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 anesthesiology 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.

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Faculty

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

A

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Doctor of Medicine, Hahnemann University, 1972  

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Master of Business Administration, John Hopkins University (Duplicate of Johns Hopkins University), 2010

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Bachelor of Arts, University of Missouri Kansas City, 2010
Doctor of Medicine, University of Missouri Kansas City, 2010

Gregory Charles Miller, M.D.
Instructor in Anesthesiology (primary appointment)
Bachelor of Science, University of Missouri Kansas City, 2010
Doctor of Medicine, University of Missouri Kansas City, 2016

Allison Denise Mitchell, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Howard University, 2008
Doctor of Medicine, University of Texas Health Sciences at San Antonio, 2012

David Thomas Monks, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Birmingham Medical School, 2018

Michael C. Montana, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Virginia, 2003
Doctor of Medicine, Washington University in St Louis, 2012

John David Moore, M.D.
Instructor in Anesthesiology (Pending Dean's Approval) (primary appointment)
Doctor of Medicine, Universidad Autónoma de Centro América, 2020

David James Moquin, M.D.
Instructor in Anesthesiology (primary appointment)
Doctor of Medicine, University of Tennessee, 2017

Rachel Willis Moquin, M.Ed., Ph.D.
Instructor in Anesthesiology (primary appointment)
Bachelor of Arts, University of Mississippi, 2011
Master of Education, University of Mississippi, 2013
Doctor of Philosophy, Vanderbilt University, 2017

Ehab Samir Morcos, M.D.
Instructor in Clinical Anesthesiology
Instructor in Clinical Anesthesiology
Doctor of Medicine, Cairo University, 1991

Jose Moron-Concepcion, Ph.D.
Professor of Anesthesiology (primary appointment)
Professor of Neuroscience
Professor of Psychiatry
Division Chief - Division of Anesthesiology, Research Unit
Henry Elliot Mallinckrodt Professorship in Anesthesiology
Doctor of Philosophy, University of Barcelona, 1998

Jeremiah J Morrissey, Ph.D.
Professor of Anesthesiology (primary appointment)
Bachelor of Arts, MacMurray College, 1969
Doctor of Philosophy, Saint Louis University, 1974

Jimmy Lewis Moss, M.D.
Instructor in Clinical Anesthesiology
Bachelor of Science, Florida State University, 2010
Doctor of Medicine, Florida State University, 2015

Christopher Marlowe Murphy, M.A., M.D.
Instructor in Anesthesiology (Pending Dean's Approval) (primary appointment)
Bachelor of Science, University of Arkansas, 2010
Master of Arts, University of Arkansas, 2012
Doctor of Medicine, University of Arkansas, 2016

Teresa Marie Murray-Torres, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Notre Dame, 2008
Doctor of Medicine, University of Chicago, 2014

Amjad Issam Musleh, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of New Mexico, 2008
Doctor of Medicine, University of New Mexico, 2013

Hadas Nahman-Averbuch, M.S., Ph.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Haifa University, 2005
Master of Science, Israel Institute of Technology, 2009
Doctor of Philosophy, Israel Institute of Technology, 2015

Jessica Lauren Nelson, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Assistant Professor of Emergency Medicine
Doctor of Medicine, University of Michigan, 2012
Bachelor of Science, University of Wisconsin, 2018

Joan M Niehoff, M.D.
Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Emergency Medicine
Doctor of Medicine, University of Missouri in St Louis, 1992
Doctor of Medicine, University of Missouri Columbia, 1982

Daniel C Nieva, M.D.
Associate Professor of Anesthesiology (primary appointment)  
Bachelor of Science, University of Iowa, 1998  
Doctor of Medicine, University of Iowa, 2003  

Dolores Benedicta Njoku, M.D.  
Professor of Anesthesiology (primary appointment)  
Division Chief of Pediatric Anesthesiology  
Rudolph L. and Mary Frances Wise Endowed Chair in Pediatric Anesthesiology  
Doctor of Medicine, University of Illinois College of Medicine, 1997  

Aaron John Norris, Ph.D., M.D.  
Assistant Professor of Anesthesiology (primary appointment)  
Bachelor of Science, Colorado State University, 2001  
Doctor of Philosophy, Washington University in St Louis, 2012  

