

Bulletin of Washington University

St. Louis, Missouri

School of Medicine

January 9, 2014

# About the 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](#), [occupational therapy](#) and [physical therapy](#) are perennially ranked among the nation's best by *U.S. News & World Report*. Faculty lead a robust research enterprise, supported by \$375.8 million from the National Institutes of Health (NIH) in the fiscal year ending June 30, 2012. The school's physicians provide care for more than 430,000 children and adults each year, in partnership with nationally ranked [Barnes-Jewish Hospital](#) and [St. Louis Children's Hospital](#).

The Bulletin of Washington University School of Medicine represents the School's academic policies, services, and course and program offerings.

For the most current information regarding academic programs and course descriptions and services available to students, please visit websites of the educational program of interest, accessible through the [Educational Programs](#) section.

## Mission Statement for Washington University

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

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

Our goals are:

- 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 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, St. Louis, as well as in the nation and the world.

To this end we intend:

- 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.

# School of Medicine Mission and Vision Statement

## Our Mission

Washington University School of Medicine will lead in advancing human health through the best clinical care, innovative research and the 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:

- 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

Approved by Executive Faculty at their September 4, 2013 meeting

## History

The education of physicians at Washington University began in 1891. Under an ordinance enacted April 14, 1891, establishing a Medical Department of Washington University, the St. Louis Medical College (an independent medical college in St. Louis) was brought under the wing of the well-established University. The faculty of the college eagerly agreed to the union, stating "Most of the great medical schools of the world have always been integrant departments of universities, and the examples which America furnishes give added testimony to the fructifying influence of the contact of students and teachers of professional schools with the workers in universities." Eight years later, the Missouri Medical College (another independent college in the city) also joined Washington University, and thus the two most famous medical colleges in the city were merged with the University.

In 1909, Abraham Flexner began a survey of 155 medical schools in the United States and Canada for the Carnegie Foundation for the Advancement of Teaching. The survey created a national sensation. Some schools collapsed, others pooled their resources, while still others reorganized. The Medical School of Washington University did not escape criticism. In the report Flexner made to Henry Smith Pritchett, Ph.D., president of the Carnegie Foundation for the Advancement of Teaching and former professor of astronomy at Washington University, he said that one of two courses must be adopted: "The department must be either abolished or reorganized."

Dr. Pritchett mailed the report to Robert S. Brookings, a St. Louis merchant who was president of the Board of Directors of Washington University. Brookings was shocked and immediately went to New York to see Flexner, demanding proof that the conditions were as bad as described. Both returned to St. Louis and the two men went through the School. In less than two hours, Brookings was convinced that drastic action was necessary if the School was to be one of the foremost institutions of medical education and research. The meeting in 1909 of Brookings and Flexner was of unsurpassed significance in the history of the Washington University School of Medicine, for it led to the complete reorganization of the School and the establishment of the present Medical Center. Abraham Flexner inspired the dream of a model medical school; Robert Brookings accepted the challenge, and with the energy and vision which characterized all his enterprises, made the dream a reality.

No time was lost in making changes. The Bulletin of the Medical School for July 1910 made the following statement: "The Corporation of the University, becoming convinced that in no other direction could greater service be rendered than through a great, modern medical school, determined to reorganize the School and to place it in the front rank of American medical institutions. It has called to the heads of a number of leading departments the ablest men it could secure."

When Robert A. Barnes died in 1892, he left a will which directed the trustees of his estate to use \$840,000 for the erection and equipment of a hospital "for sick and injured persons, without distinction of creed, under the auspices of the Methodist Episcopal Church, South." Investigation by the trustees into the cost of building a modern hospital convinced them that the sum was not large enough to build an efficient, fireproof building, and they therefore invested the trust. By 1912 the value had increased to \$2 million, a sum which permitted the building of a hospital and left an endowment greater than the original fund.

At the same time the trustees were studying hospital construction, Robert Brookings was studying medical schools. It was apparent to everyone concerned that the two projects, the building of a medical school and the construction of a modern hospital, were so interrelated that the purpose of each would be more successfully fulfilled by an affiliation. A medical school would provide a highly trained staff and would assure the most modern methods and superior laboratory facilities for the hospital. A teaching hospital would give patients superior care and, at the same time, provide the essential clinical experience consistent with modern medical teaching methods.

In the spring of 1912, construction was begun on the medical school and hospital buildings which today form the nucleus of the present center. The laboratories were moved from their old quarters in downtown St. Louis into the new buildings on Euclid Avenue and Kingshighway Boulevard during the summer of 1914, and late in the fall of the same year the activities of the Washington University Hospital were transferred to Barnes Hospital. Concomitantly, the St. Louis Children's Hospital, then located on Jefferson Avenue, became affiliated with the School of Medicine and moved to its new quarters in the Medical Center.

On April 28, 29 and 30, 1915, exercises were held to celebrate the completion of this group of buildings designed to promote the practice, the teaching and the progress of medicine. The dedication ceremonies marked what Dr. William H. Welch of The Johns Hopkins University called "one of the most significant events in the history of medical education in America." Robert S. Brookings, the one man most responsible for the reorganization, voiced the hope that "our efforts will contribute, in some measure, to raising the standard of medical education in the West, and that we will add, through research activities, our fair quota to the sum of the world's knowledge of medicine." These prophetic words have been realized.

In the ensuing years, the Medical Center has continued to grow, and now its facilities are among the best in the world. With the increase in size of the physical plant there has come a substantial increase in the number of the faculty; the expansion has been made without compromise to the standards that marked the early development of the Medical Center. As a result, significant achievements in both research and clinical areas have been steadily recorded.

## Administration

This section of the Bulletin presents major leadership bodies of Washington University, the School of Medicine, and Washington University Medical Center.

<http://boardoftrustees.wustl.edu/Pages/current-trustees.aspx>

<http://boardoftrustees.wustl.edu/Pages/emeritus-trustees.aspx>

## Officers of the University Administration

Mark S. Wrighton  
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Executive Vice Chancellor for Alumni and Development Programs

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Assistant Dean and Chief Information Officer

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Assistant Dean for Career Counseling

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Assistant Dean and Director for the Program for the Humanities in Medicine

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Assistant Dean for Academic Affairs and Registrar

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Assistant Dean and Director of Financial Aid

Lisa H. Stevenson  
Assistant Dean for Admissions and Director of Diversity Programs

Yi Zhang  
Assistant Dean for Clinical Trials and Executive Director of the Center for Clinical Studies

Karen Winters, MD  
Director of the Student and Employee Health Services — Medical Campus

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## Officers and Committees of the Faculty

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 state and federal law.

