Erin K Morrison, BA1, DOST**
Instructor in Psychiatry (primary appointment)
BA1 North Carolina State Universit 2006
DOST Virginia College of Osteopathi 2015

**Randi H Mozenter, MA, PHD**
Instructor in Clinical Medical Psychology in Psychiatry (primary appointment)
MA Washington Univ in St. Louis 1982
BA Washington Univ in St. Louis 1980
PHD Washington Univ in St. Louis 1989

**Emily Hazel Mukherji, MD**
Assistant Professor of Psychiatry (primary appointment)
MD Tufts University 2010
BS Mass Inst of Technology (MIT) 2006

## N

**Elliot C Nelson, MD**
Professor of Psychiatry (primary appointment)
MD University of Illinois 1986
BA Johns Hopkins University 1982

**Ginger E. Nicol, MD**
Associate Professor of Psychiatry (Child Psychiatry) (primary appointment)
MD University of Iowa 2002
BA University of Iowa 1998

**Bruce L Nock, MS, PHD**
Associate Professor of Neurobiology in Psychiatry (primary appointment)
Associate Professor of Neuroscience
MS Bucknell University 1975
PHD Rutgers University 1981
BA Elizabethtown College 1969

**Kevin K. Noguchi, PHD, MA**
Assistant Professor of Psychiatry (primary appointment)
BS University of CA Santa Barbara 1996
PHD University of CA Los Angeles 2003
MA University of CA Los Angeles 1998

**Thomas John Nowotny, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
BS Washington Univ in St. Louis 1980
MD Washington Univ in St. Louis 1985

## O

**Brendan Joseph O'Connor, MD**
Assistant Professor of Psychiatry (primary appointment)
MD Creighton University 2010
BS Creighton University 2006

**Kalu Onuma**
Instructor in Clinical Psychiatry (primary appointment)

**Allison Rebecca Optican, MD**
Instructor in Psychiatry (primary appointment)
MD Northeast Ohio Medical U 2016

**Akinkunle Owoso, MD, BS1**
Associate Professor of Psychiatry (primary appointment)
BA University of Oklahoma 2003
MD University of Oklahoma 2007
BS1 University of Oklahoma 2003

## P

**Steven Marc Paul, MS, MD**
Professor of Psychiatry (primary appointment)
Professor of Neurology
BS Tulane University 1972
MS Tulane University 1975
MD Tulane University 1975

**Michele L. Pergadia, PHD, MS**
Associate Professor of Psychiatry (primary appointment)
BA Washington Univ in St. Louis 1991
PHD Finch Univ of Health Sciences 2001
MS Finch Univ of Health Sciences 1997

**Michael T Perino, PHD**
Instructor in Psychiatry (primary appointment)
PHD Univ of IL -Urbana-Champaign 2018

**Susan B Perlman, D SC**
Associate Professor of Psychiatry (primary appointment)
D SC Duke University 2019

**Marco Pignatelli, D SC**
Assistant Professor of Psychiatry (primary appointment)
D SC University of Rome 2008

**Elizabeth F Pribor, MD**
Associate Professor of Clinical Psychiatry (primary appointment)
MD Saint Louis University 1985
BA Emory University 1981

**Rumi Kato Price, PHD, MPE, MA**
Professor of Psychiatry (primary appointment)
PHD University of California 1988

BA Ochanomizu Univ 1976
MPE Washington Univ in St. Louis 1990
MA University of California 1982

**John R. Pruett Jr, PHD, MD**
Professor of Psychiatry (Child Psychiatry) (primary appointment)
Professor of Psychological & Brain Sciences (Courtesy)
Professor of Radiology
PHD Washington Univ in St. Louis 2000
BA Princeton University 1990
MD Washington Univ in St. Louis 2000

## R

**John S Rabun, MD**
Instructor in Clinical Psychiatry (primary appointment)

**Tahir Rahman, MD**
Associate Professor of Psychiatry (primary appointment)
MD University of Kansas Medical 1995

**Alex Taylor Ramsey, PHD, MA**
Assistant Professor of Psychiatry (primary appointment)
BS University of Evansville 2008
PHD Southern Illinois U Carbondale 2012
MA Southern Illinois U Carbondale 2010

**Diane Rankin, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
BA University of Colorado Boulder 1962
MD University of Colorado Boulder 1968

**Radhika Rao, MD**
Instructor in Clinical Psychiatry (primary appointment)
MD University of South Dakota 2001

**Syed A Raza, MD**
Assistant Professor of Clinical Psychiatry (Child Psychiatry) (primary appointment)
MD School Not Listed 1959
BS Osmania Medical College 1953

**Chandrashekar Reddy**
Instructor in Clinical Psychiatry (primary appointment)

**Angela M. Reiersen, MD, MS PSYC**
Associate Professor of Psychiatry (Child Psychiatry) (primary appointment)
MD University of Southern Calif 1999
MS PSYC Washington Univ in St. Louis 2006
BS University of CA Davis 1994

**Daniel B. Reising**
Instructor in Clinical Psychiatry (Child Psychiatry) (primary appointment)

**John P Rice, MA, PHD**
Professor of Mathematics in Psychiatry (primary appointment)
Professor of Biostatistics
Professor of Genetics
BA Cornell University 1969
MA Washington Univ in St. Louis 1972
PHD Washington Univ in St. Louis 1975

**Cheryl Richards, MA, PHD**
Associate Professor of Psychiatry (primary appointment)
Associate Professor of Medicine
BS Ohio University 1977
MA University of Illinois 1981
PHD University of Illinois 1987

**Thomas F Richardson, MD**
Professor of Psychiatry (primary appointment)
BA Millikin University 1960
MD Washington Univ in St. Louis 1963

**William M Riedesel II, MD**
Associate Professor of Clinical Psychiatry (primary appointment)
BA University of Rochester 1968
MD Cornell University 1973

**Syed T Rizvi**
Assistant Professor of Clinical Psychiatry (Child Psychiatry) (primary appointment)

**John Deno Rogakos, MD**
Instructor in Clinical Psychiatry (Child Psychiatry) (primary appointment)
MD Washington Univ in St. Louis 1995
BS University of Dayton 1990

**Cynthia E Rogers, MD**
Associate Professor of Psychiatry (primary appointment)
MD Washington Univ in St. Louis 2005
BA Harvard University 1998

**Max S. Rosen, MD**
Instructor in Psychiatry (primary appointment)
MD Washington Univ in St. Louis 2015
BS Washington Univ in St. Louis 2010

**Eugene Harold Rubin, MD, PHD**
Professor of Psychiatry (primary appointment)
Professor of Psychological & Brain Sciences (courtesy)
Vice Chairman for Education, Department of Psychiatry
BA University of Rochester 1971
MD Washington Univ in St. Louis 1978
PHD Washington Univ in St. Louis 1977

**John Conrad Rudersdorf**
Instructor in Clinical Psychiatry (Child) (primary appointment)

**James Rutherford, MD**
Assistant Professor Emeritus of Clinical Psychiatry (primary appointment)
MD University of Iowa 1980
BA Drake University 1975

**Jo-Ellyn M Ryall, MD**
Associate Professor of Clinical Psychiatry (primary appointment)
MD Washington Univ in St. Louis 1975

BA Rutgers University 1971

## S

**Frank Scott Saccone, PHD**
Associate Professor of Psychiatry (primary appointment)
PHD Brown University 1995
BA Rensselaer Polytechnic Instit 1990

**Berette A Salazar, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
MD University of New Mexico 1982
BA Middlebury College 1973

**Carolyn E. Sartor, PHD, MS**
Adjunct Assistant Professor of Psychiatry (primary appointment)
BS Oberlin College 1994
PHD Palo Alto College 2005
MS Catholic University America 1999

**Norman Sartorius**
Adjunct Professor of Psychiatry (primary appointment)

**Jeffrey Frank Scherrer, PHD**
Adjunct Associate Professor of Psychiatry (primary appointment)
PHD Saint Louis University 2004

**Jeffrey I Schulman, MBA, MD**
Instructor in Clinical Psychiatry (Child Psychiatry) (primary appointment)
MBA Washington Univ in St. Louis 1988
BA Yale University 1970
MD University of Kentucky 1974

**Adelita Segovia Langley**
Associate Professor of Clinical Psychiatry (Child Psychiatry) (primary appointment)

**Bryan Norbert Sewing, DOST**
Instructor in Psychiatry (primary appointment)
BS Texas Christian University 1991
DOST Kirksville College of Osteopat 1998

**Paul W Sheffner, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
MD Washington Univ in St. Louis 1974

**Barbara Sue Silverstein, PHD, MSW**
Assistant Professor of Clinical Psychiatry (Child Psychiatry) (primary appointment)
BS University of Missouri 1978
PHD Saint Louis University 1992
MSW Washington Univ in St. Louis 1981

**Nathan M Simon, MD, MS**
Professor Emeritus of Clinical Psychiatry (primary appointment)
MD Washington Univ in St. Louis 1955
BS Yale University 1949
MS Yale University 1950

**Reed Earl Simpson, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
BA Wabash College 1972
MD Washington Univ in St. Louis 1976

**Judith Ann Skala, MA, PHD, RN, RN**
Assistant Professor of Psychiatry (primary appointment)
MA Washington Univ in St. Louis 1992
BS Washington Univ in St. Louis 1989
PHD Washington Univ in St. Louis 2001
RN St Louis Community College 1981
RN 1981

**Stacey L Smith, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
BA Northwestern University 1986
MD Northwestern University 1991

**Timothy Eric Spiegel, MD**
Associate Professor of Psychiatry (Child Psychiatry) (primary appointment)
MD University of Utah 2011
BS Saint Louis University 2006

**Afshan Sultana**
Instructor in Psychiatry (Child) (primary appointment)

**Yun Ju Sung, PHD**
Associate Professor of Psychiatry (primary appointment)
Associate Professor of Biostatistics
PHD University of Minnesota 2003

**Dragan M Svrakic, PHD, MD**
Professor of Psychiatry (primary appointment)
PHD University of Belgrade 1989
MD University of Belgrade 1978

**Chad M Sylvester, PHD, MD**
Assistant Professor of Psychiatry (Child Psychiatry) (primary appointment)
BS University of Notre Dame 2001
PHD Washington Univ in St. Louis 2009
MD Washington Univ in St. Louis 2009

## T

**Mini Tandon, DOST**
Associate Professor of Psychiatry (Child Psychiatry) (primary appointment)
DOST Kansas Cty Univ Med/Bioscience 2002
BS Truman State University 1997

**Alexandre Todorov, M ED, PHD**
Professor of Psychiatry (primary appointment)
M ED Vanderbilt University 1988
BS Vanderbilt University 1985
PHD Louisiana St University 1992

**Ludwig Trillo Alvarez, MD**
Instructor in Psychiatry (primary appointment)
MD Universidad de San Agustin 2005

## V

**Erica J Vance**
Instructor in Clinical Psychiatry (primary appointment)

**Jeffrey A. Vander Kooi, MD**
Instructor in Clinical Psychiatry (primary appointment)
MD University of Iowa 2002
BS University of Iowa 1997

**Theresa Nieva Villaflores**
Instructor in Psychiatry (Child) (primary appointment)

## W

**Mary C. Waldron, PHD**
Adjunct Assistant Professor of Psychiatry (primary appointment)
PHD University of Virginia 2004

**Marysia Weber**
Instructor in Clinical Psychiatry (primary appointment)

**Reuben R Welch II, M ED, PHD**
Professor of Psychiatry (primary appointment)
BA Point Loma Nazrene College 1980
M ED University of Missouri 1982
PHD University of Missouri 1988

**Michael L Wenzinger, MD**
Instructor in Psychiatry (Child) (primary appointment)
MD Eastern Virginia Med School 2014

**Diana J Whalen, PHD, PHD**
Assistant Professor of Psychiatry (primary appointment)
BS University of Pittsburgh 2005
PHD University of Pittsburgh 2014
PHD University of Pittsburgh 2014
BS University of Pittsburgh 2005

**Denise Wilfley, PHD**
Professor of Psychiatry (primary appointment)
Professor of Medicine
Professor of Pediatrics
Professor of Psychological & Brain Sciences
Scott Rudolph University Professor
PHD University of Missouri Columbi 1989

**Joshua L Wilson**
Instructor in Psychiatry (primary appointment)

**Katie E Wilson, MD1**
Instructor in Psychiatry (Child) (primary appointment)
MD1 Wake Forest University 2004

**Matthew Stewart Wilson**
Instructor in Clinical Psychiatry (primary appointment)

**Eric Nicholas Wittrock, DOST**
instructor in Psychiatry (primary appointment)
DOST Kansas State University 2011

**Edwin D Wolfgram, MD**
Assistant Professor of Clinical Psychiatry (primary appointment)
MD University of Iowa 1959
BS Iowa State University 1954

**Fay Yeh Womer, MD**
Associate Professor of Psychiatry (primary appointment)
BS Washington Univ in St. Louis 1999
MD University of Connecticut 2003

**David F Wozniak, PHD, MA**
Professor of Psychiatry (primary appointment)
Adjunct Associate Professor of Psychological & Brain Sciences
PHD Washington Univ in St. Louis 1984
BA Hobart College 1973
MA Connecticut College 1977

## Y

**Carla Marie Yuede, PHD**
Associate Professor of Psychiatry (primary appointment)
Associate Professor of Neurology
Associate Professor of Neuroscience
PHD University of MO St Louis 2006

**Sean H Yutzy**
Adjunct Professor of Psychiatry (primary appointment)

## Z

**Charles F Zorumski, MD**
Samuel B. Guze Professor of Psychiatry (primary appointment)
Head of the Department of Psychiatry
Professor of Neuroscience
BA Saint Louis University 1974
MD Saint Louis University 1978

**Jorge Sergio Zwir, MS, BSCS, PHD**
Assistant Professor of Psychiatry (primary appointment)
MS Universidad del Buenos Aires 1995
BSCS Universidad del Buenos Aires 1991
PHD University of Granada 2001

# Research Electives

## Psychiatry Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

**Note to Students:** There are always a number of research projects in the Department of Psychiatry. For additional information, contact Dr. Rubin at 314-362-2462.

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**Andrey Anokhin, PhD**
Genetics of the Brain, Behavior and Psychopathology
Central Institute for the Deaf (CID) Building
660 S. Euclid Ave., Suite 1
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.

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**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.

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**Laura Jean Bierut, MD**
Maternity 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.

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**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 (http://www.nil.wustl.edu/labs/kevin/) for examples of past research.

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**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 brain mapping and EEG-guided transcranial magnetic stimulation (TMS-EEG) 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.

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**Rumi Kato Price, PhD, MPE**
Central Institute for the Deaf (CID) Building
4560 Clayton Rd.
Phone: 314-286-2283

Medical students, post- and pre-doctoral students, and clinical fellows will work closely with Dr. Price and her collaborators on ongoing research projects in psychological trauma, substance abuse, psychiatric epidemiology and methodologies relevant

for prevention and intervention in the community research context. Current projects include epidemiology and clinical studies of human trafficking and gender-based violence in the St. Louis region as well as in a global context. We work closely with the Institute for Public Health, and we collaborate with multidisciplinary researchers, community leaders, international governmental agencies, and NGOs.

## Psychiatric and Behavioral Health Sciences Concentration

**Rumi Kato Price, PhD, MPE (concentration program director); Patricia Cavazos-Rehg, PhD; Sarah Hartz, PhD MD; Ginger Nicol, MD**
Taylor Avenue Building (TAB)
660 S. Taylor Ave.
Phone: 314-286-2283

Courses are held at the Institute for Public Health TAB building. The Psychiatric and Behavioral Sciences concentration is an integral component of the Master of Population Health Sciences (MPHS) and taught by psychiatry faculty members. The concentration provides clinician-researchers, postdoctoral fellows, and advanced medical and other graduate students with strong conceptual and methodological skills required for the design, advanced analysis and interpretation of epidemiological and treatment-effectiveness studies. Didactic training focuses on the understanding of disease phenotypes and developmental trajectories; understanding the underlying biological and environmental factors and their interactions; understanding the role of psychiatric and substance abuse epidemiology in disease prevention and intervention locally and globally; and evaluating psychiatric clinical treatment and management of psychopathology, including digital applications. A fellow/student has an option of applying for an MPHS degree program or taking appropriate courses as part of their training or academic program.

Current available courses include the following:

1. M19 PHS 562 Addictions and Addictive Behaviors (Course director: S. Hartz, MD; 3 credits): This course provides an overview of the principles of substance-related addictions and the processes and mechanisms that underlie addiction. Students will work on data analysis and manuscript preparation simultaneously.
2. M19 PHS 5656 Global Burden of Diseases: Methods and Applications / S55 MPH 4003 (Course director: R.K. Price, PhD; 3 credits): This course provides an overview of the current methods for studying the global burden of medical and psychiatric diseases from a multidisciplinary perspective.
3. M19 PHS 566 Psychiatric and Behavioral Assessment in the Digital Age (Course directors: G. Nicol, MD, and P. Cavazos-Rehg, PhD; 2 credits): The first segment of this course introduces psychiatric disorder nosology and diagnostic assessment and screeners. The second segment will provide didactic and student-initiated digital applications of evidence-based prevention and intervention examples coupled with implementation frameworks of such digital applications.

## Courses

Visit online course listings to view offerings for M85 Psych (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M85).

**M85 Psych 676A Diseases of the Nervous System: Psychiatry**
This course will emphasize the diagnosis of major psychiatric illnesses in adults and children. Psychiatric diseases will be described in terms of epidemiology, clinical presentations, natural history, genetics, differential diagnosis and clinical management. Biological and psychological influences on these diseases will be presented. Interviewing techniques and performance of the mental status exam will be demonstrated by patient interviews.
Credit 44 units.

**M85 Psych 770 Psychiatry Clerkship**
Students spend three weeks on the inpatient psychiatry service of Barnes-Jewish Hospital at the main campus unit. Students evaluate and treat patients with psychiatric illness under the supervision of house staff and an attending physician. Students are also assigned for one week at either an ambulatory treatment site or an inpatient consult-liaison service. There is also an opportunity for students to gain exposure to emergency psychiatric services in the Barnes-Jewish Hospital emergency department. The clerkships includes required attendance at teaching conferences, including small-group sessions with WUSM clinical faculty and upper-level psychiatry residents. Students are responsible for completing learning exercises and other assignments.
Credit 154 units.

**M85 Psych 771 Ambulatory Clerkship: Psychiatry for Generalists**
Up to 2 students may elect to pursue their ambulatory medicine selective through the psychiatry department. Students participate in clinical duties depending on assigned locations, which can include the BJH adult psychiatry clinic, a community mental health center, the Wash U child and adolescent psychiatry clinic, and both the adult and child psychiatry consultation services. Students will also submit a written review of a relevant clinical topic of their choice. There are no call obligations at any clinical site.
Credit 154 units.

**M85 Psych 805 Psychiatry Consult Subinternship**
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

**M85 Psych 810 Outpatient Community Psychiatry**
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 also attend scheduled lectures and conferences over the course of the rotation relevant to outpatient Psychiatry. 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.

**M85 Psych 836 Inpatient Psychiatry Subinternship**
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, take patients in rotation, and share night call with first-year residents approximately every fifth night. 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.

**M85 Psych 840 Child Psychiatry**
This elective in child psychiatry utilizes the Child Psychiatry Outpatient Clinic and the consult-liaison service at St. Louis Children's Hospital. It provides experience in age-appropriate diagnostic and treatment methods in children and adolescents. A portion of the student's time may be spent on the inpatient behavioral unit at St. Louis Children's Hospital if interested and if circumstances permit. A paper on a topic of the student's choosing is required.

**M85 Psych 844 Forensic Psychiatry**
The medical student will be actively involved in many aspects of forensic psychiatry including civil litigation, workman's compensation, malpractice, civil commitment, and guardianship. There may be opportunities to be involved in criminal forensic issues. The student will work with several instructors within the Department of Psychiatry but will primarily meet with the Course Director a minimum of two hours per week. They will also work with The BJH Manager of Case Management and The City of St Louis Probate Court. The student will also be assigned readings of landmark cases, textbooks, psychiatric expert opinions, legal filing with the probate court and attend civil hearings. The student will learn relevant criminal statutes regarding competency and civil commitment, causation in civil litigation, the concept of medical malpractice and risk assessment of violence and suicide. There may be the opportunity to witness sexually violent predator evaluations and/or treatment. The student will be required to research and write an opinion on a specific approved topic in forensic psychiatry. 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 originality, thoroughness, and quality of the research paper.

**M85 Psych 855 Introduction to Eating Disorders**
Students will learn the basics of assessment, participate in groups that focus on family education, gain experience in interdisciplinary psychiatric team work, attend case discussions with psychiatrists, and participate in treatment planning. Students will be able to describe core symptoms, recommend treatment options, and discuss the medical, nutritional, and psychiatric components of treatment.

**M85 Psych 880 Schizophrenia Precursors & Prodomal States**
This is an opportunity for trainees to gain experience in the evaluation of children and adolescents who may be at high risk for schizophrenia. The rotation would center around the "First Contact Assessment Service", which evaluates patients who show 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 (for example, nonspecific social/emotional/behavioral symptoms in a child/adolescent with a strong family history of schizophrenia). Since the full symptoms of schizophrenia are often preceded by a wide range of childhood behavioral and developmental abnormalities, this rotation would also help trainees integrate information regarding the continuity between childhood development and adult psychopathology. Trainee would observe all aspects of First Contact evaluations (including semi-structured diagnostic interviews and examination of subtle neurological signs), participate in case discussions, and observe follow-up consultations involving patients with psychotic and/or complex neurodevelopmental disorders. Trainee would also be required to write a literature review on a topic relevant to the rotation.

**M85 Psych 889 Interventional Psychiatry**
Interventional Psychiatry involves the application of procedures including ECT (Electroconvulsive Therapy), rTMS (Repetitive Transcranial Magnetic Stimulation) and other neuromodulation techniques such as VNS (Vagus Nerve Stimulation) in the treatment of medication-resistant psychiatric illness. The student will learn about indications for ECT and rTMS, participate in the clinical management of patients undergoing these interventions and will receive training in the application of these procedures. As cases become available, the student will be involved in evaluations of patients receiving VNS. The student will participate in the evaluations of patients referred to the Treatment Resistant Depression Clinic supervised by Dr. Charles Conway. The student will be encouraged to review appropriate literature and make clinically relevant case-oriented presentations. The student will be expected to write a review of a self-selected clinic topic relevant to interventional psychiatry. As advances in the field occur, the rotation may also involve exposure to individuals receiving other modalities of intervention, such as esketamine for treatment resistant depression.

**M85 Psych 900 Research Elective-Psychiatry**
Research opportunities may be available. If interested, please contact the Department of Psychiatry.

# Department of Radiation Oncology

The Department of Radiation Oncology (http://radonc.wustl.edu/) was created on July 1, 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 the three divisions of clinical, physics and biology; and teaching for graduate students, medical students, residents in radiation oncology, 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. Our faculty have gained international recognition for innovative technological advances in physics and treatment planning, biological research, computer applications and clinical investigation.

## Milestones

- Implementation of novel respiratory gating algorithms
- Development of biomarkers of DNA repair capacity of tumors
- Demonstrated the use of proton therapy
- Implementation of first Mevion S250 single-room proton therapy system
- Implementation of real-time MRI guidance for radiation therapy treatment with the ViewRay system (Real-time MRI guidance provides the ability to see tumors move in real time during a patient's entire treatment process. This helps to ensure that tumor targets are hit and that healthy tissue is spared.)
- Acquisition of high-intensity focused ultrasound with MRI thermometry mapping

The Department of Radiation Oncology currently occupies a large and convenient clinical facility on the lower level of the Center for Advanced Medicine. The downtown clinical facility includes nine treatment rooms, three simulator rooms, and a brachytherapy center with two high dose rate treatment units. Furthermore, the facility houses the latest Gamma Knife, the ICON unit. We have advanced treatment planning computer systems for 3D conformal and intensity-modulated radiation therapy. We have six linear accelerators with on-board CT imaging capability. The brachytherapy suite includes capabilities for high dose rate remote afterloading and for image-guided permanent prostate seed implants. Interstitial and external hyperthermia treatments are also available.

In 2013, we implemented a new type of proton treatment facility that involves the use of a superconducting synchrocyclotron mounted on a gantry. In addition, we implemented the world's first MRI-guided radiation therapy treatment program in 2014. In March 2017, all of the Washington University in St. Louis/Barnes-Jewish Hospital Radiation Oncology facilities achieved accreditation for the American Society for Radiation Oncology (ASTRO) Accreditation Program for Excellence (APex). The department provides radiation therapy treatment at Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine, Siteman Cancer Center-South County, Siteman Cancer Center at Barnes-Jewish West County Hospital, Siteman Cancer Center at Northwest HealthCare, Siteman Cancer Center at Barnes-Jewish St. Peters Hospital, Siteman Cancer Center at Memorial Hospital East, and Alton Memorial Hospital.

Physics faculty have research laboratories and offices on the fourth floor of the Clinical Sciences Research Building plus designated areas adjacent to the clinical facility in the Center for Advanced Medicine building. The Radiation Biology laboratory and faculty offices are housed at the 4511 Forest Park Building, the Wohl Hospital Building and the BJC Institute of Health Building.

**Website:** http://radonc.wustl.edu

## Faculty

### Department Head

**Dennis Hallahan, MD (https://radonc.wustl.edu/people/dennis-hallahan/)**

### Clerkship Director

**Maria Thomas, MD (https://radonc.wustl.edu/people/maria-a-thomas-md-phd/)**

### Director of Education in Medical Physics

**Rao Khan, PhD (https://radonc.wustl.edu/people/rao-khan-phd/)**

Visit our website for more information about our faculty (https://radonc.wustl.edu/faculty/) and their appointments.

### A

**Christopher Abraham, MS, MD**
Assistant Professor of Radiation Oncology (primary appointment)
Assistant Professor of Medicine
BS Medical College Georgia 2005
MS Washington Univ in St. Louis 2011
MD Saint Louis University 2006

**Michael Bernard Altman, PHD**
Assistant Professor of Radiation Oncology (primary appointment)
PHD University of Chicago 2010

**Anthony John Apicelli III, MD, PHD**
Assistant Professor of Radiation Oncology (primary appointment)
MD Washington Univ in St. Louis 2009
PHD Washington Univ in St. Louis 2009
BS Princeton University 1999

**Abdelkareem Azab, PHD**
Associate Professor of Radiation Oncology (primary appointment)
PHD Hebrew University 2007

## B

**Shahed Nicolas Badiyan, MD**
Assistant Professor of Radiation Oncology (primary appointment)
BS University of Texas Austin 2005
MD University of Texas Austin 2009

**Brian Christopher Baumann, MD**
Assistant Professor of Radiation Oncology (primary appointment)
BA Princeton University 2003
MD University of Pennsylvania 2012

**Carmen Renee Bergom, MD, MS, PHD**
Associate Professor of Radiation Oncology (primary appointment)
BS Mass Inst of Technology (MIT) 1998
MD Medical College of Wisconsin 2008
MS Cambridge University 1999
PHD Medical College of Wisconsin 2006

**Walter R Bosch, BE, MS, PHS**
Associate Professor of Radiation Oncology (primary appointment)
BE Washington Univ in St. Louis 1980
MS Washington Univ in St. Louis 1983
PHS Washington Univ in St. Louis 1990

## C

**Douglas Ford Caruthers, MS**
Instructor in Radiation Oncology (primary appointment)
MS Univ Texas Health Science Ctr 2010

**Aadel Ahmed Chaudhuri, MD**
Assistant Professor of Radiation Oncology (primary appointment)
Assistant Professor of Computer Science and Engineering
Assistant Professor of Genetics
BS Mass Inst of Technology (MIT) 2004
MD Stanford University 2013

**David T Curiel, MD, PHD**
Distinguished Professor of Radiation Oncology (primary appointment)
Professor of Medicine
Professor of Obstetrics and Gynecology
MD Emory University 1982
BA West Georgia College 1978
PHD University of Groningen 2000

## D

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MS Shahid Beheshti University 2007
PHD University of NC Charlotte 2013
MS University of NC Charlotte 2011
BS University of Tehran 2004
PHD University of Pennsylvania 2015

**Carl J. DeSelm, MD, PHD**
Assistant Professor of Radiation Oncology (primary appointment)
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PHD Washington Univ in St. Louis 2016
BS Dartmouth College 2004

**Venkata Rao Devineni, MD**
Associate Professor of Clinical Radiation Oncology (primary appointment)
MD Osmania Medical College 1973

**Igor Dmitriev, PHD**
Assistant Professor of Radiation Oncology (primary appointment)
PHD SRC Vector 1994

## G

**H Michael Gach, PHD**
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Associate Professor of Radiology
PHD University of Pittsburgh 1998

**Jose L Garcia, MS**
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MS Finch Univ of Health Sciences 1997
BS University of Puerto Rico 1995

**Hiram Alberto Gay, MD**
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MD University of Puerto Rico 2000

**Sreekrishna M Goddu, PHD, MS**
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**Perry W Grigsby, MD, MBA, MS**
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Professor of Radiology

MD University of Kentucky 1982
BS University of Kentucky 1974
MBA Washington Univ in St. Louis 1990
MS University of Kentucky 1978

**Yuxing Gu, PHD**
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PHD University of MO St Louis 2014

## H

**Lannis Hall, MD, M PH**
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MD Howard University 1992
M PH Saint Louis University 1995

**Dennis E Hallahan, MD**
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Professor of Biomedical Engineering
Professor of Cell Biology and Physiology
Professor of Molecular Microbiology
Professor of Pathology and Immunology
MD Rush University 1984
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**Yao Hao, PHD**
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PHD Univ of Massachusetts Lowell 2016

**Lauren Elizabeth Henke, MSCI, MD**
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MSCI Washington Univ in St. Louis 2018
BS St Olaf College 2010
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**Jiayi Huang, MD**
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**Geoffrey Douglas Hugo, PHD**
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## K

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MS All-India Inst of Medical Sci 2008
PHD All-India Inst of Medical Sci 2013
BA Delhi University 2006

**James Alexander Kavanaugh, MS, PHD**
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MS Louisiana St University 2011
PHD Louisiana St University 2020

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Associate Professor of Biomedical Engineering
MD Quaid-Azam University 1997
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BS University of Montana Missoula 2009
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## L

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PHD Duke University 2009

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MS Chinese Academy of Sciences 1995
PHD Friedrich-Alexander Universit 2001
BS Huashong University of Science 1992

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MD University of CA Irvine 2016
BA University of Nebraska 2016
PHD University of CA Irvine 2016
MA University of CA Irvine 2016

**Hsiu-San Lin, PHD, MD**
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PHD University of Chicago 1968
MD National Taiwan University 1960

**Zhi Hong Lu, PHD**
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PHD University of Mississippi Med 1999

## M

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PHD Washington Univ in St. Louis 2017

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PHD Washington Univ in St. Louis 2011
BS John Carroll University 2005
PHD University of MO St Louis 2014
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## P

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MA University of Texas Austin 1969

## R

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Professor of Radiology
MA Washington Univ in St. Louis 1991
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**Tapan Roy, MS**
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## S

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MS University of Cincinnati 2007
MD University of Cincinnati 2011
MPH Washington Univ in St. Louis 2020

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MA Truman State University 2006

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## T

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Professor of Radiation Oncology (primary appointment)
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MS Bangalore University 1993
BS Bangalore University 1990
PHD Bangalore University 1998

**Amaris Renee Tippey, PHD**
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PHD East Carolina University 2014

## V

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## W

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MD Washington Univ in St. Louis 1966
BA Washington Univ in St. Louis 1962

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BA St Olaf College 1974
PHD University of Minnesota 1982
MS University of Minnesota 1980

## Y

**Deshan Yang, PHD, MS**
Associate Professor of Radiation Oncology (primary appointment)
PHD Univ of Wisconsin Madison 2005
MS Illinois Institute of Technol 2001
BS Tsinghua University, China 1992

**Joanna Chensi Yang, MD, M PH**
Assistant Professor of Radiation Oncology (Pending Executive Faculty Approval) (primary appointment)
MD Mount Sinai School of Medicine 2013
M PH Harvard University 2018

## Z

**Jin Zhang, MS, PHD**
Instructor in Radiation Oncology (primary appointment)
MS Tianjin Polytech University 2008
BS Tianjin University 2005
PHD University of Connecticut 2012

**Tiezhi Zhang, PHD, MS**
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BS Jilin Medical University 1994
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MS Drexel University 1999

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BS Shanghai Jiao Tong University 1998
PHD Washington Univ in St. Louis 2010
MS Shanghai Jiao Tong University 2001

**Imran Zoberi, MD**
Professor of Radiation Oncology (primary appointment)
BS University of South Dakota 1992
MD Washington Univ in St. Louis 1996

**Jacqueline Esthappan Zoberi, PHD**
Professor of Radiation Oncology (primary appointment)
BA University of Chicago 1995
PHD 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 (http://dbbs.wustl.edu/Pages/) (DBBS) and the Medical Scientist Training Program (http://mstp.wustl.edu/Pages/) (MSTP) to train with faculty in the cancer biology research laboratories.

The Department of Radiation Oncology offers a clinical clerkship for medical students that can be selected as an elective through the medical school.

Please visit the Department of Radiation Oncology website (https://radonc.wustl.edu/education/) for more information about current research in the department.

# Courses

## Post-PhD Graduate Certificate/ Masters of Science in Medical Physics

For course information, please visit the Medical Physics (p. 41) page of this *Bulletin*.

## MD/MSTP Programs

The Department of Radiation Oncology offers two courses that are open to students in the MD and MSTP (MD/PhD) programs. For course information, please visit the online course listings (https://acadinfo.wustl.edu/CourseListings/Semester/Listing.aspx).

**M92 RadOnc 740 Radiation Oncology Clerkship**
The four-week clerkship in Radiation Oncology will provide students with the opportunity to participate in the evaluation and management of a broad range of patients referred for consideration of radiation therapy. Clerkship activities will take place at the Barnes-Jewish Hospital/Siteman Cancer Center complex and at our satellite facilities. Students will conduct patient evaluations under the supervision of radiation oncology department residents and faculty. Students will attend many conferences throughout the weeks of this clerkship, with the workday starting between 7:00 and 7:30 a.m. Students will also have the opportunity to attend the appropriate multidisciplinary clinics, follow-up clinics, and multidisciplinary conferences (such as pediatric neuro-oncology, cardiothoracic oncology, lymphoma, GYN tumor conferences, and so on) pertaining to their rotation schedule. Instructional materials are available for students on the rotation. (Students are not expected to purchase any curricular materials for the clerkship.) Student performance will be evaluated by both resident and faculty members who supervise the student over the course of the four-week clerkship. Credit 154 units.

**M92 RadOnc 801 Clinical Radiation Oncology Subinternship**
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. This course is designed for MS4 students who are entering the Radiation Oncology Match. If a student is an MS4 applying in another specialty but interested in a radiation oncology elective, we encourage them to pursue a two-week special study elective in Radiation Oncology.

# 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 (https://www.mir.wustl.edu/) for Washington University School of Medicine in St. Louis (http://medicine.wustl.edu/), 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 (https://ehs.wustl.edu/radioactive-material-safety/); for more information, contact the department's director Maxwell Amurao, PhD, MBA, at 314-362-2988 or maxwell.amurao@wustl.edu.

**Website:** https://www.mir.wustl.edu

# Faculty

## Department Chair

**Richard L. Wahl, MD (https://wuphysicians.wustl.edu/for-patients/find-a-physician/richard-leo-wahl/)**

Visit our website for more information about our faculty (https://www.mir.wustl.edu/patient-care/directory-of-physicians/) and their appointments.