Sydney Marie Nykiel-Bailey, M.D.  
Assistant Professor of Anesthesiology (primary appointment)  
Bachelor of Science, Saint Louis University, 2001  
Doctor of Medicine, University of Missouri Kansas City, 2005  

O  

Uchenna Otoma, M.S., M.D.  
Associate Professor of Anesthesiology (primary appointment)  
Doctor of Medicine, University of Nigeria, 1998  
Master of Science, Pennsylvania State University, 2010  

Folasade Oladapo, M.D.  
Assistant Professor of Anesthesiology (primary appointment)  
Doctor of Medicine, University of Medicine and Dental Of New Jersey, 2008  

Lawrence Osei, M.S., M.D.  
Instructor in Clinical Anesthesiology  
Bachelor of Science, University of Science & Techn, 1994  
Master of Science, University of Science & Techn, 1996  
Doctor of Medicine, University of Science & Techn, 1996  

William D Owens, M.D.  
Professor Emeritus of Anesthesiology  
Bachelor of Arts, Westminster College, 1961  
Doctor of Medicine, Davenport University, 1965  

P  

Ben Julian Palanca, M.D.  
Associate Professor of Anesthesiology (primary appointment)  
Associate Professor of Psychiatry  
Bachelor of Science, University of Washington, 1997  
Doctor of Medicine, Washington University in St Louis, 2005  

Arvind Palanisamy, Ph.D., M.D.  
Associate Professor of Anesthesiology (primary appointment)  
Associate Professor of Obstetrics and Gynecology  
Division Chief - Division of Obstetrical Anesthesia  
Doctor of Medicine, Tamilnadu Medical University, 2000  
India Inst of Medical Sci, 2003  

Chris M Palmer, M.D.  
Associate Professor of Anesthesiology (primary appointment)  
Associate Professor of Emergency Medicine  
Bachelor of Science, Virginia Tech, 2004  
Empire State College, 2008  

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Bachelor of Science, University of Miami, 2003  
Doctor of Medicine, University of Miami, 2007  

Kyle Edward Parker, Ph.D.  
Instructor in Anesthesiology (primary appointment)  
Doctor of Philosophy, University of Missouri Columbia, 2013  

Jesus Ceforino Patino, M.D.  
Instructor in Clinical Anesthesiology  
Bachelor of Science, University of the Philippines, 1997  
Doctor of Medicine, University of the Philippines, 2002  

Giovanni Pauletti, M.S., Ph.D.  
Adjunct Professor of Anesthesiology  
Master of Science, Swiss Fed Inst Tech (EPFL), 1987  
Doctor of Philosophy, Swiss Fed Inst Tech (EPFL), 1994  

Patricia A. Penkoske, M.D.  
Instructor in Anesthesiology (primary appointment)  
Bachelor of Science, Lindenwood University, 1969  
Doctor of Medicine, Washington University in St Louis, 1974  

Bethany Pennington, Pharm.D.  
Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)  
Doctor of Pharmacy, Saint Louis College of Pharmacy, null  

John Albert Pieper, M.D.  
Adjunct Professor of Anesthesiology  
Bachelor of Science, University of Colorado Boulder, 1974  
Doctor of Medicine, State University of New York at Buffalo, 1979  

Mitchell R Platin, M.D.  
Assistant Professor of Anesthesiology (primary appointment)  
Doctor of Medicine, Kent State University, 1987  

Debra D Pulley, M.M.E., M.D.  
Professor of Anesthesiology (primary appointment)  
Bachelor of Science, Vanderbilt University, 1978  
Master of Mechanical Engineering, University of Missouri Columbia, 1982  
Doctor of Medicine, Saint Louis University, 1987  

Laurie Jean Punch, M.D.  
Instructor in Clinical Anesthesiology  
Bachelor of Science, Yale University, 1997  
Doctor of Medicine, University of Connecticut, 2002  

Lesley Kathryn Rao, M.D.  
Associate Professor of Anesthesiology (primary appointment)
Rashmi R Rathor, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Illinois, 2007

Andrea Bulkley Reidy, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Illinois Wesleyan University, 2005
Doctor of Medicine, Illinois Wesleyan University, 2010

Eduardo Reina, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Illinois Chicago, 2011