## Executive Faculty

### Voting Members

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Ralph G. Dacey Jr.

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Dennis E. Hallahan

Sherrie M. Hauff  
Chair, ECFC

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Jeffrey D. Milbrandt

Alison Nash  
Voluntary Faculty Representative

James B. Skeath  
Vice Chair, ECFC

Lilianna Solnica-Krezel

Alan L. Schwartz

Herbert W. Virgin

Charles F. Zorumski

## Attending

Mark S. Wrighton  
Chancellor  
Ex officio

Edward S. Macias (until July 1, 2013)  
Provost  
Ex officio

Holden Thorp (effective July 1, 2013)

## Faculty Council

The Faculty Council consists of all full-time members of the faculty with the rank of professor, associate professor, assistant professor and those instructors who have been on the faculty for at least three years. The officers and executive committee are listed below. Their service ends in June of the year in parenthesis after their name.

## Executive Committee of the Faculty Council (ECFC)

Kim Carmichael, MD (2014)  
Chair

Robert Mercer, PhD (2014)  
Vice Chair

Steven Edmundowicz, MD (2014)  
Vice Chair Elect

Clinical Representative to the Executive Committee of the Faculty Council

Leonard Maggi, PhD (2014)

Michael Noetzel, MD (2014)

Rajendra S. Apte, MD, PhD (2015) \*serving remaining term of Dr. Edmundowicz

Peter D. Panagos, MD (2015) \*serving remaining term of Dr. Sheline

Mary E. Klingensmith, MD (2016)

Jennifer S. Stith, PT, PhD, LCSW (2016)

Preclinical Representative to the Executive Committee of the Faculty Council

Paul Shaw, PhD (2014)

Sheila Stewart, PhD (2015)

Peter M. Burgers, PhD (2016)

Research Track Representative to the Executive Committee of the Faculty Council

Nancy L. Baenziger, PhD (2015)

Amy McQueen, PhD (2016)

Program or Division Representative to the Executive Committee of the Faculty Council

Beth Crowner, PT, DPT (2015)

Divisional Representative to Faculty Senate Council

Scott Saunders, MD, PhD (2014)

William Clark, PhD (2015)

Elected Member of Practice Plan Board of Directors

Jeffrey Crippin, MD (2016)

Ellen Lockhart, MD (2016)

Medical School Faculty Rights Committee

Kim Carmichael, MD, (2013)

Robert Mercer, PhD (2014)

Feng Chen, PhD (2014-R)

Andrew Galakatos, MD (2014-R)

Angela Reiersen, MD (2014-R)

Sherrie Hautt, MD, Co-Chair (2016-A)

Catherine E. Lang, PT. PhD (2016-A)

Leonard B. Maggi, Jr., MD (2016-A)

Academic Freedom and Tenure Hearing Committee (University Committee)

Robyn Klein, MD, PhD (2014-R)

Jill Firszt, PhD (2014-A)

J. Philip Miller (2015- R)

Jacob Buchowski (2015-A)

Ad Hoc ECFC Members

Diana Gray, MD (Office of Faculty Affairs)

Joan Luby, MD (Academic Women's Network)

## Animal Studies Committee

Dana Abendschein  
Chair

Steven L. Leary

## Committee on the Academic and Professional Evaluation of Students

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*Chair*

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Erika C. Crouch, MD, PhD

Dehra Glueck, MD

Henry Huang, PhD

Nigar Kirmani, MD

Stephen S. Lefrak, MD

Robert W. Mercer, PhD

Jane Phillips-Conroy, PhD

Linda J. Pike, PhD

Deborah Rubin, MD

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W. Edwin Dodson, MD  
*Ex officio*

Michael Awad, MD, PhD  
*Ex officio*

Deborah A. Monolo  
*Ex officio*

Lisa M. Moscoso, MD, PhD  
*Ex officio*

Will R. Ross, MD, MPH  
*Ex officio*

Alison J. Whelan, MD  
*Ex officio*

Karen Winters, MD  
*Ex officio*

## Committee on Admissions

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*Chair*

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Rebecca Bavolek

Raykee Bhayani

Alan Braverman

Angela L. Brown

Lewis Chase

Praveen Raju Chenna

Koong-Nah Chung

Sharon Cresci

John S. Daniels

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Matthew Dobbs  
Ian Dorward  
Oluwadamilola Fayanju  
Andrew Galakatos  
Alan Glass  
Joel Goebel  
Melody Goodman  
Ramaswamy Govindan  
Ann Gronowski  
Andrea Hagemann  
Ian Hagemann  
Anjum Hassan  
James Heins  
Gary Hirshberg  
Eva Hurst  
Aimee James  
Sandra Klein  
Eric Knoche  
Friederike Kreisel  
Gina LaRossa  
Steven Lawrence  
Kirstin Lee  
Mark Levine  
Latisha Love-Gregory  
Jeffrey Lowell  
Susan E. Mackinnon  
Tessa E. Madden



Robert Mahoney  
Julie Margenthaler  
James Marks  
Marcia McCabe  
Gerald Medoff  
Deborah A. Monolo  
Brian Nussenbaum  
Allison Ogden  
Bridget O'Neal  
Daniel Osei  
F. Thomas Ott  
William D. Owens  
Yumi Padron-Turmelle  
Amit Patel  
Jeffrey Peipert  
Jane Phillips-Conroy  
Steve Plax  
Greg Polites  
Valerie Ratts  
Marvin Rennard  
Cynthia Rogers  
Will Ross  
Erin Rubin  
Heidi Sandige  
Souzan Sanati  
Julie K. Schwarz  
Noah Schoenberg  
Barbara B. Sterkel

Lisa Stevenson  
Angela Marie Theard  
Linda Tsai  
Nancy Tye-Murray  
Damon Vincent  
Lindy Wall  
Colleen Wallace  
Jennifer Wambach  
Alvin Wenneker  
Karen Winters  
Franz Wippold  
Darryl Zuckerman