## A

**Diane S Abou, MS, PHD**
Assistant Professor of Radiology (primary appointment)
MS Faculté des sciences d'Orsay 2005
BS University of Montpellier II 2003
PHD Delft University of Technology 2010

**Samuel I Achilefu, PHD**
Michel M Ter-Pogossian Professor of Radiology (primary appointment)
Professor of Biochemistry and Molecular Biophysics
Professor of Medicine
PHD University of Nancy I 1991

**Joseph J.H. Ackerman, PHD**
Professor of Radiology (primary appointment)
William Greenleaf Eliot Professor Emeritus of Chemistry
BA Boston University 1972
PHD Colorado St University 1977

**Tabassum Ahmad, MD**
Assistant Professor of Radiology (primary appointment)
MD Aga Khan University 1996

**Maryellen Amato, MD**
Instructor in Clinical Radiology (primary appointment)
BA Notre Dame College 1976
MD Case Western Reserve Univ 1981

**Hongyu An, PHD, MS**
Professor of Radiology (primary appointment)
Professor of Neurology
BS Tianjin University 1993
PHD Washington Univ in St. Louis 2001

MS Washington Univ in St. Louis 1999

**Trevor John Andrews, PHD**
Assistant Professor of Radiology (primary appointment)
PHD Univ Texas Health Sci San Anto 2005
BS University of Texas Austin 1994

## B

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Adjunct Associate Professor of Radiology (primary appointment)
BS Seoul National University 1981
ME University of Iowa 1983
PHD University of Pennsylvania 1988
MD University of Chicago 1992
MS University of Pennsylvania 1985

**Jonathan C Baker, MD**
Associate Professor of Radiology (primary appointment)
BS Saint Louis University 2000
MD Washington Univ in St. Louis 2004

**Dennis M Balfe, MD**
Professor of Radiology (primary appointment)
MD Medical College of Wisconsin 1975
BS Santa Clara University 1968

**David Hilton Ballard, MS, MD**
Assistant Professor of Radiology (primary appointment)
MS Mcneese St University 2011
MD Louisiana St Univ Hlth Sci 2015
BS Mcneese St University 2008

**Adam Quentin Bauer, MS, PHD**
Assistant Professor of Radiology (primary appointment)
MS Washington Univ in St. Louis 2005
BS Truman State University 2001
PHD Washington Univ in St. Louis 2009

**Debbie Lee Bennett, MD**
Associate Professor of Radiology (primary appointment)
BS Princeton University 2003
MD Harvard University 2008

**Kevin Michael Bennett, PHD**
Associate Professor of Radiology (primary appointment)
PHD Medical College of Wisconsin 2003
BS Milwaukee School of Engineer 1998

**Tammie Lee Smith Benzinger, PHD, MD**
Professor of Radiology (primary appointment)
Professor of Neurological Surgery
PHD University of Chicago 1998
BA Williams College 1993
MD University of Chicago 2000

**Mikhail Y Berezin, PHD, MS**
Associate Professor of Radiology (primary appointment)
Adjunct Assistant Professor of Chemistry (Courtesy Affiliation)
PHD Moscow Institute of Oil & Gas 1991
MS Moscow Institute of Oil & Gas 1987

**Sagine Audra Berry-Tony, MD**
Assistant Professor of Radiology (Pending Executive Faculty Approval) (primary appointment)
MD George Washington University 2013
BS Stony Brook University 2008

**Sanjeev Bhalla, MD**
Professor of Radiology (primary appointment)
BS Yale University 1990
MD Columbia College of Phy & Surg 1994

**Andrew J Bierhals, MPH, MD**
Associate Professor of Radiology (primary appointment)
BS University of Pittsburgh 1993
MPH University of Pittsburgh 1996
MD University of Pittsburgh 2000

**Joelle Biernacki, MD**
Assistant Professor of Radiology (primary appointment)
MD University of MO Kansas City 1989
BA University of MO Kansas City 1988

**Janine Diane Bijsterbosch, MS, PHD**
Assistant Professor of Radiology (primary appointment)
BS Maastricht University 2006
MS University of Sheffield 2007
PHD University of Sheffield 2011

**Kvar Carl Lee Black, PHD, MS**
Instructor in Radiology (primary appointment)
BS University of Arizona 2005
PHD Northwestern University 2012
MS Northwestern University 2008

**Mitra Bill Boodram, MD**
Instructor in Clinical Radiology (primary appointment)
BS McMaster University 1983
MD CHICAGO MEDICAL SCHOOL 1989

**G. Larry Bretthorst, MS, PHD**
Associate Professor of Radiology (primary appointment)
MS University of MO St Louis 1980
BS Lincoln University 1971
PHD Washington Univ in St. Louis 1987

**Jennie Esther Brodsky, MD**
Assistant Professor of Radiology (primary appointment)
MD New York U. School of Medicine 2007
BS New York University 2003

**Arianna Cloe Buckley, MD**
Instructor in Radiology (primary appointment)
BS Southern Methodist University 2011
MD Southern Illinois University 2015

## C

**Karen A Caudill, MD**
Assistant Professor of Radiology (primary appointment)

Assistant Professor of Pediatrics
MD University of MO Kansas City 1996
BS University of MO Kansas City 1996

**Ganesh B Chand, MS, PHD**
Instructor in Radiology (primary appointment)
BS Tribhuvan University 2003
MS Tribhuvan University 2007
PHD Georgia St University 2015

**Arindam Rano Chatterjee, MD**
Assistant Professor of Radiology (primary appointment)
BS Columbia University 2000
MD University of Tenn Memphis 2006

**Sadaf Summer Chaudhry, MD**
Instructor in Clinical Radiology (primary appointment)
BS Boston University 2003
MD Boston University 2007

**Wenhua Chu, MS, PHD**
Instructor in Radiology (primary appointment)
MS Academia Sinica China 1985
PHD Academia Sinica China 1988
BS Quigdao Ocean Univ 1982

**Marc F. Clemente, MD**
Instructor in Clinical Radiology (primary appointment)
MD Saint Louis University 1997
BS University of CA Davis 1993

**Paul Kevin Commean**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Physical Therapy
BS Georgia Tech 1982

**Thomas E Conturo, MD, PHD**
Associate Professor of Radiology (primary appointment)
Adjunct Associate Professor of Physics
BA University of Pennsylvania 1981
MD Vanderbilt University 1989
PHD Vanderbilt University 1989

**Constance Stone Courtois, MD**
Assistant Professor of Radiology (primary appointment)
MD Medical University of Sth Car 1985
BS Wofford College 1980

**Joseph P Culver, PHD**
Sherwood Moore Professor of Radiology (primary appointment)
Professor of Physics (Courtesy)
PHD University of Pennsylvania 1997
BA Whitman College 1985
BS University of Washington 1988

**Douglas J Curry, BE, MD**
Instructor in Clinical Radiology (primary appointment)
BE University of Texas Austin 1993
MD University of Texas Southwest 1997

## D

**Michael D Darcy, MD**
Professor of Radiology (primary appointment)
Associate Professor of Surgery (General Surgery)
BS Ohio State University 1976
MD Ohio State University 1979

**Gene Layton Davis Jr, MBA, MD**
Assistant Professor of Clinical Radiology (primary appointment)
MBA Webster University 1991
MD University of Virginia 1972
BA University of Virginia 1968

**Farrokh Dehdashti, MD**
Barry A and Marilyn J Siegel Professor of Radiology (primary appointment)
MD Pahlavi University 1977

**Jamal Jon Derakhshan, PHD, MD**
Assistant Professor of Radiology (primary appointment)
PHD Case Western Reserve Univ 2009
BS West Virginia University 2002
MD Case Western Reserve Univ 2011

**Christina Doherty, MD**
Assistant Professor of Radiology (Pending Executive Faculty Approval) (primary appointment)
MD Southern Illinois University 2001
BS Truman State University 1997

**Steven Don, MD**
Professor of Radiology (primary appointment)
Professor of Pediatrics
BA Johns Hopkins University 1981
MD Vanderbilt University 1985

**Monica R. Drylewicz, PHD, MS**
Instructor in Radiology (primary appointment)
BS Northwestern University 2004
PHD Washington Univ in St. Louis 2002
MS Washington Univ in St. Louis 2012

**James R Duncan, MD, PHD**
Professor of Radiology (primary appointment)
MD Washington Univ in St. Louis 1988
BS Davenport University 1982
PHD Washington Univ in St. Louis 1988

## E

**Adam Thomas Eggebrecht, PHD, MS**
Assistant Professor of Radiology (primary appointment)
PHD Washington Univ in St. Louis 2009
MS Washington Univ in St. Louis 2005

**Rami Walid Eldaya, MD, MBA**
Assistant Professor of Radiology (primary appointment)
BS University of Texas Houston 2006
MD Univ of Texas Med Sch Houston 2012

MBA University of Texas Houston 2008

**Cihat Eldeniz, PHD, MS**
Instructor in Radiology (primary appointment)
PHD University of North Carolina 2014
BS Bogazici University 2006
MS Duke University 2008

**Allen Devaney Elster, BEE, MBA, MS, MD**
Professor of Radiology (primary appointment)
BEE Vanderbilt University 1976
MBA Wake Forest University 1999
MS Oxford University 1978
MD Baylor University 1980

## F

**Tyler Jacob Fraum, MD**
Assistant Professor of Radiology (primary appointment)
BS University of Chicago 2008
MD Duke University 2012

**Saul Nathan Friedman, MD, PHD**
Assistant Professor of Radiology (primary appointment)
MD Tel-Aviv University 2013
BS McGill University 2004
PHD University of Western Ontario 2009

## G

**Joel Richard Garbow, PHD**
Professor of Radiology (primary appointment)
BS University of Illinois 1978
PHD University of CA Berkeley 1983

**Heather Vallhonrat Garrett, MD**
Assistant Professor of Radiology (primary appointment)
BA University of Virginia 1996
MD Washington Univ in St. Louis 2002

**Charles F Garvin, MD**
Instructor in Clinical Radiology (primary appointment)
BA University of MO Columbia 1980
MD University of MO Columbia 1982

**Joseph Giardina, MD**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Surgery (General Surgery)
MD New York Medical College 2010
BA Williams College 2004

**David S Gierada, MD**
Professor of Radiology (primary appointment)
BS Davenport University 1983
MD Wayne State University 1988

**Harvey S Glazer, MD**
Professor of Radiology (primary appointment)
MD Washington Univ in St. Louis 1976
BA Washington Univ in St. Louis 1971

**Brian A Gordon, PHD, MS PSYC**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Psychological & Brain Sciences
BS University of Illinois 2003
PHD University of Illinois 2010
MS PSYC University of Illinois 2006

**Evan Moss Gordon, PHD**
Assistant Professor of Radiology (primary appointment)
BS Duke University 2004
PHD Georgetown University 2012

**Jennifer E Gould, MD**
Associate Professor of Radiology (primary appointment)
MD Washington Univ in St. Louis 1997
BA Cornell University 1993

**Manu Shri Goyal, MD, MS**
Associate Professor of Radiology (primary appointment)
Associate Professor of Neurology
Associate Professor of Neuroscience
BS University of Illinois Chicago 2000
MD University of Chicago 2005
MS Oxford University 2001

**Robert John Gropler, MD**
Professor of Radiology (primary appointment)
Associate Professor of Biomedical Engineering
Associate Professor of Medicine
MD University of Cincinnati 1981
BS Allegheny College 1977

**Carlos J Guevara, MD**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Surgery (General Surgery)
BS University South Carolina 2002
MD Duke University 2006

**Punita Gupta, MD, MPH**
Assistant Professor of Radiology (primary appointment)
MD University of Illinois 2000
MPH Saint Louis University 1996
BA Washington Univ in St. Louis 1995

**Fernando R Gutierrez, MD**
Professor of Radiology (primary appointment)
MD University of Valladolid 1974

**Jordan M Gutovich, BAS, MD**
Instructor in Clinical Radiology (primary appointment)
BAS Yeshiva University 2008
MD Drexel University 2013

**Gloria J. Guzman Perez-Carrillo, MS1, M PH, MD**
Assistant Professor of Radiology (primary appointment)
MS1 University of Granada 2011
M PH University of Arizona 2019
BA Johns Hopkins University 1999
MD University of Puerto Rico 2004

## H

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Instructor in Clinical Radiology (primary appointment)
MD Southern Illinois University 1977

**Bruce L Hedgepeth, MD**
Instructor in Clinical Radiology (primary appointment)
BS Arizona State University 1986
MD University of Arizona 1990

**Cheryl R Herman, MD**
Associate Professor of Radiology (primary appointment)
MD Meharry Med College 1990
BS Loma Linda University 1986

**Thomas Eugene Herman, MD**
Instructor in Radiology (primary appointment)
MD Johns Hopkns University Medic 1975
BA Dartmouth College 1971

**Albert E Hesker, MD**
Assistant Professor of Clinical Radiology (primary appointment)
MD University of MO Columbia 1964
BA University of MO Columbia 1961

**Travis J Hillen, MD, MS**
Associate Professor of Radiology (primary appointment)
BS Blackburn College 1998
MD University of MO Columbia 2004
MS University of MO Columbia 2000

**Sumner Holtz, MD**
Associate Professor of Clinical Radiology (primary appointment)
MD Saint Louis University 1948

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Associate Professor of Radiology (primary appointment)
Associate Professor of Pediatrics
AB Mount Holyoke College 1977
MD Davenport University 1981

## I

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Assistant Professor of Radiology (primary appointment)
Assistant Professor of Biochemistry and Molecular Biophysics
PHD Washington Univ in St. Louis 2007
MD Washington Univ in St. Louis 2007
BS Cornell University 1998

**Amir Iravani Tabrizipour, MD**
Assistant Professor of Radiology (primary appointment)
MD Tehran University 2003

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Assistant Professor of Radiology (primary appointment)
BS American University of Beirut 2003
MD American University of Beirut 2007

## J

**William P James, MD**
Assistant Professor of Radiology (primary appointment)
BA Washington Univ in St. Louis 1989
MD University of MO Columbia 1993

**Cylen Javidan, MD**
Associate Professor of Radiology (primary appointment)
MD Iran Univ of Medical Sciences 1994

**Jack W Jennings, MD, PHD, MS**
Professor of Radiology (primary appointment)
Professor of Orthopaedic Surgery
MD University of South Florida 2002
PHD University of South Florida 1999
BS Wheaton College 1992
MS Ohio State University 1995

**James A Junker, MD**
Instructor in Clinical Radiology (primary appointment)
BA Saint Louis University 1975
MD Saint Louis University 1979

## K

**Akash Pravin Kansagra, MS, MD**
Associate Professor of Radiology (primary appointment)
BS Mass Inst of Technology (MIT) 2004
MS University of CA Irvine 2005
MD University of CA San Diego 2009

**John Peter Karageorgiou, MD**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Surgery (General Surgery)
BS Vanderbilt University 2007
MD Vanderbilt University 2011

**Pavan Kumar Kavali, MD**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Surgery (General Surgery)
MD Morehouse College 2010
BS Georgia Tech 2003

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Assistant Professor of Radiology (Pending Executive Faculty Approval) (primary appointment)
BS University of MO Kansas City 1995
MD University of MO Columbia 2002

**James E. Kelly, MD, MA**
Assistant Professor of Radiology (primary appointment)
MD Washington Univ in St. Louis 2005
BS University of Notre Dame 1999
MA Washington Univ in St. Louis 2005

**Seung Kwon Kim, MD**
Associate Professor of Radiology (primary appointment)
Associate Professor of Surgery (General Surgery)
MD Kyung Hee University 1995

**Lawrence M Kotner, MD**
Associate Professor Emeritus of Radiology
MD Washington Univ in St. Louis 1968
BA Washington Univ in St. Louis 1965

## L

**Richard Laforest, MS, PHD**
Professor of Radiology (primary appointment)
MS University of Laval 1991
PHD University of Laval 1994
BA University of Laval 1989

**Daniel Joseph Leary Jr, MD**
Assistant Professor of Clinical Radiology (primary appointment)
BS Saint Louis University 1962
MD Washington Univ in St. Louis 1966

**Michelle Lee, MD**
Adjunct Associate Professor of Radiology (primary appointment)
BS Univ of Wisconsin Madison 1993
MD Northwestern University Med 2001

**David Alan Leitman, MD**
Instructor in Clinical Radiology (primary appointment)
BS Lindenwood University 2006
MD A T Still University 2010

**Paula M Leiva, MD**
Assistant Professor of Radiology (primary appointment)
MD Univ Nacional de Cuyo 2000

**Tsen Hsuan Lin, PHD**
Instructor in Radiology (primary appointment)
PHD Washington Univ in St. Louis 2013
BS Tamkang University 2015

**Yongjian Liu, PHD, MS**
Associate Professor of Radiology (primary appointment)
BS Henan Normal University 1997
PHD University of Missouri Columbi 2007
MS Zhejiang Medical University 2000

**Daniel Ryder Ludwig, MD**
Assistant Professor of Radiology (primary appointment)
MD University of Pittsburgh 2014
BS Brown University 2009

## M

**Mariam Akbar Malik, MD**
Instructor in Radiology (primary appointment)
MD Saint Louis University 2013
BS Univ of Minnesota Twin Cities 2007

**Christopher Devin Malone, MD**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Surgery
MD Tulane University 2011
BS Bucknell University 2005

**Naganathan B Mani, MS, MBBS**
Associate Professor of Radiology (primary appointment)
Associate Professor of Surgery (General Surgery)
MS PGIMER 1999
MBBS Tamilnadu Medical University 1995

**Jaimee Elizabeth Mannix, MD**
Instructor in Radiology (primary appointment)
BS William Jewell College 2011
MD Creighton University 2015

**Daniel Scott Marcus, PHD**
Professor of Radiology (primary appointment)
BS Washington Univ in St. Louis 1995
PHD Washington Univ in St. Louis 2001
BA Washington Univ in St. Louis 1995

**Ben R Mayes Jr, MD**
Assistant Professor of Clinical Radiology (primary appointment)
MD Washington Univ in St. Louis 1966
BA Vanderbilt University 1962

**William H McAlister, MD**
Professor of Radiology (primary appointment)
Professor of Pediatrics
BS Wayne State University 1950
MD Wayne State University 1954

**Mark P. McAvoy, MEE, PHD**
Assistant Professor of Radiology (primary appointment)
BS University of Illinois 1991
MEE Southern Illinois University 1993
PHD Southern Illinois University 1998

**Robert Carolin McKinstry III, MS, MD, PHD**
Professor of Radiology (primary appointment)
Professor of Pediatrics
Vice Chair for Diagnostic Radiology in Radiology
MS Mass Inst of Technology (MIT) 1986
BS Boston University 1984
MD Harvard University 1992
PHD Mass Inst of Technology (MIT) 1991

**Vincent Michael Mellnick, MD**
Associate Professor of Radiology (primary appointment)
BS University of Notre Dame 2002
MD University of Texas Houston 2006

**Christine Onsy Menias, MD, BS1**
Adjunct Professor of Radiology (primary appointment)
MD George Washington University 1995
BS Marquette University 1990
BS1 Marquette University 1990

**Joyce Chipo Mhlanga, MD**
Assistant Professor of Radiology (primary appointment)
MD University of Liverpool 2000

**Ali Yusuf Mian, MD**
Assistant Professor of Radiology (primary appointment)

MD Virginia Comm University 2008
BS Colby College 1999

**Mary Ann Middleton, MD**
Assistant Professor of Radiology (primary appointment)
BS Univ of Wisconsin Whitewater 1974
MD Medical College of Wisconsin 1982

**William D Middleton, MD**
Professor of Radiology (primary appointment)
BS Duke University 1977
MD Duke University 1981

**Mikhail V Milchenko, PHD, MS**
Instructor in Radiology (primary appointment)
PHD Louisiana Tech University 2005
MS Moscow State University 1999

**Michelle M Miller-Thomas, MD**
Associate Professor of Radiology (primary appointment)
MD Saint Louis University 2002
BS California Institute Technolo 1998

**Aaron Joseph Mintz, MD**
Assistant Professor of Radiology (primary appointment)
MD Washington Univ in St. Louis 2013
BS Stanford University 2005

**Stephen M Moerlein, MASHLTHP, PHARMD, MA, MHS, PHD**
Associate Professor of Radiology (primary appointment)
Associate Professor of Biochemistry and Molecular Biophysics
BS University of Illinois 1976
MASHLTHP Illinois Institute of Technol 2020
PHARMD University of Florida 2008
MA Washington Univ in St. Louis 1979
MHS Illinois Institute of Technol 2020
PHD Washington Univ in St. Louis 1982

**Suman Bikash Mondal, PHD, MS**
Instructor in Radiology (primary appointment)
PHD Washington Univ in St. Louis 2016
BS Indian Institute Of Technology 2010
MS Indian Institute Of Technology 2010

**Stephen M Moore, BS1, MEE**
Assistant Professor of Radiology (primary appointment)
BS Washington Univ in St. Louis 1981
BS1 Washington Univ in St. Louis 1981
MEE Washington Univ in St. Louis 1984

**Christopher J Moran, MD**
Professor of Radiology (primary appointment)
Professor of Neurological Surgery
BS University of Notre Dame 1970
MD Saint Louis University 1974

**Carrie Christina Morrison, MD**
Instructor in Clinical Radiology (primary appointment)
MD University of Iowa 1991
BS University of MO Columbia 1982

## N

**Kelby Brett Napier, MD, PHD**
Assistant Professor of Radiology (primary appointment)
MD University of Louisville 2008
BS Eastern Kentucky University 2001
PHD University of Louisville 2006

**Vamsi R. Narra, MD**
Professor of Radiology (primary appointment)
Senior Vice Chair for Clinical Imaging Informatics and New Clinical Business Development
MD Osmania Medical College 1990

**Michael Lee Nickels, PHD**
Associate Professor of Radiology (primary appointment)
BS Northern Kentucky University 2001
PHD Univ of IL -Urbana-Champaign 2007

**John Hart Niemeyer, MD**
Instructor in Clinical Radiology (primary appointment)
MD Washington Univ in St. Louis 1982
BS Davenport University 1978

## O

**Christine Mary O'Brien, PHD**
Instructor in Radiology (primary appointment)
PHD Vanderbilt University 2017
BS University of MO St Louis 2010

**Lisa M Oakley, MD**
Assistant Professor of Radiology (Pending Executive Faculty Approval) (primary appointment)
BS Stanford University 1988
MD Duke University 1992

**Gary H Omell, MD**
Assistant Professor of Clinical Radiology (primary appointment)
MD University of Tennessee 1967

**Hilary Louise Purdy Orlowski, MD**
Assistant Professor of Radiology (primary appointment)
MD Rush University 2011
BS Northwestern University 2007

## P

**Smita Parikh, MD**
Instructor in Clinical Radiology (primary appointment)
MD BJ Medical College 1970

**Matthew S Parsons, MD**
Associate Professor of Radiology (primary appointment)
BA Miami University 1995
MD University of Cincinnati 2000

**Michael W Penney, MD**
Associate Professor of Radiology (primary appointment)
MD University of AR Little Rock 1996

BS University of Arkansas 1992

**Daniel D Picus, MD, BS1**
Professor of Radiology (primary appointment)
Professor of Surgery (General Surgery)
MD University of Chicago 1981
BS1 University of Illinois 1977
BS University of Illinois 1977

**David Gerard Politte, D SC, MEE**
Assistant Professor of Radiology (primary appointment)
D SC Washington Univ in St. Louis 1999
BS Washington Univ in St. Louis 1981
MEE Washington Univ in St. Louis 1983

**Maria Rosana Ponisio, MD**
Assistant Professor of Radiology (primary appointment)
MD La Plata University 1990

**Hilton I Price, MD**
Instructor in Clinical RadiologyInstructor in Clinical Radiology (primary appointment)
MD University of the Witwatersra 1972

**Linda Ruth Proctor, MD, BS1**
Instructor in Clinical Radiology (primary appointment)
MD University of Pennsylvania 1989
BS1 University of Pennsylvania 1985

## Q

**James D Quirk, PHD, MA**
Associate Professor of Radiology (primary appointment)
PHD Washington Univ in St. Louis 2001
MA Washington Univ in St. Louis 1998
BS Mass Inst of Technology (MIT) 1994

## R

**Edward Floyd Ragsdale, MD**
Instructor in Clinical Radiology (primary appointment)
MD Washington Univ in St. Louis 1964
BA University of Arkansas 1960

**Marcus E Raichle, MD**
Professor of Radiology (primary appointment)
Alan A and Edith L Wolff Distinguished Professor of Medicine
Professor of Biomedical Engineering
Professor of Neurology
Professor of Neuroscience
Professor of Psychological & Brain Sciences
MD University of Washington 1964
BS University of Washington 1960

**Cyrus A Raji, MD, PHD**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Neurology
MD University of Pittsburgh 2010
BS University of Pittsburgh 2004
BA University of Pittsburgh 2004
PHD University of Pittsburgh 2009

**Mohamed Zakariya Rajput, MD**
Assistant Professor of Radiology (primary appointment)
MD Loyola University Chicago 2013
BS Augustana College Rock Island 2009

**Constantine A Raptis, MD**
Associate Professor of Radiology (primary appointment)
BS University of Chicago 1999
MD University of Pennsylvania 2004

**Demetrios Andreas Raptis, MD**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Pediatrics
BS University of Chicago 2005
MD Case Western Reserve Univ 2011

**David E Reichert, PHD**
Associate Professor of Radiology (primary appointment)
PHD University of Illinois 1994
BS Roanoke College 1986

**Martin Nicholas Reis, MD**
Assistant Professor of Radiology (primary appointment)
MD Columbia University 2000
BS Princeton University 1994

**Nassir Rostambeigi, MD, MS**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Surgery (General Surgery)
MD Tehran University 2005
MS monash University 2008

**Toni Roth, MD, BS1**
Instructor in Clinical Radiology (primary appointment)
MD Hahnemann University 1987
BS1 Lehigh University 1983

**Henry D Royal, MD**
Professor of Radiology (primary appointment)
BS Providence College 1970
MD Saint Louis University 1974

## S

**Floyd E Scales, MD, BS1**
Instructor in Clinical Radiology (primary appointment)
MD University of Texas Southwest 1979
BS1 University of Texas Austin 1974

**Robert F Scheible, MD**
Assistant Professor of Clinical Radiology (primary appointment)
BA Johns Hopkins University 1968
MD Washington Univ in St. Louis 1972

**Thomas Hellmut Schindler, MD1, PHD, MD**
Associate Professor of Radiology (primary appointment)
Associate Professor of Medicine
MD1 University of Leipzig 1996
PHD University of Geneva 2009

MD University of Leipzig 1995

**Sally J Schwarz, MS**
Professor of Radiology (primary appointment)
MS University of Southern Calif 1976
BS University of Iowa 1971

**Janice Semenkovich, MD**
Associate Professor of Radiology (primary appointment)
BS Yale University 1977
MD Washington Univ in St. Louis 1981

**Aseem Sharma, MBBS**
Professor of Radiology (primary appointment)
MBBS All-India Inst of Medical Sci 1992

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Professor of Radiology (primary appointment)
PHD Panjab University 1987
BS Panjab University 1980
MS Panjab University 1983

**Anup Shashindra Shetty, MD**
Assistant Professor of Radiology (primary appointment)
MD University of Texas Southwest 2007
BS Duke University 2003

**Joshua S Shimony, PHD, MD**
Professor of Radiology (primary appointment)
PHD University of Tennessee 1988
BS Technion - Israel Inst. of Tec 1982
MD University of Illinois 1995

**Kooresh Isaac Shoghi, MS, PHD**
Professor of Radiology (primary appointment)
BS University of CA Los Angeles 1996
MS University of CA Los Angeles 2000
PHD University of CA Los Angeles 2005

**Monica Shokeen, PHD, MBA**
Assistant Professor of Radiology (primary appointment)
BS School Not Listed 1997
PHD Washington Univ in St. Louis 2006
MBA School Not Listed 1999

**Ryan Gregory Short, BS1, MD**
Assistant Professor of Radiology (primary appointment)
BS1 Cedarville College 2008
MD Ohio State University 2013

**Hui Hua Shu, MD**
Assistant Professor of Radiology (primary appointment)
BA University of MO Kansas City 1986
MD University of MO Kansas City 1987

**Barry Alan Siegel, MD**
Professor of Radiology (primary appointment)
Professor of Medicine
BA Washington Univ in St. Louis 1966
MD Washington Univ in St. Louis 1969

**Cary Lynn Siegel, MD**
Professor of Radiology (primary appointment)
BS Davenport University 1983
MD Davenport University 1987

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Professor of Radiology (primary appointment)
Professor of Radiology in Pediatrics
MD State University of New York 1969
BA Washington Univ in St. Louis 1965

**Celette Sugg Skinner, PHD, MA**
Adjunct Assistant Professor of Radiology (primary appointment)
BA Furman University 1980
PHD University of North Carolina 1991
MA Wheaton College 1982

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Professor of Radiology (primary appointment)
Associate Professor of Neurology
PHD Rockefeller University 1977
BA Columbia University 1970
MD State University of New York 1981

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Assistant Professor of Clinical Radiology (primary appointment)
BA Northwestern University 1981
MD University of Chicago 1985

**Sheng-Kwei Song, PHD, MS**
Professor of Radiology (primary appointment)
BS Tamkang University 1981
PHD Washington Univ in St. Louis 1990
MS University of Alabama 1986

**Aristeidis Sotiras, PHD, MS**
Assistant Professor of Radiology (primary appointment)
PHD Ecole Centrale Paris 2011
BS National University of Athens 2006
MS Ecole Polytechnique 2007

**William Marshall Spees, PHD**
Assistant Professor of Radiology (primary appointment)
BS Truman State University 1993
PHD Washington Univ in St. Louis 1999

**Robert Peter Stachecki, MD**
Assistant Professor of Radiology (primary appointment)
BS University of Notre Dame 2003
MD Georgetown University 2007

**James G Stewart, MD**
Instructor in Clinical Radiology (primary appointment)
MD Mayo Clinic 1984
BS University of Wisconsin 1980

**Benjamin S Strnad, MD**
Instructor in Radiology (primary appointment)
MD Univ of Texas Med Sch Houston 2014

BA University of Texas Austin 2010

**Alexander L Sukstansky, PHD, D SC, MS**
Associate Professor of Radiology (primary appointment)
PHD Donetsk State University 1980
D SC Donetsk State University 1991
MS Kharkov State University 1971

**Peng Sun, PHD, MS**
Assistant Professor of Radiology (primary appointment)
PHD Beijing University 2005
MS Beijing Inst Of Technology 2002
BS Harbin Engineering University 1999

## T

**Yuan-Chuan Tai, PHD, MEE**
Associate Professor of Radiology (primary appointment)
PHD University of CA Los Angeles 1998
BS National Tsing Hua University 1988
MEE University of Texas Arlington 1992

**Chandrakant Tailor, MD**
Assistant Professor of Clinical Radiology (primary appointment)
MD Medical College of India 1970

**Rui Tang, MS, PHD**
Instructor in Radiology (primary appointment)
MS Washington Univ in St. Louis 2004
PHD Wayne Community College 2009

**Ting Y Tao, MD, PHD**
Assistant Professor of Radiology (primary appointment)
MD Washington Univ in St. Louis 2008
PHD Washington Univ in St. Louis 2008
BS Washington Univ in St. Louis 2000

**Sharlene A Teefey, BN, MD**
Professor of Radiology (primary appointment)
BN Mercy College of Detroit 1973
MD University of Hawaii 1980

**Daniel Lyndon Jaffe Thorek, PHD**
Associate Professor of Radiology (primary appointment)
BS University of Toronto 2004
PHD University of Pennsylvania 2010

**Christopher O Thornton, MD, MBA**
Instructor in Clinical Radiology (primary appointment)
MD University of MO Kansas City 1994
BS University of MO Kansas City 1992
MBA Washington Univ in St. Louis 2019

**Malcolm Tobias, PHD, MS**
Assistant Professor of Radiology (primary appointment)
PHD Washington Univ in St. Louis 1997
MS Washington Univ in St. Louis 1993

**Jerry Tobler, MD, PHD**
Instructor in Clinical Radiology (primary appointment)
MD Yale University 1983
BS Cornell University 1973
PHD California Institute Technolo 1978

**Shaw-Wei David Tsen, MD, PHD**
Instructor in Radiology (primary appointment)
MD Washington Univ in St. Louis 2016
PHD Washington Univ in St. Louis 2016
BS John Hopkins University 2008

**Zhude Tu, MS1, MS, PHD**
Professor of Radiology (primary appointment)
MS1 University of St Thomas 2000
MS Beijing Normal University 1991
PHD Beijing Normal University 1995
BS Beijing Normal University 1988

## U

**Alexander Ushinsky, MD**
Assistant Professor of Radiology (primary appointment)
Assistant Professor of Surgery (General Surgery)
MD University of CA San Diego 2014
BS University of CA San Diego 2010

## V

**Theodore Louis Vander Velde, MD**
Assistant Professor of Radiology (primary appointment)
MD Wayne State University 1993
BS Calvin College 1989

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## W

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MS1 Shandong University 1995
PHD Washington Univ in St. Louis 2004

MS School Not Listed 1995

**Maria Zulfiqar, MD**
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# 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.

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**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 syntheois, phantom studies, animal models, human studies, clinical patient studies, and comparison with other imaging modalities.

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**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)dioxy]-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.

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**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 PPARa system in defining this metabolic-functional relation.

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**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.

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**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.

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## Courses

For more information, contact Michelle Miller-Thomas, MD, Coordinator of Radiology Medical Student Education, at miller-thomasm@wustl.edu or 314-362-5949.

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Visit online course listings to view offerings for M90 Radiol (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M90).

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**M90 Radiol 701 General Radiology Clerkship**
This four-week introductory radiology elective allows students to rotate through four of the following radiology services: Emergency Radiology, Mammography, Pediatrics, Chest, Abdominal Imaging, Musculoskeletal, Neuroradiology, Interventional Radiology and Nuclear Medicine. The primary course objective is to familiarize students with the scope of diagnostic and interventional radiology, including the consulting role that radiologists provide to primary care and specialty providers, the risks/benefits and cost-effectiveness of radiologic examinations, and the guidelines for ordering common studies as well as specific disease entities and their radiologic appearance and work-up. Students spend the majority of the day in the radiology reading rooms with residents, fellows, and faculty for interactive teaching based on daily clinical cases. Students will attend morning case-based conferences and noon didactic conferences with the residents. The students will have an observational role in conferences and in the clinical setting. In the afternoon, students will convene with a radiology resident for an interactive workshop on a scheduled topic in radiology. The day prior to each workshop, students will receive a templated PowerPoint presentation of the following day's workshop, and they are expected to spend the afternoon preparing for the next day's session. Students will be evaluated on their preparedness and participation in the afternoon workshops. On Friday afternoons, students will present an interesting case from the week in PowerPoint format. Two PowerPoint presentations will be submitted at the end of the rotation for grading. An image-based exam will be given during the final week of the elective covering topics presented in the daily student workshops. Reading lists, references and text books will be provided. The first and final days of the elective are mandatory. Grades will be based on daily attendance, workshop participation, the exam at the end of the rotation, and submitted PowerPoint presentations. More than three days' absence will require exceptional work for honors. No honors will be awarded if a student is absent for more than five days of the rotation.
Credit variable, maximum 154 units.

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**M90 Radiol 801 General Radiology**
This four-week introductory radiology elective allows students to rotate through four of the following radiology services: Emergency Radiology, Mammography, Pediatrics, Chest, Abdominal Imaging, Musculoskeletal, Neuroradiology, Interventional Radiology and Nuclear Medicine. The primary

course objective is to familiarize students with the scope of diagnostic and interventional radiology, including the consulting role that radiologists provide to primary care and specialty providers, the risks/benefits and cost-effectiveness of radiologic examinations, and the guidelines for ordering common studies as well as specific disease entities and their radiologic appearance and work-up. Students spend the majority of the day in the radiology reading rooms with residents, fellows, and faculty for interactive teaching based on daily clinical cases. Students will attend morning case-based conferences and noon didactic conferences with the residents. The students will have an observational role in conferences and in the clinical setting. In the afternoon, students will convene with a radiology resident for an interactive workshop on a scheduled topic in radiology. The day prior to each workshop, students will receive a templated PowerPoint presentation of the following day's workshop, and they are expected to spend the afternoon preparing for the next day's session. Students will be evaluated on their preparedness and participation in the afternoon workshops. On Friday afternoons, students will present an interesting case from the week in PowerPoint format. Three PowerPoint presentations will be submitted at the end of the rotation for grading. An image-based exam will be given during the final week of the elective covering topics presented in the daily student workshops.

**M90 Radiol 802 Advanced Radiology**
This course is available only to students who have completed the General Radiology Clerkship Selective (M90 701) or the General Radiology Elective (M90 801). This four-week sub-internship in radiology is intended for students who are interested in pursuing radiology as their intended career choice. Students may tailor their experience to focus on one or more services, if desired. This will be considered on a case-by-case basis by the course directors. This elective allows students to rotate through the following radiology services: Emergency Radiology, Mammography, Pediatrics, Chest, Abdominal Imaging, Musculoskeletal, Neuroradiology, Interventional Radiology and Nuclear Medicine. Students spend the majority of the day in the radiology reading rooms with residents, fellows, and faculty for interactive teaching based on daily clinical cases. Students will attend morning case-based conferences and noon didactic conferences with the residents. The students will have an observational role in conferences and in the clinical setting. These returning students will be exempt from the end-of-rotation exam and attending the daily afternoon teaching sessions if they have previously completed M90 701 or M90 801; however, returning fourth-year students will be required to present weekly presentations with the students in the introductory course. In addition, students may be asked to pursue an educational project during their rotation.

**M90 Radiol 820 Clinical Nuclear Medicine**
The clinical service in Nuclear Medicine (NM) is divided into five subsections: outpatient general NM, inpatient general NM, Positron Emission Tomography (PET), Pediatric NM studies, and NM Cardiac studies. The recommended schedule will be to spend weeks 1 and 3 in the Center for Advanced Medicine/ BJH North Campus, where the emphasis will be on outpatient general and pediatric Nuclear Medicine with some time spent in the PET reading room. Week 2 will be split between the inpatient general and cardiac NM services. The schedule for Week 4 will be determined after a preference discussion with the student. The primary objective of this rotation is to provide exposure to the full range of clinical nuclear medicine studies. Under direct supervision of the NM attendings, the student will be able to participate in the planning and interpreting of imaging studies for patients referred to the Division. An opportunity also exists to explore instrumentation techniques, including dedicated computer applications utilized for the interpretation of NM studies. In addition to the clinical experience, the student will attend the NM daily morning conference, held in the Miller Conference Room in 956 West Pavilion, from 8-9:00 a.m. Also, the student will be excused to attend the daily diagnostic radiology resident conference from 12-1:00 p.m. The student will also be excused to attend any conferences within the Department of Radiology. The student is not expected to do any formal presentations but may participate by preparing a case for the Friday follow-up conference. Students may keep a log of interesting cases to use as a guide for additional reading, or for discussions with the Course Director or other NM attendings. Educational material including textbooks and digital teaching file cases will be available. The first and final days of the elective are mandatory. No honors will be awarded if a student is absent for more than five days of the rotation.