Clare H Ridley, M.D.
Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Surgery (Cardiothoracic Surgery)
Bachelor of Arts, Columbia College of Physicians and Surgeons, 2002
Doctor of Medicine, Washington University in St Louis, 2008

Isabella Rossi Riordan, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Interim Division Chief for the Progress West Division
Doctor of Medicine, Loyola University Chicago, 2014

Stephen L. Ristvedt, M.A., Ph.D.
Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Psychiatry
Bachelor of Arts, University of Minnesota, 1981
Master of Arts, University of Pennsylvania, 1983
Doctor of Philosophy, University of Pennsylvania, 1989

Charles M Robertson, M.D.
Instructor in Anesthesiology (primary appointment)
Bachelor of Arts, University of Virginia, 1997
Doctor of Medicine, University of Virginia, 2003

Evan Ward Roller, M.D.
Associate Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Cincinnati, 2010

Angela K Saettele, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Simpson College, 2004
Doctor of Medicine, University of Missouri Columbia, 2008

Monica Sala-Rabanal, Ph.D.
Instructor in Anesthesiology (primary appointment)
Instructor in Cell Biology and Physiology
Bachelor of Science, University of Barcelona, 1997
Doctor of Philosophy, University of Barcelona, 2003

Emine Aysu Salviz, M.S., M.D.
Instructor in Anesthesiology (primary appointment)
Doctor of Medicine, Baskent University, 2004

Master of Science, Ankara University, 2009

Vijaya K Samineni, Ph.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Philosophy, Southern Illinois University, 2013

Jessica Lauren Sanford, M.D.
Instructor in Anesthesiology (primary appointment)
Doctor of Medicine, University of Missouri Columbia, null

Matthew Stringfellow Sanzalone, M.D.
Instructor in Anesthesiology (Pending Dean's Approval) (primary appointment)
Doctor of Medicine, Louisiana State University, 2015

Charles R Schrock, M.D.
Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Notre Dame, 1986
Doctor of Medicine, University of Missouri Columbia, 1991

Fourutan Tim Shafiei, M.D.
Instructor in Anesthesiology (primary appointment)
Doctor of Medicine, Trinity Medical Sciences University, 2015

Rajiv K Shah, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, University of Rochester, 2010

Nicole Jimin Shin, M.D.
Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Washington University in St Louis, 2010
Doctor of Medicine, Washington University in St Louis, 2015

Preet Mohinder Singh, M.D., MBBS
Assistant Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Dayanand Medical College, 2007
India Inst of Medical Sci, 2010

Pratik Sinha, Ph.D., M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Manchester, 2001
Doctor of Medicine, University of Manchester, 2002
Doctor of Philosophy, Imperial College, 2013

Sarah Kendall Smith, Ph.D., M.D.
Assistant Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)
Bachelor of Science, University of Kansas, 2004
Doctor of Philosophy, University of Kansas Medical, 2011
Doctor of Medicine, University of Kansas Medical, 2013

John Charles Spitler, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Missouri Columbia, 1998
Doctor of Medicine, University of Missouri Columbia, 2003

Joseph H Steinbach, Ph.D.
Professor Emeritus of Anesthesiology
Bachelor of Arts, Reed College, 1968
Doctor of Philosophy, University of California San Diego, 1973

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Doctor of Medicine, Washington University in St Louis, 2008

Sanjay Subramanian, M.D.
Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Medicine
Doctor of Medicine, Christian Medical College, 1994

Robert A Swarm, M.D.
Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Oberlin College, 1978
Doctor of Medicine, Washington University in St Louis, 1983

T

Rene Tempelhoff
Professor Emeritus of Anesthesiology

Raghu P Terkonda, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Missouri Columbia, 1983
Doctor of Medicine, University of Missouri Columbia, 1987

Loc Vinh Thang, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Michigan State University, 2015

Douglas Royce Thompson, M.D.
Associate Professor of Anesthesiology (primary appointment)
Vice Chair - Education
Bachelor of Science, University of California San Diego, 1998
Doctor of Medicine, University of California San Diego, 2003

Silvestre A Tomeldan, M.D.
Instructor Emeritus in Anesthesiology
Doctor of Medicine, School Not Listed, 1970

V

Swarup Varaday, MBBS
Associate Professor of Anesthesiology (primary appointment)
Foreign MD equivalent, Andhra University, 1989