## Committee on Fellowships and Awards

Susan K. Dutcher  
Chair

Sharon Cresci

Jeff Miner

## Committee on Student Financial Aid

Valerie S. Ratts  
*Chair*

Bridget O'Neal

# Conflicts of Interest Review Committee

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*Chair*

Leonard Bacharier, MD

Laura Bierut, MD

Paul Bridgman, PhD

Bradley Castanho, PhD

*Ex officio*

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David Curiel, MD, PhD

Leesa Galatz, MD

William Gillanders, MD

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Patty Hart

*Ex officio*

R. Edward Hogan, MD

Henry Huang, PhD

Evan Kharasch, MD, PhD

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Daniel Ory, MD

Edward Pearce, PhD

Keith Rich, MD

Luis Sanchez, MD

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Anshuman Sharma, MD

Alan Shiels, PhD

# Human Research Protection Office (HRPO)

## Executive Chair, IRB

Green, Jonathan, MD

Associate Dean for Human Studies

## Current IRB Committee Members

Aloush, Aviva

Alper, Caryn

Atkinson, Jeffrey

Baggstrom, Maria

Balakas, Karen

Bannister, Linda

Bear, Bryan

Beck, Emily

Berg, Christine

Berla, Jenny

Bierhals, Andrew

Bliss, Paulette

Bloomberg, Gordon

Boehmer, Leigh

Bogomolov, Barbara

Bohner, Diane

Boomer, Jonathan

Brown, Angela

Bucholz, Kathleen

Buckles, Virginia

Butler, Sara  
Byers, Derek  
Cahill, Alison  
Canter, Charles  
Carmichael, Kim  
Carreno, Beatriz  
Casabar, Ed  
Cashen, Amanda  
Chandel, Rick  
Char, Corinne  
Char, Douglas  
Chrisman Robbins, Camaryn  
Clark, Judson  
Clarke, Mary (Mickey)  
Cleary, Jackie  
Cole, Robert  
Cook, Susan  
Cramer, William  
Cyr, Amy  
Darcy, Michael  
Davies, Sherri  
Davis, Karen  
Davis, T. Keefe  
Deschryver, Anne  
Dickinson, John  
Dilthey, Beverly  
Doyle, Ann  
Dresser, Rebecca

Engeszer, Robert  
Feit, Debi  
Feman, Stephen  
Filley, Gina  
Fowler-Dixon, Sarah  
Friedman, Diane  
Gartland, Jennifer  
Geekie, Sharon  
Geltman, Edward  
Gerdes, Brenda  
Gillanders, William  
Govindan, Ramaswamy  
Gruchevska, Ioana  
Guemmer, Sally  
Guy, Diane  
Hart, Patricia  
Hartman, Mary  
Hartz, Sarah  
Henry, Chad  
Hildebolt, Charles  
Hixson, Emily  
Hmiel, S. Paul  
Hollander, Abby  
Holstad, Beth  
Holstad, Sheldon  
Jenkerson, Michelle  
Jiang, Allan  
Jones, Martha

Keeley, Abby  
Kersting, Lynn  
Kipnis, Laura  
Kissel, S. Sarah  
Kisseleva, Marina  
Koch, Tammy  
Lane, Bruce  
Lauber, Joanne  
Lawrence, Lisa  
Leary, Michael  
Lijowska, Anna  
Linneman, Travis  
Lopate, Glenn  
Lunsford, Valerie  
Ma, Cynthia  
Manary, Mark  
Margenthaler, Julie  
Martinez, Sara  
Mathur, Amit  
McCarthy, Nancy  
McLain, Patrick  
McNulty, James  
McWay, Dana  
Mead, Kathleen  
Micek, Scott  
Millsap, Pamela  
Minder, Carissa  
Moulder, Krista

Mulcahy, Elizabeth  
Mullins, Michael  
Murphy, Stacey  
Murphy, Theresa  
Neely, John  
Nguyen, Nguyet  
Nobbe, Julie  
Nolan, Melissa  
Nouri-Wolverson, Soraya  
O'Neill (Narconis), Meg  
Paniello, Randal  
Patterson, Brenda  
Pesti, Dawn  
Petite, Carolyn  
Picus, Joel  
Price, Kathie  
Puri, Varun  
Ramsey, Robert  
Ratnaraj, Jebadurai  
Rich, Jason  
Richmond, Tracey  
Righton, Kelly  
Roberts, Michelle  
Rothermich, Philip  
Rovak, Stephen  
Rush, Carol  
Saulisbury-Robertson, Mitchell  
Schaefer, Anneliese



Schreiber, Lawrence  
Schwendinger, Robert  
Sheshadri, Ajay  
Simpson, Joseph  
Sommers, Mitchell  
Stein, Phyllis  
Steps, Gary  
Steurer, Lisa  
Swaney, William  
Terrill, Cindy  
Theodoro, Daniel  
Trogdon, W. Vic  
Turner, Rochelle  
Unanue, Amanda  
Van Zandt, Khleber  
Van Zandt, Linda  
Vehe, Kathryn  
Velders, Jeanne  
Voorhees, Alphonso  
Wagner-Johnston, Nina  
Walsh, Thomas  
Wedner, H. James  
Weinman, Jennifer  
Welch, John  
Welker, Timothy  
Wickline, Karen  
Wiehl, Jim  
Wilson, James

Wingbermuehle, Cheryl

Wingbermuehle, Erin

Withers, Agnes

Xiong, Chengjie

Zlatic, Joe

Zuckerman, Darryl

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*Co-Chair*

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W. John Smith II

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Stephen M. Moerlein, PhD, RPh

Marcus E. Raichle, MD  
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Yuan-Chuan Tai, PhD

Roger D. Yusen, MD

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Joel Picus  
*Co-Chair*

Julie Margenthaler  
*Co-Chair*

Camille Abboud

Kristan Augustin

Jeff Bradley

Caroline Bumb

Sara Butler

Kenneth Carson

Mark Fiala

Kathryn Fowler

Jennifer Frye

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Byron Peters

John D. Pfeifer

Timothy Pluard

Matthew Powell

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Mark Schroeder

Joshua Shimony

Seth Strobe

Benjamin Tan

Wade Thorstad

Tom Walsh

Kathryn Britton

*Ad hoc*

Sean DeFrates

*Ad hoc*

Farrokh Dehdashti

*Ad hoc*

Lorri DeWitt

*Ad hoc*

Lindsay Hladnik

*Ad hoc*

Lisa Kehlenbrink

*Ad hoc*

Lynne Lippmann

*Ad hoc*

Janelle Mann

*Ad hoc*

Chrisann Winslow

*Ad hoc*

Nancy L. Bartlett

*Ex officio*

Jeff M. Michalski

*Ex officio*

J. Philip Miller

*Ex officio*

Jeffrey F. Moley

*Ex officio*

Stephen Ristvedt

*Ex officio*

Barry Siegel

*Ex officio*



# Alvin J. Siteman Cancer Center Quality Assurance and Safety Monitoring Committees

Nancy L. Bartlett  
*Chair*

Maria Q. Baggstrom

Leigh Boehmer

Hiram Gay

J. Philip Miller

Matthew G. Mutch

Michael J. Naughton

## Faculty at a Glance

Washington University School of Medicine has one of the finest faculties of any medical school in the nation. Recognized for their distinguished achievements in original research, 13 faculty members are among the fellows of the prestigious National Academy of Sciences; 20 belong to its Institute of Medicine. Seventeen Nobel laureates have been associated with the School of Medicine.