**M90 Radiol 830 Interventional Radiology**
This elective is designed to give students in-depth exposure to and experience in all clinical and procedural aspects of interventional radiology, including patient evaluation and consultation, preparation of patients for procedures, performance of a wide range of vascular and non-vascular procedures, postprocedure patient management, and longitudinal patient follow-up. Students will actively participate in interventional procedures. Students will attend the departmental noon conference (daily) as well as morning section conferences including didactic lectures, quality and safety conferences, journal club, interventional oncology conference, multidisciplinary liver tumor conference, and case conferences.

**M90 Radiol 842 Thoracic Imaging**
A four-week elective emphasizing the interactions between cardiothoracic radiologists and the various clinical services, to include thoracic surgery, thoracic oncology, 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 aspects of the clinico-pathological medicine conference. Learn to identify subtle pneumothorax and pneumonia. Learn the limitations of portable chest radiographs. Rotating on cardiac CT and MR service and in the ED service, if interested. The student will be expected to present a single case from what they have seen during the rotation at a 7AM teaching conference.

**M90 Radiol 900 Research Elective-Radiology**
Research opportunities may be available. If interested, please contact the Departments of Radiology or Radiation Oncology.

# Mary Culver Department of Surgery

Formal instruction in surgery begins during the third year, with the required 12-week Integrated Surgical Disciplines Clerkship. During this surgical clerkship, students are assigned to clinical rotations, mostly within the Department of Surgery, with some exposure to other surgical-related disciplines outside of the department. The clerkship gives students 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 didactic sessions on a regular basis. During the fourth year, students may select sub-internship electives within the Division of General Surgery, which include a variety of general surgical specialties. In addition to the general surgery sub-internships, electives are available in several other surgical subspecialties (e.g., pediatric surgery, transplant surgery, vascular surgery, cardiovascular and thoracic surgery, urologic surgery, plastic and reconstructive surgery).

**Website:** http://www.surgery.wustl.edu

# Faculty

## Clerkship Director

**Bethany Sacks, MD**

## Assistant Clerkship Director

**Sara Holden, MD (https://surgery.wustl.edu/people/sara-holden-md/)**

Visit our website for more information about our faculty (http://www.surgery.wustl.edu/Faculty/) and their appointments.

## A

**Rebecca L Aft, MD, PHD**
Professor of Surgery (General Surgery) (primary appointment)
BS Univ of Wisconsin Madison 1978
MD Washington Univ in St. Louis 1992
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## B

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BA Youngstown St University 1962

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## C

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MBBS University of Queensland 1979

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MS George Washington University 1975

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UNKNOWN Duke University 1978
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BS University of Mississippi 1964

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## D

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## E

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Professor of Pathology and Immunology
Senior Associate Dean for Cancer Programs
Spencer T. and Ann W. Olin Distinguished Professor
BS University of Pittsburgh 1973
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## F

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Kim and Tim Eberlein Distinguished Professor
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Adjunct Associate Professor of Radiology

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## G

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Professor of Medicine
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Vice Chair for Research, Department of Surgery
BA1 Williams College 1987
MS Medical Univ South Carolina 2006
MD Duke University 1991
BA Williams College 1987
MS1 Medical University of Sth Car 2006

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BS Duke University 1995
MD Duke University 1999

**Katherine LuBell Glover-Collins, PHD, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
BS Xavier University Lousiana 2001
PHD Meharry Med College 2009
MD Meharry Med College 2009

**Simon P Goedegebuure, MA, PHD**
Associate Professor of Surgery (General Surgery) (primary appointment)
MA School Not Listed 1985
BS School Not Listed 1982
PHD Erasmus University Rotterdam 1989

**Jun Guo, MS, PHD**
Associate Professor of Surgery (Pediatric Surgery) (primary appointment)
MS Dalian Medical University 1997
BS Nanjing University 1991
PHD Shanghai Medical University 2000

**Steven William Guyton**
Associate Professor of Clinical Surgery (Cardiothoracic Surgery) (primary appointment)

## H

**Bruce Lee Hall, MD, MBA, PHD**
Professor of Surgery (General Surgery) (primary appointment)
Fellow in the Center for Health Policy
Professor of Health Care Management (Olin School of Business)
MD Duke University 1992
MBA Harvard University 2000
PHD Duke University 1991
BA Princeton University 1984

**Chet Hammill, MS, MD**
Associate Professor of Surgery (General Surgery) (primary appointment)
MS Oregon Health Science Univers 2012
BS Univ of IL -Urbana-Champaign 1996
MD Univ of IL -Urbana-Champaign 2004

**William G. Hawkins, MD**
Professor of Surgery (General Surgery) (primary appointment)
Neidorff Family and Robert C Packman Professor
MD State Univ of NY Stonybrook 1995
BA New York University 1991

**Michael E Hayek, MD, MS**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
BA Saint Louis University 1976
MD University of Missouri 1982
MS Saint Louis University 1978

**Mark Francis Heiland**
Assistant Professor of Clinical Surgery (General Surgery) (primary appointment)

**Beth A. Helmink, PHD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
PHD Washington Univ in St. Louis 2012
BS Illinois State University 2004

**Sara E Holden, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD University of Minnesota 2010
BS Truman State University 2005

**Mark Houston Hoofnagle, MD, PHD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD University of Virginia 2009
PHD University of Virginia 2008
BS Bucknell University 1999

**Ashley J Housten, MPA, OTD, MSCRM**
Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
MPA George Mason University 2007
OTD Washington Univ in St. Louis 2014
BA University of Washington 2005
MSCRM Washington Univ in St. Louis 2014

**Jean Marie Hunleth, PHD, M PH**
Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
Instructor of Anthropology (Courtesy Affiliation)
PHD Northwestern University 2011
M PH Northwestern University 2011
BA Vanderbilt University 1998

**Steven R Hunt, MD**
Associate Professor of Surgery (General Surgery) (primary appointment)
BA Dartmouth College 1992
MD Stanford University 1997

**Chelsea Marie Hutchinson, MD**
Adjunct Assistant Professor of Surgery (General Surgery) (primary appointment)
MD University of Virginia 2014

## I

**Mohsen Ibrahim, MD**
Instructor in Surgery (Cardiothracic Surgery) (primary appointment)
MD University of Rome 1999

**Obeid Noor Ilahi, MD**
Associate Professor of Surgery (General Surgery) (primary appointment)
MD Aga Khan University 1992

**Akinobu Itoh, MD, PHD**
Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD Tohoku University Sendai Miyag 1998
PHD Tohoku University Sendai Miyag 2010

## J

**Aimee S. James, M PH, PHD, MA**
Professor of Surgery (General Surgery) (primary appointment)
M PH University of Texas Houston 2000
PHD University of Houston 1999
BA Goucher College 1995
MA University of Houston 1998

**Shu Jiang, MS, PHD**
Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
MS University of Western Ontario 2016
BS Simon Fraser University 2015
PHD University of Waterloo 2018

**Dane P Johnson, MD**
Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
MD University of Minnesota 2011
BS University of Minnesota 2007

## K

**Puja Kachroo, MD, MS**
Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
BS Boston University 2001
MD Ross Univ School of Medicine 2007
MS Columbia University 2003

**Demetrios Katsikas, MD**
Instructor in Clinical Surgery (Urological Surgery) (primary appointment)
BS University of Michigan 1985
MD Wayne State University 1989

**Martin S Keller, MD**
Associate Professor of Surgery (Pediatric Surgery) (primary appointment)
Associate Professor of Pediatrics
BS University of Pennsylvania 1985
MD University of Vermont 1990

**Amy Frances Kells, PHD, MD**

Assistant Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
BS Vanderbilt University 1984
PHD Vanderbilt University 1992
MD Vanderbilt University 1993

**Adeel Khan, MD**
Associate Professor of Surgery (General Surgery) (primary appointment)
MD Aga Khan University 2002
BS Bahria University 1997

**Shumaila Nooruddin Khawja, MD, BBA**
Instructor in Surgery (General Surgery) (Pending Dean's Approval) (primary appointment)
MD Baylor College of Medicine 2010
BBA University of Texas Houston 2010

**Vipul Khetarpaul, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
Assistant Professor of Radiology
MD Karnatak Medical College 2007

**Andrew M Kim, MS, DDENT**
Assistant Professor of Clinical Surgery (Plastic and Reconstructive Surgery) (primary appointment)
Instructor in Clinical Otolaryngology
MS Ohio State University 1987
BA California State University 1978
DDENT Washington Univ in St. Louis 1984

**Eric Hwan Kim, MD**
Assistant Professor of Surgery (Urological Surgery) (primary appointment)
MD Washington Univ in St. Louis 2012

**Jae Sung Kim, MA, BS1, PHD**
Professor of Surgery (General Surgery) (primary appointment)
Professor of Cell Biology and Physiology
MA Seoul National University 1990
BS1 Seoul National University 1988
PHD University of Wisconsin 1999

**John P. Kirby, MD, MS**
Associate Professor of Surgery (General Surgery) (primary appointment)
BS University of Illinois 1988
MD University of Illinois 1993
MS University of Illinois 1999

**Saul Klein, MD**
Instructor in Clinical Surgery (Urologic Surgery) (primary appointment)
MD Syracuse University 1959

**Mary E Klingensmith, MD**
Professor of Surgery (General Surgery) (primary appointment)
Mary Culver Distinguished Professor
Vice Chairman for Education, Department of Surgery
BA Wellesley College 1988
MD Duke University 1992

**Piroska K Kopar, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD Emory University 2007
BA St Johns College 1999

**Kunal Deepak Kotkar, MD**
Assistant Professor of Surgery (Cardiothorasic Surgery) (primary appointment)
MD Grant Medical College 2004

**Benjamin D. Kozower, MD**
Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD University of Rochester 1997
BS University of Rochester 1993

**Jessica Kramer, MD**
Assistant Professor of Surger (General Surgery) (primary appointment)
BA Emory University 2001
MD St. George's University 2009

**Daniel Kreisel, MD, PHD**
Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
G Alexander Patterson MD and Mid America Transplant Endowed Distinguished Chair in Lung Tranplantation
Professor of Pathology and Immunology
MD Mount Sinai School of Medicine 1995
PHD University of Pennsylvania 2002

## L

**Hing Hung H Lai, MD**
Professor of Surgery (Urologic Surgery) (primary appointment)
Professor of Anesthesiology
BS Rice University 1994
MD Cornell University 1999

**Jennifer M Leonard, MD, PHD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD Mayo Clinic 2011
BA Colorado College 1999
PHD Mayo Clinic 2011

**Wenjun Li, MD, MS**
Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD Guangdong Medical College 1991
MS Sun Yat-Sen University 2004

**Jerry Michael Liddell, DPM**
Assistant Professor of Surgery (General Surgery) (primary appointment)

BS University of Utah 1995
DPM Ohio College of Podiatric Medi 2002

**Deacon Jones Lile, MD**
Adjunct Assistant Professor of Surgery (General Surgery) (primary appointment)
MD Drexel University 2014

**Yiing Lin, MD, PHD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD Washington Univ in St. Louis 2005
PHD Washington Univ in St. Louis 2005
BS Duke University 1997

**Erin Lynn Linnenbringer, MS1, BS1, PHD**
Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
MS1 Northwestern University 2003
BS1 Washington Univ in St. Louis 2000
PHD University of Michigan 2014

**Ying Liu, PHD, MD**
Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
PHD Texas Tech University 2006
MD Southeast U Medical School 1995

**Alan M Londe, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
BA Washington Univ in St. Louis 1957
MD Washington Univ in St. Louis 1961

**Esther Jiaxin Lu, MS, PHD**
Associate Professor of Surgery (Public Health Sciences) (primary appointment)
Associate Professor of Biostatistics
MS National Univ of Singapapore 2002
PHD Medical College of Wisconsin 2007
BS Nankai University 1997

**Mark A Ludwig, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
BA Emory University 1972
MD University of Chicago 1976

**Jingqin Luo, MS1, PHD, MS**
Associate Professor of Surgery (Public Health Sciences) (primary appointment)
Associate Professor of Biostatistics
Associate Professor of Medicine
MS1 Duke University 2003
PHD Duke University 2006
BS Renmin University of China 1998
MS Renmin University of China 2001

## M

**Susan E Mackinnon, MD**
Minot Packer Fryer Professor of Plastic Surgery (primary appointment)
Professor of Occupational Therapy
Professor of Otolaryngology
BA Queens College 1971
MD Queen's University 1975

**Kiran Mahajan, MS, PHD**
Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
MS Madurai Kamaraj University 1991
PHD Indian Institiute of Science 1998

**Nupam P Mahajan, PHD**
Professor of Surgery (Urological Surgery) (primary appointment)
PHD Indian Institute Of Technology 1997

**Arnab Majumder, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
BS Case Western Reserve Univ 2007
MD Ohio State University 2011

**Hersh Maniar, MD**
Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Associate Professor of Medicine
BS University of Michigan 1994
MD University of Illinois 1998

**Julie Ann Margenthaler, MD**
Professor of Surgery (General Surgery) (primary appointment)
MD Southern Illinois University 1997
BA Boston University 1993

**Muhammad Faraz Masood, MD**
Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD Dow Medical College Karachi 2001

**John E. Mazuski, MS, PHD, MD**
Professor of Surgery (General Surgery) (primary appointment)
BA California State Fresno 1973
MS Univ of Wisconsin Madison 1975
PHD University of Minnesota 1993
MD University of CA Los Angeles 1981

**Patricia A McGuire, MD**
Instructor in Clinical Surgery (Plastic and Reconstructive Surgery) (primary appointment)
MD University of Missouri 1985

**Spencer J Melby, MD**
Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
BS Brigham Young University 1997

MD University of Utah 2002

**Bryan F Meyers, MD**
Patrick and Joy Williamson Endowed Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
BA Yale University 1982
MD University of Chicago 1986

**Jerry R Meyers, MD**
Assistant Professor of Clinical Surgery (General Surgery) (primary appointment)
MD Washington Univ in St. Louis 1966
BA University of Texas Austin 1962

**Kevin Joseph Mitchell, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
BS Howard University 1981
MD Howard University 1985

**Marc R Moon, MD**
John M Shoenberg Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD Wayne State University 1988
BS University of Michigan 1983

**Julian C Mosley, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
BS Saint Louis University 2000
MD Washington Univ in St. Louis 1972

**Nabil A Munfakh, MD**
Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
BS University of Michigan 1981
MD University of Michigan 1985

**Gregory P Murphy, MD**
Assistant Professor of Surgery (Urological Surgery) (primary appointment)
BA Tufts University 2006
MD University of Massachussetts 2011

**Matthew G Mutch, MD**
Professor of Surgery (General Surgery) (primary appointment)
BA St Olaf College 1990
MD Washington Univ in St. Louis 1994

**Terence M. Myckatyn, MD**
Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
MD Univ of Northern British Colu 1997
BS Univ of Northern British Colu 2003

## N

**Dilip Sri Nath, MD**
Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
BS University of CA Berkeley 1995
MD New York U. School of Medicine 1999

**Ruben Nava, MD**
Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD Univ of Armed Forces: Military 2000

**Thoi Hieu Ngo, MD**
Instructor in Surgery (General Surgery) (Pending Dean's Approval) (primary appointment)
MD New York Medical College 2014
BS University of Maryland 2010

**Dennis Nguyen, MD, MS**
Assistant Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
BS University of CA Irvine 2005
MD University of CA San Francisco 2011
MS University of CA Berkeley 2009

**Thomas E Niesen, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
BS Tulane University 1975
MD Tulane University 1979

**Richard James Nissen, DDENT, MS**
Assistant Professor of Clinical Surgery (Plastic and Reconstructive Surgery) (primary appointment)
DDENT University of Iowa 1983
MS Washington Univ in St. Louis 1985
BS Iowa State University 1979

**Charles Upshur Nottingham, MD**
Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
MD Virginia Comm University 2012
BS Wake Forest University 2006

**Anthony Ian Nunez**
Instructor in Clinical Surgery (Cardio Surgery) (primary appointment)

## O

**John Westley Ohman, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
Assistant Professor of Radiology
BS University of Texas Austin 2008
MD Univ Texas Health Science Ctr 2012

**Kerri A Ohman, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
BS University of Michigan 2008
MD University of Michigan 2012

**George A Oliver, MD**

Assistant Professor Emeritus of Clinical Surgery (General Surgery) (primary appointment)
BA Washington Univ in St. Louis 1948
MD Washington Univ in St. Louis 1952

**Tiffany Medlin Osborn, M PH, MD**
Professor of Surgery (General Surgery) (primary appointment)
Professor of Emergency Medicine
M PH London Hygiene & Tropical Med 2009
BS University of Houston 1992
MD Univ Texas Health Sci San Anto 1997

## P

**Twinkle Kumar Samudra Pandian, M PH, MD**
Assistant Professor of Surgery (General Surg) (primary appointment)
M PH Johns Hopkins University 2010
MD Mayo Clinic 2011
BS University of Minnesota 2006

**Sharad P Parikh, UNKNOWN**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
UNKNOWN University of Pune 1967

**Yikyung Park, PHD, MS1**
Associate Professor of Surgery (Public Health Sciences) (primary appointment)
BS EWHA Womans University 1994
PHD Harvard University 2005
MS1 EWHA Womans University 1996

**Charles L Parks, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
MD Washington Univ in St. Louis 1969
BS University of South Dakota 1967

**Jeffrey Andrew Parres, MD**
Instructor in Clinical Surgery (Urologic Surgery) (primary appointment)
BA Washington Univ in St. Louis 1983
MD University of Missouri 1987

**Michael K Pasque, MD**
Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
Professor of Biomedical Engineering
Professor of Radiology
MD University of Oklahoma 1978

**Kamlesh Babulal Patel, MD**
Associate Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
MD University of Arizona 2005
BS University of MO Kansas City 2000

**G Alexander Patterson, MD**
Joseph C Bancroft Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD Queen's University 1974

**Enrique Pedro Perinetti, MD, PHD**
Instructor in Clinical Surgery (Urologic Surgery) (primary appointment)
MD School Not Listed 1969
PHD School Not Listed 1975

**Mitchell A Pet, MD**
Assistant Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
MD Washington Univ in St. Louis 2011

**Mary Politi, PHD, M PHIL**
Professor of Surgery (Public Health Sciences) (primary appointment)
PHD George Washington University 2006
BS Barnard College 2001
M PHIL George Washington University 2004

**Varun Puri, MD, MS**
Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD Washington Univ in St. Louis 2009
BS All-India Inst of Medical Sci 1998
MS Creighton University 2007

## R

**Amanda Christine Rabideau, MD**
Instructor in Surgery (General Surgery) (Pending Dean's Approval) (primary appointment)
BS Southern Illinois U Carbondale 2009
MD Southern Illinois University 2014

**Nishant Raj, MD, BS1**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD Ross Univ School of Medicine 2009
BS1 St Johns University 2004

**Ricardo Rao, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
MD University of Missouri 1987
BA University of CA San Diego 1983

**Shuddhadeb Ray, MD**
Assistant Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
MD KANSAS U SCHOOL OF MEDICINE 2011

**Nanette Rahee Reed, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
Assistant Professor of Radiology
BS University of Notre Dame 2000

MD Baylor College of Medicine 2004

**Frank O Richards, MD**
Assistant Professor Emeritus of Clinical Surgery (General Surgery) (primary appointment)
BA Talladega College 1944
MD Howard University 1947

**Shale M Rifkin, MD**
Assistant Professor of Clinical Surgery (General Surgery) (primary appointment)
MD Washington Univ in St. Louis 1948

**Brian G Rubin, MD**
Professor of Surgery (General Surgery) (primary appointment)
Professor of Radiology
BA Colgate University 1979
MD University of Vermont 1984

## S

**Bethany Cara Sacks, MED, MD**
Associate Professor of Surgery (General Surgery) (Pending Executive Faculty Approval) (primary appointment)
MED University of Houston 2010
BS Connecticut College 1995
MD Mount Sinai School of Medicine 1999

**Justin M Sacks, MD, MBA**
Sydney M Jr and Robert H Shoenberg Endowed Chair in Plastic & Reconstructive Surgery (primary appointment)
MD Mount Sinai School of Medicine 1998
BS Cornell University 1993
MBA Johns Hopkins University 2015

**Jacqueline Mitsouko Saito, MD**
Associate Professor of Surgery (Pediatric Surgery) (primary appointment)
BS Harvard Radcliff 1989
MD Columbia University 1993

**Elizabeth Ann Salerno, PHD, M PH**
Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
BS Univ of IL -Urbana-Champaign 2012
PHD Univ of IL -Urbana-Champaign 2017
M PH Johns Hopkins University 2018

**Luis A Sanchez, MD**
Professor of Surgery (General Surgery) (primary appointment)
Gregorio A. Sicard Distinguished Professor
Professor of Radiology
MD Harvard University 1987
BS Yale University 1983

**Kenneth Gordon Sands, BBA, MBA, DOST**
Assistant Professor or Surgery (Urologic Surgery) (primary appointment)
BBA Randolph Macon College 2009
MBA Lincoln Memorial University 2014
DOST Lincoln Memorial University 2014

**Dominic Sanford, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD University of MO Columbia 2009
BS Maryville University 2005

**Donald C Sauer, MD**
Assistant Professor Emeritus of Clinical Surgery (General Surgery) (primary appointment)
MD Washington Univ in St. Louis 1960
BA Washington Univ in St. Louis 1956

**Douglas J Schuerer, MD**
Professor of Surgery (General Surgery) (primary appointment)
MD University of Pittsburgh 1995
BS Allegheny College 1991

**Maryls E Schuh, BS1, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
BS1 University of North Dakota 1977
MD Washington Univ in St. Louis 1979
BS University of North Dakota 1973

**Debra L Seoane, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
MD University of Miami 1986

**Baddr Ahed Shakhsheer, MD**
Assistant Professor of Surgery (Pediatric Surgery) (primary appointment)
MD Eastern Virginia Med School 2010
BA University of Virginia 2005

**Courtney Shands III, MD**
Instructor in Clinical Surgery (Urologic Surgery) (primary appointment)
BA Stanford University 1978
MD Vanderbilt University 1982

**Surendra Shenoy, MD, PHD**
Professor of Surgery (General Surgery) (primary appointment)
BS Kasturba Medical College 1980
MD Kasturba Medical College 1984
PHD Institute of Medical Science 1989

**Michelle Ilana Silver, PHD, MS**
Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
PHD Johns Hopkins University 2015
MS Johns Hopkins University 2009
BS Stanford University 2007

**Matthew Leon Silviera, MS1, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MS1 Temple University 2010

BS Pennsylvania State University 2001
MD Temple University 2005

**David Siroospour, MD**
Assistant Professor of Clinical Surgery (General Surgery) (primary appointment)
MD School Not Listed 2000

**Arjun Sivaraman, MD**
Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
MD Madras Medical College 2005

**Radhika K Smith, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD University of MO Kansas City 2010

**Zachary Lee Smith, MD**
Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
MD University of MO Kansas City 2010

**Jason Andrew Snyder, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD Marshall University 2008
BS Kettering University 2004

**Alison K Snyder-Warwick, MD**
Assistant Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
BA Knox College 2000
MD Washington Univ in St. Louis 2004

**Dirk M Spitzer, PHD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
BS School Not Listed 1995
PHD Technische U Braunschweig 1999

**Charlie Srivilasa**
Adjunct Assistant Professor of Surgery (primary appointment)

**Alan Joel Stein, MD**
Assistant Professor of Clinical Surgery (Urologic Surgery) (primary appointment)
MD Wayne State University 1976
BS Univ of Wisconsin Madison 1972

**Melissa Kay Stewart, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD University of Pittsburgh 2011

**Daniel Charles Stoeckel**
Instructor in Clinical Surgery (primary appointment)

**Steven M Strasberg, MD**
Pruett Professor of Surgery (General Surgery) (primary appointment)
Associate Professor of Cell Biology and Physiology
MD University of Toronto 1963

**Herbert Sunshine, MD**
Assistant Professor of Clinical Surgery (Urologic Surgery) (primary appointment)
MD Washington Univ in St. Louis 1954
BA Washington Univ in St. Louis 1950

**Siobhan Sutcliffe, MHS, PHD, MS**
Professor of Surgery (Public Health Sciences) (primary appointment)
MHS Johns Hopkins University 2001
PHD Johns Hopkins University 2005
BS Princeton University 1998
MS Johns Hopkins University 2004

## T

**Tsuyoshi Takahashi, MD, PHD**
Instructor in Surgery (Cardiothoracic Surgery) (primary appointment)
MD Tokushima University 2007
PHD University of Tokyo 2018

**Marissa Morningstar Tenenbaum, MD**
Associate Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
MD Washington Univ in St. Louis 2002
BS Univ of Wisconsin Madison 1998

**Ajit K Tharakan**
Visiting Assistant Professor of Surgery (primary appointment)

**Lewis Jones Thomas IV, MD**
Assistant Professor of Surgery (Urologic Surgery) (Pending Executive Faculty Approval) (primary appointment)
BS Washington Univ in St. Louis 2008
MD University of MO Columbia 2012

**Robert W Thompson, MD**
Professor of Surgery (General Surgery) (primary appointment)
Professor of Cell Biology and Physiology
Professor of Radiology
MD University of Michigan 1983
BA Hope College 1979

**Adetunji Toriola, PHD**
Associate Professor of Surgery (Public Health Sciences) (primary appointment)
PHD University of Tampere 2011

**Ralph J Torrence, MD**
Asst Prof of Clinical Surgery (Urologic Surgery) (primary appointment)
MD Georgetown University 1983

**Erica J Traxel, MD**
Associate Professor of Surgery (Urologic Surgery) (primary appointment)

BS Texas A&M University 1998
MD Beaufort Technical College 2002

**Thomas H Tung, MD**
Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
BS Duke University 1986
MD University of Maryland 1990

**Isaiah Turnbull, MS, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
BS University of Oregon 1998
MS Washington Univ in St. Louis 2008
MD Washington Univ in St. Louis 2008

## V

**Kelly Jean Vallar, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD University of MO Kansas City 2011

**Ramakrishna Venkatesh, MS1, MS, MD**
Professor of Surgery (Urologic Surgery) (primary appointment)
MS1 School Not Listed 1991
MS Bangalore University 1991
MD Bangalore University 1988

**Jesse Daya Vrecenak, MD**
Assistant Professor of Surgery (Pediatric Surgery) (primary appointment)
MD University of Pennsylvania 2007
BS Yale University 2003

**Gino J Vricella, MD**
Assistant Professor of Surgery (Urologic Surgery) (primary appointment)
BS Saint Louis University 2012
MD University of MO Columbia 2006

## W

**Howard S Walker, MD**
Instructor in Clinical Surgery (Cardiothoracic Surgery) (primary appointment)
BA Citadel 1971
MD Beaufort Technical College 1974

**Lisa Marie Waller, PHD, MS**
Professor of Surgery (Public Health Science) (primary appointment)
BS Concordia College 1982
PHD University of Minnesota 1995
MS University of Memphis 1991

**Fei Wan, PHD, MS**
Assistant Professor of Surgery (Public Health Sciences) (primary appointment)
PHD University of Pennsylvania 2015
MS University of Vermont 2001

**Brad W. Warner, MD**
Jessie L. Ternberg, M.D., PhD. Distinguished Professor of Pediatric Surgery in Surgery (Pediatric Surgery) (primary appointment)
Professor of Pediatrics
BS University of MO Kansas City 1982
MD University of MO Kansas City 1982

**Erika Waters, MS PSYC, M PH, PHD**
Associate Professor of Surgery (Public Health Sciences) (primary appointment)
MS PSYC Rutgers University 2003
M PH Johns Hopkns University Medic 2007
PHD Rutgers University 2006
BS Arizona State University 1999

**Michael D Weiss, DPM, BS1**
Assistant Professor of Surgery (General Surgery) (primary appointment)
DPM Ohio College of Podiatric Medi 1981
BS1 Ohio State University 1977

**Jason R Wellen, MD**
Associate Professor of Surgery (General Surgery) (primary appointment)
MD St George's University 2002
BS Emory University 1998

**Amanda Meppelink Westman, PHD**
Assistant Professor of Surgery (Plastic & Reconstructive Surgery) (Pending Executive Faculty Approval) (primary appointment)
PHD University of Virginia 2020
BS Washington Univ in St. Louis 2012

**Brad C White, MD**
Instructor in Clinical Surgery (Urologic Surgery) (primary appointment)
MD Loyola University Chicago 1993
BS Illinois State University 1986

**Paul Edward Wise, MD**
Professor of Surgery (General Surgery) (primary appointment)
BS Georgetown University 1992
MD John Hopkins University 1996

**Brian Wing-Chi Wong, PHD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
BS University of British Columbia 2001
PHD University of British Columbia 2011

**Matthew D Wood, PHD, MS**
Assistant Professor of Surgery (Plastic and Reconstructive Surgery) (primary appointment)
BS Washington Univ in St. Louis 2009
PHD Washington Univ in St. Louis 2009

BS Saint Louis University 2005
MS Washington Univ in St. Louis 2008

## Y

**Yan Yan, MHS, MD, PHD**
Professor of Surgery (Public Health Sciences) (primary appointment)
Professor of Biostatistics
MHS Johns Hopkins University 1995
MD Nanjing Medical University 1983
PHD Johns Hopkins University 1998

**Muhammad T Yasin, MD**
Assistant Professor of Surgery (General Surgery) (primary appointment)
MD Punjab University 1985

**William D Yates, MD**
Instructor in Clinical Surgery (General Surgery) (primary appointment)
BA Northwestern University 1983
MD Northwestern University 1985

**Robert A Young, MS, MD, JD**
Instructor in Clinical Surgery (Plastic and Reconstructive Surgery) (primary appointment)
MS Ohio State University 1975
MD Ohio State University 1978
BA University of Michigan 1973
JD Saint Louis University 1997

## Z

**Mohamed A Zayed, MD, PHD**
Associate Professor of Surgery (General Surgery) (primary appointment)
Associate Professor of Radiology
MD University of North Carolina 2009
BS University North Carolina 2002
PHD University of North Carolina 2007

**Christian W Zemlin, PHD**
Associate Professor of Surgery (Cardiothoracic Surgery) (primary appointment)
PHD Humboldt University 2012

# Research Electives

## Surgery Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

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Section of Minimally Invasive Surgery
660 S. Euclid, Box 8109
Phone: 314-454-8877

Under the direction of **L. Michael Brunt, MD,** students may investigate minimally invasive gastrointestinal and hernia surgery. The minimum rotation length is four weeks. Under the auspices of the Section of Minimally Invasive Surgery and the Washington University Institute for Minimally Invasive Surgery, a number of surgeons are investigating outcomes of various minimally invasive surgical approaches to abdominal wall hernias, benign foregut disorders, bariatric surgery and cholecystectomy. Dr. Brunt is currently investigating the clinical outcomes and standardization of various laparoscopic surgical procedures, opioid prescribing patterns and opioid use in surgical patients, and education-related research and skills training for medical students planning to enter a surgical internship.

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Division of Plastic and Reconstructive Surgery
660 S. Euclid, Box 8238
Phone: 314-747-0541

The Division of Plastic Surgery offers many opportunities for research projects on various topics related to plastic surgery. A project will be designed with students prior to their rotation on plastic surgery so that all of the materials and methods will be available at the beginning of the rotation. The basic science laboratories primarily investigate nerve injury and regeneration, including nerve transplantation. Students will be encouraged to design and complete their own research study during the elective. The minimum rotation length is six weeks.

The research rotation can be conducted in the plastic surgery laboratories under the direction of **Drs. Moore, Snyder-Warwick, Wood** or **Mackinnon**. Ongoing projects include the following:

- The influence of the immune system on nerve regeneration;
- Neural tissue engineering and regenerative medicine therapeutics, such as electrical stimulation to promote tissue regeneration
- The investigation of glial cells at the neuromuscular junction during development, maintenance, aging, and after nerve injury

Additional clinical and educational research opportunities in various fields of plastic surgery are available with **Drs. Fox, Myckatyn, Patel, Tung,** and **Woo**. These various projects include the following:

- In vivo tissue generation and tissue differentiation
- The mechanical, structural and biochemical effects of stress on scar tissue maturation
- In vivo anatomy of craniofacial deformities
- Outcome analysis of methods of cleft lip and palate management

- Breast reconstruction (3D imaging of breasts after cosmetic or reconstructive surgery, interpretation of angiograms of the breast to measure nipple perfusion)
- The use of nerve transfer to improve hand function in patients with cervical spinal cord injury/quadriplegia
- Surgical education (specifically web-based multimedia strategies for peripheral nerve surgery education)

The Department of Surgery can host Washington University medical students in any of its labs either to receive credit for a class they are currently enrolled in or to add them into the system as Washington University student employees to be paid for their time worked. Student work may be obtained through the Federal Work-Study program, the Office of Medical Student Research, or direct communication initiated by the student with faculty they wish to work alongside on specific subjects of interest with the goal of furthering their education. This can occur during any year of a medical student's education.

## Courses

Visit online course listings to view offerings for M95 Surgery (https://courses.wustl.edu/CourseInfo.aspx?sch=M&dept=M95).

**M95 Surgery 790 Integrated Surgical Disciplines Clerkship**
During the 12-week surgery clerkship, students are assigned to three separate rotations. Each student is assigned to three seperate rotations. Each student is assigned to a required general surgery rotation at Barnes-Jewish Hospital or the John Cochran Veterans Administration Medical Center. In addition, each student selects elective rotations in other general surgical fields, surgical subspecialties and related disciplines of critical care. The student is an active participant in the daily care of patients on each service and attends the service teaching conferences and rounds. For the duration of the 12-week rotation, there are weekly small-group tutorial sessions with faculty members and a biweekly lecture series.
Credit 462 units.

**M95 Surgery 814 Trauma Service Subinternship**
The student on this elective will function as a subintern on the Trauma and Acute Care Surgical Service within the Section of Acute and Critical Care Surgery. Through completion of this subinternship, the student will gain an ability to evaluate, resuscitate and manage trauma and emergency general surgery patients. Subinterns will actively interact with patients in the outpatient office, hospital ward and operating room. Practical experience will involve preoperative patient evaluation, resuscitation of acutely ill patients, operative patient management, in-hospital patient care and postoperative outpatient follow-up. The student will also participate in affiliated conferences and in-house call.

**M95 Surgery 818 Surgical Night Float & ED Subinternship**
This subinternship is specifically designed to give senior medical students an intern-level experience in managing acute on-call problems in surgical patients and in evaluating urgent and emergent problems in the ED. The rotation will be divided into two, two-week segments: one segment in the ED and the second on night float call on the surgical floors. Students will gain experience evaluating and managing the types of acute problems they will encounter as surgical interns as first responders to patients with acute abdominal pain, chest pain, hypotension, mental status changes, and other ER/on-call type problems. They will be assigned to the on-call surgical resident and will have a structured experience in order to maximize development of their diagnostic, management, and case presentation skills in the acute care setting so that they may more smoothly make the transition to a surgical internship.

**M95 Surgery 820 Cardiothoracic Surgery Subinternship**
The senior 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, ventricular assist devices, cardiac transplantation, 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 subinterns under the direct supervision of a faculty member. On the thoracic surgical rotation students will have the opportunity of performing 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.

**M95 Surgery 830 Plastic & Reconstructive Surgery Subinternship**
The period on Plastic Surgery may either be spent as a clinical clerkship or conducting a research project. The purpose of the clinical subinternship 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. Research projects should be student-motivated, and must be approved prior to scheduling and confirming the research rotation. Student will perform a ten-minute case presentation.

**M95 Surgery 832 Plastic Surgery Externship**
This course is for visiting medical students only. Students rotate on different Plastic Surgery Services for two weeks each to maximize exposure to all faculty. 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. Participation in conferences is expected. Students will turn in two H&Ps.

**M95 Surgery 850 Urology Subinternship**
The four-week clinical subinternship 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 two days per week. Medical students are also invited to participate in ongoing research projects under the mentorship of urology faculty. Please contact course director prior to the start of the elective if you are interested in this option.

**M95 Surgery 862 Colon & Rectal Surgery Subinternship**
This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Colorectal Surgery Service. Students work closely with the attendings within the Section of Colon and Rectal Surgery, and clinical exposure is focused on a wide range of benign and malignant colorectal diseases. There is exposure to radiation oncology and the specialized areas of nursing related to care of patients with colorectal cancer and inflammatory bowel disease. The course will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative, patient management under house staff, fellows, 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 Colorectal Surgery Office prior to beginning this elective.