Anandhalakshmi Varadharajan, M.D., MBBS
Voluntary Clinical Instructor in Anesthesiology
Foreign MD equivalent, Sri Ramachandra Medical College, 2000
Doctor of Medicine, St. Lukes, 2007

Gershon Ram Volotzky, M.D.
Associate Professor of Anesthesiology (primary appointment)
Aviv University, 1979

W

Brian Louis Weber, J.D., M.D.
Instructor in Anesthesiology (primary appointment)
Bachelor of Science, University of Missouri in St Louis, 2005
Juris Doctor, Washington University in St Louis, 2008
Doctor of Medicine, University of Missouri Kansas City, 2015

Ashley Brooke Weinhold, M.D.
Assistant Professor of Anesthesiology (primary appointment)

Doctor of Medicine, University of Arkansas, 2011

Brian T Wessman, M.D.
Associate Professor of Anesthesiology (primary appointment)
Associate Professor of Emergency Medicine
Division Chief - Division of Critical Care Medicine
Bachelor of Science, College of William and Mary, 2000
Doctor of Medicine, Commonwealth College, 2005

Troy S Wildes, M.D.
Division Chief - Division of Perioperative Medicine
Bachelor of Science, Illinois Wesleyan University, 1998
Doctor of Medicine, Washington University in St Louis, 2002

Brett D Wolff, M.D.
Professor of Anesthesiology (primary appointment)
Bachelor of Arts, Indiana University Bloomington, 1981
Doctor of Medicine, Indiana University Bloomington, 1985

Maxim Wolfson, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Washington University in St Louis, 2015

X

Xiaoming Xia, M.S., Ph.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Fudan University, 1984
Master of Science, Shanghai Jiao Tong University, 1987
Doctor of Philosophy, Vollum Institute of Oregon Health and Science University, 1998

Zili Xie, Ph.D.
Instructor in Anesthesiology (Pending Dean's Approval) (primary appointment)
Doctor of Philosophy, Wuhan University (####), 2017

Y

Branden Edward Yee, M.D.
Associate Professor of Anesthesiology (primary appointment)
Bachelor of Science, Tufts University, 2004
Doctor of Medicine, Tufts University, 2008

Xiaobin Yi, M.D.
Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Hunan Medical University, 1985

Alexander H Young, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Arts, University of Mississippi, 1986
Doctor of Medicine, University of Arkansas, 1990

Anna Rebecca Young, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, Asbury College, 2004
Doctor of Medicine, University of Kentucky, 2008

Allison Nicole Yu, M.D.
Instructor in Anesthesiology (primary appointment)
Bachelor of Arts, Cornell University, 2008
Doctor of Medicine, University of Buffalo, 2016

Z

Paul Battista Zanaboni, Ph.D., M.D.
Associate Professor of Anesthesiology (Pending Executive Faculty Approval) (primary appointment)
Doctor of Philosophy, Saint Louis University, 1990
Doctor of Medicine, Saint Louis University, 1992

Jing Zhong, M.D.
Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Duke University, 2009
Doctor of Medicine, University of North Carolina at Chapel Hill, 2017

Yu Zhou, M.S., Ph.D.
Instructor in Anesthesiology (primary appointment)
Bachelor of Science, Wuhan University, 1996
Master of Science, Zhejiang Medical University, 1999
Doctor of Philosophy, State University of New York at Buffalo, 2005

Anita Mathew Zimmerman, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Bachelor of Science, University of Illinois Chicago, 2010
Doctor of Medicine, University of Illinois Chicago, 2014

Jonathan Kramer Zoller, M.D.
Assistant Professor of Anesthesiology (primary appointment)
Doctor of Medicine, Tulane University, 2009

Research Electives

Anesthesiology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

Special electives in basic science research as it applies to anesthesiology can be arranged with the principal investigators in the Department of Anesthesiology (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, MBBC; Anne Drewry, MD; Brian Fuller, MD; Simon Haroutounian, PhD; Thomas Kannamapallii, PhD; Michael Montana, MD, PhD; Ben Palanca, MD, PhD; or Troy Wildes, MD.

Courses


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.

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.
M10 Anesth 812 Pediatric Anesthesiology
This clinical elective is designed to teach the theory and practice of pediatric anesthesia 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.

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.

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.

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.