During fiscal year 2012, 137 members of the faculty held individual and/or institutional career development awards. Some individual faculty members may hold multiple awards:

99 from National Institutes of Health (including direct-pay and pass-through awards)

1 from Agency for Healthcare Research and Quality

1 from Alpha One Foundation

1 from American Cancer Society

1 from American Diabetes Association

1 from American Federation for Aging Research

1 from American Glaucoma Society

8 from American Heart Association

1 from American Liver Foundation

1 from American Society of Colon & Rectal Surgeons  
4 from American Society of Hematology  
1 from American Vascular Association  
2 from ASCO Cancer Foundation  
9 from Burroughs Wellcome Fund  
1 from Central Society for Clinical Research  
1 from Child Neurology Foundation  
3 from Children's Discovery Institute  
2 from Doris Duke Charitable Foundation  
1 from Emory University-Dystonia Coalition  
2 from Howard Hughes Medical Institute  
2 from Leukemia and Lymphoma Society  
1 from National Comprehensive Cancer Network  
1 from Prostate Cancer Foundation  
1 from National Science Foundation  
1 from Radiological Society of North America  
1 from Research to Prevent Blindness  
4 from Robert Wood Johnson Foundation  
1 from Susan G. Komen Breast Cancer Foundation  
1 from Thoracic Surgery Foundation for Research and Education

The School of Medicine has 13 faculty members with Method to Extend Research in Time (MERIT) status, a special recognition given to only a few NIH grantees, which provides long-term, uninterrupted financial support to investigators who have demonstrated superior achievement during previous research projects.

In 2012-13, the School employed 1,968 full-time, salaried faculty members in its 20 preclinical and clinical departments. The clinical departments are further strengthened by 1,349 voluntary and adjunct faculty members, a group of physicians who practice their medical specialties in St. Louis and are members of one or more of the staffs of the hospitals in the Washington University Medical Center.

# Student Body

The School of Medicine attracts a student body of exceptional quality. The student body of the School of Medicine numbers 598 medical students. Programs also are conducted for 766 students who are pursuing graduate degrees in communication sciences, clinical investigation, occupational therapy, physical therapy, psychiatric epidemiology or genetic epidemiology. The Division of Biology and Biomedical Sciences has extensive graduate training programs for 568 students seeking the Doctor of Philosophy degree in areas of Biochemistry; Computational and Systems Biology; Developmental, Regenerative and Stem Cell Biology; Evolution Ecology and Population Biology; Human and Statistical Genetics; Immunology; Molecular Biophysics; Molecular Cell Biology; Biochemistry; Molecular Genetics and Genomics; Molecular Microbiology and Microbial Pathogenesis; Neurosciences; and Plant Biology.

## The MD Program

The 2013 entering class of 122 students was selected from a pool of 4,445 applicants. The School is a national institution with 47 states plus the District of Columbia and Puerto Rico and 12 countries represented in the current enrollment.

In 2013, the School conferred the MD degree upon 94 individuals. In addition, three students received the MD/MA degrees, two students received the MD/MSCI degrees, one student received the MD/MPHS degrees, and 20 students graduated with the MD/PhD degrees. Graduating students who participated in the 2013 National Residency Matching Program matched in programs recognized for high quality and selectivity. In the Alphabetical List of Students area of the Register of Students section, the graduates are listed by name, hometown, undergraduate and graduate schools attended and year of degree, type of postgraduate residency program, name of hospital and the city in which it is located.

## Teaching Facilities

The 164-acre Washington University Medical Center, spread over portions of 17 city blocks, is located along the eastern edge of Forest Park in St. Louis. Along the western edge of the park is the 169-acre Danforth Campus of the university. All campuses (North, West, Danforth and Medical) are connected by the MetroLink light rail system. The Danforth Campus and the Medical Campus are also connected by the Washington University Gold MetroBus. Students, faculty and staff can access both of these modes of transport with a free U-Pass, obtained from the Transportation Office, along with their Washington University identification badge.

The medical center was incorporated in 1962. It now consists of Washington University School of Medicine, Barnes-Jewish Hospital, St. Louis Children's Hospital, Barnard Hospital and Central Institute for the Deaf and is affiliated with BJC HealthCare. Two integral units of the medical center are the world-famous Mallinckrodt Institute of Radiology (MIR) and the Center for Computational Biology.

The medical center generates an annual economic impact of nearly \$4.9 billion for the St. Louis area, according to an economic model maintained by the St. Louis Regional Commerce and Growth Association. With more than 21,000 employees, the combined medical center institutions are among the largest employers in the metropolitan area.

Unprecedented growth has occurred at the medical center over the past 14 years. At the School of Medicine alone during the past five years, almost \$300 million has been expended on capitalized infrastructure, renovation and new construction. Capital improvements and strategic purchases have added approximately 1 million square feet of space to the medical school during this same period. In the most recent fiscal year, more than \$70 million of capitalized expenditures were made at the School. Recently completed is the BJC Institute of Health at Washington University School of Medicine, which added approximately 245,000 square feet of lab, vivarium and support space and almost \$140 million in capitalized building improvements.

In the last 10 years, School of Medicine expansion has included the Genome Sequencing Center (GSC) Data Center; the Northwest Tower; the school's first dedicated teaching facility, the Farrell Learning and Teaching Center; the Specialized Research Facility — East; the Southwest Tower/Charles F. Knight Emergency Center; the Center for Advanced Medicine; the McDonnell Pediatric Research Building; two parking garages; and the acquisition of the Central Institute for the Deaf buildings.