**M95 Surgery 863 Surgical Oncology & Endocrine Surgery Subinternship**
This subinternship is designed to give students in-depth experience in the clinical management of patients on the Endocrine and Surgical Oncology Service (Unit I Service). Students will serve as clerks and will be responsible for patient management with house staff under the guidance of the chief resident and attending surgeons. Clinical exposure is focused on thyroid and parathyroid surgery, as well as breast oncology, melanoma, and soft-tissue sarcomas. The course will offer opportunities for students to gain experience in preoperative, intraoperative, and postoperative patient management. 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.

**M95 Surgery 864 Ethical Challenges in Surgery and Medicine**
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.

**M95 Surgery 871 Vascular Surgery Subinternship**
This subinternship 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.

**M95 Surgery 879 Hepatobiliary-Pancreatic Surgery Subinternship**
This subinternship is designed to give students in-depth experience in the clinical management of patients on the Hepatobiliary-Pancreatic (HPB) Service. The HPB Service is a busy upper gastrointestinal service with a focus on hepatobiliary and pancreatic diseases and their treatment. The course offers opportunities for students to gain experience in preoperative, intraoperative, and postoperative patient management.
Students will serve as clerks and will be responsible for patient management with house staff under the guidance of the fellow, chief resident 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. Note: 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.

**M95 Surgery 880 Pediatric Surgery Subinternship**
This subinternship will expose the student to a wide variety of pediatric surgical cases. This includes the preoperative and postoperative care of patients as well as the care of pediatric trauma patients. Daily walking or sit-down rounds are made with the resident, nurse practitioner, and attending staff, and participation is expected in the pediatric surgery clinic and the operating room. Weekly conference attendance is mandatory and includes mortality and morbidity, radiology, pathology, solid tumor board, ED/trauma, and GI conferences. Students have the opportunity to understand the widely differing anatomy and physiology of patients ranging from newborn infants to teenagers and young adults. The student functions as a team member and assumes level-appropriate responsibilities as determined by senior team members in this highly specialized care field.

**M95 Surgery 891 Organ Transplantation Subinternship**
The care of transplant patients requires the integration of multiple diverse medical and surgical disciplines. This subinternship in organ transplantation encompasses the preoperative evaluation and management of adult and pediatric recipients of liver, kidney, and pancreas. Students participate in procurement of allografts from cadaveric or living donors, organ preservation, and transplantation. Emphasis is also placed on postoperative care, multimodality immunosuppression and management of allograft rejection. Basic hepatic and renal physiology, fluid and electrolyte balance, and transplantation immunology are stressed. Rotation provides an elaborate

exposure to different facets of management of end stage renal and liver disease. Management of the complications of diabetes, hypertension, portal hypertension, and infectious problems are an integral part of pre- and post-transplant care. This course is designed to offer the student an overview of the field of organ transplantation, however, in addition to transplant surgery, students will also get some exposure to vascular access and hepatobiliary surgery. The student functions as a member of the transplant team and assumes appropriate responsibilities under supervision.

**M95 Surgery 893 Minimally Invasive Surgery Subinternship**
This subinternship elective in minimally invasive surgery is offered by the Chief of the Section of Minimally Invasive Surgery in the General Surgery Division. Surgeons in the Minimally Invasive Surgery group regularly perform the following procedures laparoscopically: cholecystectomy, splenectomy, adrenalectomy, hiatal hernia repair, endoscopic myotomy for achalasia, inguinal hernia repair, ventral hernia repair, complex abdominal wall reconstruction, robotic surgery, and bariatric surgery for morbid obesity. The medical student electing this rotation will participate in the outpatient office and direct patient care, assist and observe in a wide range of laparoscopic procedures and participate in teaching rounds and conferences. During this rotation, the student will also have the opportunity to observe and participate in minimally invasive surgical procedures performed by various surgeons within the Section of Minimally Invasive Surgery and will function as an acting intern.

**M95 Surgery 900 Research Opportunities-Surgery**
Research opportunities may be available. If interested, please contact the department of Surgery.

# People of the School of Medicine

## Faculty & Staff

### Staff

For staff contact information, please visit the Washington University online directory (http://wustl.edu/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 (http://medicine.wustl.edu/directory/).

### Faculty

The All Faculty List of the online *Bulletin* is drawn from the Washington University Human Resources Management System (HRMS) and provides academic appointments and education details. To update or change a faculty member's *Bulletin* listing, please contact the HRMS representative for the department, division or program.

## Students

For student contact information, please visit the Washington University online directory (http://wustl.edu/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

David H. Perlmutter
*Executive Vice Chancellor for Medical Affairs*
*George and Carol Bauer Dean of the School of Medicine*
*Spencer T. and Ann W. Olin Distinguished Professor*
*Chairman, Executive Faculty*

Michael S. Avidan
Craig A. Buchman
John A. Cooper
Richard J. Cote
Timothy J. Eberlein
Victoria J. Fraser
Dennis E. Hallahan
David M. Holtzman
Dineo Khabele
Todd P. Margolis
Jeffrey D. Milbrandt
Regis J. O'Keefe
David W. Piston
Linda J. Richards *(effective 1/1/21)*
Gary A. Silverman
Lilianna Solnica-Krezel
Paul H. Taghert *(interim through 12/31/20)*
Richard L. Wahl
Sean P. J. Whelan
Gregory J. Zipfel
Charles F. Zorumski

Maria Q. Baggstrom
*Chair, Executive Committee of the Faculty Council*

James A. J. Fitzpatrick
*Vice Chair, Executive Committee of the Faculty Council*

Kristin Stahl
*Voluntary Faculty Representative*

#### Ex Officio

Andrew D. Martin
*Chancellor*

Beverly Wendland
*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)

Maria Q. Baggstrom
*Chair*

James A. J. Fitzpatrick
*Vice Chair*

For a full list of committee members, please visit the Executive Committee of the Faculty Council website (https://ecfc.wustl.edu/).

## Institutional Animal Care and Use Committee

Brian Finck
*Chair*

Please visit the Institutional Animal Care and Use Committee (http://research.wustl.edu/Offices_Committees/ASC/Pages/default.aspx) website for information.

## Committee on the Academic and Professional Evaluation of Students

Linda J. Pike, PhD
*Chair*

Kari Allen, MD
Paul Bridgman, PhD
Steven Cheng, MD
Erika C. Crouch, MD, PhD
Brian Edelson, MD, PhD
Melissa Harbit, MD
Henry Huang, PhD
Nigar Kirmani, MD
Robert Naismith, MD
Casey Pruitt, MD
Deborah Rubin, MD

### Ex Officio

Eva Aagaard, MD
Tom De Fer, MD
Michael Donlan, PhD
Lisa M. Moscoso, MD, PhD
Valerie Ratts, MD
Will R. Ross, MD, MPH
Karen Winters, MD

## Committee on Admissions

Valerie S. Ratts
*Chair*

For a full list of committee members, please visit the Medical Student Admissions website (https://mdadmissions.wustl.edu/how-to-apply/selection-process/admissions-committee-bios/).

## Committee on Fellowships and Awards

Jeffrey Miner
*Chair*

Sharon Cresci
Alison Snyder-Warwick

## 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 (http://research.wustl.edu/ComplianceAreas/COI/Committees/Pages/default.aspx).

## Human Research Protection Office (HRPO)

### Washington University Institutional Review Board (IRB)

Amanda F. Cashen, MD
*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 (https://hrpo.wustl.edu/).

## Human Research Quality Assurance/ Quality Improvement Committee

Edward M. Geltman
*Chair*

For a full list of committee members, please visit the Human Research Quality Assurance Program webpage (http://research.wustl.edu/Offices_Committees/hrqaqi/monitoring/Pages/committee.aspx).

## Institutional Biological and Chemical Safety Committee

Michael Caparon, PhD
*Co-Chair*

Henry Huang, PhD
*Co-Chair*

Neil Anderson, MD
Michael Diamond, MD, PhD
Scott Handley, PhD
Barbara Joy Snider, MD, PhD

### Ex Officio

Bruce Backus, MS, PE
Chad Faulkner, DVM, PhD
Susan Cook, PhD, CBSP
Brian Dieckgraefe, MD, PhD

### Alternates

Ken Boschert, DVM
Krista Hyde, PhD

### Public Members

Mary Burke
Robert Koehler
Paul Mercurio

## Medical School Faculty Rights Committee

Heather L. True, PhD (2020)
*Co-Chair*

Maria Q. Baggstrom, MD (2020)
*Co-Chair*

Ann M. Gronowski, PhD (2020-R)
Katherine M. Jones, MD (2020-R)
Steven J. Mennerick, PhD (2020-R)

Judith E.C. Lieu, MD (2022-A)
Anna N. Miller, MD (2022-A)
Daniel R.C. Nieva, MD (2022-A)

## Medical Scientist Training Program Committee

Wayne M. Yokoyama
*Program Director*

Megan A. Cooper
*Associate Director*

Nathan O. Stitziel
*Associate Director*

For a full list of committee members, please visit the Medical Scientist Training Program website (http://mstp.wustl.edu/about%20mstp/Pages/Administration.aspx).

## Radiation Safety Committee

Barry A. Siegel, MD
*Chair*

Buck E. Rogers, PhD
*Vice Chair*

Maxwell Amurao, PhD
*Radiation Safety Officer and Executive Secretary*

For a full list of committee members, please visit the Department of Radiation Safety website (https://radsafety.wustl.edu/An1Pages/An1-Committees.htm).

## Radioactive Drug Research Committee

Barry A. Siegel, MD
*Chair*

Thomas H. Schindler, MD
*Vice Chair*

For a full list of committee members, please visit the Department of Radiation Safety website (https://ehs.wustl.edu/).

## Alvin J. Siteman Cancer Center Protocol Review and Monitoring Committee

### Co-Chairs

Bettina Drake
Perry Grigsby
Brad Kahl
Julie Margenthaler
Joel Picus

For a full list of committee members, please visit the Siteman Cancer Center website (https://siteman.wustl.edu/about/committees/).

## Alvin J. Siteman Cancer Center Quality Assurance and Safety Monitoring Committees

Nancy L. Bartlett
*Chair*

For a full list of committee members, please visit the Siteman Cancer Center website (https://siteman.wustl.edu/about/committees/).

# Officers

## Board of Trustees

Please visit the Board of Trustees website for the list of current trustees (https://boardoftrustees.wustl.edu/current-trustees/) and other information concerning the board.

### Emeritus Trustees

Please visit the Board of Trustees website for the list of emeritus trustees (https://boardoftrustees.wustl.edu/emeritus-trustees/) and other information concerning the board.

## Officers of the University Administration

Andrew D. Martin
*Chancellor*

Beverly Wendland
*Executive Vice Chancellor for Academic Affairs and Provost*

Pamella A. Henson
*Executive Vice Chancellor for University Advancement*

David H. Perlmutter
*Executive Vice Chancellor for Medical Affairs*
*George and Carol Bauer Dean of the School of Medicine*

Henry S. Webber
*Executive Vice Chancellor and Chief Administrative Officer*

William S. Stoll
*Senior Vice Chancellor for University Advancement*

Monica J. Allen
*Vice Chancellor and General Counsel*

Rebecca L. Brown
*Vice Chancellor, Secretary to the Board of Trustees, and Chief of Staff*

Dedric Carter
*Vice Chancellor for Operations and Technology Transfer*

Legail P. Chandler
*Vice Chancellor for Human Resources*

Kurt T. Dirks
*Vice Chancellor for International Affairs*

Julie Hail Flory
*Interim Vice Chancellor for Public Affairs*

Lynda Heaney
*Vice Chancellor for Medical Advancement*

Amy B. Kweskin
*Vice Chancellor for Finance and Chief Financial Officer*

Jennifer K. Lodge
*Vice Chancellor for Research*

Pamela S. Lokken
*Vice Chancellor for Government and Community Relations*

Robert M. Wild
*Interim Vice Chancellor for Student Affairs*

Mark N. Amiri
*Associate Vice Chancellor for Finance and Treasurer*

Scott L. Wilson
*Chief Investment Officer*

## Board of Directors, Washington University Medical Center

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Robert G. Clark
David P. Conner
Peter B. Corr, MD
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Joann L. Data, MD, PhD
John P. Dubinsky
David C. Farrell
Daniel P. Getman, PhD
Jay A. Kaiser, MD
Lee C. Kling
Arthur M. Krieg, MD
Richard J. Liekweg
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Richard J. Mahoney
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James S. McDonnell III
Walter L. Metcalfe Jr.
Patricia M. Nagel
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Roger M. Perlmutter, MD, PhD
Allan H. Rappaport, MD, JD

Rodger Riney
Mark Simon
Kelvin R. Westbrook
William P. Wiesmann, MD
Roma Broida Wittcoff
Pamela Gallin Yablon, MD

### Emeritus Members

Floyd E. Bloom, MD
Joseph M. Davie, MD, PhD
Barbara J. Reynolds, MD

## Class Officers

### Fourth-Year Class Officers

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Medical Education Representative (MER)
Katie Goodenberger

Representative to the Organization of Student Representatives (OSR Rep)
Griffin Plattner

Representative to the Graduate Professional Council (GPC Rep)
Roger Klein

### Third-Year Class Officers

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Medical Education Representative (MER)
Jason Morris

Representative to the Organization of Student Representatives (OSR Rep)
Gautam Adusumilli

Representative to the Graduate Professional Council (GPC Rep)
Neel Raval

### Second-Year Class Officers

President
Joanna Kim

Medical Education Representative (MER)
Sarah Cohen

Representative to the Organization of Student Representatives (OSR Rep)
Monica Lim

Representative to the Graduate Professional Council (GPC Rep)
Zach Xu

### First-Year Class Officers

President
Alex Kim

Medical Education Representative (MER)
Brooke Higgins

Representative to the Organization of Student Representatives (OSR Rep)
Patrick Ward

Representative to the Graduate Professional Council (GPC Rep)
Reyan Coskun

# 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. 10) of this *Bulletin*. A more complete list is available on the Washington University Compliance and Policies page (https://wustl.edu/about/compliance-policies/).

## 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.

## 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 (https://md.wustl.edu/academics/learning-management-technology-canvas/).



## Health Professions Policies & Guidelines

For information regarding the policies and guidelines of the following degrees and programs, please visit these sites:

- Applied Health Behavior Research (https://crtc.wustl.edu/programs/degrees/ahbr/)
- Audiology and Communication Sciences (https://pacs.wustl.edu/programs/)
- Biology and Biomedical Sciences (http://dbbs.wustl.edu/curstudents/DBBSStudentPolicies/Pages/DBBSStudentPolicies.aspx)
- Biomedical Engineering (https://bme.wustl.edu/graduate/phd/Pages/default.aspx)
- Biostatistics (https://biostatistics.wustl.edu/)
- Clinical Investigation (https://crtc.wustl.edu/programs/degrees/msci/)
- Doctor of Philosophy (http://graduateschool.wustl.edu/policies-procedures/)
- Occupational Therapy (https://www.ot.wustl.edu/about/resources-118/)
- Physical Therapy (https://pt.wustl.edu/student-resources/)
- Population Health Sciences (http://mphs.wustl.edu/)
- Public Health (http://bulletin.wustl.edu/brownschool/policies/)

## 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 polices and guidelines for the respective program areas.

- Doctor of Medicine (Five-Year Program) (p. 340)
- Doctor of Medicine and Master of Science in Clinical Investigation (https://crtc.wustl.edu/courses/class-list/academic-policies/)
- Doctor of Medicine and Master of Population Health Sciences (http://mphs.wustl.edu/)
- Doctor of Medicine and Master of Public Health (http://bulletin.wustl.edu/brownschool/policies/)
- Doctor of Medicine and Doctor of Philosophy (http://dbbs.wustl.edu/curstudents/DBBSStudentPolicies/Pages/DBBSStudentPolicies.aspx)

# Student Health & Safety Policies

## Bloodborne Pathogens Policy

In 1992, the Executive Faculty of the School of Medicine formally adopted a Medical Campus policy on human immunodeficiency virus (HIV) and hepatitis B virus (HBV) infections. This policy was updated in 2001 to include hepatitis C virus (HCV) infections. The purpose of the policy is to provide guidelines to prevent or reduce the transmission of these infectious agents between patients and health care workers. It is an ethical and moral obligation for students/employees to report bloodborne pathogen infections.

The policy deals with the following: (1) the university's responsibilities to infected patients, including obligation to treat, confidentiality, and appropriate serologic testing; (2) appropriate health and safety precautions and procedures for faculty, students and staff, including compliance with Centers for Disease Control and Prevention guidelines, blood and body fluid precautions, and handling of needles or sharp instruments; and (3) the university's responsibilities to faculty, staff or students who are infected with HIV, HBV or HCV, including admission to medical school, participation in clinical rotations, serologic testing confidentiality, and medical treatment.

The policy makes a distinction between Category I activities (those involving no risk of transmission from infected health care workers to patients, such as routine history/physical examinations, minor surface suturing, and elective phlebotomy), Category II activities (those for which bloodborne virus transmission is theoretically possible but unlikely, such as minor local procedures, central venous lines, and other specialty procedures), and Category III activities (those for which there

is a definite risk of bloodborne virus transmission, such as general surgery, cardiothoracic surgery, neurosurgery, and other surgeries as well as nonelective procedures performed in the emergency department).

In 2012, a committee was formed that included representation from Administration, Legal – Risk Management, Infectious Disease, Occupational Health, and Student Health Services. The Student Health Services director meets with infected students and discusses the need for restricted activities and proper follow-up.

## Needle Stick/Human Blood and Body Fluid Exposure Policy

All exposures to human blood and body fluids must be reported immediately to the Health Service, which maintains a 24-hour reporting system. During working hours (8 a.m.-4 p.m.), the office can be reached at 314-362-3523 or 314-362-3528. After hours, the Health Service can be contacted through a digital beeper at 314-871-2966.

### Needle Stick Procedure

Cleanse the wound immediately with soap and water. If a mucous membrane has been exposed, rinse with copious amounts of water.

1. Identify the source of exposure.
2. Call the Health Service 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 will notify the physician. All source patient charges will be the responsibility of the Health Service.
3. Complete the Injury/Exposure Report form.
4. Employees and students will report to the Health Service for follow-up. 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 vaccination
   e. Tetanus and diphtheria vaccination
   f. Post-exposure prophylaxis

### Human Blood and Body Fluid Exposures Procedure

1. Clean the area with soap and water.
2. Call Employee Health (314-362-3528) or Student Health (314-362-3523). After hours, call the digital beeper (314-871-2966).
3. Keep the source or patient available for HIV, HBV and HCV testing.
4. Follow the instructions given by the Health Service. Complete an incident report.

**Always wear Personal Protective Equipment!**

# Liability Insurance

Washington University provides general liability insurance for all students or practicums while participating in required clinical experiences. In addition, Washington University voluntarily provides a defense and indemnification benefit for matriculated students who are candidates for the MD degree at Washington University School of Medicine.

The benefit is provided to School of 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 the School of 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 the School of Medicine.

# Professionalism & Conduct Policies

## Policy Against Abusive Conduct

Please visit the Human Resources website for the Policy Against Abusive Conduct (http://hr.med.wustl.edu/Policies/Pages/AbusiveConduct.aspx).

## 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 (https://research.wustl.edu/washington-university-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 (https://wustl.edu/about/compliance-policies/media-policies/social-media-policy/)
- WUSM Social Media Guidelines (https://medicine.wustl.edu/brand/social-media/)

## 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 (http://hr.wustl.edu/policies/Pages/DrugandAlcoholPolicy.aspx) 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 (https://wusmhealth.wustl.edu/students/).

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 $1000 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 (https://mdstudentaffairs.wustl.edu/) 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 (https://meet.wustl.edu/services/catering/catering-alcohol-guidelines/) 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, WUSM Facilities (https://facilities.med.wustl.edu/), Danforth Event Management (https://eventmanagement.wustl.edu/), 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, also should 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 21 years old 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 (http://wusm.cafebonappetit.com/catering/), 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.

# Guidelines for Professional Conduct in Teacher/Learner Relationships and Policy Against Medical Student Mistreatment

## The Teacher/Learner Relationship

Effective learning is possible only in an environment in which students can trust their teachers to treat them fairly and with respect. For purposes of this policy, a teacher shall be defined as any person subject to School of Medicine policies, such as a member of the School of Medicine faculty to whom a student is assigned during a course or clinical rotation. A teacher may also be defined as an attending physician, fellow, resident, research mentor, student, nurse or other person charged with supervising the education of a student.

One manner in which the teacher/learner relationship is unique is that students may be vulnerable, depending on many of their teachers for evaluations and recommendations. In addition, medical education includes mastering not just pathophysiology but also the essentials of professional behavior, as set forth in our Guiding Principles of Professionalism (p. 375).

We also recognize that students learn professional behavior primarily by observing the actions of their teachers as role models. Unprofessional, offensive, disrespectful or abusive behavior by teachers is antithetical to the standards of professional conduct that medical students are expected to master. These behaviors by teachers may also be self-perpetuating, as students come to believe that such behavior is appropriate when they assume the role of teacher. As we strive to create an environment of mutual respect, all faculty, staff and students are expected to abide by the Abusive Conduct Policy (http://hr.med.wustl.edu/Policies/Pages/AbusiveConduct.aspx).

Behaving in ways that embody the ideal student-teacher relationship fosters respectful behavior, minimizes the likelihood of student mistreatment, and optimizes the educational experience for students. The following practices are examples of ways in which teachers and learners can encourage a positive learning environment conducive to the exchange of ideas among all who participate in the learning process:

1. Teachers
   a. Be prepared and on time.
   b. Provide learners with the most current materials.
   c. Treat students fairly, respectfully, and without bias related to their race, color, age, religion, sex, sexual orientation, gender identity or expression, national origin, veteran status, disability or genetic information.
   d. Give students timely, constructive and accurate feedback.
   e. Distinguish between the Socratic method, where insightful questions are a stimulus to learning and discovery, and overaggressive questioning, where detailed questions are repeatedly presented with the endpoint of embarrassment or humiliation of the student.
2. Learners
   a. Treat teachers, peers, patients and members of the health care team fairly, respectfully, and without bias related to their race, color, age, religion, sex, sexual orientation, gender identity or expression, national origin, veteran status, disability or genetic information.
   b. Respect patients' privacy. Under no circumstances should you discuss a patient online or post a patient's photo online, even if the patient gives you permission.
   c. Be conscientious with your electronic presence. Voicemail, email and other electronic communications (e.g., blogs, social media sites, smartphone apps, photographs, published writing) should be thoughtfully composed. Treat all individuals in the learning environment with respect and understanding.
   d. You have the right to free speech. However, in order to foster a community of professionalism, you and your peers are encouraged to approach one another professionally and to abide by the Washington University Code of Conduct.
   e. Treat fellow students as colleagues, not competitors.
   f. Take responsibility for maximizing your educational experience by addressing conflicts and discomforts that may impede your learning.
   g. Be an enthusiastic learner.
   h. Be trustworthy and honest.
   i. Be prepared and punctual.
   j. Know your limitations, and ask for help when needed.
   k. Put the patient's welfare first and ahead of your educational needs.

l. Know and understand each patient's medical history, diagnoses, treatment and status.
m. Take the initiative to educate yourself about each patient's illness.
n. Be compassionate.

## Student Mistreatment

The School of Medicine prohibits behavior that is abusive or that involves the mistreatment of students or others in the learning environment. We take issues of mistreatment seriously and aspire to a culture of zero tolerance for instances of abuse, mistreatment and disrespect. Washington University School of Medicine (WUSM) is committed to maintaining an environment free from discrimination, harassment of any type, and abuses of authority. The Association of American Medical Colleges (AAMC) has defined *mistreatment* in previous Graduation Questionnaires as follows: "Mistreatment arises when behavior shows disrespect for the dignity of others and unreasonably interferes with the learning process. It can take the form of physical punishment, sexual harassment, psychological cruelty, and discrimination based on race, religion, ethnicity, sex, age or sexual orientation." The behaviors listed below are provided as examples of mistreatment and offensive behavior by the AAMC. However, we recognize that there are nuances to interpersonal interactions. Students who feel that they may have been subjected to mistreatment are encouraged to follow the procedures outlined in the Steps for Reporting Student Mistreatment section of this policy. The goal of this process is to provide the best learning environment possible.

### Examples of Potential Mistreatment

- Public humiliation
- Threats of physical harm
- Physical harm (e.g., being hit, slapped, or kicked)
- Requirements to perform personal services (e.g., shopping, babysitting)
- Offensive sexist remarks/names
- Denial of opportunities for training or rewards based solely on gender, race, sexual orientation or ethnicity
- Lower evaluations or grades because of gender, race, sexual orientation or ethnicity rather than performance
- Unwanted sexual advances
- Being asked to exchange sexual favors for grades or other rewards
- Racially or ethnically offensive remarks/names
- Offensive remarks/names related to sexual orientation

## Steps for Reporting Student Mistreatment

The university takes allegations of student mistreatment by faculty, residents, staff or other students very seriously and strongly encourages its faculty, staff and students who are witness to such conduct to report it immediately, without fear of retaliation, to any of the following three deans: the senior associate dean for education, the associate dean for student affairs, or the associate dean for medical student education. These individuals will offer guidance and support — described below — to the student and discuss informal and formal options to resolve the matter. For more information, please visit the website of the Office of Medical Student Affairs (https://mdstudentaffairs.wustl.edu/).

Students may also consult with a medical student ombudsperson as a confidential resource. The medical student ombudsperson can provide guidance as well as mediation, directly or indirectly, between the student and the offender.

Students may also choose to report student mistreatment via a link on the Canvas learning management system student commons homepage or via the Oasis curriculum management system. The end-of-clerkship and elective surveys have questions regarding mistreatment, where incidents can be reported in real time. These reports are confidential. The Office of Medical Student Affairs will receive all reports and will follow up with the reporting individual, if identified, to offer guidance, support and options for resolution to the student. If sufficient information is provided, the report will be passed on to the clerkship director and department chair after student evaluations are finalized for the course or clerkship in which the event occurred. Reports will be reviewed quarterly by a Learning Climate Committee. This committee will be chaired by the associate dean of student affairs and will consist of a medical student, an advisory dean or deans, the director of graduate medical education (or their designee), a hospital staff member, and the medical student ombudsperson. Aggregate reports will generally be forwarded to department chairs quarterly for monitoring purposes.

### Confidentiality and Anonymous Reporting

The university will strive to protect, to the greatest extent possible, the confidentiality of persons reporting mistreatment and of those accused of mistreatment. Because the university may have certain legal obligations (e.g., in response to allegations of sexual harassment), the university cannot guarantee complete confidentiality where it would conflict with the university's obligation to investigate meaningfully or, where warranted, take corrective action. 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.

If the student is not comfortable reporting to one of the individuals identified above, the student may choose an intermediary who can then directly communicate information about the incident to these individuals while maintaining anonymity. Students may also submit anonymous reports via the Oasis curriculum management system in real time or when filling out course evaluations. Anonymous reports will be shared with the clerkship director and the department chair.

**If a student insists on confidentiality or anonymity, the university may be limited in its ability to respond and take action with respect to the report.**

### Bias Report and Support System (BRSS)

In addition, Washington University students, faculty, staff and community members who have experienced or witnessed what they perceive as incidents of bias, prejudice or discrimination involving a student can report their experiences to the university's Bias Report and Support System (BRSS) (https://diversityinclusion.wustl.edu/brss/) team. If, for any reason, students do not want to provide identifying information when filing a report, they have the option to fill out the BRSS form (http://diversity.wustl.edu/students/mosaic/bias-report-support-system/bias-report-form/) anonymously online by selecting the "For Information Only" option. Please note that a brief description of the incident will be included in the quarterly summary report. If an individual submitting a report selects the "For Support and Referral" option, a member of the BRSS team will meet with the individual and refer that person to the appropriate university policy and administrator. Note that these non-anonymous BRSS reports on the WUSM campus are sent to the assistant provost, who assists WUSM students with navigating their programs and connects them with the relevant policies and contacts within those programs.

## Informal and Formal Options for Possible Resolution

### Informal Options

If you feel comfortable dealing with the situation without assistance, you can communicate either orally or in writing with the person whose behavior was offensive. The most useful communication will have three parts:

1. A factual description of the incident(s), including date, time, place and specific action
2. A description of the writer's feelings, including any consequences of the incident
3. A request that the conduct cease

Frequently, such a communication will cause the offensive behavior to stop, particularly when the person may not be aware that the conduct is offensive.

If you would like to proceed informally but with the assistance of someone else, you may do the following:

1. Ask the person's supervisor (i.e., the department chair, dean, director, housing office representative, academic adviser, or a trained WUSM faculty member) to speak to the person whose behavior was offensive. The purpose of such conversations is the cessation of offensive behavior. You should note that these individuals may be obligated to report the incident or conduct you disclose to the university for further investigation and action.
2. Consult with one of the advisers listed in the Additional Resources section below. These individuals are specifically charged with responding to mistreatment inquiries and complaints. They are thoroughly familiar with WUSM's mistreatment policy and are available to consult with victims, those accused of engaging in mistreatment, witnesses, and supervisors of parties to a complaint. They can provide information about informal actions that might remedy the situation and discuss university policies and procedures for resolving complaints.
3. Ask the adviser to mediate or arrange for mediation. Mediation is discussion and negotiation with the help of a third party, and it is designed to permit the parties to reach a mutually agreeable resolution of a dispute. If the person complaining of mistreatment seeks mediation, the person accused of mistreatment agrees, and the adviser concludes that the mediation would be consistent with the university's legal obligations in responding to and preventing discrimination or discriminatory harassment, then the adviser may mediate or arrange for mediation.

### Formal Options

Should informal resolution be unsuccessful or inappropriate under the particular circumstances alleged, the student will be referred to the applicable university policies and procedures for filing a formal complaint. The university will initiate an investigation into the allegations under the appropriate policy and 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 Sexual Harassment Policy would be followed.

## 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 provide definitions and standards for an optimal learning environment in an effort to inform students and educators about policies and processes for reporting offensive behavior and learner mistreatment. This educational information will be provided by the Learning Climate Committee. The policy will be posted in the *Bulletin* and in the clerkship and course director handbooks, and it

will be reviewed with students during orientations. In addition, educational sessions may be provided at departmental and division meetings, resident sessions, staff meetings and curriculum committee meetings.

### Additional Resources

The following is a list of Medical Student Advisers who may provide guidance when addressing some of the potential issues discussed in the above guidelines:

- Kathy Diemer, MD, Assistant Dean for Career Counseling (https://residency.wustl.edu/)
- Eva Aagaard, MD, Senior Associate Dean for Education (https://medicine.wustl.edu/news/school-medicine-names-new-leader-medical-education/)
- Thomas De Fer, MD, FACP, Associate Dean for Medical Student Education (https://md.wustl.edu/contact/medical-student-education/)
- Lisa Moscoso, MD, PhD, Associate Dean for Student Affairs (http://mdstudentaffairs.wustl.edu/contact/)
- Medical Student Ombudsperson (Confidential Adviser) (https://ombuds.med.wustl.edu/)

# Student Rights Policies

## 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 (http://sites.wustl.edu/universityregistrar/student-records/ferpa-privacy/washington-university-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 (https://acadinfo.wustl.edu/), 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 (http://sites.wustl.edu/universityregistrar/student-records/ferpa-privacy/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.

## Students With Disabilities Policy

It is the goal of Washington University to assist students with disabilities in removing the barriers their disabilities may pose and to provide support as these students face the challenge of pursuing an education at Washington University.

Washington University recognizes and accepts its professional, legal and moral responsibility to avoid discrimination in the acceptance and education of qualified students with disabilities and to provide reasonable accommodations to such students consistent with the principles embodied in the law. These guidelines apply to students seeking admittance as well as to those who become disabled while they are enrolled.

Washington University makes every effort to ensure that all qualified applicants and students can participate in and take full advantage of all programs and opportunities offered within the university. Washington University encourages and gives full consideration to all applicants for admission. Washington University does not discriminate in access to its programs and activities on the basis of age, sex, sexual orientation, race, disability, religion, color or national origin.

All students in educational programs at the School of Medicine, those seeking admittance, and those who become disabled while they are enrolled must possess the intellectual, ethical, physical and emotional capabilities required to undertake the full curriculum and to achieve the levels of competence required by the faculty and the profession.

In this regard, we will be guided by the principles outlined below.

## A. Responsibilities of the Student

1. **Disclosure of disability**
   It is the responsibility of a student who has a disability to disclose this fact and to request accommodation from the dean for student affairs or the program director. The school encourages students with disabilities to identify themselves as early as possible to optimize the mobilization of resources and available accommodations.
2. **Diagnosis of disability**
   Students who are having academic difficulty that may be a consequence of a disability are encouraged to avail themselves of diagnostic services that may lead to accommodations. Furthermore, such students are encouraged to explore with the administration of their academic unit the possibility of a disability if the inquiry is relevant to educational performance and there is evidence of educational performance problems.
3. **Documentation of disability and request for accommodation**
   The disability, its functional impact and the requested accommodation(s) must be documented. If the student discloses a disability and requests accommodation, the school requires documentation of the disability from a qualified professional. Unless there are extraordinary and compelling circumstances, the student is financially responsible for the costs related to this documentation, which must be performed by an appropriately educated and trained professional. The information provided by the professional must be factual, objective and technically valid, and it must establish clearly that the disability substantially limits one or more of the student's major life activities. The professional(s) who evaluate the student should identify options for the management of the disability. Based on this information, the affected student should then request, in writing, the relevant accommodations. The student should work together with the dean for student affairs or the program director to arrive at a plan for reasonable accommodations. The school may also require a second expert opinion for which the school may be financially responsible under extraordinary and compelling circumstances. The school reserves the right to request as much detailed information from the student and/or the verifying professional(s) as is necessary to assess the scope of the disability and/or the reasonable accommodations.

## B. Responsibilities of the School

1. **Review of requests for accommodation**
   Requests for accommodations will usually be reviewed by the dean for student affairs or the program director. An ad hoc assessment team may be convened that may include the dean for student affairs, the educational program director (or curriculum supervisor), selected members of the Disabilities Oversight Committee (refer to Section B.5 below), and other consultants as appropriate to the individual circumstances. The assessment team usually should include the following people: (1) individuals who understand the curriculum in question; (2) a person who is knowledgeable about the Americans with Disabilities Act; and (3) a person with the authority to authorize accommodations and cause them to be implemented.
2. **Responsibilities for accommodation**
   The School of Medicine is responsible for the costs incurred to make accommodations that are not unduly burdensome or unreasonable. Accommodations may include but may not be limited to academic modifications that do not fundamentally alter the nature of the program, auxiliary services, modifications of the circumstances and methods of qualification examinations, and classroom modifications. The school's responsibility to accommodate ends when a student with a disability does one of the following: (1) refuses reasonable accommodations; (2) is unable, with reasonable accommodations, to fulfill the essential requirements of the program; (3) fulfills the essential requirements and graduates; or (4) transfers to another institution. The school is not required to provide an accommodation that fundamentally alters the nature of the program, that is unduly burdensome or that is unreasonable.
3. **Confidentiality**
   Information pertaining to a student's disability and accommodations will be maintained in a file that is kept confidential and separate from the student's academic record. Appropriate faculty, staff and administrators may be informed regarding the student's disability, limitations, restrictions and accommodations when they have a need to know such information.
4. **Application of the Committee on the Academic and Professional Evaluation of Students (CAPES) policies**
   The policies and procedures of the school regarding promotion and retention are documented for each academic unit. These policies and procedures govern the relationship between the school and all students, including those with disabilities. The school is not obligated to retain a student with a disability who poses a significant threat to the health or safety of others when there is no reasonable accommodation that either eliminates or sufficiently reduces that risk.
5. **Disabilities Oversight Committee**

There shall exist a standing Disabilities Oversight Committee composed of members designated by the dean of the School of Medicine. The committee shall have the following responsibilities: (1) performing a periodic review of requests for accommodations and accommodations granted; (2) providing recommendations regarding accommodations for disabilities; and (3) serving as requested on a disability appeals committee. This group serves as a resource regarding issues of significance to the institution and to students with disabilities.

## C. Appeals

A student with a disability who believes that a request for accommodation has been improperly denied or who perceives that they have been discriminated against on the basis of a disability should direct their appeal to the dean of the School of Medicine. As needed, the dean of the School of Medicine may assemble an advisory group to review appeals and make recommendations. This group may include but may not be limited to the chair of the committee that oversees the academic evaluation and advancement of students for the particular academic unit, students, and/or representatives of the Disabilities Oversight Committee.

# MD: Absences & Leaves

## Absence Policy for Medical Students on Clinical Rotations

### Background

The profession of medicine requires the utmost commitment of time and energy to patient care and research activities. While the development of this commitment begins in the preclinical years, it is further practiced and developed during clinical training.

The clinical year at Washington University School of Medicine (WUSM) comprises 48 weeks of required core clinical experiences.The fourth year encompasses a 44-week time block and requires MD students take a minimum of 36 weeks of credit (32 weeks of electives plus four weeks of Capstone). MSTP students are required to take a minimum of 12 weeks of credit (eight weeks of electives plus four weeks of Capstone).