The **BJC Institute of Health at Washington University School of Medicine** was built to support the Washington University BioMed 21 initiative. Phase 1 construction is now complete and consists of approximately 675,000 square feet. It is an eleven- and six-story building (the building is also structured to add an additional ten stories above the six story portion of the building). The top five floors, totaling 215,000 square feet, are wet labs to support the six research centers associated with BioMed 21 along with lab space for Pathology and Immunology, Obstetrics and Gynecology, and Pediatric Surgery. There is also a 30,000-square-foot vivarium in the lower level. BJC HealthCare will eventually occupy the first five floors, which are programmed for dietary services, offices, pharmacy and clinical labs.

The **GSC Data Center** (2008) is a state-of-the art data center located across Newstead Avenue from its parent department in the 4444 Forest Park Building. A 14,000-square-foot building houses a 3,000-square-foot data room capable of populating 120 high-speed blade center racks and disk racks. This facility will allow the GSC to expand their research capability in the demanding world of sequencing grants and projects for years to come. A 16,500-square-foot expansion of this facility, supporting research, funded by an ARRA grant, was completed in 2012.

The eight-story **Northwest Tower** (2006) resides above the seven-level Children's Hospital Garage. This new 190,000-square-foot building provides faculty office space.

**The Farrell Learning and Teaching Center** (2005), a 110,000-square-foot, six-story facility, located at the corner of Scott and Euclid avenues, is the home for all of the School of Medicine teaching labs; ER, patient room and OR simulation training rooms; small-group and seminar rooms; and all individual student study areas. A lecture hall, case-study hall and café are on the first floor of the building.

**The Specialized Research Facility — East** (2004) is a 56,000-square-foot barrier facility supporting several research study programs.

**The Center for Advanced Medicine** (2001), at the corner of Euclid and Forest Park avenues, is a shared facility between the school and BJC. This building brings all of the medical center's clinics together under one roof. The School of Medicine occupies 243,400 square feet in the Center for Advanced Medicine and 75,000 square feet on three floors in the new Southwest Tower. Located in the heart of the Center for Advanced Medicine is the 66,150-square-foot Alvin J. Siteman Cancer Center. The Siteman Cancer Center is the only NCI-designated comprehensive cancer center in the region.

**The McDonnell Pediatric Research Building** (2000) added 230,000 square feet of state-of-the-art research facilities — four and a half floors for the Department of Pediatrics, three floors for the

Department of Molecular Microbiology, and one-half floor for the Department of Medicine — on the corner of Euclid Avenue and Children's Place. This building includes a Barnes & Noble bookstore with a coffee shop on the ground level.

In addition, major renovations to existing buildings continue, with emphasis on research facilities. The Department of Genetics, together with the Department of Developmental Biology, recently started the Center for Genome Sciences, with a wet lab renovation of 30,000 square feet on the fifth floor of 4444 Forest Park. The Department of Biochemistry added a Nuclear Magnetic Resonance (NMR) Spectrometer in a small addition to Cancer Research Building. The Department of Ophthalmology remodeled their wet labs and offices on the 1st, 10th, 11th and 12th floors of McMillan Hospital Building. The Department of Biochemistry and Molecular Biophysics renovated research labs on half of the second floor and the Department of Medicine renovated research labs on half of the seventh floor of the McDonnell Medical Sciences Building. A major renovation of the Maternity Hospital was recently completed for the Department of Obstetrics. Floors two through six are completely renovated into new office space for Obstetrics faculty and administration. The recently acquired building at 4533 Clayton Ave. has been renovated into office space for the departments of Anesthesiology, Radiology and Obstetrics.

Ongoing improvements to the campus infrastructure are being made through the Public Realm Project, which is focused on landscape, street lighting and streetscape enhancements.

The School of Medicine is divided into two segments. Clinical departments are predominantly located on the west side of the Medical Center, adjacent to hospital and patient areas. Preclinical departments are to the east. Research and instructional endeavors occupy the greater portion of the facilities, with more than 1.8 million gross square feet devoted to these activities. In the aggregate, the medical school occupies nearly 6 million gross square feet of space on this campus.

The focal point of the preclinical teaching activities is the **McDonnell Medical Sciences Building**, the center of activity for entering medical students. This building, with 300,000 square feet of research laboratories, was made possible by James Smith McDonnell III, a generous benefactor of Washington University. Rising nine floors above ground, it contains administrative offices and two lecture halls on the first floor. Three floors of wet lab space were completely renovated in the last five years. Offices and research laboratories for the seven basic science departments are located on the upper floors. Modern centralized animal quarters are housed in the basement.

**The North and South Buildings**, in which the work of several Nobel laureates has centered, have been renovated extensively. Along with the Cancer Research Building, they continue to provide space for laboratories, offices and some departmental facilities.

**The East Building** houses an MRI facility, a cyclotron, computer installations and other components of the Mallinckrodt Institute of Radiology. The East Building also houses several administrative office suites.

A network of pedestrian bridges provides the ability to move freely among the major facilities, enhancing the interaction of all medical center institutions and benefiting research and patient care.

Other facilities owned or operated by Washington University include:

The 45,160-gross-square-foot **Eric P. Newman Education Center** accommodates nondegree professional education for the medical center. The education center provides auditoriums, classrooms, meeting space and lecture halls to support and enhance a comprehensive education program.

The five-story **Biotechnology Center** supports laboratories for the departments of Psychiatry, Medicine, Neurology, and Pathology and Immunology.

**McMillan Hospital Building** houses offices and research laboratories for the departments of Neurological Surgery, Neurology, Ophthalmology and Visual Sciences, and Otolaryngology.

**The Edward Mallinckrodt Institute of Radiology (MIR)** is internationally recognized for excellence in teaching, research and clinical services. Housed in its own 13-story building, MIR has satellite facilities in Barnes-Jewish Hospital, St. Louis Children's Hospital, the Clinical Sciences Research Building, the East Building, the Scott Avenue Imaging Center, the Center for Advanced Medicine, the Charles F. Knight Emergency Center and the South County Siteman Cancer Center. Services also are provided at Barnes-Jewish West County Hospital and Barnes-Jewish St. Peters Hospital and at the Washington University Orthopedics and Barnes-Jewish Hospital Outpatient Orthopedic Center.

With consolidation of psychiatric patient care services in the West Pavilion, the eight-story Renard Hospital provides additional office and laboratory space for the Department of Psychiatry.

**Maternity Hospital** provides offices for the departments of Obstetrics and Gynecology and Ophthalmology and Visual Sciences. A Perinatal Center and some Psychiatry clinical research are located in this building.

**The West Building** contains administrative offices and research laboratories for the Department of Pathology and Immunology and research labs for the Department of Medicine.

**Wohl Hospital Building** provides offices and laboratories for the Department of Medicine and the Department of Surgery.

The resident clinics in **Wohl Clinic** are administered by Barnes-Jewish Hospital. The lower five floors contain clinical space and space for translational research. The first floor is home to the Chromalloy American Kidney Dialysis Center. The upper five floors are devoted to research facilities for several departments of the School of Medicine.

The 294,302-gross-square-foot building at **4444 Forest Park** houses administrative offices of various medical school departments plus the Program in Physical Therapy, the Program in Occupational Therapy and a major research facility for the Department of Genetics and the Genome Sequencing Center, including the new Center for Genomics and Human Genetics.

The **4511 Forest Park Medical Building** houses administrative offices and research labs for the Department of Radiation Oncology. The third-floor clinic and office area has recently been renovated into wet lab research space.

The 136,977-gross-square-foot, seven-story **East McDonnell Specialized Research Facility** is a maximum-barrier research facility to accommodate higher brain function research and transgenic studies.

The 10-story **Clinical Sciences Research Building (CSRB)** and **North Tower Research Addition**, 201,349 gross square feet, consolidates medical school specialized research into one structure. The top three floors of the addition house wet lab research space.

The 4488 Forest Park Parkway Building houses, among other things, the recently completed administrative offices, and research labs for the Washington University Knight Alzheimer's Disease Research Center (ADRC). The ADRC is one of 29 centers funded or otherwise supported by the National Institute on Aging with the collective aim of facilitating advanced research on clinical, genetic,

neuropathological, neuroanatomical, biomedical, psychosocial, and neuropsychological aspects of Alzheimer's disease and related brain disorders.

The second floor of the Taylor Avenue Building (TAB) was renovated in 2012 to create office and teaching space for the Division of Public Health Sciences in the Department of Surgery. This renovation adds ten teaching rooms, each named for a pioneer in public health sciences who opened new fields, paths to study, or applied research to improve population health. The largest teaching space holds fifty people, and many of the rooms are equipped with state-of-the-art video conference technology. The rooms are used to support exceptional population health sciences and clinical research training through the Master of Population Health Sciences (MPHS) degree program for clinicians, clinical doctorates, and medical/health services students. The space also accommodates professional meeting space for clinicians and researchers across Washington University campuses for groups including Siteman Cancer Center Prevention and Control, the Transdisciplinary Research on Energetics and Cancer Center (TREC@WUSTL), and for community partner events through the Program for the Elimination of Cancer Disparities (PECaD).

Founded in 1911, the **Bernard Becker Medical Library** is one of the oldest and most comprehensive medical libraries west of the Mississippi. The library serves as an information services hub for the Washington University Medical Center and extends its services and resources to the global health science community.

The facility, completed in 1989, integrates biomedical information resources and information technology and provides the medical center with the services of skilled librarians and bioinformaticists. The eight-level, 114,000-square-foot structure has capacity for more than 300,000 volumes. The biomedical resource collection includes 26 subscribed databases, 6,303 full-text e-journals and 20,912 e-books. The library also holds 5,899 print journals, 82,170 print book titles and 2,320 audiovisual items.

The Translational Research Support Division of the library provides specialized knowledge, customized programs and services, and unique information resources to support Washington University's broader goals of connecting basic research to patient care. The division includes a bioinformatics support program to provide instruction, consultation services and support for specialized software and databases for the bioinformatics, genomic and basic science research community. Its community outreach and consumer health information program focuses on ways to foster consumer health literacy and seeks opportunities to partner with the School of Medicine, medical center groups and local organizations to improve health literacy. The division also includes a scholarly communications program to support authors and researchers on a wide range of issues including publishing options, public access mandates, copyright and author rights, assessment of research impact and dissemination of research findings.

The Health Information Resources Division provides a broad range of biomedical information resources and training services covering clinical point of care, evidence-based medicine and information management. Through this division, the library focuses on integrating information management into the curricula of the various educational programs and promoting the effective use of information resources in the school's clinical mission. Librarians in this division focus on each of the school's divisions, departments or programs to meet their specific information needs. Circulation services, interlibrary lending and document delivery also fall within the scope of services managed by the Health Information Resources Division.

Special Collections (Archives and Rare Books) is a unique and important unit of the library's resources. The Archives preserve and make accessible 905 archival collections, comprising institutional records, manuscripts, visual items and oral histories that document the medical center's institutional history,

ongoing progress and many significant contributions of its faculty. Among the manuscript collections are papers of William Beaumont, Joseph Erlanger, E.V. Cowdry, Evarts Graham and Carl Cori. There are nine distinct rare book collections containing 14,416 books available for scholarly use. These acclaimed collections include the Bernard Becker Collection in Ophthalmology, the CID-Max Goldstein Collection in Speech and Hearing, the H. Richard Tyler Collection in Neurology and the Paracelsus Collection of the St. Louis Medical Society.

The Bernard Becker Medical Library takes pride in providing the latest biomedical information and services to the Medical Center. For detailed information about the library's programs and services, visit <https://becker.wustl.edu>.

The library is open to the general public Monday through Friday, 7:30 a.m. to 6 p.m. Library hours for affiliated users are:

Monday-Thursday: 7:30 a.m. – midnight

Friday: 7:30 a.m. – 10 p.m.

Saturday: 8:30 a.m. – 6 p.m.

Sunday: noon – midnight

Telephone numbers:

Circulation Services: (314) 362-7080

Information Services: (314) 362-7085

Interlibrary Loan: (314) 747-0029

Archives and Rare Books: (314) 362-4236

**Barnes-Jewish Hospital** has a premier reputation in patient care, medical education, research and community service, and is the adult teaching hospital of Washington University School of Medicine, which is ranked among the top medical schools in the country. The 9,728 Barnes-Jewish team members include professional nurses, technicians, service and support personnel, plus more than 1,771 physicians and 799 residents, interns and fellows. Barnes-Jewish is licensed for 1,315 beds and in 2012 had 56,379 inpatient admissions, along with 86,490 emergency department visits. In 2003, Barnes-Jewish Hospital was the first adult hospital in Missouri to earn Magnet recognition, the highest award given by the American Nurses Credentialing Center, and was redesignated for the second time in 2013. Barnes-Jewish Hospital has been consistently ranked on the "Honor Roll" of Best Hospitals by U.S. News & World Report since 1993.