All students on clinical rotations have a scheduled two-week winter recess break and a three-day spring break. All clinical students have a two-week break between the end of the third-year clinical rotations and the start of the fourth-year elective rotations. During every clinical rotation, each student is expected to participate fully in all activities of the clinical rotation until the designated end time of the clinical rotation or the start time of a holiday break. This regularly requires participation beyond formal weekday hours to include evening and nighttime call and clinical responsibilities on weekends. Regarding access to healthcare services, refer to the Access to Healthcare Services Policy. (p. 354)

Students must recognize that clinical teaching, learning and evaluation are dependent on the student's presence and participation in every aspect of the clinical rotation. While students will not be graded down only because of an excused absence, time spent away from the rotation may decrease learning and impede effective evaluation.

### Policies

If a student is ill or has a personal emergency, they are responsible for notifying the clinical course director's office and the supervising clinician of their clinical team as soon as possible. If the absence extends beyond two consecutive days, the student is responsible for notifying the Office of Student Affairs.

It is recognized that a student may, on a rare basis, desire to be excused from clinical activities for professional or significant personal events. Travel prior to or following observed university holidays and breaks that occurs outside of the officially designated times/dates on the MD Program Academic Calendar does not constitute a significant personal event or unavoidable absence. Students are responsible for directly contacting the clinical course director in writing to obtain permission for any planned absences well in advance.

For all students on clinical rotations, the Clinical Curriculum Committee has agreed upon the following limitations on the maximum number of days of absences (both planned and unplanned) from clinical rotations.

| Type of Course | MD Students | MSTP Students and Interviewing Fourth-Year MD Students* |
|---|---|---|
| 2-week clerkship | 1 day | 1 day |
| 2-week elective | 1 day | 1 day |
| 3-week clerkship | 1 day | 2 days |
| 4-week clerkship | 2 days | 3 days |
| 4-week elective | 3 days | 5 days |
| 5-week clerkship | 3 days | 5 days |
| 6-week clerkship | 3 days (1 day max per 2-week rotation) | 5 days (2 days max per 2-week rotation) |
| 8-week clerkship | 4 days | 7 days |
| 9-week clerkship | 4 days | 7 days |
| 10-week clerkship | 5 days | 9 days |
| 12-week clerkship | 5 days | 9 days |

* Residency interviewing season is typically from mid-October through January. Any additional days off would require approval by the associate dean for medical student education and the elective course director.

If a student misses more than the maximum number of allowable days of absences for a given clinical rotation, the consequence rendered will be at the discretion of the clinical course director and the associate dean of student affairs or the associate dean of the office of medical student education.

Failure of the student to notify the clinical course director of their absence after consideration of the particular circumstances of the absence will result in the filing of a professionalism concern form (PCF).

## Guidelines

All non-clinical electives and the Capstone course may have separate attendance requirements and absence procedures. Please refer to the course syllabus for details.

Students are encouraged to make up missed work on rotations in which this can result in meaningful learning and should discuss this option with the clinical course director.

At the discretion of the clinical course director, any student who misses portions of the clinical experiences due to planned and/or unplanned absences that exceed the maximum time may be required to utilize winter recess, spring break or free time at the end of the third-year clinical rotations to complete the 48 weeks of mandatory clinical rotations.

Central monitoring of absences will reside with the Office of Student Affairs, in order to support student well-being. A concerning trend of absences may result in a review of professional integrity by the Committee on the Academic and Professional Evaluation of Students (CAPES), at the discretion of the dean of student affairs.

MSTP students are encouraged to do the following:

- Meet with the Assistant Dean for Career Development early for assistance in residency planning.
- Consider returning to the MD program to allow for 18 to 24 months to complete MD training to allow flexibility for interviewing and USMLE exams.
- Discuss planned absences with clinical course directors early, prior to a clinical rotation, to better allow placement on a team to optimize the educational experience. We believe this guideline strikes an appropriate balance between increased flexibility for the MSTP students and assuring a meaningful educational experience on the core clinical rotations.

*The Washington University School of Medicine Absence Policy for Medical Students on Clinical Rotations was last approved by the Oversight Committee on Medical Student Education on November 4, 2019. All substantive edits to this policy require approval by Oversight Committee on Medical Student Education.*

# Phase 1 Attendance Policy

## Background

The profession of medicine requires the utmost commitment of time and energy to learning/education, patient care, research and other scholarly activities. The development of this commitment begins in Phase 1 of the Gateway Curriculum.

Students must recognize that teaching, learning and assessment in both clinical and nonclinical settings are dependent on the student's presence and participation in their education. Time spent away from an educational experience may decrease learning and impede effective assessment.

In keeping with 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. 354) for additional details.

## Policies/Requirement

Students are expected to attend all required sessions within Phase 1 of the Gateway Curriculum as specified within the learning management system. In the unusual circumstance that a student finds that they are unable to attend a required session, the student must complete an absence notification form in the learning management system that will be sent to the faculty lead, with a copy sent to the Office of Medical Student Education (OMSE). This form must be completed prior to the session that they will miss or as soon as possible after the session if missed due to sudden illness or emergency. In addition, students unable to attend a team activity should notify their team members by email. In the case of immersions, students must also notify by email the clinical team to which they have been assigned.

In the event that an absence is unavoidable, students will work with the faculty leads to develop a remediation plan for the missed session. All required assignments associated with a missed session must be completed. Faculty directors may require additional makeup work for missed sessions. Faculty leads may also designate some sessions as those that cannot be missed except under extreme circumstances because they cannot be made up. These sessions will be noted in the learning management system and should only be missed under extreme, unavoidable circumstances such as a medical illness or family emergency. Failure to attend a required learning activity without providing notification is considered an unprofessional behavior.

Attendance data will be tracked longitudinally by OMSE within the learning management system 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 Director of Assessment in collaboration with OMSE and will be reviewed by the Competency Attainment Committee as evidence contributing to attainment of competency in PROF-2: Exhibit high standards of professional integrity.

## Guidelines

Central monitoring of absences will reside with the Office of Medical Student Education and the Director of Assessment. A concerning trend of absences may be discussed with the Associate Dean of Student Affairs and the Director of Coaching and Student Success to ensure appropriate student support can be offered and provided. Faculty directors of required Phase 1 sessions will include a specific faculty contact in the learning management system associated with all required sessions.

*The Washington University School of Medicine Phase I Attendance Policy was last approved by the Committee on the Oversight of Medical Student Education governing body on February 19, 2021. All substantive edits to this policy require approval by the Committee on the Oversight of Medical Student Education governing body*.

# Preclinical Course Attendance Guidelines

## Attendance Guidelines for All Preclinical Courses

### Team Activities

Students are assigned to teams prior to the beginning of the course session and are accountable to these teams as they work together on a task. Team Activities allow for the development of interpersonal and communication skills as well as of the ability to work collaboratively and effectively in teams. These are essential competencies for all professionals and, consequently, attendance at Team Activities is required.

### Patient Presentations

Patient Presentations are live presentations by patients to learners during which patients recount their personal experiences. Attendance at Patient Presentations is required out of respect for patients and their time commitments.

### Other Activities

Attendance at events of additional activity types may be required for individual courses.

## Attendance Expectations for All Preclinical Courses

The expectation is that all students will be present for all sessions with required attendance. However, the Preclinical Curriculum Committee acknowledges that students may need to be excused from some of these sessions due to unavoidable illness, professional obligations, or significant personal events/ emergencies (hereinafter referred to as *unavoidable/emergency absences*). Thus, the Preclinical Curriculum Committee has agreed on the following guidelines regarding the maximum number of excused absences (including for illness) from required sessions:

### Maximum Number of Excused Absences Without Required Remediation

A student may miss no more than 10% of sessions (including for illness) with required attendance within an academic year. Individual courses will adhere to this 10% allowance for unavoidable/emergency absences unless they have fewer than 10 sessions requiring attendance; in these cases, the course director will set the number of allowable absences at a level higher than 10% but not exceeding 25% of required attendance sessions.

### Approval of Absences

Absences do not need to be approved, but the expectation is that they will be used for unavoidable/emergency situations. It is expected that students will not use all of the allowed unavoidable/emergency absences.

### Reporting of Absences

Students who ar eunable to attend a session are expected to contact the course director prior to the session that they will miss (or as soon as possible after the session if missing due to sudden illness or emergency). For planned absences, students should notify course directors well in advance of the absence. In addition, students unable to attend a Team Activity should notify their team members. Failure to attend a required learning activity without providing notification is considered an unprofessional behavior.

### Completion of Associated Assignments

All required assignments associated with a missed session must be completed. Course directors may require additional makeup work for missed sessions.

### Consequences for Exceeding the Maximum Number of Absences Within a Course

Absences beyond the allowed percentage within each course may result in one or both of the following:

1. A grade of Incomplete for the course will be given until remediation is completed. The remediation will be determined by the course director.
2. A Professionalism Concern Form will be filed.

### Addressing Concerning Patterns of Absences

Attendance data will be tracked longitudinally for all preclinical courses, and this data will be monitored by the associate dean for student affairs in collaboration with the Office of Medical Student Education. An absence will be recorded even when makeup work for a missed session is completed. Students for which a concerning pattern of absences is identified will be required to meet with the associate dean for student affairs. Students for which a professionalism concern is identified will

be referred to the associate dean for medical student education, and this may also result in referral to the Committee on the Academic and Professional Evaluation of Students (CAPES) (p. 356).

# 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 (WUSM) dedication to providing access to support and 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 WUSM 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 WUSM. The Student Health Services Office is located on the Medical School Campus and provides a full range of primary care medical, mental health, health promotion and wellness services. The staff consists of physicians, nurses, psychologists, and administrative support for those clinicians.

## 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 director of the educational activity (e.g., the clerkship director) and, if applicable, the supervising clinician of their clinical team as soon as possible. This is for 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 Absence Policy for Medical Students on Clinical Rotations (p. 351).

B. Responsibility of directors of required educational activities (e.g., the clerkship director)

1. Directors 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 clinical or course director and take appropriate action.

*The Washington University School of Medicine Medical Student Access to Healthcare Services Policy was last approved by the Committee on the Oversight of Medical Education on March 2, 2020. All substantive edits to this policy require approval by the Committee on the Oversight of Medical Education.*

# Leave of Absence (LOA) Policy

Return of students from involuntary leave of absence requires clearance of both the director of Student Health Services and the associate dean for student affairs.

I. **Voluntary LOA:** A student may request a leave of absence for academic or personal reasons by submitting a statement in writing to the Office of Student Affairs. Such a statement should include indication of the beginning and anticipated ending dates and a brief statement of the reason (academic or personal). Requests for leaves of absence must be approved by the associate dean for student affairs. Leaves of absence shall be granted for no more than one year, but in unusual cases may be renewed by the Committee on the Academic and Professional Evaluation of Students (CAPES) for additional time after discussion with the associate dean for student affairs. Students requiring a personal leave of absence for medical reasons must submit a supporting letter from the director of Student Health Services. A written statement of medical clearance will be required before the student may return from such a leave.

II. **Involuntary LOA:** If there is a reasonable basis for believing that the continued presence of the student on campus or in clinical rotations poses a substantial threat to the student, to patients, or to the rights of others to engage in their normal university functions and activities, the following procedures apply:

   A. The chancellor or his designate may impose an involuntary leave of absence when there is evidence that a student has committed an offense under these rules or the University's Judicial Code, and when there is evidence that the continued presence of the student on the university campus or as a participant in a clinical rotation poses a substantial threat to themselves, to patients, or to the rights of others to continue their normal university function and activities.

B. Imposition of the involuntary leave of absence may result in denial of access to the campus, prohibition of class attendance and/or prohibition of participation in clinical rotations.

C. If an involuntary leave of absence is imposed, the suspending authority shall prepare a written notice of the imposition and shall have the notice mailed certified or personally presented to the student. The written notice shall include a brief statement of the reasons therefore and a brief statement of the procedures provided for resolving cases of involuntary leave of absence under these rules.

D. The student shall be given an opportunity to appear personally before the suspending authority within five (5) business days from the date of service of the notice of imposition of the involuntary leave of absence. If the student asks to appear personally before the suspending authority, only the following issues shall be considered:
   1. Whether the suspending authority's information concerning the student's conduct is reliable; and
   2. Whether under all the circumstances, there is a reasonable basis for believing that the continued presence of the student on campus or in clinical rotations poses a substantial threat to the student, to patients, or to the rights of others to engage in their normal university functions and activities.

E. Within one week of the date of imposition of the involuntary leave of absence, the suspending authority shall either file a statement of charges against the student with the University Judicial Board, and shall have the statement or charges served, by mail or personal service, upon the student and the dean of the school or college or director of the program in which the student is enrolled, or initiate proceedings under these rules to convene a Disciplinary Committee.

F. A temporary suspension shall end
   1. when rescinded by the suspending authority, or
   2. upon the failure of the suspending authority to promptly file a statement of charges with the University Judicial Board or a Disciplinary Committee, or
   3. when the case is heard and decided by the University Judicial Board or the Disciplinary Committee.

Return of students from involuntary leave of absence requires clearance of both the director of Student Health Services and the associate dean for student affairs.

III. **LOA Impact on Financial Aid:** Students receiving financial aid should be advised that at the end of sixty (60) days or more leave of absence, the grace period for loan repayment during a leave of absence may be exhausted. In such cases there will be an obligation for the student to start payments. According to the federal rules under which loans are made, the use of a grace period during a leave of absence will generally mean that the schedule for loan repayment may be changed. Students who are receiving financial assistance should consult with the Financial Aid Office to determine the implications of a leave of absence for their financial aid.

IV. **LOA Impact on Tuition:** A student returning from a leave of absence of one year duration or less will maintain the same tuition rate. Students returning after more than one year leave of absence will assume the tuition rate of the class they are rejoining. Appeals of this policy should be submitted in writing to the registrar. Please refer to the Financial Information (p. 379) section on Registration, Payments, and Withdrawal & Refunds Policy and the effect of a leave of absence on tuition and other financially related matters.

For additional information please review the Student Information for Leave of Absence or Withdrawal (PDF) (http://bulletin.wustl.edu/medicine/policies/md-absences/Leave_of_Absence_Withdrawal_Handout_2018.pdf).

# Policy on Student Status and Benefits During Research Years or Leave of Absence

## MD/PhD

Student status is maintained while in the research phase of the MD/PhD programs. During research years, students are registered in either the graduate school or under the program granting the master's degree. Both student health and disability coverage are provided by the Division of Biology and Biomedical Sciences.

## Master's/MD

Student status is maintained while in the research phase of the MSCI and MPHS programs. Both student health and disability coverage are provided.

## Five-Year MD Program

### Research Year at WUSM

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 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 maintained throughout the approved research year. Students are 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 WUSM

Student status is not maintained during the leave of absence though 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 and Biomedical Sciences if funds are available. The Office of Financial Aid should be consulted for information regarding loan repayment and grace periods when on a leave of absence.

### Leave of Absence Year Away

Student status is not maintained during the leave of absence 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.

# MD: CAPES - Assessing Academic Achievement & Professionalism

The policies and procedures listed below are adopted by the faculty and administration of the School of Medicine concerning review of student academic performance and professional integrity.

Overall academic and professional evaluation of students at the Washington University School of Medicine (WUSM) will be made by the Committee on the Academic and Professional Evaluation of Students (CAPES). The Committee on the Academic and Professional Evaluation of Students operates under the Rules Governing Review of Student Performance. Please visit the CAPES (p. 356) section below for more information.

## Rules Governing Review of Student Performance

### Preface

This document describes procedures adopted by the faculty and administration of the School of Medicine concerning review of student academic performance and professional integrity. Students are encouraged to read this information for a thorough understanding of the contents. Any questions arising from the procedures laid out herein should be directed to the Office of Student Affairs or the Office of the Registrar.

Major revisions to this document will be approved by the Academic Affairs Committee.

Questions about this document may be directed to:

Lisa Moscoso, MD, PhD
Associate Dean for Student Affairs

Michael Donlan, PhD
Assistant Dean for Academic Affairs, Registrar

*Updated 1/25/2018*

## CAPES - Committee on the Academic and Professional Evaluation of Students

### Purpose and Jurisdiction

Students at the Washington University School of Medicine must demonstrate the ability to synthesize and apply knowledge and the capability of becoming a safe and effective physician. In addition, they must demonstrate the principles of professionalism including sound judgment, honesty, integrity, responsibility, a sensitivity and compassion for individual needs, and compliance with applicable laws, policies and regulations.

Serious or repeated academic failures or breaches of these principles in professionalism will be referred to the Committee on the Academic and Professional Evaluation of Students (CAPES) for review. Throughout the enrollment of a student, it is within the jurisdiction of the CAPES to terminate the enrollment of a student who has demonstrated serious academic failure or a breach of professionalism. The deliberations of the CAPES are generally positive in approach and are committed to the ultimate aim of assisting students to successfully complete the courses of study required by the school. The principle that careful selection of students will minimize attrition from the school is strongly endorsed by the CAPES.

The text contained herein outlines rules governing the review of student performance. For further information, refer to the Guiding Principles of Professionalism (p. 375) in the Policies section of this *Bulletin*.

### Responsibility of the Committee

The ultimate responsibility of the Committee on the Academic and Professional Evaluation of Students (CAPES) is to assess whether each student meets the academic and ethical standards necessary to enter the profession of medicine. To accomplish this mission, CAPES undertakes the following tasks:

- Student Advancement: The CAPES annually recommends promotion of students who have successfully completed all requirements of the current academic year to the studies of the subsequent year.
- Degree Recommendations: The CAPES recommends to the Executive Faculty those students who have successfully completed all prescribed requirements of the school and are qualified to receive the Doctor of Medicine degree.

- Academic Remediation Reviews: When a student is in need of academic support services, the CAPES will recommend student status and remediation measures, which may include entry of a student into an Individualized Study Program.
- Disciplinary Action: The CAPES will review cases requiring disciplinary action due to unprofessional behavior or a breach of integrity.

## Students for Whom the Rules Apply

- All students engaged in preclinical and clinical education requirements for the MD degree
- Students in all years of the Five-Year MD program
- All students in joint and dual degree programs including but not limited to MD/MPH, MD/MSCI and MD/PhD (MSTP) programs taking preclinical or clinical portions of their MD education

  **Joint or Dual Degree Students:**
  When a student enrolled in a joint or dual degree program is found in violation of the other program's academic or professional integrity policy or is found to have committed any disciplinary violations, including violations of the University Student Conduct Code, such matters may be brought to the attention of the CAPES for review and further action. Notwithstanding decisions made by the other schools or programs, the CAPES reserves the right to take further action when a student is found in violation of such policies. If a student enrolled in a joint or dual degree program is not meeting academic performance expectations of the other program or school such that the student's status in that program or school may be impacted, the CAPES reserves the right to determine whether any action should be taken with respect to the student's status at WUSM.

## CAPES Membership

- **Appointed and ex officio membership**: Twelve voting faculty members of the CAPES are appointed for a four-year term by the dean of the School of Medicine following nomination by the department heads and/or associate deans. Faculty members may be reappointed to serve on the CAPES. Membership will include both clinical and preclinical department faculty. In addition, the CAPES membership will include, in ex officio capacity, the registrar (nonvoting) and the associate dean for student affairs (nonvoting). The senior associate dean, the associate deans for medical education, admissions and diversity programs, and the director of Student Health Services may attend the CAPES meetings as nonvoting participants.
- **Chair**: A faculty member will be appointed by the dean from within the CAPES committee to serve as chair. The term of the chair will be four years and may be reappointed.
- **Guests:**

  1. When the committee is addressing issues related to academic performance, a course director who is not a member of the CAPES but who submitted a Fail/Incomplete grade for a student who is to be discussed at the meeting will be present at the meeting to provide information regarding the student's performance. A course director may send a designated representative or may submit information in writing. In the event that a course director or designated representative is not present or sufficient information has not been forwarded, final action for the student will be deferred until adequate information is available.
  2. Similarly, when the committee is addressing issues of professionalism, the individual filing the professionalism concern form will be present for the meeting or in some instances may be allowed to submit information in writing.
  3. Any faculty, administrator or staff may be invited at the discretion of the chair.

## Meeting Frequency and Quorum

The CAPES meetings must occur in a timely manner after final examinations or re-examinations, as soon as practical after grades are submitted to the registrar. Generally grades will be submitted to the registrar within 10 days of completion of an examination. A meeting of the CAPES may also be convened at any time such that timely review of a matter is deemed necessary.

Seven voting members must be present to consider academic or disciplinary actions.

# Grades

## Grade Scales

Courses in the first- and second-year curriculum are evaluated on a pass/fail basis. Third- and fourth-year courses use a graded scale. Specific grades for each grade level are detailed in the Evaluation and Grades (p. 370) section of this *Bulletin*.

## Grade Submission

Final grades will be submitted online within 10 business days of the final examination or final class meeting for the first two years. For the third and fourth years, grades are due within four weeks of the receipt of standardized examination scores or the last day of the rotation if no examination was given.

## Grade Appeals

Students may appeal a grade with the course director by filing a grade appeal request form (https://registrar.med.wustl.edu/resources/#Forms). Grade appeals must be filed within 10 business days after the grade has been posted.

If reasons beyond the student's control delay the appeal past the July 15 deadline, the registrar must be notified so that the final transcripts, grade distributions and class rankings for the match process can be held pending resolution of the matter. If this notice is not received by the registrar prior to the deadline, the new grade cannot be accepted. Students participating in the residency match process should also notify the office of career counseling whenever a grade appeal is in process. After the course director considers any appeal, they will indicate the resolution for the appeal on the grade appeal form and forward it to the registrar and the associate dean for student affairs.

**No grade changes are permitted for the prior academic year after July 15.**

## Grade Remediation

The CAPES may invoke remediation requirements for individual courses that are different from those determined by the course director. In such cases, the CAPES determination will supersede that of the course director. The CAPES may also require the student to repeat a full academic year or portion thereof if it is judged necessary given the academic history. Occasionally, in order to remediate a failed course in the first or second year, students are permitted to complete equivalent course work at other institutions with the permission of the responsible department and written notification to the registrar.

## Grade Point Average, Ranking and Distribution

The School of Medicine does not calculate grade point averages. Hours of credit appearing on the transcript reflect clock hours scheduled for the course or clinical rotation. For the purpose of residency applications only, students are placed in the upper, middle or lower third of the class according to a formula which considers weighting of courses in each academic year. This ranking is not recorded on the permanent academic record and does not appear on transcripts. It may appear in the Medical Student Performance Evaluation (MSPE). At the conclusion of the academic year, when all the official grades have been received, the official transcript, in addition to listing courses and grades achieved, gives the grade distribution in each course with the exception of elective and selective courses.

Please visit the Evaluation and Grades (p. 370) section of this *Bulletin* for more information.

# Academic Support and Accommodations

## Tutoring

Students experiencing difficulty in any course may request tutorial assistance. Such requests should be initially directed toward the course director and thereafter to the associate dean for student affairs. Students who are repeating courses will be offered tutorial assistance, and the CAPES may also require it. There is no charge to the student for tutorial assistance.

## Individual Study Program

Students who have difficulty handling the normal academic course load will enter an Individual Study Program (ISP) requiring five years to complete rather than four years. The intent of an ISP is to optimize the prospect that the student will successfully complete the curriculum. An ISP may be requested by the student or recommended or required by the committee.

1. **ISP: Scope and Sequence**
   The content and sequence of courses will be determined by the associate dean for student affairs with the input from the student, relevant course directors and the CAPES. The plan for execution of an ISP will be recorded in the student's file in the Registrar's Office and a copy will be provided to the student.
2. **ISP: Examination Schedules**
   Unless extenuating circumstances exist, ISP students are required to take the examinations for a particular course in their usual temporal relationship to the course work. Requests for exceptions should be recorded in the student's file in the Office of the Associate Dean for Student Affairs. Approval of such requests is considered according to the Washington University School of Medicine guidelines for exam administration (p. 370) found in the Policies section of this *Bulletin*.
3. **ISP: Single Fail or Incomplete Grade**
   In the event that a single Fail or Incomplete grade is recorded for a student after entry into an ISP, the CAPES will again review the student's record. Consequences may include remediation, repeat of the course or dismissal from the school.
4. **ISP: Grounds for Dismissal**
   Students on an ISP who have not successfully completed and received a grade of Pass or above in all required courses of the first- and second-year curricula by the start of the second six-week period in the year of the clinical clerkship may be dismissed from the school.

## Accommodations

It is the responsibility of students to alert the CAPES regarding personal concerns, health problems, or any other factors that may be adversely affecting their academic performance, and to bring such matters to the attention of the director of Student Health Services or the associate dean for student affairs for possible accommodations (p. 349).

# Indications for Review of Academic Performance

"Indications for Review of Academic Performance" refers to the guidelines used at the school in the event a student either fails exams or a course or fails to complete a course in the requisite time. **In general, the school guidelines for the "Indications for Review of Academic Performance" are as follows:**

## Exam Failure

Exam failures can warrant meeting with the associate dean for student affairs (ADSA) and/or lead to referral to the CAPES. Consult the conditions below for further details relevant to each student-year level.

## Single Course Failure – Meeting with the ADSA

In the event of any initial failure of a course the student will meet with the associate dean for student affairs (ADSA) to formulate a remediation plan in coordination with the course director.

## Multiple Course Failures – Referral to the CAPES

**Two or more courses in one year**

- If either a failing or incomplete grade in two or more courses occurs in a single year, the student's academic performance will be referred to the CAPES for review and determination of a course of action.

**Three courses (cumulatively across multiple years)**

- If either a failing or incomplete grade in three courses occurs across multiple years, the student's academic performance will be referred to the CAPES for review and determination of a course of action.

## Individualized Study Program (ISP)

Refer to the ISP section (p. 358) within this CAPES policy for full details on guidelines pertaining to the review of students engaged in an ISP.

## Time Constraints

**Three-year rule:**

No student may take more than three years to complete the course work required for the first two years of study. Time periods included in an approved leave of absence are not counted in these three years.

**Two-year rule:**

In the absence of extenuating circumstances or an approved leave of absence, no student may take more than two academic years to complete the course work required in any individual curricular year. Time periods included in an approved leave of absence are not counted in these two years.

## Maximum Attempts at Passing a Course

Students have a maximum number of three attempts to pass any individual course during enrollment in the school.

## Joint or Dual Degree Program Students

If a medical student enrolled in a joint or dual degree program is not making satisfactory academic progress or is not meeting academic performance expectations of the other program or school such that the student's status in that school or program may be impacted, the CAPES reserves the right to determine whether any action should be taken with respect to the student's status within the School of Medicine. Further details pertaining to joint or dual degree program students are listed in the section describing students for whom the rules governing student performance apply.

**Note:** Specific conditions warranting review of academic performance are detailed below for each student-year level. Conditions for review of student performance due to professionalism issues are found in the policy section regarding professionalism.

# First-Year Students – Indications for Review of Academic Performance

All first-year courses must be completed before the start of the second-year curriculum. Failure to meet this requirement typically means one of the following conditions has occurred:

## Failure of a Single Exam (for First-Year Medical Students)

Failure of a single exam is not an immediate indication for review of academic performance by the CAPES. However, failure of a single exam that comprises a significant portion of the final grade (typically 20% or more) must be reported by the course director to the associate dean for student affairs (ADSA). The course director may allow one attempt at remediation of the exam at a time the course director prescribes. The scheduling of the remedial exam will be agreed upon by the course director and the student, but it should generally not extend beyond 30 days after the end of the course. Days of recess for winter and spring break will not be counted in the 30 days. A grade of "E" (i.e., temporary grade signifying the pending make-up of a failed exam) will be submitted by the course director if the remedial

exam is not accomplished within the course dates. This grade will stand on the academic record until it is replaced with a valid final grade of Pass or Fail. Grades of "E" that are not resolved within 30 days will be replaced with a grade of Fail (F). In rare circumstances, the ADSA may approve an extension of this deadline. If the student successfully remediates the exam, and has otherwise passed the course, a Pass (P) will be recorded by the registrar. A student may remediate only one examination in any course.

### Failure of Two or More Exams

The ADSA may request that the CAPES reviews performance of a student who has failed two or more examinations. In such cases, the CAPES will recommend a course of action.

### Failure of a Course

If a student receives a Fail/Incomplete grade in a single first-year course, the ADSA will meet with the student to formulate a remediation plan in coordination with the course director. The remediation plan may include the following options:

- Take a re-examination as approved by the course director.
- Enroll in and successfully complete, at the level designated by the course director, a summer course at a different institution, such a course being completed and passed by the beginning of the second year.

If a student fails to successfully complete an approved summer course or fails the re-examination taken to remediate a failed course, they will be referred to the CAPES for review and recommended course of action. The CAPES may require the student to enter an ISP or be dismissed from the school. The CAPES may permit a second re-examination. If the second re-examination is failed, the student will be dismissed from the school.

### Failure of Two or More Courses

A student for whom the registrar has recorded a Fail/Incomplete grade in two or more courses during the first year will be referred to the CAPES for determination of a course of action. The committee may decide to permit the student to take re-examinations, if a re-examination has not already been taken. Such re-examinations will generally occur during the inter-academic year break. If a re-examination is failed the student may be required to enter an ISP or be dismissed from the school.

## Second-Year Students – Indications for Review of Academic Performance

Students in their second year will be referred to either the associate dean for student affairs (ADSA) **or** the CAPES for review and resolution of a recommended course of action when any one of the following conditions has occurred:

### Conditions for Meeting with the ADSA for *Second-Year* Students

**Failure of a single interval exam within a year-long course or failure of one block-long course (for Second-Year Students):**

- An initial failure of a single exam does not signal an automatic referral to the CAPES.
- A second-year student who receives a final grade of Fail or Incomplete in a single interval exam in a year-long course will first meet with the ADSA.
- A second-year student receiving a failing/incomplete grade in one block-long course must first meet with the associate dean for student affairs (ADSA).

### Re-examination Scheduling and Resolution

- Re-examinations for year-long courses will generally be offered during the inter-academic year break, prior to entry into the third year.
- Re-examinations for individual block-long courses will generally be offered at a time determined by the course director and the ADSA. All such re-exams must be offered to students and completed prior to the start of the next academic year.
- Students failing the re-examination of a single block-long course (**or** failing a re-examination of a single year-long course) will be referred to the CAPES to determine a course of action. If the examination is failed for a third time, enrollment will be terminated.

### Deferral of Clinical Rotation Start Date

The CAPES may allow the student to defer beginning the clinical rotations so that re-examinations may be taken up to six weeks after the beginning of the usual cycle of clinical clerkships. Such extra time used for study and preparation will ordinarily mean that the student will not have the usual unscheduled time in the elective year.

*Note*: No student is permitted to begin Clinical Rotations of the Third Year until all first- and second-year courses have been successfully completed.

### If Re-examinations Are Not Allowed

- **ISP:** In the event that the CAPES decides to not permit re-examination, an ISP may be recommended.
- **Dismissal/Termination:** The CAPES has the option to recommend any such student be dismissed.

### Conditions for Referral to the CAPES for *Second-Year* Students

**Second-year students will be referred to the CAPES for review and resolution under any of the following categories:**

1. Failure of an interval exam in one year-long course **and** one block-long course
2. Failure of two interval exams in year-long courses
3. Failure or Incomplete recorded in any re-examination
4. Failure or Incomplete grade in one year-long course
5. Failure or Incomplete grades in two or more block-long courses

### Remediation for *Second-Year* Students Reviewed by the CAPES

**Re-examinations allowed:**

The committee may permit the student to take re-examinations in the courses for which a Fail or Incomplete has been recorded (provided that a re-examination has not already been taken for a given course). Such re-exams will generally occur during the inter-academic year break. *Note*: In the event that a Fail/Incomplete grade is recorded after a re-examination, the CAPES may require that a student enter an ISP or that enrollment in the School of Medicine be terminated. The CAPES may decide that a second re-examination may be offered.

### Cumulative Academic Review *(at End of Second Year)*

Prior to promotion to the clerkship year, the CAPES will review the cumulative academic record of each student brought forth by the associate dean for student affairs (ADSA) to determine whether the student's academic performance justifies advancement to the clinical phase of the medical education without warning. Typically, multiple remediated examinations and/or failing grades during the first two years of the curriculum will raise concerns about the student's knowledge and readiness to participate in clinical care of patients.

**Students with overall records indicating globally poor performance may have one of the following actions taken upon them with written notification:**

- Required to repeat specific preclinical course work
- Advancement to Clinical Year with Academic Warning, with a required meeting with the ADSA in order to –
  - Review and pursue available resources for academic intervention
  - Review and plan an effective clerkship schedule to consider schedule changes helping to facilitate successful clinical experiences
  - Recommend students seek tutorial assistance through each clerkship director and address any additional or unique circumstances
- Probation – Contingencies for continued enrollment on probationary status and for return to good standing will be specified by the CAPES.
- Dismissal – Globally poor performance may be deemed grounds for dismissal by the CAPES. In addition, a third-year student who is advanced with academic warning and then fails any component of a clinical clerkship may be dismissed from the school.

## Indications for Review of Academic Performance for Third and Subsequent Years

Failure of any core clinical rotation without successful remediation will prevent proper advancement toward the student's degree and may result in significant consequences for career planning. For these reasons, the following list itemizes the conditions under which the CAPES committee will convene.

### Failure of One Course Required for *Third or Subsequent Years*

The ADSA will meet with any student for whom a single Fail/Incomplete/E grade has been recorded for a course beyond the second year of the MD curriculum. Discussion will include the requirements stipulated by the relevant course director in order to remediate the academic encumbrance. Options will generally include a re-examination or the repeating of all or a portion of the course. If a single failing grade for a clerkship course or elective has been recorded, the student ***may*** *be* referred to the CAPES for review and course of action. **If a Fail grade has been entered *following the prescribed remediation*, the student *will* always be referred to the CAPES to determine a course of action**. When such a student is referred to the CAPES, the committee may permit a re-examination or retaking/repeating of all or any portion of the course. If the course is failed a third time, the student will be dismissed from school.

### Failure of any Component of a Clerkship while on Academic Warning

A student who advances to the clinical years under academic warning, and who fails any component of a clerkship will be referred to the CAPES for action including possible dismissal from the school.

### If Poor Academic Performance is Reported for Two or More Courses

The ADSA **may** request that the CAPES review performance of a student who has been reported as having demonstrated poor academic performance in two or more courses at interval evaluations conducted throughout the courses. In such instances, the CAPES may determine a course of action.

### Failure of Two or More NBME Subject/Shelf Examinations

Any student who fails to achieve a passing grade on any two or more NBME subject/shelf examinations conducted as part of any clerkship evaluation will be referred to the CAPES for review and course of action. *Note*: A passing grade for any subject/shelf examination is defined as any score greater than or equal to the 10th percentile as reported by the NBME.

### Recording of Failed Grades, Remediation, Re-examinations, Repercussions, or Dismissal (for Students in their *Third Year and Beyond*)

A student who fails any clinical component of a clerkship or elective will have a Fail grade recorded on the permanent academic record. At the discretion of the course director or the CAPES, the student must repeat either the portion failed or the entire clerkship or elective in order to remove the academic degree encumbrance. The failing grade will, however, remain visible on the permanent academic record. Any new passing grade for any such remediated course will display on the transcript; thus, both the original failing grade and the newly recorded grade for the course will be visible on the permanent academic record.

In addition, a failing grade for clinical clerkships will be officially recorded onto the permanent academic record whenever a student fails the subject/shelf examination for the second time. A failing grade is defined as a score of less than the 10th percentile as reported by the NBME.

For students referred to the CAPES for failed/incomplete grades, the committee may endorse or amend the remediation recommendations of the corresponding course director(s). In the event a student fails a course remediation defined by the course director and approved by the CAPES, the CAPES may require that the clerkship rotation be repeated or that enrollment of the student in the school be terminated. Students will generally be permitted three attempts to achieve a passing grade in any clerkship course. If three failing NBME subject examination grades or final clerkship grades have been submitted for a course, the student will be dismissed from the school.

## Procedures Concerning Review of Academic Performance

### A. Convening a Meeting

Actions for Academic Review of students shall be referred to the CAPES for consideration by way of the associate dean for student affairs (ADSA) or registrar. The ADSA will convene a meeting of the CAPES, notifying the student in writing regarding the reason for the review and the date, time, and place of the meeting. A meeting of the CAPES may be convened at any time when a timely review of an issue is deemed necessary.

### B. Attendees

The associate dean for student affairs, the registrar, and the course director(s) or their designated representatives shall present the matter to the CAPES in a closed and confidential CAPES meeting.

### C. Student Responsibility

All students will be asked to be available to appear before the committee to provide additional information relevant to the concern. If the student fails to be available to appear at the meeting, the committee may postpone the meeting or may conduct the meeting and impose sanctions without the student present. Failure of a student to appear or provide information requested by the CAPES may result in the committee's filing a professionalism concern form. Meetings may be rescheduled at the discretion of the CAPES chair.

It is the responsibility of the student to alert the CAPES of any extenuating circumstances or contributing factors that should be considered regarding the student's status. The student shall be permitted, upon request in advance of the CAPES meeting, to appear before the CAPES on their own behalf. At the student's request, they may be accompanied by a member of the faculty, staff or fellow student of the school.