For over 130 years, **St. Louis Children's Hospital** has been at the forefront of pediatric medicine, with physicians, nurses and staff who dedicate their lives to the care of children. The hospital provides a full range of health services to children and their families throughout its 300-mile service area, as well as nationally and internationally. Children's Hospital offers comprehensive services in every pediatric medical and surgical specialty, including newborn medicine, cardiology, orthopedic surgery, neurosurgery and one of the nation's largest pediatric transplant programs. St. Louis Children's Hospital-Washington University is currently ranked #6 on the prestigious *U.S. News* 2013-14 Honor Roll of America's Best Children's Hospitals. In 2010 the hospital received its Magnet re-designation from the American Nurses Credentialing Center (ANCC), the nation's highest honor for nursing excellence.

St. Louis Children's Hospital provides an array of community outreach services, including three pediatric mobile health vans, injury prevention programs, educational classes on parenting and child development, as well as patient and parent support groups. The hospital also operates the 454-KIDS Answer Line, a



free child health information service and physician referral line staffed by pediatric registered nurses and referral specialists.

**BJC HealthCare** is one of the largest nonprofit health care organizations in the United States, delivering services to residents primarily in the greater St. Louis, southern Illinois and mid-Missouri regions. With net revenue of \$4 billion, BJC serves urban, suburban and rural communities and includes 13 hospitals and multiple community health locations. Services include inpatient and outpatient care, primary care, community health and wellness, workplace health, home health, community mental health, rehabilitation, long-term care and hospice.

Through a collaboration among the Barnard Cancer Institute, Barnes-Jewish Hospital and Washington University, medically indigent patients with cancer or diseases of the skin receive care at no cost to them from Washington University physicians at the Alvin J. Siteman Cancer Center and Barnes-Jewish Hospital. **Barnard Hospital** also houses the Washington University Clinical Research Unit, part of the Institute for Clinical and Translational Sciences (ICTS) Center for Applied Research Sciences (CARS), a support center for Washington University clinical investigators.

**CID – Central Institute for the Deaf** is an internationally recognized center for deaf education focused on preparing children to attend general education schools in their communities with their hearing peers. In the CID school, teachers use listening and spoken language to help deaf children learn to listen, talk and read with proficiency without the use of sign language.

CID's acoustically enhanced "quiet school" features the Joanne Parrish Knight Family Center, serving children and their families from birth to 3. CID pre-K and primary school programs serve students ages 3 to 12. CID schoolchildren have come from 48 U.S. states and 28 other countries.

CID services for professionals include consulting services and in-service training for schools and school districts, continuing education workshops and educational tools that have been used to help children in all U.S. states and at least 33 countries throughout the world.

CID is financially independent from, but closely affiliated with, CID at Washington University School of Medicine, which continues to operate CID-developed adult clinic, research and academic programs that benefit children and adults with hearing loss. The university acquired these programs in September 2003 along with state-of-the-art facilities at the CID campus, 4560 Clayton Ave. CID continues to provide faculty and practicum sites for the university's graduate degree programs in deaf education and audiology. CID teachers and pediatric audiologists continue to work closely with its speech and hearing scientists in studies involving children who are deaf and hard of hearing.

**The Alvin J. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine** is designated by the National Cancer Institute as a Comprehensive Cancer Center, the only such center in Missouri. Siteman is world-renowned for its basic science, translational, and prevention and control research. Siteman enhances, promotes and supports interactions among cancer research efforts throughout the campus and has provided an organizational focus and stimulus for researchers to continue to produce cutting-edge institutional research.

The center holds more than \$150 million in extramural funding for cancer research and supports eight research programs (Breast Cancer Research, Cancer and Developmental Biology, Cellular Proliferation, Hematopoietic Development and Malignancy, Oncologic Imaging, Prevention and Control, Translational and Clinical Research, Tumor Immunology). Siteman also provides 14 shared resource facilities to its more than 280 research members. Shared resource facilities include: Biologic Therapy Core Facility; Biomedical Informatics Core; Biostatistics Core; Clinical Trials Core; Embryonic Stem Cell Core; Flow

Cytometry Core; Health Behavior, Communication and Outreach Core; Hereditary Cancer Core; High-Throughput Screening Core; Imaging Response Assessment Core (IRAC); Molecular and Genomic Analysis Core; Proteomics Core; Small Animal Cancer Imaging Core; and Tissue Procurement Core.

Siteman is integrated with The Genome Institute at Washington University, the Institute for Public Health and the Mallinckrodt Institute of Radiology. In partnership with the community, Siteman's Program for the Elimination of Cancer Disparities (PECaD), addresses racial, ethnic, socioeconomic and other disparities in cancer awareness, screening, treatment and research.

Siteman offers a wide range of educational and training opportunities in cancer research, including seminars, conferences, retreats, a summer student program and a pre/postdoctoral training program in cancer biology research.

For more information regarding Siteman's research programs, shared resources and educational opportunities, please visit [www.siteman.wustl.edu/research.aspx](http://www.siteman.wustl.edu/research.aspx).

A current listing of upcoming seminars is available at [www.sitemanseminars.wustl.edu](http://www.sitemanseminars.wustl.edu).

**Other hospitals.** The following hospitals and facilities also are associated with the School of Medicine, and Washington University physicians treat patients at these locations:

[Barnes-Jewish West County Hospital](#)

[Barnes-Jewish St. Peters Hospital](#)

[Christian Hospital Northeast](#)

[Missouri Baptist Medical Center](#)

[Veterans Administration Medical Center](#)

[Shriners Hospital for Children](#)

[Parkland Health Center](#)

[Progress West HealthCare Center](#)

[Phelps County Regional Medical Center](#)

[Southeast Missouri Hospital](#)

## Research Activities

Grants and contracts totaling more than \$536 million supported faculty research efforts at the School of Medicine during the fiscal year ending June 30, 2012. Substantial additional support was provided directly to faculty investigators by the Howard Hughes Medical Institute. Gifts and grants from 11,184 private sources, including alumni, individuals, foundations, corporations and other organizations, totaled \$137.4 million.