### D. Student Record Considered

A student's entire academic and professionalism record will be considered in deliberations regarding student status.

### E. Meeting Minutes

A record of the CAPES meeting shall be preserved and will be available for review by the School of Medicine's Appeals Committee, as necessary.

### F. Outcomes Possible

Actions taken by the CAPES may include but are not limited to dismissal, suspension, probation, defined penalty, advancement with academic warning, remediation, and/or additional oversight. The CAPES may also rule that the MSPE/Dean's Letter should include a citation regarding the matter. The CAPES decision shall be made by simple majority unless the vote is for dismissal which requires a three-fourths majority.

### G. Notifying Students of Final Committee Decisions

The associate dean for student affairs will inform the student verbally of the decision of the CAPES. The registrar will inform the student in writing within 10 business days.

## Indications for Review of Professional Integrity

Matters involving a possible breach of professional integrity shall be brought to the attention of the associate dean for student affairs. The individual(s) raising the questions of possible misconduct shall present a Professionalism Concern Form (https://registrar.med.wustl.edu/resources/#Forms) providing detailed written information as necessary. Individuals submitting such forms are reminded of the need for complete confidentiality regarding all matters of conduct.

Behaviors inappropriate to the medical profession shall include but are not limited to:

- cheating or unauthorized use of materials during examinations
- abuse
- misrepresentations
- other seriously improper conduct in relation to patients or colleagues
- breach of confidentiality and trust
- misconduct in violation of university policies
- violation of the University Student Conduct Code
- illegalities
- substance abuse
- failure of judgment including that related to noncompliance in the treatment of any personal medical condition
- misrepresentation or failure in personal actions or meeting obligations
- any combination of the above items, and others which might raise serious unresolved doubts about the integrity of the student with regards to entering the practice of medicine

For more information, consult the Guiding Principles of Professionalism (p. 375) under the Policies section of this *Bulletin*.

## Procedures Concerning Review of Professional Integrity

At the discretion of the associate dean for student affairs, in cases of serious or repeated breaches of professional integrity, the associate dean for student affairs will convene a meeting with the associate dean for admissions, the associate dean for medical student education, or the senior associate dean for medical education to review the complaint(s) and to decide whether further action is necessary.

If further inquiry is deemed necessary, the associate dean for student affairs and either the associate dean for medical student education, the associate dean for admissions, or the senior associate dean for medical education will discuss the complaint with the student. If the two associate deans deem that further action is warranted, the following procedure will occur:

### A. Convening of Meeting

The associate dean for student affairs will convene a meeting of the CAPES. Whenever possible, the CAPES shall convene within two weeks after the initial meeting between the student and the associate dean for student affairs. If the person bringing the complaint is a member of the CAPES, they will not vote but may participate in the discussion. If the person bringing the complaint is not a member of the CAPES, they will be asked to present the complaint and will then be excused. The CAPES chairperson will oversee the procedures of the meeting. The registrar will record the minutes.

### B. Gathering of Pertinent Information and Meeting Attendees

Prior to the meeting, the associate dean for student affairs will forward information concerning the matter to the committee. In addition the associate dean for student affairs will inform the student in writing regarding the time, date and place of the meeting. A copy of the complaint will be provided to the student. The notification shall state that the proceedings are confidential. The student may bring a faculty member, staff member or fellow student for guidance and support. If this person is not a fact witness to the complaint, they may not address the committee.

### C. Student Responsibility

Any student to be considered at a CAPES meeting will be asked to be available to appear before the committee to provide additional information relevant to the concern. If the student fails to be available for the meeting, the committee may postpone the meeting or may conduct the meeting and impose sanctions without the student present. Failure of a student to appear or provide information requested by the CAPES may result in the committee's drawing adverse conclusions. Meetings may be rescheduled at the discretion of the CAPES chair.

### D. Student Record and Pertinent Documentation/Materials

The CAPES will consider evidence which tends to prove or disprove the alleged conduct. If the CAPES finds that the student engaged in misconduct, it may consider additional evidence of prior conduct, evidence as to the charged student's character, the student's entire academic and disciplinary record, or any other evidence which would assist the CAPES in determining appropriate action. The chair of the CAPES will rule on whether or not evidence or testimony will be considered. The CAPES has neither the advantages nor limitations inherent in a court of law. During the meeting the student will have access to the written evidence presented and may present evidence and fact witnesses on their own behalf. The student should be prepared to discuss the circumstances of the complaint after which the CAPES will excuse the student from the room.

### E. Objective Approach By Committee

The purpose of the CAPES meeting is to provide fair and prompt review of the inquiry. The committee is not positioned in an adversarial role against the student, but simply serves to review the evidence as presented and determine a decision regarding disciplinary action if necessary. The decision as to whether the student committed the alleged act will be made solely on the basis of evidence and testimony presented at the meeting. Innocence of the student will be presumed. A CAPES member must find in favor of the student unless the member is persuaded that it is more likely than not that the student engaged in the alleged misconduct.

### F. Outcomes Possible

Actions taken by the CAPES may include but are not limited to dismissal, suspension, probation, defined penalty, fine and restitution, advancement with academic warning, remediation and/or additional oversight. Contingencies for continued enrollment on probationary status and for return to good standing will be specified by the CAPES in each individual case. The CAPES may also rule that the MSPE/Dean's Letter should include a citation regarding the matter. The CAPES decision shall be made by simple majority unless the vote is for dismissal which requires a three-fourths majority.

### G. Notifying Student of Committee Decisions

The associate dean for student affairs will inform the student verbally of the decision of the CAPES. The registrar will inform the student in writing within 10 business days.

### H. Meeting Minutes and Confidentiality

The record of such proceedings will be held confidentially with access restricted to committee members, the student involved and relevant members of the administration.

### I. Disclaimers

- The university does not tolerate retaliation against individuals who bring forward complaints or who participate in the CAPES process.
- Unless determined by the associate dean for student affairs that extraordinary circumstances exist, the student will be permitted to continue in the usual academic activities during CAPES proceedings. However, if there is a reasonable basis for believing that the continued presence of the student on campus or in clinical rotations poses a substantial threat to the student, to patients, or to the rights of others to engage in their normal university functions and activities, the procedure outlined under the school's Leave of Absence Policy (p. 351) will apply.

### J. Both Academic Performance and Professionalism Concerns Exist

Should a student be referred to the CAPES for an issue involving both academic performance and professionalism concerns, the procedures for Professionalism Concerns will be followed.

## Appeals Process

The School of Medicine has the right and responsibility to assure that each student, during the time of enrollment, demonstrates levels of academic achievement and ethical stature appropriate to the practice of medicine. The school must also ensure provision of fairness in discharging those rights and responsibilities. As such, an appeals process is in place as outlined below:

### A. Request for an Appeal

Within 14 working days of the date on which an academic or disciplinary decision is rendered by the CAPES, the student may request in writing to the registrar, that the School of Medicine's Appeals Committee review the record of the CAPES decision to determine that the appropriate CAPES procedures were followed or that the Appeals Committee requests that the CAPES consider additional, new relevant information which was not previously presented to the CAPES for good cause. The letter to the registrar should include the basis for appeal as well as any new relevant information and an explanation as to why it was not timely presented to the CAPES.

### B. Establishing an Appeals Committee

An Appeals Committee, composed of faculty members appointed by the dean of the School of Medicine, shall be created to review appeal of decisions by the CAPES. Members of the CAPES may not be appointed to the Appeals Committee. A quorum of this committee shall consist of five members.

### C. Review by the Appeals Committee

The Appeals Committee shall review the record of the CAPES decision solely to determine whether the pertinent CAPES procedures were followed and whether all relevant information was considered by the CAPES. If the appeal is based on a contention that all relevant information was not presented to the CAPES, the written appeal must provide the Appeals Committee with adequate reason why the student did not present this information at the CAPES meeting in question. In all cases, the Appeals Committee shall not substitute its judgment of the facts or its opinions of the merit of the matter for those of the CAPES.

## D. Appeals Committee Decision Types

1. **Remand the case to the CAPES**
   The Appeals Committee may decide to remand the matter to the CAPES for reconsideration with its explanation for the remand. If the matter is remanded to the CAPES, all documents, minutes of the Appeals Committee meeting, and information submitted by or for the student in support of the appeal will be made available to the CAPES.
2. **Denial**
   The Appeals Committee may decide to deny the appeal.

## E. Decision Notification to the Student

The Appeals Committee shall provide its decision in writing to the student, the dean of the School of Medicine, the associate dean for student affairs and the registrar. The associate dean for student affairs shall determine whether the student may continue their curriculum pending the Appeals Committee review of a CAPES decision.

## F. Student Appeal to the Dean

Within 10 business days of the date of an Appeals Committee decision, the student may request in writing that the dean of the School of Medicine review the decision of the Appeals Committee. The decision of the dean of the School of Medicine shall be final.

# Glossary

The following definitions are applied when the indicated terms are used in relation to the foregoing rules concerning review of academic performance and professional integrity:

**Academic Warning, Advancement with**

A supervised status that may be imposed if a student's cumulative academic review indicates that special oversight is warranted. Refer to the sections on Cumulative Academic Review and Academic Warning for additional information.

**Action, Disciplinary**

An action, including counseling and penalties, taken by the School of Medicine, after consideration of the disciplinary problem.

**Administrative Withdrawal**

Termination of a student's enrollment from or eligibility to return to the School of Medicine by the university where the student has:

A. failed to register and has not sought a leave of absence; or

B. not returned from an approved leave of absence within the designated period of time and where an extension of the leave of absence has not been timely requested and approved by the CAPES.

**Dismissal, Academic**

Involuntary separation of a student from the School of Medicine because they have not met the academic requirements.

**Dismissal, Disciplinary**

Involuntary separation of a student from the School of Medicine as a result of action taken because of misconduct.

**Good Standing**

As a record or transcript notation, it signifies that the student is eligible to continue, to return, or to transfer elsewhere. It implies good academic standing as well as good citizenship and replaces such terms previously used as honorable dismissal, honorable withdrawal, withdrawn, voluntary withdrawal, eligible to return and clear record.

**Grade, Incomplete**

Indicates there is still a possibility of credit after further work. Used when the instructor is not prepared to give a final mark for the term in view either of sickness of the student or some justifiable delay in the completion of certain work. It is accompanied by a note that explains the circumstances and indicates how and when the incomplete may be resolved. A definitive mark for the term is recorded on the official transcript when the work is completed and the incomplete grade is removed. In case the work is not completed within the time allowed, the recorded grade will be changed to fail.

**Permanent Academic Record**

The all-inclusive abstract of academic achievement. This is also commonly referred to as the official educational record or official transcript.

**Probation**

Probation status may be for academic and for disciplinary reasons. Academic probation is the result of unsatisfactory scholarship. It is not a penalty but a warning and provides an opportunity to improve. Usually the student is required to make regular specified improvement in his record in order to avoid dismissal.

Disciplinary probation is the middle status between good standing and suspension or dismissal. The student remains enrolled but under stated conditions according to school policies. Disciplinary probation covers a stated trial period during which it is determined whether the student is returned to good standing having met the stated requirements or dismissed from enrollment at the end of the period for failure to meet the stated requirements.

**Professionalism Concern Form**

A form completed by a member of the university community to communicate an instance of unprofessional behavior to the associate dean for student affairs. Serious or repeated instances of unprofessional behavior may be referred to the CAPES by the associate dean for student affairs.

**Suspension**

Suspension is an involuntary separation of the student from the school but it differs from dismissal from enrollment in that it implies and states a time limit when return will be possible. Thus, suspension may extend for a specified time, until a specified date or until a stated condition is met.

**Withdrawal**

A release from enrollment. A student may request that they be allowed to withdraw from enrollment. Such requests are directed to the registrar or the associate dean for student affairs. When a student has requested withdrawal status, the school, by action of the CAPES, will determine whether the withdrawal will be annotated with good standing or not in good standing in the official academic record. Such annotations may be accompanied by explanations in the official educational record.

## Appendices

### Evaluations and Grades

Please visit the Evaluation and Grades (p. 370) section of this *Bulletin* for more information.

### Grade Appeal Form

Please visit the Office of the Registrar (https://registrar.med.wustl.edu/resources/#Forms) website for more information.

### Professionalism Concern Form

Please visit the Office of the Registrar (https://registrar.med.wustl.edu/resources/#Forms) website for more information.

## CAPES Booklet

A booklet of this information (PDF) (http://bulletin.wustl.edu/medicine/policies/md-assessment/CAPES_Booklet.pdf) that includes a table of contents and an index is also available.

# MD: 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 to provide outstanding care. To fulfill this mission as an academic teaching hospital, we have created this clinical supervision policy to direct our clinical health care teams with the oversight of our medical students.

LCME Standards 9.2 and 9.3 require that a medical school ensure members of the school's faculty provide supervision of medical student learning experiences throughout required clerkships. Furthermore, we must ensure that medical students in clinical learning situations involving patient care are appropriately supervised at all times 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 that the activities supervised are within the scope of practice of the supervising health professional.

For the purposes of this policy, the following definitions will be used. *Direct supervision* will mean that the supervising physician is physically present (or continually on virtual telehealth visits) with the student and the patient. *Indirect supervision* will mean that the supervising physician is not physically (or continually on virtual telehealth visits) present with 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 physician remain physically present within the hospital or other site of patient care. The supervising physician may include any member of the physician healthcare team, including residents, fellows, and attending physicians. There are also some situations in which it is appropriate that direct supervision be provided by a nurse or other healthcare provider, so long as the specific clinical activity falls within their scope of practice as specified below.

## Policies

Supervision of medical student learning experiences involving patient care is provided on clerkships and other clinical courses by members of the school's faculty. Faculty oversee the clinical curriculum by setting expectations for appropriate physician healthcare team members about the level of student supervision required with patient care activities and the level of responsibility delegated to the student. Course directors are responsible for communicating supervision requirements according to a student's level of training to members of the

physician healthcare team. These teams are made aware of student clinical expectations, the level of student supervision, and the level of responsibility given to a student according to the student's level of training.

Supervision will need to be defined by the clinical environment and patient care activity. Below are several examples of types of patient care activities.

### Physical Exam

Students will be equipped with the basic skills necessary to perform general physical exam techniques commensurate with their level of training as they enter the clinical training environment. At the discretion of the physician healthcare team and in accordance with course-specific guidelines, students are able to perform general physical exam techniques under indirect supervision, excluding techniques defined as "sensitive."

Some physical exam skills are considered sensitive and will always need to be performed under the direct observation of a chaperone who is the same gender as the patient, even if the physician healthcare team determines that the student is capable of performing these exams under indirect supervision. These include — but are not restricted to — external genitalia exam on any patient, rectal exam on any patient, and breast exam on any person identifying as female. Infant external genital exams can be performed under indirect supervision without a chaperone at the discretion of the supervising physician. Pelvic examinations must always be performed under the direct supervision of a member of the physician healthcare team. Please refer to the "Patient's Rights" policy for additional information regarding pelvic bimanual exams performed when the patient is under anesthesia.

### Procedures

Students may not perform procedures without direct supervision by a member of the physician healthcare team or another health professional so long as the procedure is within that professional's scope of practice (e.g., a nurse supervising a venipuncture).

If any member of the physician healthcare 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. Students will not be down-graded or in any other way penalized for reporting concerns about suspected violations of the Clinical Supervision Policy.

## Guidelines

If a student has concerns about a 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, the student can then approach the Associate Dean for Student Affairs, the Senior Associate Dean for Education, or the Office of the Ombuds for WUSM.

*The Washington University School of Medicine Clinical Supervision Policy for Medical Students on Clinical Rotations was last approved by the Academic Affairs Committee on June 11, 2020. All substantive edits to this policy require approval by the Academic Affairs Committee.*

# MD: Continuous Quality Improvement

## Background

The Liaison Committee on Medical Education (LCME), per element 1.1, expects that a medical school engages in ongoing planning and continuous quality improvement processes that establish short- and long-term programmatic goals, that result in the achievement of measurable outcomes that are used to improve programmatic quality, and that ensure effective monitoring of the medical education program's compliance with accreditation standards.

Continuous quality improvement is designed to create a seamless system for monitoring and improving medical school programs and should be transparent to all relevant stakeholders. Washington University School of Medicine (WUSM) is committed to exceeding these standards.

## Policies/Requirement

A. Monitoring of accreditation standards will be led by the Program Evaluation and Continuous Quality Improvement (PE/CQI) unit in collaboration with appropriate person(s), unit(s) and/or department(s). The following process will take place annually or more frequently as needed:

1. The data collection instrument element requirements will be sent to the responsible person(s), unit(s) or department(s) who will be asked to review, edit, add and/or remove information that fulfills the required response. The information will be organized and tracked by the PE/CQI unit using various software and project management tools.
2. The PE/CQI unit will review the submitted information to assess whether the information fulfills LCME and institutional requirements based on research, benchmarking, Secretariat calls, annual internal surveys and Association of American Medical Colleges survey data.

3. For areas in which WUSM is not meeting expected metrics (as created and vetted with WUSM stakeholders) or when new requirements emerge, a plan of action will be defined including responsible person(s), resources needed, timeline for completion and evidence of improvement.
4. Results of the improvement plan will be shared with appropriate individuals, administration, and committees such as the Committee on Oversight of Medical Student Education.
5. The PE/CQI unit will continually monitor the success of the implemented plan to determine if additional improvement is required.
6. If conditions of improvement are not met, the concern will be brought to the attention of the Senior Associate Dean for Education for further action.

B. For areas not specifically required by the LCME or the data collection instrument, the PE/CQI unit will use a similar process as outlined above.

The Continuous Quality Improvement Policy was approved by the Academic Affairs Committee on May 30, 2019. All substantive edits to this policy require approval by the Academic Affairs Committee.

# MD: 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. 369). 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. 369) 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. 354).

Time spent on all required learning activities will be accounted for in the learning management system of WUSM.

All 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.

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 required courses of the Gateway Curriculum will be monitored by the Office of Medical Student Education (OMSE) for each Phase 1 course through canvasing of the learning management system and through internal and external surveys of students. In the event that there are concerns regarding the adherence of a course to the WUSM Policy for Monitoring Student Time, data substantiating said concerns will be presented by OMSE to the appropriate course 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. Course directors are also welcome to utilize less time per week, as appropriate.

All course directors 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, course directors are encouraged to use best practices, applicable Academy of Educator workshops, and/or consultation with the Instructional Design Studio.

Course directors are strongly encouraged to be considerate of the periodic need for breaks during scheduled required learning activities.

*The Washington University School of Medicine Policy for Monitoring Student Time was last approved by the Committee on the Oversight of Medical Student Education governing body on January 4, 2021. All substantive edits to this policy require approval by the Committee on the Oversight of Medical Student Education governing body*.

# MD: 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, clerkship 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 four hours for continuity, educational debriefing, and didactic activities. No new patients should be assigned to students after the 24-hour call limit.
- 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 work day 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 absence policy for additional details regarding excused time off from clinical duties.
- Individual clerkship 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 clerkship director or the director of the clinical elective. 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 WUSM.

## 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.

- Clerkship directors and directors of clinical electives 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. Quarterly data will be presented to the Committee on Oversight of Medical Student Education and its subcommittee, the Clinical Curriculum Committee, which will charge the appropriate individuals or offices with improvement plans, when necessary.

*The Duty Hour Policy was last approved by the Academic Affairs Committee on September 12, 2019. All substantive edits to this policy require approval by the Academic Affairs Committee.*

# MD: Evaluation and Grades

More information about assessing student performance and integrity can be found in the Assessing Academic Achievement and Professionalism (p. 356) section of this *Bulletin*.

Following are general guidelines for exams administered in the undergraduate medical curriculum. Additional requirements may be posed by the individual course director.

## Washington University School of Medicine Formative Assessment and Feedback for Medical Students Policy

### Background

Formative assessment and feedback are critical to high-quality medical education, and, as such, they are central to the educational mission of Washington University School of Medicine (WUSM). In keeping with LCME Standard 9.7, WUSM is committed to ensuring that each medical student is assessed and provided with formal formative feedback early enough during each required course or clerkship to allow sufficient time for improvement. For the purposes of this policy, formative assessment is defined as any no/low stakes assessment performed during the learning experience for the purposes of providing formative feedback. Formative feedback is defined as information communicated to a medical student in a timely manner that is intended to modify the student's thinking or behavior to improve subsequent learning and performance in the medical curriculum.

### Policies

All students must receive meaningful formal formative assessment of and feedback on their performance during each of the required courses and clerkships of all phases of the Gateway Curriculum at WUSM. At minimum, this feedback should occur at the midpoint of the course or clerkship, although formative assessment and feedback occurring before and after this point are also encouraged.

Required courses or clerkships that are less than four weeks in length must provide an alternate means by which each student can measure their progress in learning at a point that still allows sufficient time for improvement.

Directors of required courses and clerkships are responsible for documenting that each student has received formative assessment and feedback. The Committee for Oversight of Medical Education (COMSE) will conduct oversight of student responses on both internal and external surveys for all required modules and clerkships. In the event that a given module, course, or clerkship fails to demonstrate that each student has received formative assessment and feedback, additional inquiry will be conducted by the Associate Dean for Medical Student Education. In the event that a consistent pattern of noncompliance is identified, the COMSE will make specific recommendations for remediation.

### Guidelines

Quality feedback ought to include reinforcement of things done well, identification of room for improvement or omissions, and specific strategies for improvement. Evidence for this feedback in the form of specific examples and observations should also be included.

*The Washington University School of Medicine Formative Assessment and Feedback for Medical Students Policy was last approved by the Oversight Committee on Medical Education on October 5, 2020. All substantive edits to this policy require approval by the Oversight Committee on Medical Education governing body.*

## Washington University School of Medicine Narrative Assessment Policy

### Background

Washington University School of Medicine (WUSM) is committed to providing the highest quality medical education to 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, LCME Standard 9.5 requires that students receive narrative feedback on parameters of competency development in all competency domains, not just medical knowledge. The purpose of narrative assessment is to ensure

that students are aware of where they may be deficient or below expectations, with enough time to support bringing their performance onto a better trajectory, when possible. For the purposes of this policy, narrative assessment is defined as a mechanism to provide students feedback on their development and progress in all areas of competence.

## Policies

Narrative assessment is a required component of the assessment of each student in the Gateway Curriculum at WUSM. The purpose is to provide students with information about their trajectory toward competency attainment. Within the Gateway Curriculum, this occurs when students review their performance in all competency domains with their coach during mandatory performance review sessions. These meetings occur multiple times across each phase to ensure that students are prevented from arriving at critical transitions in training unaware of their current performance and likelihood of advancement.

To support narrative assessment, the Office of Medical Student Education (OMSE) and the Educational Technology and Innovation Unit (ETIU) will aggregate performance data for all WUSM Program Objectives (POs) into individual student portfolios that display outcomes and trajectory toward competency attainment in the individual POs and larger competency domains. Portfolios will also present information on key subject areas such that high performance in one area does not compensate for poor performance in another area. This is supported by the development of phase-level anchors to explain the expected level of performance, by phase of the curriculum, for each PO as well as the use of keyword tags to track performance in key subject areas. Students and coaches will be provided these performance portfolios with sufficient time to review them prior to discussion during the mandatory performance review. The review and discussion of the portfolios provides the narrative assessments required by WUSM and the LCME.

As narrative assessment occurs within the coach/student dyad, meetings and their outcomes will be periodically monitored and reviewed by the Director of Coaching and the Competency Attainment Committee (CAC). This process will be enabled by logs of narrative assessment provision and internal surveys performed by the Program Evaluation and Continuous Quality Improvement (PE/CQI) unit. In the event that there is failure to demonstrate that each student has received narrative assessment when required, additional inquiry will be conducted by the Director of Coaching. In the event that a consistent pattern of noncompliance is identified, the CAC or PE/CQI unit will advise the Committee for Oversight of Medical Education (COMSE). COMSE will then make specific recommendations for remediation to the Directors of Coaching and Student Success Services.

## Guidelines

During mandatory performance reviews, students and coaches should identify areas of strength, specific areas for improvement for each student, and actionable plans for improvement.

*The Washington University School of Medicine Narrative Assessment for Medical Students Policy was last approved by the Oversight Committee on Medical Education governing body on November 2, 2020. All substantive edits to this policy require approval by the Oversight Committee on Medical Education.*

# Washington University School of Medicine High-Stakes Exam Expectations for Medical Students in All Phases of the Curriculum

The term *high-stakes exams* is used to denote all summative assessments, which are those assessments that evaluate student learning against intended course outcomes at the conclusion of instruction. Within the preclinical curriculum, the term includes all events for which the activity type is listed as “Exam.” Within the clinical curriculum, the term includes NBME Shelf Exams.

- Students are required to take all examinations at the originally specified time. A student may be excused from this rule for extenuating circumstances at the discretion of the associate dean for student affairs (ADSA). Examples of extenuating circumstances include personal illness and personal or family emergency. Doctor appointments of a routine nature or personal obligations such as weddings, birthday celebrations, or other planned personal or family commitments are generally not considered to be extenuating circumstances for which students can be exempted from the regularly scheduled exam date.
- All makeup exam requests go through the ADSA. The ADSA then submits the approved request to the Office of Medical Student Education (OMSE), and the OMSE will then transfer and track the requests granted. Course directors should refer all makeup exam requests to the ADSA.
- Students who are unable to attend a scheduled examination should promptly contact the ADSA. Students should also notify the course director(s); in cases related to personal illness, students should also contact Student Health Services. The OMSE handles all exam rescheduling, and examinations will only be rescheduled after approval by the ADSA. The timing of the rescheduled examination will be determined by the OMSE in collaboration with the course director(s).

- Students are expected to be punctual and should be assembled in the designated exam area before the official start time of the exam. Tardiness will not be excused except in extenuating circumstances. For purposes of the exam, "tardiness" will be defined by the course director or exam proctor. The course director will set expectations and determine consequences for exam tardiness.
- Students are expected to place all personal items, including muted cell phones, in designated areas.
- Students are expected to follow all proctor instructions.
- Students must not share study materials, exchange information, or collaborate or communicate with others during the exam.
- After taking the exam, students must not share information about the exam with anyone who has not yet taken it.

## Exam Expectations for Faculty

- Exams should be proctored by the course director or a designee appointed by the course director comfortable with proctoring and exam administration guidelines. NBME subject exams are proctored by or coordinated by the Office of Student Affairs.
- Administration should be fair to all students.
- If the faculty member answers a substantive question or clarifies an issue, the same should be communicated to *all* students, including those in separate rooms or at different times.
- Reasonable adjustments should be offered to students who require special accommodations, including a separate testing room or additional time. Course directors are notified of these students through the associate dean for student affairs.
- If a student behaves inappropriately, the course director should notify the associate dean for student affairs immediately (refer to examples in the Cheating section below (p. 372) regarding inappropriate behaviors).
- All requirements of students should be communicated to all students *prior* to the start of the exam.

## Special Accommodations

Any student needing accommodations for exams should review the school's Students with Disabilities Policy (p. 349) in advance of exams. Students needing accommodations should meet with the associate dean for student affairs in advance of exams to discuss their request. The associate dean for student affairs will inform course directors of approved exam accommodations.

## Cheating

**The following examples are intended to be representative of behaviors that constitute cheating in the context of an exam. This is not intended to be an all-inclusive list.**

- Looking at or copying from another student's test
- Collaborating with another student during the test without authorization
- Using lecture notes or textbooks during an exam without authorization
- Possessing crib notes during an exam
- Using signals/signs to obtain answers from others
- Using a calculator, cell/smart phone, smart watch, computer, or any other device or learning aid without authorization (This includes storing, receiving, and/or accessing course matter stored on such devices.)
- Obtaining assistance in answering questions on a take-home exam without authorization
- Obtaining advance copies of exams or quizzes by any means
- Having someone else take an exam in your place
- Feigning illness or submitting misleading statements to avoid taking an exam at the scheduled time
- Changing an answer on a graded test and claiming the question response was incorrectly marked wrong

## United States Medical Licensing Exam (USMLE)

Students who matriculated prior to 2014 and who anticipate practicing clinical medicine are required to take the USMLE Step 1 and 2 examinations. Beginning with the class matriculating in 2014, all students are required to take the USMLE Step 1, Step 2 CK and Step 2 CS prior to graduation.

The USMLE is designed to "assess a physician's ability to apply knowledge, concepts, and principles, and to demonstrate fundamental patient-centered skills, that are important in health and disease and that constitute the basis of safe and effective patient care." The USMLE represents a single uniform examination for medical licensure in the United States, and as such, is a minimum requirement for obtaining a medical license.

The USMLE consists of four separate examinations. "Step 1 assesses whether you understand and can apply important concepts of the sciences basic to the practice of medicine, with special emphasis on principles and mechanisms underlying health, disease, and modes of therapy. Step 1 ensures mastery of not only the sciences that provide a foundation for the safe and competent practice of medicine in the present, but also the scientific principles required for maintenance of competence through lifelong learning." Step 1 is taken after completing the second year at Washington University School of Medicine (WUSM).

Step 2 consists of two separate examinations, Step 2 CK (Clinical Knowledge) and Step 2 CS (Clinical Skills), which are taken at different times. "Step 2 assesses whether you can apply medical knowledge, skills, and understanding of clinical science essential for the provision of patient care under supervision and

includes emphasis on health promotion and disease prevention. Step 2 ensures that due attention is devoted to principles of clinical sciences and basic patient-centered skills that provide the foundation for the safe and competent practice of medicine." Step 2 exams are taken after completing the third year but prior to graduation from WUSM.

"Step 3 assesses whether you can apply medical knowledge and understanding of biomedical and clinical science essential for the unsupervised practice of medicine, with emphasis on patient management in ambulatory settings. Step 3 provides a final assessment of physicians assuming independent responsibility for delivering general medical care." Step 3 is taken following graduation and during internship/residency training.

Further information can be obtained from the USMLE (http://www.usmle.org) Bulletin of Information published by the National Board of Medical Examiners, and is available, along with application forms and information, on their website.

# Grading System

## I. First and Second Year

Courses in the first-year and second-year curriculum are evaluated on a Pass (P) or Fail (F) basis. For purposes of the final official grade records of the School of Medicine, grades used for the first year and second year are as follows:

- P = Pass, indicating satisfactory performance
- F = Fail; any grade of F remains on the student's academic record. When the course is repeated or remediated the new grade will appear as a separate entry in addition to the failing grade.
- L = Successful audit
- NG = Course credit earned, students not graded
- W = Withdrawal from a course
- Z = Unsuccessful audit

Valid temporary grades include the following:

- E = Temporary grade, makeup of failed exam pending
- I = Incomplete, temporary grade pending completion of course requirements, replaced with an F if not removed within one year (In rare instances, the Committee on the Academic and Professional Evaluation of Students [CAPES] may grant an extension. Incomplete indicates that, because of a delay excused by the course director, the student has not completed the requirements to pass a course.)

## II. Subsequent Years

For purposes of the final official grade records of the School of Medicine, the following grades are used for subsequent years:

- H = Honors, reflecting a truly outstanding performance
- HP = High Pass, awarded for excellent/very good work
- P = Pass, indicating satisfactory performance
- F = Fail (Any grade of F remains on the student's academic record. In clinical clerkships that have a subject examination, students must score at or above the 10th percentile of the national pool of students taking the examination to pass the clerkship. If a student fails a shelf examination for the second time in a third-year clerkship, an F is recorded on the permanent record.)

When the course is repeated or remediated, the new grade will appear as a separate entry in addition to the failing grade.

- Cr/NCr = Credit/No Credit for select second- and fourth-year courses
- L = Successful audit
- NG = Course credit earned, students not graded
- W = Withdrawal from a course
- Z = Unsuccessful audit

Valid temporary grades include the following:

- E = Temporary grade, makeup of failed exam pending (In clinical clerkships that have a subject examination, students must score at or above the 10th percentile of the national pool of students taking the examination to pass the clerkship. If a student fails the subject examination once, the grade of E will be recorded. Upon successfully retaking the subject examination, the new grade will replace the grade of E on the permanent academic record. If the shelf examination is failed a second time, the grade of F is recorded on the permanent academic record.)
- I = Incomplete, temporary grade pending completion of course requirements, replaced with an F if not removed within one year (In rare instances, the CAPES may grant an extension. Incomplete indicates that, because of a delay excused by the course director, the student has not completed the requirements to pass a course.)

# 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 six weeks of the end of a course or clerkship. Given this requirement, departments are asked to report final grades for clerkships and electives within 4 weeks of the course ending and within 14 calendar days for preclerkship courses. The purpose of this policy is to ensure that no grade is delayed beyond 6 weeks from the end of the course/clerkship/elective/sub-internship, as mandated by our accrediting body.

## Policies

- The Medical School Registrar is responsible for monitoring and reporting that all grades for preclerkship courses are submitted in the learning management system within 14 calendar days of the course ending. The process outlined below will be followed in all instances when course directors fail to meet this expectation:
  - If grades are not submitted by the 14th calendar day, the Medical School Registrar will notify the course director via email requesting grades within three calendar days or an explanation why grades cannot be submitted. The Assistant Dean of Curriculum and Foundational Sciences will be copied on this email.
  - If the grades or an explanation is not received within three calendar days, the Medical School Registrar will notify the Associate Dean for Medical Student Education, who will directly address the concern with the course director.
  - For instances in which extenuating circumstances prevent the submission of grades within 14 calendar days, the Medical School Registrar will collaborate with the course director and the Assistant Dean for Curriculum and Foundational Sciences to determine an appropriate deadline and will ensure the grade is recorded in the learning management system within six weeks of the end of the course.
- The Medical School Registrar is responsible for monitoring and reporting that all clerkship and elective grades are submitted within four weeks of the course ending. The process outlined below will be followed in all instances when clerkship and elective directors fail to meet this expectation:
  - If grades are not submitted by the end of the fourth week, the Medical School Registrar will notify the clerkship or elective director and the program manager via email requesting grades within three calendar days of notification or an explanation why the grades cannot be submitted. The Assistant Dean of Curriculum and Clinical Sciences will be copied on this email.
  - If the grade or an explanation is not received within three calendar days of notification, the Medical School Registrar will notify the Associate Dean for Medical Student Education, who will directly address the concern with the course or clerkship director.
  - For instances in which extenuating circumstances prevent the submission of grades within four weeks, the Medical School Registrar will collaborate with the clerkship or elective director and the Assistant Dean for Curriculum and Clinical Sciences to determine an appropriate deadline and will ensure the grade is recorded in the learning management system within six weeks of the end of the course or clerkship.
- Course, clerkship or elective directors who fail to submit 100% of grades within six weeks of the end of a course, clerkship or elective will meet with the Associate Dean for Medical Student Education with notification to the relevant department chair or designee.

## Guidelines

- Communication: The expectations for return of grades should be shared with course, clerkship and elective directors at least annually. All course, clerkship and elective directors should be encouraged to create a streamlined process for the completion and integration of student evaluations in order to meet grade submission deadlines.
- Reminders: Course, clerkship and elective directors should receive reminders prior to the deadlines for grade entry outlined by this policy. Ideally, automatic email reminders can be generated from the learning management system starting the week prior to the end of the course and continued on a weekly basis reminding course directors to submit grades. The office of Medical Student Education will send an email to preclinical course directors at the conclusion of their course reminding them of grade submission deadlines.
- Monitoring: Central monitoring will occur in the office of the Medical School Registrar. Monitoring should include review of grade reports quarterly to identify missing grades as well as documentation of explanatory notes, extenuating circumstances, and trends of non-compliance. Data will be shared and made available to the Office of Medical Student Education and the Program Evaluation and Continuous Quality Improvement Unit for collaboration efforts and office function. Grade reporting data will be shared quarterly with the appropriate curriculum committee(s).
- Monitoring of temporary grades: The Medical School Registrar will review reports quarterly to identify students with an E or I grade and will notify the appropriate course/clerkship director and student.

*The Washington University School of Medicine Grade Notification Policy for the Medical Program was last approved by the Committee on the Oversight of Medical Student Education on September 16, 2019. All substantive edits to this policy require approval by the Committee on the Oversight of Medical Student Education.*

# Grade Point Average, Class Ranking, and Grade Distributions

For more information about grade-point average, class ranking, and grade distributions, please visit the Assessing Academic Achievement & Professionalism (p. 356) section of this *Bulletin*.

## Grade Appeals

For more information about grade appeals, please visit the Assessing Academic Achievement & Professionalism (p. 356) section of this *Bulletin*.

## Remediation

For more information about remediation, please visit the Assessing Academic Achievement & Professionalism (p. 356) section of this *Bulletin*.

# MD: Professionalism

## Preamble

Medicine is one of the oldest of the learned professions. A professional is one who is in command of a specialized body of knowledge and skills, and is given specific rights not typically allowed to the public. Along with those rights, the professional has specific responsibilities or duties not generally expected of the public.

The singularity of medicine is that it deals with human health. Patients are potentially at their most vulnerable when establishing a relationship with a physician. That the patient's relationship with their physician involves a dependency that encompasses life and death adds further to the uniqueness of this relationship.

The label of professional is not a right but must be earned. The special contract physicians have with society has professionalism as its foundation. Professionalism consists 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.

Professional development is an ongoing process at all levels of training and practice. The purpose of this document is to outline those elements of professionalism expected of our medical students. It is not meant to be all-encompassing, providing exact guidelines for all possible situations. While this document was developed with medical students in mind, it is generally applicable to all medical professionals.

The goal of the Washington University Medical Center is to provide patient care, medical education, and biomedical research of the highest quality. Accomplishing this goal depends in part, also, on an atmosphere of mutual respect and collegiality among all those who work and study here. This document focuses on the special issues presented by the teacher/learner relationship, as well, and applies to all years of the medical school curriculum.

## Guiding Principles of Professionalism

### Professional Responsibility

1. Students have a responsibility to actively participate in their education and to work to improve the educational environment for future students.
2. Students should have a willingness to pursue lifelong, self-directed learning, which is an essential attribute of any professional.
3. Students should act responsibly in their personal and academic lives with regard to meeting deadlines, financial obligations and other comparable responsibilities.
4. Preparation for class and during clinical rotations sets a good example for peers, maximizes every student's learning opportunity, and demonstrates respect for the teachers and peers.
   a. Respecting one's peers in a classroom or in the hospital setting includes behaviors such as arriving on time, exhibiting respectful body language, listening attentively, turning off cell phones and allowing all present to engage in discussion.
5. Students should report to the appropriate supervisor potentially serious errors that others have committed.
6. Students should contribute to their community.
   a. Students are encouraged to participate in the first- and second-year teaching groups.
   b. These provide a service to the larger St. Louis community, while teaching students how to communicate with people of diverse backgrounds.
   c. Students are encouraged to serve at the Saturday Neighborhood Health Clinic and other community service and teaching activities.
7. Students should be aware of the larger social and economic context in which disease occurs, and take advantage of opportunities to deepen their knowledge about this topic.

### Competence and Self-Improvement

1. In order to function at the expected level, students should attend to their own physical and emotional health.
   a. The experience of being a medical student can be physically and emotionally challenging. Students need to be able to identify when they are overwhelmed to the point where they may not be able to function appropriately. Students are encouraged to seek educational assistance and/or the emotional support of others in these instances.
2. Recognizing and admitting errors in patient care are key to being a good physician.

   a. Students should view mistakes as part of learning. Assuming responsibility for mistakes is critical for professional development.
   b. Developing productive strategies for dealing with mistakes and non-confrontational ways of correcting them is essential.
3. Feedback, advice and criticism from residents, fellows and faculty fosters personal and professional development, and should be taken in the context of mentoring.
   a. Students should assume that opinions of their faculty/residents/fellows that may seem unclear are usually solidly founded, and accept feedback regarding their performance openly and maturely from individuals more experienced than they.
   b. Students should provide suggestions and examples for improving the mentoring environment by forthrightly evaluating their instructors.
4. Students should identify and correct errors in patient care as soon as possible or notify those who can correct it.
5. Students should balance personal and professional interests.
   a. Students should not over-commit.
   b. Students should communicate schedule conflicts to course directors, lecturers, and/or house staff.

## Respect for Others and Professional Relationships

1. Students should conduct themselves with manners and consideration of all others, and be respectful of others' time.
2. While individual effort is important in developing a medical knowledge base, much of what students learn in medical school will depend on a collaborative effort with their peers.
   a. From the first day of medical school, students should encourage each other and collaborate with their peers when appropriate in the learning environments of lectures, small group discussions, and lab sessions. In doing so, they are laying the foundation for the truly collaborative nature of medicine.
   b. During the clinical years, students should understand that their peers are a valuable resource. Likewise, a student should assist peers in patient care responsibilities.
   c. In all cases, students should respect the work and learning opportunities of their classmates and they should share educational opportunities with their peers. Professional behaviors include listening to other's presentations, and encouraging others' opportunities to present, ask/answer questions, admit patients, participate in surgical cases/procedures, or perform duties.
3. Respect for the ethnic and cultural diversity of classmates provides for a more nurturing environment for all.
   a. Students should be aware that their classmates come from a wide variety of religious and ethnic backgrounds and that they will have differing lifestyles and viewpoints. This diversity is an important resource in our community, contributing to the personal and professional growth of all.
   b. Students should be sensitive to the importance of these issues and should seek opportunities to enhance appreciation of multiple cultures through dialog, educational opportunities, etc.
4. Students should be supportive of peers during difficult times in their personal and professional lives.
   a. Students must appreciate that their peers may have issues in their personal or professional lives (e.g., family, medical, academic, or administrative problems) that may affect their interactions with others. In these circumstances, students should make every attempt to be sympathetic and to offer their support to those students.
5. Participation and teamwork enhances the educational experience.
   a. The learning process is a partnership between students and faculty. Students should actively participate in this partnership by providing feedback to professors by way of evaluations and surveys.
   b. Contributing to the overall functioning of the team maximizes both learning and patient care in the clinical setting.
6. Understanding the appropriate venues for feedback to house staff/fellows/faculty is critical to successfully resolving conflicts. Students should be aware of the hierarchy of the team, and appropriate mechanisms for handling disagreement with faculty/residents/fellows. Conflicts can be translated into productive outcomes if handled appropriately. For additional helpful information, reference the university Code of Conduct (https://universitycompliance.wustl.edu/code-of-conduct/).
7. Maintaining a professional relationship with teachers (including faculty/residents/fellows and TAs) is important, especially during times when these teachers are in a position to grade or evaluate the student.
   a. Students should avoid behaviors that could potentially be construed as attempting to influence the faculty, for example running personal errands.
   b. The university has specific codes and regulations regarding romantic relationships between a student and a teacher, including faculty/resident/fellows outlined in the Consensual Relationships Policy (https://hr.wustl.edu/items/consensual-relationships/). Students engaged in such relationships should review these codes and avoid any situation that can cause potential conflict of interest in the academic setting.

8. Patients should be treated as individuals in the context of their family, culture and community. Personal bias should be subordinated when possible to further the therapeutic relationship.
   a. Use of offensive language or gestures is unacceptable.
   b. At times, some religious beliefs will require the use of alternative care approaches.
   c. Students, like practicing physicians, should not refuse to participate in the care of a patient with a communicable disease unless this represents a meaningful threat to the student's own health. In contrast, a student who is verbally or physically threatened by a patient may ask to be excused from care of that patient.
9. Students should treat hospital staff with appreciation and respect as they are vital members of the health care team.

## Honesty and Integrity

1. Student work should be original.
   a. Only authorized resources should be used during examinations, quizzes or graded course work. WUSM has a zero tolerance policy for plagiarism (https://studentconduct.wustl.edu/academic-integrity/).
   b. When students are aware that a classmate has submitted work that is not their own (cheated), they should discuss this situation with the course director and/or the associate dean for student affairs.
2. Students must respect patients' rights and maintain confidentiality, in accordance with HIPAA guidelines.
   a. Students should be ever aware that patients are ill and have the right to refuse care, particularly when poorly provided.
   b. Patient information should only be discussed with appropriate people at appropriate times.
   c. Patient records should not be photocopied carelessly or removed from appropriate areas.
   d. Patient information should be disposed of appropriately to prevent careless transmission of patient information.
3. Students should clearly communicate their abilities and level of training to patients.
   a. If a student does not know the answer to a patient's question, it is the student's responsibility to admit this lack of knowledge.
   b. Even if other members of the health care team introduce students to patients as "doctor," the student should never do so as it leads to a false perception of expertise on the patient's part.
   c. Students should always be truthful with the house staff and other medical staff in terms of patient care and never compromise patient care as a consequence of personal gain.
4. Students should not participate in any aspect of patient care if under the influence of a substance that may compromise the student's judgment or otherwise cause the patient harm. Likewise, students should report any member of the health care team who may be participating in patient care while under the influence of a judgment-impairing substance.
5. Any student who is impaired by physical or psychological illness should excuse themselves from patient care responsibilities, and should also respect recommendations to do so from colleagues or supervisors.
6. Although students are often tired or under stress, they should attempt to maintain an appropriate level of composure at all times.
7. Students should be appropriately attired for all patient care duties.
8. Students should carefully consider their participation in benefits provided by pharmaceutical companies or other medically-related businesses.
9. Students should respect the laws of federal, state and local governments in both professional and private life.

# 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 standards 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 order to more equitably distribute both on and off campus assignments, a system for centrally monitoring students' travel for off-campus clinical assignments will be available to clinical course directors and will be overseen by the Clinical Curriculum Committee (CCC). When applicable, students

will have the opportunity to submit their ranked choices for clinical assignments in advance. A record of student choice with subsequent alignment and nonalignment with clinical assignment will be included in this system.

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 and Clinical Sciences with their concerns.

### Guidelines

Clinical course directors should consider a student's current choice for assignment in the context of the degree to which their prior choices aligned with prior assignments. Clinical course directors should work to accommodate students who indicate a preference for a particular off-campus assignment as opposed to one that is on site.

Course directors should be aware of the significant amount of time incurred by students who are assigned off site in their commutes to and from campus when scheduling required learning activities on campus. When available, telecommunication strategies should be used as a way to mitigate this burden. 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.

*The Washington University School of Medicine Transportation Policy for Medical Students on Clinical Assignments was last approved by the Committee on the Oversight of Medical Student Education on April 6, 2020. All substantive edits to this policy require approval by the Committee on the Oversight of Medical Student Education.*

## Related Policies

Washington University Discrimination and Harassment Policy (http://hr.wustl.edu/policies/Pages/DiscriminationAndHarassment.aspx)

Washington University Sexual Assault Policy (https://wustl.edu/about/compliance-policies/governance/usaib-procedures-complaints-sexual-assault-filed-students/)

Washington University Abusive Conduct Policy (https://hr.wustl.edu/items/abusive-conduct-policy/)

Washington University Diversity Bias Report Form (http://diversity.wustl.edu/students/mosaic/bias-report-support-system/bias-report-form/)

Assessing Academic Achievement & Professionalism (MD Program) (p. 356)

## 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. 378)
- Academic Calendars (https://registrar.med.wustl.edu/calendars/)
- Advising and Career Counseling (https://mdstudentaffairs.wustl.edu/academic-support/advising/)
- Diversity, Equity & Inclusion, Office of (https://diversity.med.wustl.edu/)
- Diversity Programs, Office of (http://medschooldiversity.wustl.edu/)
- Housing (https://facilities.med.wustl.edu/housing/)
- Education, Office of (https://education.med.wustl.edu/)
- Medical Student Affairs, Office of (https://mdstudentaffairs.wustl.edu/)
- Medical Student Education, Office of (https://md.wustl.edu/contact/medical-student-education/)
- Medical Student Research, Office of (https://mdstudentresearch.wustl.edu/)
- Student Financial Planning, Office of (https://finaid.med.wustl.edu/)
- Protective Services (http://facilities.med.wustl.edu/security/)
- Registrar, Office of the (https://registrar.med.wustl.edu/)
- Student Health Services (https://wusmhealth.wustl.edu/students/)

# 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) (p. 356) may also require it. There is no charge to the student for tutorial assistance.

## Tutoring

**First- and second-year students:** Tutoring for individual courses 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 master.

**Third-year students:** 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.

## Learning Specialist

Professional learning specialists can meet with students privately to assess and improve upon individual learning styles. Specialists also conducts 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 (http://becker.wustl.edu/) for free online exam preparation tools. For more information, contact Betsy Kelly, Becker Library Associate Director, by phone at 314-362-2783 or by email at betsy.kelly@wustl.edu.

For subject-specific preparation in clinical neurology, medicine, obstetrics/gynecology, pediatrics, psychiatry and surgery, please visit the National Board of Medical Examiners (NBME) website (http://www.nbme.org/students/sas/MasterySeries.html).

# 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 more 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 awarded 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 Financial Aid (Campus Box 8059) 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 (https://netpartnerstudent.wustl.edu/), to indicate what type of aid they are applying for. The Financial Aid Office 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 solicit information about the applicant and their parents, including a detailed description of resources and liabilities. If an applicant's parents are separated or divorced, the financial information is required from both biological 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 biological parents' individual U.S. income tax returns and the applicant's official IRS transcripts 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 biological 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 awards are 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 award will be funded through the resources of the School of Medicine or through the Federal Direct Loan program. Financial aid awards are made for a given academic year. Beginning with the 2019-20 academic year, any need-based scholarship awarded will be fixed for all future years. 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 Performance (SAP).

Federal law and regulations require that all students receiving financial assistance from Federal Title IV funds maintain SAP. This policy presents the standards adopted by the Washington University School of Medicine and applies to all MD students.

Annually, at the end of each spring term, the School of Medicine at Washington University in St. Louis evaluates SAP. If a student is not maintaining progress, they will be notified by the Committee on Academic and Professional Evaluation of Students (CAPES) and the director of financial aid and will be ineligible, or "suspended," for federal aid for future terms unless they appeal their status and it is approved by CAPES and the director of financial aid.

In order to be compliant in maintaining SAP and thus eligible for 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 completion of each program is as follows:

- Four-year MD program: 6 years
- Five-year MD program: 7.5 years
- MA/MD program: 7.5 years (or 9 years if a 2-year MA is pursued)

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 aid.

## 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 on Academic and Professional Evaluation of Students (CAPES). Refer to the Assessing Academic Achievement (p. 356) section of this *Bulletin* for more information.

A student failing to meet the standards of satisfactory progress as determined by CAPES 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 semester. 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 2020-21 academic year are listed below. Students who enter in 2020 will benefit from a tuition stabilization plan, which provides that their annual tuition of $68,480 will be constant for up to five consecutive years. The stabilized rate will expire five academic years after matriculation. Therefore, students whose medical education is interrupted for any reason for more than one year will be charged the rate of the class they rejoin. Appeals of this policy should be submitted in writing to the medical school registrar. The items listed below provide an estimate of the expenses for a single student in the 45-week first-year class. The total of these figures suggests a basic minimum budget of approximately $92,260. Allowances for entertainment, travel, clothing and other miscellaneous items must be added to this estimate.

**Tuition** (includes Student Health Services and Microscope Lending Plan): $68,480
**Books and supplies:** $700
**Medical instruments:** $461
**Housing and food:** $17,051
**Miscellaneous:** $3,029
**Travel and personal:** $2,539

## 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.

## Awards and Prizes

At two annual events, Washington University School of Medicine publicly recognizes and rewards outstanding scholarship, research accomplishments and community service of individual students. In December, the Student Awards Luncheon acknowledges academic excellence earned during the first three years of study. As part of the festive commencement activities in May, graduates are recognized for meritorious research and clinical achievements accomplished during their medical school careers.

**Morris Alex, MD Prize.** Awarded each year to the medical student who is outstanding among their peers in the second-year Practice of Medicine course. *The December 2019 recipient: Helen Liljenwall.*

**Alpha Omega Alpha Book Prize.** Awarded to a member of the graduating class who has performed outstandingly for the entire medical course. *The May 2020 recipient: Andrew Simmerman.*

**Alpha Omega Alpha Initiates.** *The May 2020 initiates: Rina Amatya Ferguson, Yun Zhu (Louisa) Bai, Bronwyn Bedrick, Lauren Behlke, Taylor Dibble, Katherine (Kate) Douglas, Noah Eby, Ryan Furdock, Katherine (Kate) Gerull, Leonard (Brian) Hickman, Jawad Khalifeh, Caroline Min, William Padovano, Erin Peterson, Griffin Plattner, Airika (Danielle) Poivre, Alexandra (Allie) Rubin, Andrew Simmerman, Averey Strong, Julia Suggs, William Tompkins, William Tzeng, Bianca Vannucci, Noah Wasserman, Georgia Wilke, Gregory Wong, Ran (Catherine) Xu, and Minerva Zhou.*

**American Academy of Neurology Medical Student Prize for Excellence in Neurology.** Awarded to a member of the graduating class for excellence in clinical neurology and outstanding personal qualities of integrity, compassion and leadership. *The May 2020 recipient: Leonard (Brian) Hickman.*

**American College of Physicians Michael M. Karl, MD Book Award.** Presented annually to a member of the graduating class committed to a career in internal medicine, in recognition of highest achievement in the field of internal medicine. *The May 2020 recipient: Vivek Durai.*

**American College of Physicians Award for Excellence in Physical Diagnosis.** Given to a student annually for outstanding performance in the second-year Practice of Medicine course. *The December 2019 recipient: Carly O'Donnell.*

**American College of Physicians Clerkship Award.** Established in 1992 to be awarded to a student completing the third year of study with meritorious achievement in the Internal Medicine Clinical Clerkship. *The December 2019 recipient: Sophia Lewis*.

**American Medical Women's Association Glasgow-Rubin Award for Academic Achievement.** Presented to the women graduating first in their class. *The May 2020 recipients: Catherine Xu and Danielle Poivre.*

**American Medical Women's Association Glasgow-Rubin Citation for Academic Achievement.** Presented to women medical students graduating in the top 10% of their class. *The May 2020 recipients: Yun Zhu (Louisa) Bai, Bronwyn Bedrick, Lauren Behlke, Katherine (Kate) Douglas, Katherine (Kate) Gerull, Yedda Li, Annelise Mah-Som, Caroline Min, Erin Peterson, Allie Rubin, Julia Suggs, Biana Vannucci, and Minerva Zhou.*

**The Ruth Bebermeyer Award.** Established in 2001 by the WUMCAA executive council to honor Ruth Bebermeyer for her many years of dedicated service to WUMCAA (1990-2000) and to the students of the School of Medicine. The award is given to "a student who has shown extraordinary kindness and sensitivity to the needs of others," whether those others be fellow students, patients or just people in general. *The December 2019 recipient: Kate Douglas.*

**Alexander Berg Prize.** Awarded to the students presenting the best results in research in molecular microbiology. *The May 2020 recipient: Charise Garber.*

**The James and Philip Brasington Memorial Prize.** Awarded to a medical school student who has demonstrated excellent preclinical and clinical academic performance in psychiatry and who has the potential to make significant contributions to the field. *The May 2020 recipient: Lauren Behlke.*

**Jacques J. Bronfenbrenner Award.** Provided by Dr. Bronfenbrenner's students in memory of his inspiration as a teacher and a scientist, and awarded to the member of the graduating class who, as judged by the Department of Medicine, has done the most outstanding work in infectious diseases or related fields. *The May 2020 recipient: Samantha Greaney.*

**Dr. Richard S. Brookings and Robert Carter Medical School Prizes.** Provided through a bequest of Robert S. Brookings to recognize academic and personal achievements, including but not limited to exemplary academic performance, leadership, community service and research. *The December 2019 Dr. Richard S. Brookings recipients: Louisa Bai, William Padovano, and Andrew Simmerman. The May 2020 Dr. Richard S. Brookings recipient: Nakul Shah. The December 2019 Robert Carter recipients: Noah Eby, Danielle Poivre, and Catherine Xu. The May 2020 Robert Carter recipients: Margery Gang and Gregory Kazarian.*

**Dr. Harvey Butcher Prize in Surgery.** Awarded annually in memory of Dr. Harvey Butcher to the members of the graduating class who, as judged by the Department of Surgery, show the greatest promise for general surgery. *The May 2020 recipient: Yun Zhu (Louisa) Bai.*

**Kehar S. Chouke and George Gill Prize in Anatomy.** Awarded annually to a first-year medical student who has demonstrated superior scholarship in Human Anatomy. *The December 2019 recipient: Hosannah Evie.*

**Class of 2001 Award.** Established by the Class of 2001 as its gift to the medical school. Awards are to be given to third-year medical students in recognition of outstanding performance in the areas of community service and student group activities in the first two years of medical school. *The December 2019 recipients: Helen Liljenwall and Samantha Lund.*

**Class of 2003 Award.** Dedicated to the memory of three classmates who died in a car accident, and awarded to a first-year student recognized by peers as being selfless, exceptionally kind to others and dedicated to the highest standards in medicine, traits for which these classmates will be remembered. *The December 2019 recipients: Joanna Kim and Monica Lim.*

**F. Sessions Cole Award.** The inaugural Cole award is presented to a senior medical student entering the field of pediatrics who exhibits honest and thoughtful patient care, who gives generously with their time, and who welcomes emerging technology. A masterful clinician who continually advocates for our smallest patients. *The May 2020 recipient: Jacqueline Kading.*

**Carl F. and Gerty T. Cori Prize in Biochemistry.** Awarded at the end of the first year to the class member who has demonstrated superior scholarship in biochemistry. *The December 2019 recipient: Winston Winkler.*

**Edmund V. Cowdry Prize in Histology.** Established in 1969 to honor Dr. Cowdry; awarded to a medical student in the first-year class who has performed meritoriously in microscopic anatomy. *The December 2019 recipients: Cyrus Ghaznavi and Sydney Sillart.*

**Antoinette Frances Dames Award in Cell Biology and Physiology.** Awarded annually to members of the first-year class who have demonstrated superior scholarship in these fields. *The December 2019 recipients: Xinwen Hu and Talia Pearl.*

**Elisabeth L. Demonchaux Prize in Pediatrics.** Established in 1985, the prize is awarded annually to a graduating student who has done outstanding work in pediatrics. *The May 2020 recipient: Katherine (Kate) Douglas.*

**Steven Dresler Prize.** Awarded to a graduating student who has demonstrated a commitment to promoting social good, civil rights and civil liberties through social action and volunteerism. *The December 2019 recipient: Divya Natarajan.*

**Dr. William Ellis Award.** Established in 1990 by Dr. Ellis and awarded to a senior student in recognition of meritorious research in ophthalmology. *The May 2020 recipient: Jonathan Lin.*

**The Endocrine Society Medical Student Achievement Award.** Recognizing a graduating medical student who has shown special achievement and interest in the general field of endocrinology. *The May 2020 recipient: Jane Wang.*

**The Family Health Foundation of Missouri Scholarship Award.** Awarded to the top graduating student entering the specialty of family medicine. *The May 2020 recipient: Airika (Danielle) Poivre.*

**George F. Gill Prize in Pediatrics.** Awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics. *The May 2020 recipient: Rina Amatya Ferguson.*

**Gold Humanism Honor Society.** *The May 2020 members: Rina Amatya Ferguson, Eva Archer, Curtis Austin, Bronwyn Bedrick, Lauren Behlke, Barbara (Basia) Blachut, Bradley Busebee, Taylor Dibble, Katherine (Kate) Douglas, Shahroz Fatima, Ryan Furdock, Owen Hamilton, Jessica Hao, Helena Hong, Sarah Mayer, Joshua Mendoza, Caroline Min, Divya Natarajan, Eunhye Oak, Griffin Plattner, and Alexander Yahanda.*

**Alfred Goldman Book Prize in Diseases of the Chest.** Created in 1972 as an annual award to be given to a student selected by the faculty for outstanding clinical work or research in diseases of the chest or pulmonary physiology. *The May 2020 recipient: Sophia Lewis.*

**Max and Evelyn Grand Prize.** Established in 1985 by Dr. M. Gilbert Grand, the prize is awarded annually to a member of the graduating class for excellence in ophthalmic research or clinical ophthalmology. *The May 2020 recipient: Georgia Wilke.*

**Peter Halstead Hudgens Award.** Established by Dr. Richard W. Hudgens in memory of his son, this award recognizes a graduating student for excellence in research and clinical psychiatry. *The May 2020 recipient: Dov Lerman-Sinkoff.*

**Nathan Edward Hellman, MD, PhD, Memorial Award.** Recognizes second-year students selected through a vote of fellow classmates. The recipients are distinguished as students with a strong track record of accomplishments and an interest in academic medicine, and whose humanism, collegiality, humor and compassion are an inspiration to members of the class. *The December 2019 recipients: Kamaria Lee and Sharon Abada.*

**Herrmann Prize.** Created by Dr. Paul Herrmann (MD '61) and his wife, Susan, to recognize a student who is considered a thoughtful and sensitive communicator in the clinical arena and whose listening and communication skills every patient hopes their physician will possess. *The December 2019 recipient: Eunhye Oak.*

**Dr. John Esben Kirk Scholastic Award.** Established in 1975 and awarded to graduating students of high scholastic standing. *The May 2020 recipients: Griffin Plattner and William Tzeng.*

**Rosalind Kornfeld Student Leadership Award.** Presented to a woman or women in the graduating class who has or have demonstrated outstanding leadership in service to or advancement of women in the community. *The May 2020 recipient: Katherine (Kate) Gerull.*

**Louis and Dorothy Kovitz Senior Prize in Surgery.** Senior award in surgery recognizing members of the graduating class who have shown the most outstanding ability, zeal and interest in surgical problems. *The May 2020 recipient: William (Will) Gerull.*

**I. Wallace Leibner Award.** Established in 1988 in memory of Dr. Leibner, the award is given to the member of the graduating class who has not only demonstrated excellence in diagnosis and therapeutics, but also an understanding of human nature and needs, and an active nurturing of both patient and family. *The May 2020 recipient: Anand Upadhyaya.*

**Irwin Levy Prize in Neurology and Neurological Surgery.** Established in 1980 by friends of Dr. Levy as a tribute to his commitment to clinical teaching. Provides a prize for the student who presents the best performance in the neurology and neurological surgery clerkships. *The December 2019 recipient: Eunhye Oak.*

**Edward Massie Prize for Excellence in Cardiology.** Awarded to the member of the graduating class, selected by the director of the Division of Cardiovascular Disease in the Department of Medicine, who has done the most outstanding clinical or basic research work in the field of cardiovascular disease. *The May 2020 recipient: William Tompkins.*

**Howard A. McCordock Book Prize in Pathology.** Awarded at the end of the second year to a member of that class for general excellence in pathology. *The December 2019 recipient: Neel Raval.*

**Medical Center Alumni Scholarship Fund Prize.** Given annually to students who have shown excellence in their work during the preceding year. *The December 2019 recipient: Debanjan Saha.*

**Medical Fund Society Prize in Medicine.** One prize awarded annually to a graduating student who has excelled in the study of internal medicine. *The May 2020 recipient: Conor Williams.*

**Medical Fund Society Prize in Surgery.** One prize awarded annually to a graduating student who has excelled in the study of surgery. *The May 2020 recipient: Melissa Thornton.*

**Merck Academic Excellence Award.** Given to three graduating medical students for scholastic achievement in medical studies. *The May 2020 recipients: Taylor Dibble, William Padovano, and Gregory Wong.*

**Missouri State Medical Association Award.** Presented annually to honor School of a Medicine graduate for outstanding achievement in the study of medicine. *The May 2020 recipient: Noah Eby.*

**The Missouri State Medical Association Student Scholarships.** Awarded annually to first-year medical students who graduated from Missouri high schools in recognition of their high undergraduate academic achievement. *The December 2019 recipients: Nathan Adams, Nick Becker, Meg Guard, Adam Koenig, Samantha Lund, Momo Oyama, Joseph Roh, Alex Shimony, Melissa Thornton, and Thomas Van Horn.*

**Dr. Helen E. Nash Academic Achievement Award.** Given annually to a student who has exhibited to an unusual degree the qualities of industry, perseverance, determination and enthusiasm. The prize is given in honor of Dr. Helen Nash, a pediatrician noted in the St. Louis community for her commitment to excellence, tireless advocacy on behalf of children and endless enthusiasm for the field of medicine. *The December 2019 recipients: Eva Archer and Averey Strong.*

**The Dr. Philip Needleman Pharmacology Prize.** Established by his family in 1989 to honor Dr. Needleman, who was chairman of the Department of Pharmacology from 1976-89. This annual award is given to a member of the graduating class for outstanding research in pharmacology. *The May 2020 recipient: Mitsukuni Yoshida.*

**The Doctor James L. O'Leary Neuroscience Prize.** Awarded annually to a student who demonstrates the best accomplishment in the Neuroscience course. *The December 2019 recipients: Xinwen Hu, Travis Tabor, and Winston Winkler.*

**The Roy R. Peterson Prize in Anatomy.** Awarded for outstanding performance in the Human Anatomy course in recognition of Dr. Peterson's many contributions as a teacher in the School of Medicine. *The December 2019 recipient: Cyrus Ghaznavi.*

**The Richard and Mildred Poletsky Education Fund.** Established in 1995 by the family of Mr. Richard Poletsky, an alumnus of Washington University. A prize is awarded annually to a professional student in the health sciences whose interest is in research on dementia and care of demented patients.

**The Dr. Frank O. Richards Medical Student Scholarship Prizes.** Provided by African-American alumni and friends of Washington University School of Medicine. The prizes embrace diversity efforts and are awarded in recognition of achievements in the first and second year of the curriculum. *The December 2019 recipients: Jason Morris and Akua Nuako.*

**Dr. Philip Rosenblatt Award in Pathology.** Given to a senior medical student for distinguished performance during an elective in pathology or laboratory medicine. *The May 2020 recipient: Saravanan Raju.*

**Dr. William A. Rubenstein Award in Medicine.** Awarded to a fourth-year student who shows a serious interest in pursuing a career in internal medicine and who demonstrates the exceptional qualities of a gifted physician, including compassion, caring, and the pursuit of scientific knowledge. *The December 2019 recipient: Michael Bern.*

**St. Louis Pediatric Society Senior Prize.** Presented to the senior student showing the greatest promise in clinical pediatrics. *The May 2020 recipient: Sarah Mayer.*

**David F. Silbert Outstanding Teaching Assistant Award.** Established in memory of Dr. David Silbert, it is awarded to a teaching assistant in a medical school course in recognition of a commitment to teaching. *The December 2019 recipient: Hunter Patterson.*

**John R. Smith Memorial Fund Award.** Created in 1982, it is awarded to a medical student who has done meritorious clinical and/or research work in the Division of Cardiovascular Disease within the Department of Medicine. *The May 2020 recipient: Qiaonan Zhong.*

**Dr. Margaret G. Smith Award.** Given to a woman medical student for outstanding achievement in the first two years of medical school. *The December 2019 recipient: Sharon Abada.*

**Society for Academic Emergency Medicine Excellence in Emergency Medicine Award.** Based on demonstrated excellence in the specialty of emergency medicine, it is awarded to a senior medical student at Commencement. *The May 2020 recipient: Colleen Walsh-Lang.*

**Samuel D. Soule Award in Obstetrics and Gynecology.** Presented to a member of the fourth-year class for meritorious achievement in either basic or clinical investigation in obstetrics and gynecology. *The May 2020 recipient: Bianca Vannucci.*

**Jessie L. Ternberg Award.** Presented to a woman graduating from the School of Medicine who best exemplifies Dr. Ternberg's indomitable spirit of determination, perseverance and dedication to her patients. *The December 2019 recipient: Kate Gerull.*

**Washington University Internal Medicine Club Research Award.** Awarded to the member of the graduating class who has done the most significant research in any area of internal medicine. *The May 2020 recipient: Vasilios Kalas.*

**Washington University Summer Research Prize.** The award recognizes students for meritorious research in the Summer Research Fellowship Program at Washington University School of Medicine. *The December 2019 recipients: Michelle Cai and Lauren Elson.*

**Samson F. Wennerman Prize in Surgery.** Donated by his wife, Zelda E. Wennerman, and awarded annually to the fourth-year student who has demonstrated promise in the field of surgery. *The May 2020 recipient: Felicia Zhang.*

**Doris P. and Harry I. Wexler Prize.** Established in 1998 by a bequest from Mrs. Wexler, the prize is awarded annually for research in multiple sclerosis and in alternate years research in eye disease.

**The Park J. White, MD Prize.** Created in 1992 in honor of the centennial of the birth of Dr. White, who was a distinguished pediatrician, social activist and pioneer teacher of medical ethics. He introduced the first course on medical ethics to students in 1927. The prize is awarded to students for outstanding performance in the ethics elective offered by the Program for the Humanities in Medicine. *The May 2020 recipient: Rina Amatya Ferguson.*

**Hugh M. Wilson Award in Radiology.** Given annually to a graduating medical student in recognition of outstanding work in radiology-related subjects, either clinical or basic science. *The May 2020 recipient: Minerva Zhou.*

**The Wynder Prize in Preventive Medicine.** An annual prize established in 1994 and awarded to senior medical students who have done the best research in preventive medicine. *The May 2020 recipients: Bronwyn Bedrick and Caroline Min.*

**James Henry Yalem Prize in Dermatology.** Established by Charles Yalem in memory of his son and awarded annually to members of the fourth-year class for outstanding work in dermatology. *The May 2020 recipient: Patrick Phelan.*

## 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.

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.

## 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 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), Distinguished Faculty Scholars (DFS), 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

Up to four full-tuition scholarships are 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. Since 1989, Distinguished Alumni Scholarships have been named in honor of the following individuals:

- Leonard Bacharier, MD
- Thomas Bailey, MD
- Thomas Baranski, MD, PhD
- Walter F. Benoist, MD
- Leonard Berg, MD
- Grace E. Bergner, MD
- Laura Bierut, MD
- Ellen F. Binder, MD
- Stanley J. Birge, MD
- Eugene M. Bricker, MD
- Keith H. Bridwell, MD
- Angela Brown, MD
- Elmer B. Brown, MD
- J. William Campbell, MD
- David B. Clifford, MD
- C. Robert Cloninger, MD
- Jennifer W. Cole, MD
- John N. Constantino, MD
- Justin J. Cordonnier, MD
- Michael Crowder, MD, PhD
- Carlos Daughaday, MD
- John D. Davidson, MD
- Louis P. Dehner, MD
- Brian Dieckgraefe, MD, PhD
- Bradley Evanoff, MD, MPH
- Ronald G. Evens, MD
- Lewis C. Fischbein, MD
- I.J. Flance, MD
- James W. Fleshman, MD
- James Forsen Jr., MD
- Bernard T. Garfinkel, MD
- Deborah J. Gersell, MD
- Jerome J. Gilden, MD
- Harvey S. Glazer, MD
- David Goldring, MD
- Sidney Goldring, MD
- Samuel B. Guze, MD
- Paul O. Hagemann, MD
- Marc R. Hammerman, MD
- Alexis F. Hartmann, MD
- Alexis F. Hartmann Jr., MD
- John C. Herweg, MD
- Scott G. Hickman, MD
- Richard W. Hudgens, MD
- David Hunstad, MD
- Robert S. Karsh, MD

- John M. Kissane, MD
- Ira J. Kodner, MD
- Allan E. Kolker, MD
- Stuart A. Kornfeld, MD
- Lawrence M. Kotner Jr., MD
- Nicholas T. Kouchoukos, MD
- William M. Landau, MD
- Timothy J. Ley, MD
- Virgil Loeb, MD
- Maurice Lonsway, MD
- Robert H. Lund, MD
- Alan P. Lyss, MD
- Philip W. Majerus, MD
- Mark J. Manary, MD
- Paul R. Manske, MD
- Gerald Medoff, MD
- Paul A. Mennes, MD
- J. Neal Middelkamp, MD
- Benjamin Milder, MD
- Barbara S. Monsees, MD
- Carl V. Moore, MD
- George E. Murphy, MD
- David G. Mutch, MD
- D. Michael Nelson, MD, PhD
- Robert C. Packman, MD
- Charles W. Parker, MD
- Mary L. Parker, MD
- Alan L. Pearlman, MD
- M. Alan Permutt, MD
- Frederick D. Peterson, MD
- Gordon W. Philpott, MD
- Gary A. Ratkin, MD
- Edward H. Reinhard, MD
- Fred C. Reynolds, MD
- William J. Ross, MD
- Will R. Ross, MD, MPH
- Joseph F. Ruwitch Jr., MD
- Llewellyn Sale Jr., MD
- George Sato, MD
- Bradley Schlaggar, MD, PhD
- Mark E. Frisse, MD
- Gustav Schonfeld, MD
- Clay F. Semenkovich, MD
- Hyman R. Senturia, MD
- Donald Sessions, MD
- Gary D. Shackelford, MD
- Penelope G. Shackelford, MD
- Larry Shapiro, MD
- Bernard L. Shore, MD
- Barry A. Siegel, MD
- Emily L. Smith, MD
- William F. Stenson, MD
- Arnold W. Strauss, MD
- Robert A. Swarm, MD
- Steven L. Teitelbaum, MD
- Jessie L. Ternberg, PhD, MD
- Bradley T. Thach, MD
- Mildred Trotter, PhD
- Stanley Wald, MD
- Stuart Weiss, MD
- Alison J. Whelan, MD
- Rakhee Bhayani, MD '99
- Tessa Madden, MD '01
- Eugene Rubin, MD, PhD '78
- Garry Tobin, MD '85

### Distinguished Alumni Scholarship Program Honorees 2019-20:

- Nancy Bartlett, MD '86
- Sam Bhayani, MD '96
- Eva Hurst, MD '02
- Matt Mutch, MD '94

## Distinguished Faculty Scholars

The Distinguished Faculty Scholar Program provides merit-based scholarships (up to full-tuition for four years) to students who demonstrate their commitment to bringing diverse people together and to enhancing service to disadvantaged groups.

These awards are for students who have done the following:

- Been recognized as scholars from groups that are historically underrepresented in medicine
- Challenged themselves and excelled academically
- Demonstrated leadership
- Engaged in or shown a commitment to community service
- Demonstrated their commitment to bringing diverse people together (for example, by having been involved in diversity initiatives in their schools or communities)
- Demonstrated a commitment to serving historically underprivileged populations, and/or demonstrated achievement and determination in the face of personal challenges

## 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.

## Scholarship Funds

**Grace Bergner Abrams Scholarship.** Established in 1995 through the bequest of Dr. Grace Bergner Abrams, MD '43. Friends and patients also contributed to this endowed scholarship.

**Helen M. Aff-Drum Scholarship Fund.** Established in 1988 to provide scholarship support to financially deserving medical students.

**Anderson Student Scholarship.** Established through bequest in 2001 by Rolf L. Anderson, MD '62.

**Franz and Harriet I. Arzt Student Loan.** Established by the estate of Dr. and Mrs. Franz Arzt in 2013.

**Isak and Breine Ascher Scholarship Fund.** The late Dr. Eduard Ascher, MD, '42, established this scholarship through a trust to memorialize his parents, who were lost in the Holocaust during World War II. He chose Washington University School of Medicine because of their willingness to "give a chance" to an Austrian refugee.

**Arthur I. Auer, MD 1956 and Marian D. Auer, NU 1955 Scholarship.** Established in 2012 by Dr. and Mrs. Auer to provide scholarship assistance to worthy students.

**Dr. William Monroe Baker Fund.** Established in 1988 under the will of Miss Lola Braxton in memory of Dr. Baker to provide scholarship assistance to worthy students.

**Barnes-Jewish Hospital Medical Staff Association Scholarship.** Established in 1998 by the Barnes-Jewish Hospital Medical Staff Association to provide financial assistance to students based on academic excellence.

**Floyd A. and Rita Sue Barnett Scholarship.** Established in 1994 from a trust agreement (1989) of Floyd and Rita Sue Barnett for scholarships for students who are academically well-qualified and financially deserving.

**Dr. Frederick Barry Scholarship.** Established in 2009 through the estate of Dr. Frederick Barry for medical student education.

**The Dr. Joseph A. and Helene H. Bauer Scholarship.** Created in 1987 by Dr. and Mrs. Joseph A. Bauer to provide scholarship support to academically well-qualified and financially deserving medical students.

**Edward Baumhardt Scholarship.** Established in 2014 through the estate Dr. Edward Earl Baumhardt.

**William L. Becker, MD Scholarships.** Established in 2012 by Dr. William Becker, MD '87 and awarded based on financial need.

**Albert G. Blanke Jr. Endowed Scholarship.** Established by a generous gift in 1982, the fund provides scholarship assistance for deserving students in the School of Medicine.

**Dr. John A. Bowers Scholarship Fund.** Established through the estate of Dr. and Mrs. John Bowers. The scholarship is awarded based on need.

**Warren Bowersox, MD Scholarship Fund.** Established in 2005 by Mrs. Warren Bowersox in memory of her husband, who was a member of the MD class of 1943, to support scholarships.

**Isabel Valle Brookings Scholarship.** Established in 1957 by Isabel Valle Brookings (Mrs. Robert S.) for scholarships and loans in the School of Medicine.

**The Seymour Brown, MD and Rose Tropp Brown Scholarship.** Established by the estate of Dr. Seymour and Mrs. Rose Tropp Brown.

**Jane Stewart and Robert S. Brua, MD Scholarship Fund.** Established in 1996 through the generosity of Dr. Brua.

**The Bruce Family Scholarship.** Established in 2012 by Robert and Suzanne Bruce to commemorate three generations of physicians: Helen L. Bruce, MD; her son, Robert M. Bruce, MD; and her grandson, Carl T. Bruce, Washington University School of Medicine, Class of 2015.

**Robert W. Butcher, MD Scholarship.** Established in 2012 by an anonymous donor.

**Ruth Elizabeth Calkins Scholarship Fund.** Established by Dr. Delevan Calkins in honor of his granddaughter.

**Dr. Richard Brookings and Mr. Robert Carter Medical School Scholarship.** Established through a bequest of Robert S. Brookings.

**Gilbert L. Chamberlain, MD Scholarship Fund.** Created in 1971 by Dr. Gilbert L. Chamberlain to be used to aid worthy students in acquiring their medical education.

**Cecil M. Charles – Nu Sigma Nu Medical Student Scholarship Fund.** Established by the Nu Sigma Nu Medical Fraternity in memory of Dr. Charles.

**Tien Hsin Cheng, MD Endowed Scholarship in Medicine.** Established in 2007 by Dr. Tien Hsin Cheng, MD '76, for deserving medical students with financial need.

**Dr. Kehar S. Chouke Loan.** Established by the estate of Dr. Kehar Singh Chouké.

**Class of 1945 Scholarship.** Established by the alumni from the Class of 1945 in honor of their 45th reunion.

**Class of 1954 Scholarship In Memory of Dan Nathans.** Established in 2000 by the alumni from the Class of 1954 in memory of their classmate, Daniel Nathans, who was awarded the Nobel Prize in Medicine in 1978. Members of the Nathans family also contributed to the establishment of the fund.

**Class of 1956 Scholarship.** Established in 1996 by members of the Class of 1956 in honor of their 40th reunion.

**Class of 1959 50th Reunion Scholarship.** Established in 2008 by members of the Class of 1959 in honor of their 50th reunion.

**Class of 1960 Scholarship.** Established in 2010 by the members of the Class of 1960 in honor of their 50th reunion.

**Class of 1961 Scholarship.** Established in 2001 by the members of the Class of 1961.

**Class of 1964 Scholarship.** Established in 1993 by the alumni from the Class of 1964 to support scholarships.

**Class of 1968 Scholarship.** Established in 1998 by the alumni from the Class of 1968 in honor of their 30th reunion to support student scholarships.

**Class of 1969 Scholarship.** Established in 1994 by members of the Class of 1969 in honor of their 25th reunion.

**Class of 1970 Scholarship.** Established in 1996 by members of the Class of 1970 in honor of their 25th reunion.

**Class of 1971 Scholarship.** Established in 1999 by members of the Class of 1971 in honor of their 25th reunion.

**Class of 1972 Scholarship.** Established in 1999 by members of the Class of 1972 in honor of their 25th reunion.

**Class of 1973 Scholarship.** Established in 2000 by members of the Class of 1973 in honor of their 25th reunion.

**Class of 1974 Scholarship in Honor of Dr. Jonathan Mann.** Established in 2002 by members of the Class of 1974 for their 25th reunion and to honor the memory of their classmate, Dr. Jonathan Mann, a pioneering AIDS researcher, who died in the Swissair Flight 111 accident in 1998.

**Class of 1975 Scholarship.** Established in 2000 by members of the Class of 1975 in honor of their 25th reunion.

**Class of 1976 Scholarship.** Established in 2000 by members of the Class of 1976 in honor of their 25th reunion.

**Class of 1977 Scholarship.** Established in 2002 by members of the Class of 1977 in honor of their 25th reunion.

**Class of 1978 Scholarship.** Established in 2002 by members of the Class of 1978 in honor of their 25th reunion.

**Class of 1979 Scholarship.** Established in 2003 by members of the Class of 1979 in honor of their 25th reunion.

**Class of 1980 Scholarship.** Established in 2004 by members of the Class of 1980 in honor of their 25th reunion.

**Class of 1981 Scholarship.** Established in 2005 by members of the Class of 1981 in honor of their 25th reunion.

**Class of 1982 Scholarship.** Established in 2006 by members of the Class of 1982 in honor of their 25th reunion.

**Class of 1983 Scholarship.** Established in 2007 by members of the Class of 1983 in honor of their 25th reunion.

**Class of 1984 Scholarship.** Established in 2008 by members of the Class of 1984 in honor of their 25th reunion.

**Class of 1985 Scholarship.** Established in 2016 by members of the Class of 1985.

**Class of 1986 Scholarship.** Established in 2011 by members of the Class of 1986 in honor of their 25th reunion.

**Grace Strong Coburn Scholarship.** Created in 1962 through the bequest of Mrs. Grace Strong Coburn for scholarships in the School of Medicine.

**Jack W. Cole, MD Scholarship Fund.** Established in 2002 by Mrs. Ruth Kraft Cole, in memory of her late husband, a 1944 graduate of WUSM, and to recognize Dr. Cole's deep appreciation for the education he received. Preference will be given to a student pursuing a career in academic medicine.

**T. Griswold Comstock Scholarships.** Established under the will of Marilla E. Comstock for students who would otherwise be unable to obtain a medical education.

**Robert Emmet Connor Family Scholarship Fund.** Established in 2010 by Dr. Robert Connor in appreciation for the medical education he received at Washington University.

**Clark and Mildred Cox Scholarship for Women.** Established in 1998 with a donation from the Clark Cox Trust.

**Arpad Csapo, MD Memorial Scholarship Fund.** Established in 1982 by Elise Csapo in memory of her husband, and by his friends and colleagues to provide assistance for students who have shown promise in fields relating to reproductive medicine.

**William H. and Elizabeth Gray Danforth Scholars Program.** Established in 1998 in honor of Chancellor Danforth's retirement. The Scholarship recipients must demonstrate outstanding academic promise and a record of community service that reflects Dr. Danforth's values and actions.

**Harriet Arey and John D. Davidson Scholarship.** Established in 2000 by Harriet Arey and John D. Davidson for scholarships in the School of Medicine.

**Davie Family Endowed Scholarship.** Established by Joseph Davie, MD '68, and his family to support scholarships for deserving medical students.

**Paul H. and Ruth K. DeBruine Endowed Scholarship.** Established in 1994 by Dr. and Mrs. Paul DeBruine in honor of his 35th medical school reunion to provide scholarship support to academically well-qualified and financially deserving medical students.

**The Melvin DeHovitz Scholarship.** Established by the estate of Mr. DeHovitz in honor of his mother, Jeanette DeHovitz.

**Distinguished Alumni Scholarship.** These scholarships are made available by generous donations from our alumni. The Washington University Medical Center Alumni Association Executive Council names the scholarships for alumni each year to honor their outstanding contributions and leadership.

**Distinguished Faculty Scholarship.** These scholarships are for students who have challenged themselves and excelled academically, demonstrated leadership, engaged in or shown a commitment to community service, demonstrated their commitment to bringing diverse people together, and enhanced service to disadvantaged groups. In addition, it links each of the scholarship recipients with a faculty mentor who has contributed to the diversity of the medical school.

**Distinguished Student Scholarship.** These scholarships are awarded to students who are selected primarily on the basis of merit (demonstrated superior intellectual and personal achievements, and an assessment of the applicant's character, attitude, motivation and maturity).

**Dr. Charles Drabkin Scholarship.** Created in 1964 to provide financial assistance to medical students.

**Hazel B. Duncan Scholarship Fund.** Established in 2003 through the bequest of Hazel B. Duncan, NU '26.

**Eichner-Dominguez Family Scholarship.** Established in 2005 by Lora Eichner, MD '93, to make it easier for students to attend medical school.

**Dr. Howard Eisen and Dr. Judith Wolf Scholarship.** Established in 2013 by Dr. Howard Eisen and Dr. Judith Wolf, who both completed their residencies at Washington University School of Medicine. Provides support to medical students based on need or merit.

**Dr. and Mrs. Max Elliott Scholarship.** Established in 2000 by Dr. Elliott, MD '64, to assist medical students.

**Robert B. Fickel, DDS Scholarship Fund.** Established by a 1941 graduate of Washington University School of Dental Medicine.

**Carl Fisch Scholarship Fund.** Created in memory of Dr. Fisch by his daughter, Marguerite F. Blackmer. Provides support to students who demonstrate financial need.

**Flance Medical Scientist Traineeship.** Established in honor of faculty member and alumnus I. Jerome Flance, MD '35 by the Harry Edison Foundation for support of a student in the Medical Scientist Training Program.

**Ann Randolph Flipse, MD Scholarship in Medicine.** Established in 2007 by Dr. Ann Randolph Flipse to support deserving medical students with a preference for students whose undergraduate degree was in English, history, philosophy, music, arts or a graduate degree in the humanities.

**George F. Gill Scholarship in Pediatrics.** Instituted in memory of a former clinical professor of pediatrics.

**Helen H. Glaser Scholarship for Women Medical Students.** Established in 1999 by Robert J. Glaser, MD, emeritus trustee and former faculty member, in memory of his wife, Helen H. Glaser, MD '47.

**Anne T. and Carl Goetsch Scholarship.** This fund was established in 2003 through the bequest of Dr. Anne T. Goetsch, MD '41, HS '44, and Dr. Carl Goetsch, HS '43, to support medical students.

**Norman M. and Eleanor H. Gross Scholarship Fund.** Established in 2001 through a bequest from Mr. Gross to provide financial assistance to qualified medical students.

**Paul H. and Lila L. Guttman Scholarship Fund.** Established in 1976 to provide financial assistance to qualified medical students.

**Paul O. and Nancy P. Hagemann Scholarship Fund.** Established by Dr. and Mrs. Hagemann to assist academically well-qualified students with documented financial need.

**Donald R. and Mary N. Harkness Family Scholarship.** Established in 2004 by Drs. Donald and Mary Harkness, both MD '58, in memory of their daughter, Laurel, MD '86.

**Lee B. and Virginia G. Harrison Scholarship.** Established in 1996 for scholarships for students who intend to pursue a career in internal medicine or family practice. Dr. Harrison was a 1927 graduate of the School of Medicine.

**Thomas James Hartford Jr. Scholarship.** Established in 2008. Priority is given to a medical student who is considering a career in health administration.

**Harvielle-Bailey Scholarship for Medicine or Surgery.** Established in 1970 under the will of Miss Isabel Bailey Harvielle as a memorial to Dr. Charles Poplin Harvielle and Dr. Steele Bailey Jr., alumni of the school.

**Ronald C. and Nell W. Hertel Endowed Scholarship for the School of Medicine.** Established in 1995 and endowed in 2005 in memory of Mrs. Nell Hertel to provide financial aid to medical students.

**Raymond F. Holden Jr. and Gertrude K. Holden Scholarship.** Established in 2009 by the Estate of Dr. Raymond F. Holden Jr., MD '33, to provide scholarship support to medical students.

**Allan O. and Doris M. Holtzman Scholarship.** Established by Dr. David and Mrs. Tracy Holtzman in honor of Dr. Holtzman's parents.

**Donald J. Horsh Scholarship.** Established in 1985 to honor Dr. Donald J. Horsh, former associate professor and deputy director for the Health Administration Program. Provides support to medical students.

**Dr. and Mrs. Charles Y. (Yueh-Gin Gung) Hu Scholarship.** Established in 2002 to provide a scholarship to medical students.

**Dr. Grace Huse Memorial Fund.** Provides scholarship awards for deserving Washington University medical students.

**Justan Icks Scholarship.** Established in 2008 by anonymous donor to support students with high academic achievement.

**Jackson Johnson Scholarship.** Provided through a bequest in 1930 from Jackson Johnson.

**Dr. Lorraine A. Johnsrud Scholarship.** Established in 1983 as a memorial to Lorraine from her classmates, friends and family to assist deserving medical students in the funding of their medical expenses.

**Henry J. Kaiser Family Foundation – Medical Century Club Scholarship Endowment.** Following the foundation's generous gift in 1980 for medical student scholarships, the Medical Century Club accepted the challenge to raise new scholarship funds to match an additional gift from the foundation.

**Jay and Ronnie Kaiser Endowed Scholarship.** Established in 2004 by Dr. Jay Kaiser, MD '72, and Mrs. Ronnie Kaiser in appreciation of the financial aid Dr. Kaiser received as a student and to provide support for medical students.

**George D. Kettelkamp Scholarship.** Established in 1969 by Mrs. Kettelkamp in memory of her husband, an alumnus of the School of Medicine.

**M. Kenton King, MD Scholarship.** Created by the Executive Faculty to honor Dr. King at the time of his retirement in 1989 as dean of the School of Medicine after having served in that position for 25 years.

**Saulo Klahr Endowed Scholarship.** Established in 2010 by Mrs. M. Carol Klahr in memory of her husband, Dr. Saulo Klahr, a WUSM professor of kidney disease for 46 years, to provide scholarship support to medical students.

**Ira J. Kodner Scholarship.** Established in 2014 to honor Dr. Ira Kodner, MD, professor emeritus of surgery.

**Albert F. Koetter, MD Scholarship Fund.** Established in 1978 by Mrs. Stella Koetter Darrow in memory of her father, an alumnus and former faculty member of the School of Medicine.

**Nicholas T. Kouchoukos, MD '61 and Judith B. Kouchoukos Scholarship.** Established in 2011 by Dr. Nicholas T. and Mrs. Judith B. Kouchoukos, to provide scholarship support to medical students.

**Helen Hoerr Kurtz Endowed Scholarship in the School of Medicine.** Established by the estate of Mrs. Helen Hoerr Kurtz.

**Anne L. Lehmann Scholarship Fund.** Established in 1983 to grant continued scholarship support to medical students.

**Life Insurance Medical Scholarship Fund.** Created in 1972 from residual funds in the Life Insurance Medical Research Fund. Scholarship support is now awarded to students in the MD degree program.

**Maude L. Lindsey Memorial Scholarships.** Created in 1976 to assist students in the School of Medicine.

**John R. Lionberger Jr. Medical Scholarship Endowment Fund.** Created in 1982 by Dr. John R. Lionberger to be used to aid worthy students in acquiring their medical education.

**E.A. Marquard Memorial Student Scholarship.** Established in 1994 from the E. Alfred Marquard Memorial Student Loan Fund to provide scholarships for deserving medical students.

**Alma Mavis Scholarship.** Created in 1988 under the will of Alma Mavis to assist students intending to practice family medicine.

**Eliza McMillan Scholarship.** Provides assistance to young women in any of several schools of the university to secure an education.

**Medical Alumni Scholarship Fund.** Awarded on the basis of academic achievement and financial need.

**Edith and Martin Meltzer Scholarship.** Established in 2004 by the Meltzer Family Foundation to honor Dr. Gerald Meltzer's (MD '63) parents, who established the foundation.

**Dr. Charles Miller Jr. and Florence Noland Miller Scholarship.** Established in 2014 to support medical students.

**Roy B. and Viola R. Miller Memorial Fund.** Created in 1963 through the bequest of Roy B. Miller to provide scholarships for medical students.

**The Warren S. and Dorothy J. Miller Scholarship Fund.** Established in 1982 through the bequest of Dorothy J. Miller to provide scholarships for any students engaged in studies leading to the degree of Doctor of Medicine.

**Joseph J. and Ernesta G. Mira Scholarship Fund.** Established in 1988 by Dr. and Mrs. Mira to provide assistance to students from the Alton, Illinois, area. Available to others when there are no students from the Alton/Madison County area.

**George and Elizabeth Ann Neilson Scholarship.** Established by the estate of George and Elizabeth Neilson.

**David and Janine Nelson Scholarship in Medicine.** Established in 2011 by Dr. David Nelson, a 1963 graduate of Washington University School of Medicine, and his wife, Janine.

**Nancy S. Newlin, MD and Henry H. Newlin, JD Scholarship Fund.** Established by Dr. Newlin and her late husband.

**Norland Endowed Scholarship.** Established in 2015 by Dr. Charles C. Norland, a 1959 graduate of Washington University School of Medicine, and Mrs. Dorothy Norland.

**Mr. and Mrs. Spencer T. Olin Fellowships for Women.** Provides for annual financial support to female graduates of an undergraduate institution in the United States in any of several disciplines. Application deadline is February 1.

**Spencer T. and Ann W. Olin Medical Fellowships.** Created in an effort to help fill the continuing shortage of physicians who pursue careers in biomedical research, the awards are primarily for students in the Medical Scientist Training Program.

**Dr. Roy W. Osterkamp Memorial Scholarship Fund.** Established in 2003 by Mrs. Linda Osterkamp Desloge and Mrs. Lila Osterkamp Haberberger, in memory of their father, Dr. Roy W. Osterkamp, DE '36. Preference will be given to a student pursuing a career in a medical field related to dental medicine, such as maxillo-facial surgery. If no student shares this interest, it will be awarded based on need.

**F. Thomas Ott (MD '65) and Mary Miller Ott (MSN '68) Scholarship.** Established in 2010 by Dr. F. Thomas and Mrs. Mary Miller Ott to provide scholarship support to medical students.

**Dr. Sidney F. (Class of '29) and Dora K. Pakula Scholarship.** Established in 2001 by Dr. and Mrs. Lawrence C. Pakula in memory of Dr. Pakula's parents to support student scholarships.

**Mary Langston Parker Scholarship.** Established in 2014 by The Parker Family to honor Dr. Mary Langston Parker, MD '53, professor emerita of preventive medicine and past director of Student Health Services.

**William B. Parker Scholarship.** Established in 1976 by the School of Medicine in honor of William B. Parker's 51 years of service.

**The Robert W. and Elise Hampton Parsons Scholarship Fund.** Established in 2014 by Dr. Robert W. Parsons, MD '54, to support medical students.

**William A. Peck, MD Scholars in Medicine.** Established in 2002 to recognize Dr. Peck's 14 years of service to the Medical Center and Washington University community. University trustees, faculty, staff, alumni and friends honored Dr. Peck with gifts to this scholarship.

**Peterson Group Scholarship.** Established in 2014 by Peterson Group to provide financial support to medical students.

**Philpott Family Scholarship.** Established in 1995 by the Philpott family to provide support for medical students with financial need and excellent academic achievement.

**Pi Beta Phi – Charles Ruggieri Scholarship Fund.** Established in 1985 by the Washington University alumni of the Pi Beta Phi medical fraternity to honor Charles Ruggieri and to assist deserving medical students enrolled in Washington University School of Medicine with the funding of their medical education.

**The Virginia Keck, George M. (MD '32) and George K. (MD '64) Powell Medical Student Scholarship Fund.** Established in 1984 by Mrs. George M. Powell in grateful appreciation for the medical education provided to her husband and son by Washington University School of Medicine, which so positively affected the lives of the Powell families.

**Henry and Louise Reller Scholarship.** To be given to medical students in the name of the parents of Louise Reller.

**Gennaro Resta Scholarship.** Established in 2014 by Dr. Regina M. Resta (Class of 1985) and Dr. Michael A. Kolodziej (Class of 1984) to honor Dr. Resta's father.

**Lyman K. Richardson, MD Scholarship Fund.** Established in 1993 by Mrs. Ellen Richardson to provide scholarship support to medical students.

**John E. Rittmann Scholarship.** Established in 2015 by Dr. John E. Rittman, a 1962 graduate of Washington University School of Medicine.

**Samuel Jennings Roberts Scholarship Fund.** Created to provide scholarships for any students engaged in study leading to the degree of Doctor of Medicine.

**Robert Allen Roblee Scholarship Fund.** Established in 1948 through a gift of Mrs. Joseph H. Roblee for students in the School of Medicine.

**Thomas W. and Elizabeth J. Rucker Scholarship Fund.** Created in 1956 through the bequest of Eugenia I. Rucker, in memory of her mother and father.

**J. Max Rukes Scholarship Fund.** Established in 1987, the fund provides scholarship support to deserving medical school students, with a preference for those who are interested in endocrinology.

**Joseph H. Scharf Scholarship Fund.** Provided in 1949 through the bequest of Dr. Joseph H. Scharf.

**Robert G. and Maxine W. Scheibe Scholarship.** Established in 1999 by Robert G. Scheibe, a 1960 Washington University graduate who also received his medical degree here in 1964 and his wife, Maxine, who is a 1966 graduate of the Washington University School of Nursing.

**William H. and Ella M. Schewe Scholarship.** Established to provide financial assistance to worthy students in the medical school.

**Dr. David Schlessinger Endowed Scholarship.** Created in 2006 by Dr. Dan Longo in honor of his mentor, Dr. Schlessinger, who was a professor of molecular microbiology, professor of genetics and professor of microbiology at Washington University School of Medicine.

**Dr. Gustav and Mrs. Miriam Schonfeld Scholarship.** Established in 2010 by Dr. Gustav and Mrs. Miriam Schonfeld to support medical students. Dr. Schonfeld, MD '60, was past chair of the Department of Internal Medicine and physician-in-chief at Barnes-Jewish Hospital.

**Edna Schrick, MD Scholarship Fund.** Established in 1992 by Dr. Schrick to provide scholarship support.

**Mordecai E. Schwartz Endowed Scholarship.** Established in 2006 by Dr. Mary R. Schwartz, Dr. David Cech and Alexander I. Schwartz in memory of their father, who was committed to the training of future physicians.

**Edward L. Schweich Scholarship.** Established in 2010 by Mr. and Mrs. Henry L. Schweich, in memory of Edward L. Schweich, for medical student scholarship support.

**Senior Merit Scholarship.** Established by an anonymous alumnus of the School of Medicine, it provides a scholarship to a senior student who has earned a distinguished record of academic and personal achievements during the first three years in the medical school.

**Charlie W. Shaeffer Jr. Endowed Scholarship Fund.** Established in 2008 by Charlie Shaeffer (MD '64) and his wife, Claire, for medical students, based on academic merit and/or financial need.

**Dr. John B. Shapleigh Scholarship Fund.** Established in 1926 through the bequest of Dr. John B. Shapleigh and supplemented by contributions from Mrs. Shapleigh and Miss Margaret Shapleigh.

**Alexander Balridge Shaw Scholarship Fund.** Created in 1958 through the bequest of Roy A. Shaw in memory of his father, Dr. Alexander Balridge Shaw.

**William T. Shearer and Lynn Des Prez Diversity Scholarship.** Created by William T. Shearer, MD '70, and his wife, Lynn Des Prez. Scholarships are awarded with a preference for under-represented students.

**Dr. Edward Hiroshi Shigeoka Scholarship Fund.** Created in 1988 by Dorothy F. Shigeoka in memory of her husband, Dr. Edward Hiroshi Shigeoka, to help disadvantaged and deserving students pursue their careers in medicine.

**Ernie Simms Scholarship Fund.** Founded in 1984 by friends, colleagues and former students of Professor Simms in recognition of his contributions to scholarly research and teaching in the Department of Microbiology and Immunology.

**Dr. and Mrs. Vergil N. Slee Endowed Scholarship Fund.** Established in 2012 through a bequest from 1941 graduate of the School of Medicine, Dr. Vergil N. Slee, and his wife.

**Stanley B. Smith, MD Scholarship.** Established in 2001 in memory of Samuel and Dora Smith, Dr. Smith's parents, to support student scholarships.

**Dr. Dwight H. Stone Scholarship.** Established by Mr. Dwayne Stone in honor of his brother, Dr. Dwight H. Stone, a 1959 graduate of the School of Medicine.

**Beulah B. Strickling Scholarship Fund.** Established in 1960 with a bequest from Mrs. Beulah B. Strickling.

**Marleah Hammond Strominger Scholarship.** Established in 1971 by Donald Strominger, MD, and supported by family and friends of Marleah Hammond Strominger. The recipient shall be a motivated student with need for financial assistance.

**Mary and Ernst Stuehrk Scholarship Fund.** Established in 1987 to assist medical students with documented financial need.

**Edwin H. and Virginia M. Terrill Scholarship Fund.** Established in 1964 with the bequest of Dr. Edwin H. Terrill, an alumnus.

**Betty L. Thompson Scholarship Endowment.** Established in 2001 by Anthony Thompson, in honor of his mother, Betty.

**Mildred Trotter Scholarship Fund.** For students with documented financial need, the fund was established in 1979 by Dr. and Mrs. Paul Guttman, and supplemented by former students of Dr. Trotter, as a tribute to her many years of teaching in the Department of Anatomy.

**Hiromu Tsuchiya Scholarship Fund.** Created to provide scholarships in the School of Medicine.

**Tuholske-Jonas-Tuholske Medical Scholarship Fund.** Established in 1974 by Rose T. Jonas in memory of her father, husband and brother. The recipient shall be a senior student preparing to enter the field of surgery, obstetrics and gynecology, or internal medicine.

**Cornelia Van Prooyen, MD Scholarship Fund.** Established in 1987, the fund provides scholarship support and other financial assistance to female medical students.

**George S. and Aspasia N. Vellios Scholarship.** Established by Frank Vellios, MD '46, in honor of his parents. Scholarships are awarded to deserving medical students with financial need.

**Louis H. Waltke and Marie Waltke Memorial Fund for Medical Education.** Created in 1984 to provide scholarships and fellowships at the School of Medicine.

**Dr. Robert A. Weiss Scholarship.** Established by Dr. and Mrs. Robert Weiss.

**George and Irene Wolf Medical Scholarship Fund.** Established by the donors to benefit students in the School of Medicine.

**Pamela F. Gallin Yablon, MD Scholarship.** Established in 2008 by Dr. Pamela F. Gallin Yablon and Mr. Leonard H. Yablon to support medical students.

**Dr. Mitchell and Elaine Yanow Scholarship Fund.** Established in 2002 by the children of Dr. and Mrs. Yanow to honor the memory of their parents and to provide support for deserving medical students.

**George Zografakis Memorial Scholarship Fund.** Created by the family and friends of Dr. Zografakis, a distinguished faculty member in the Department of Surgery.

## Loan Funds

**Auer-Rosenfeld Memorial Loan Fund.** Established by Mrs. Elizabeth Auer to be used for educational loans to students.

**Dr. John C. Boetto Loan Fund.** Established in 1993 by a bequest from Mrs. Josephine D. Boetto as a memorial to her son to provide loans for deserving medical students.

**Otto W. Brandhorst Loan Fund.** Created in 1985 by the estate of Fern Crawford. This fund supports loans to students in the School of Medicine.

**Dr. Harold A. Budke Loan.** Established in 1998 to provide financial assistance to needy and deserving medical students.

**Harold A. Budke, MD, Loan Fund II.** Established in 2001 with a bequest from the estate of Etta Elise Wedemeyer to provide loans to needy and deserving female students who will practice family medicine, internal medicine or obstetrics-gynecology medicine.

**Class of 1947 Loan Fund.** Established in 1996 by members of the class of 1947 in honor of their 50th reunion.

**Jess K. Goldberg Memorial Loan Fund by Ophelia H. Kooden and Violet G. Sachs.** Created in 1970 to provide zero-interest loans for medical students in memory of the donors' brother who passed away while attending medical school.

**Health Professions Student Loan Fund.** Established by federal legislation for medical students with a demonstrated financial need. Loans are available for long terms at favorable rates.

**William Randolph Hearst Medical Scholars Loan Fund.** In 1989, the Hearst Foundation provided funding for a new and innovative loan program which provides interest-free loans to students in their last year of study.

**Ursula Hecker Loan Fund.** Established in 1967 by a bequest from Ursula Lee Hecker for the use and benefit of worthy, deserving and needy medical students.

**Kathy E. Holden Loan Fund.** Established by Mrs. Roland Holden and the Roland and Ruby Holden Foundation in honor of her granddaughter, Kathy E. Holden, and in recognition of W. Edwin Dodson, MD, to support loans to deserving medical students.

**Horncrest Foundation — School of Medicine Loan Fund.** In 1982, the trustees of the Horncrest Foundation approved a proposal on behalf of the School of Medicine to match up to a generous annual cap for five-year loan funds solicited by the school. The campaign was extremely successful and now provides loan funds to students with documented financial need.

**W.K. Kellogg Foundation Loan Fund.** Provides financial assistance to medical students in need of such aid.

**Gustel and Edith H. Kiewitt Scholarship Loan Fund.** Provides loan funds for medical students.

**Medical Scholars Loan Program.** Established in 1985 by members of the William Greenleaf Eliot Society, this fund provides an interest-free source of long-term student loans. Annual contributions from alumni and friends support this perpetual and growing resource upon which current and future medical students will draw.

**George W. Merck Memorial Loan Fund.** Established in 1959 by The Merck Company Foundation, the original purpose of the loan was modified in 1983 to provide loans to graduating students which would help bridge the transition from student to resident physician.

**Edward F. Musgrave Loan Fund.** Established in 1981 by Mrs. Jeannette L. Musgrave. The fund supports medical student loans.

**Dr. Lloyd L. Penn and Goldie H. Penn Student Loan.** Dr. Penn, MD '33, established the fund in 1977 to aid well-qualified and deserving students.

**Perkins Student Loan.** A federal program (formerly National Direct Student Loan) to provide loans to students with financial need. Permits repayment over an extended period at a favorable interest rate.

**Dr. William C. and Elva Pratt Loan Fund.** Established in 1982 for medical students with demonstrated financial need.

**G.H. Reinhardt Memorial Scholarship Loan Fund.** Established in 1947 through the bequest of G.H. Reinhardt.

**Aline Rixman Loan Fund.** Created in 1940 by William Rixman in memory of his wife, the fund is used to alleviate unexpected financial emergencies of medical students.

**James L. and Dorothy Rouner Loan Fund.** Established in 1997 by Dr. James and Mrs. Dorothy Rouner to be used for medical students pursuing a career in primary care–general internal medicine.

**Caroline O. Schlesinger Loan Fund.** Established in 1969 to provide financial support for medical students.

**School of Medicine Student Loan Fund.** Established to make loans to students with documented financial needs.

**Washington University Medical Center Alumni Association Loan Fund.** Provides emergency loans to medical students.

**The Alan A. and Edith L. Wolff Loan Fund.** Established in 1993 by Mrs. Edith L. Wolff to provide loans to students with demonstrated financial need who are in their final year of study for the Doctor of Medicine degree.

# Health Professions

The following policy applies to students pursing graduate/professional training in Applied Health Behavior Research (p. 396), Audiology and Communication Sciences (p. 396), Biology and Biomedical Sciences (p. 396), Biomedical Engineering (p. 396), Biostatistics (p. 396), Clinical Investigation (p. 396), Doctor of Philosophy (p. 396), Genetic Epidemiology (p. 396), Occupational Therapy (p. 396), Physical Therapy (p. 396), Population Health Sciences (p. 396), and Public Health (p. 396).

# 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

**Note (for non-MD students):** Students enrolled in other School of Medicine degree programs should refer to the policies of their primary program (Applied Health Behavior Research (https://crtc.wustl.edu/programs/degrees/ahbr/), Audiology and Communication Sciences (https://pacs.wustl.edu/), Biostatistics (https://biostatistics.wustl.edu), Clinical Investigation (https://

crtc.wustl.edu/programs/), Genetic Epidemiology (https://biostatistics.wustl.edu/education/), Occupational Therapy (http://www.ot.wustl.edu/), Physical Therapy (https://pt.wustl.edu/), and Population Health Sciences (http://www.mphs.wustl.edu/)).

# 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 (https://pacs.wustl.edu/admissions/tuition-and-financial-aid/) website.

## Biological and Biomedical Sciences

Students admitted to the Division of Biology & Biomedical Sciences (DBBS) graduate programs are guaranteed full stipend and tuition support contingent upon satisfactory performance. The stipend for the 2020-21 academic year is $30,500. In addition, health coverage, disability, and life insurance are also provided. Please visit the DBBS website (http://dbbs.wustl.edu/Pages/) for additional information.

## Biomedical Engineering

For more information about the Biomedical Engineering (http://bulletin.wustl.edu/grad/engineering/biomedical/) program, including tuition and fees, please visit the McKelvey School of Engineering *Bulletin*.

## Biostatistics

For tuition information, please visit our Biostatistics website (https://biostatistics.wustl.edu/education/master-of-science-in-biostatistics-msibs/tuition-and-financial-aid/), 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 (https://crtc.wustl.edu/courses/class-list/tuition/) website for additional tuition information.

## Doctor of Philosophy

For more information about the Doctor of Philosophy program, including tuition and fees, please visit the Graduate School website (http://graduateschool.wustl.edu).

## Genetic Epidemiology

For tuition information, please visit our website (https://biostatistics.wustl.edu/education/), 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 2020 is $100,000. This breaks down to $16,667 × five semesters and $8,333 × two fieldwork experiences.

The total cost of tuition for the incoming OTD class in fall 2020 is $132,500. This breaks down to $16,667 × six semesters, $8,333 × two fieldwork experiences, and $15,832 for one doctoral capstone.

Part-time tuition is $1,250 per credit unit.

## Physical Therapy

Professional DPT Curriculum = $20,973 per semester
PhD in Movement Science Curriculum = $28,150 per semester

## Population Health Sciences

For more information about the Population Health Sciences program (http://mphs.wustl.edu/), including tuition and fees, please visit the Population Health Sciences website (http://mphs.wustl.edu/Admissions/Tuition/).

## Public Health

For more information about the Public Health program, including tuition and fees, please visit the Graduate School website (http://graduateschool.wustl.edu).

# Joint Programs

The following policy applies to students pursing graduate/professional training in the following joint programs: MD/PhD (p. 397), MD/MSCI (p. 397), MD/MPHS (p. 398) and MD/MPH (p. 398).

# 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 $30,500 per year), health coverage, disability and life insurance, 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 a year for the duration of the award. Please visit the MSTP website (http://mstp.wustl.edu/Pages/) 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 (https://crtc.wustl.edu/courses/class-list/tuition/) website for additional tuition information.

For information about tuition for the Medicine program, please visit the Medical Students section (p. 379) of this page.

## Doctor of Medicine and Master of Population Health Sciences: MD/MPHS

For more information about the Population Health Sciences program (http://mphs.wustl.edu/Academics/MD-MPHS/), 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. 379) of this page.

## Doctor of Medicine and Master of Public Health: MD/MPH

For more information about the MD/MPH program (http://bulletin.wustl.edu/brownschool/financial/), 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. 379) of this page.

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