During the Washington University fiscal year ending June 30, 2012, the School of Medicine received \$375.8 million from the National Institutes of Health, coming in 686 separate grants. This amount includes direct-pay and pass-through awards.

### **The many firsts at the School of Medicine include:**

- Served as a major contributor of genome sequence data to the Human Genome Project, providing the foundation for personalized medicine.
- Developed a genetic test that detects whether an individual will develop a form of thyroid cancer and would benefit from thyroid removal — the first surgical prevention of cancer based on genetic test results.
- Developed screening tests used worldwide to diagnose Alzheimer’s disease.
- Created the first positron emission tomography (PET) scanner, a device that images the brain at work.
- Helped pioneer the use of insulin to treat diabetes.
- Proposed the now-common practice of taking aspirin to help prevent heart attacks.
- Performed the world’s first nerve transplant using nerve tissue from a cadaver donor.
- Developed a blood test that quickly and safely identifies whether a patient needs invasive treatment for a heart attack.
- Decoded the entire genome of a cancer patient and used the results to alter the course of treatment, which put the cancer into remission.
- Demonstrated that severely malnourished children given antibiotics along with a therapeutic peanut butter based food are far more likely to recover and survive than children who only receive the therapeutic food.

### **Ongoing research includes:**

- Participating in the National Children’s Study, the largest U.S. study of child and human health ever conducted.
- Seeking new ways to diagnose and treat stroke as part of a national network of state-of-the-art stroke treatment centers.
- Decoding the genomes of hundreds of cancer patients and their tumors to understand the genetic roots of the disease and to find better treatments.
- Leading an international research collaboration to study inherited forms of Alzheimer’s disease and one of the first clinical trials to evaluate whether the disease can be prevented before memory loss and dementia develop.
- Developing and using nanoparticles for molecular imaging and targeted drug delivery for cancer and heart, lung and vascular diseases.
- Mapping the major circuits in the human brain to understand normal brain function and connectivity errors involved in alcoholism, autism and schizophrenia.
- Exploring the links that connect obesity and malnutrition to the community of microbes that live in the gut.
- Searching for clues in the brain and spinal cord to help physicians diagnose Alzheimer’s disease before symptoms develop.
- Leading research, teaching and community engagement to improve population health through Washington University’s Institute for Public Health.

- Investigating changes to the brain in soldiers exposed to roadside blasts and athletes who have suffered repeated concussions to understand their long-term mental and physical consequences.
- Exploring the genetic influences at play in alcohol, smoking and drug addiction.
- Leading research to improve care for heart failure and cardiovascular disease, including clinical trials to evaluate mechanical assist devices and studies to look at the link between diabetes and aggressive heart disease.

## BioMed 21

Launched in 2003, BioMed 21 creates a multidisciplinary and translational-research imperative for basic scientists and clinician-researchers from many medical disciplines.

BioMed 21 reorganizes the life sciences at Washington University to address the biggest questions about disease: their origins, how they affect us and how we can cure them. Its goal is to reshape the university culture to rapidly convert the knowledge of the genetic blueprint of human beings into effective, individualized treatments.

To successfully make those discoveries and develop those therapies, BioMed 21 advances on many fronts:

It aims to collect and dedicate resources, including NIH support and gifts from friends and supporters.

Recent grants include:

- \$50 million grant to enhance clinical and translational research
- \$14 million in two grants for neuroscience research
- \$16 million grant for nanomedicine research

It defines new spaces to house promising research and educational programs, including:

- 240,000 square feet of new research space in the new BJC Institute of Health at Washington University School of Medicine in the center of the medical campus
- the Farrell Learning and Teaching Center, an important teaching component of BioMed 21
- a 40,000-gross-square-foot facility designed to spur development of mouse models for human diseases
- a 16,000-square-foot data center to meet the massive computing needs of The Genome Center
- 15,000 square feet of space added to the previously established Center for Genome Sciences & Systems Biology to support new investigators

In addition to the Center for Sciences & Systems Biology, it establishes five new Interdisciplinary Research Centers (IRCs) housed in the BJC Institute of Health at Washington University School of Medicine. The IRCs are central in promoting scientific and educational innovations across school boundaries. IRCs have the primary goal of promoting innovative interdisciplinary, inter-departmental research and education in the biological and medical sciences. The mission of the IRCs is to assemble

talented faculty and students to address key and emerging scientific problems, and to understand fundamental biological processes with broad implications for human health.

- The BRIGHT Institute (Bridging Research with Imaging, Genomics and High-Throughput)
- Center for the Investigation of Membrane Excitability Disorders — The EXCITE Center
- Center for Women's Infectious Disease Research (cWIDR)
- Diabetic Cardiovascular Disease Center (DCDC)
- Hope Center Program on Protein Aggregation and Neurodegeneration (HPAN)

See [biomed21.wustl.edu](http://biomed21.wustl.edu) to learn more.

## Research Training

The School of Medicine offers many degree programs focused on research training. Please visit the [Educational Programs](#) section or the links below for more information.

### Combined Degrees:

[Doctor of Medicine/Doctor of Philosophy \(MD/PhD\)](#)

[Doctor of Medicine/Master of Arts \(MD/MA\)](#)

[Doctor of Medicine//Master of Science in Clinical Investigation \(MD/MSCI\)](#)

### Doctor of Philosophy Programs

[Biomedical Sciences](#)

[Audiology and Communication Sciences](#)

[Occupational Therapy](#)

[Physical Therapy](#)

### Masters Degree Programs

[Master of Science in Applied Health Behavior Research](#)

[Master of Population Health Sciences](#)

### Postdoctoral Research Training

[Postdoctoral Research Fellowships](#)

### Medical Student Research Opportunities

[Summer Research Program](#)

[Year-long research activities](#)

### Combined Degrees:

[Doctor of Medicine/Doctor of Philosophy \(MD/PhD\)](#)

[Doctor of Medicine/Master of Arts \(MD/MA\)](#)

Doctor of Medicine//Master of Science in Clinical Investigation (MD/MSCI)

## Doctor of Philosophy Programs

Biomedical Sciences

Audiology and Communication Sciences

Occupational Therapy

Physical Therapy

## Masters Degree Programs

Master of Science in Applied Health Behavior Research

Master of Population Health Sciences

## Postdoctoral Research Training

Postdoctoral Research Fellowships

## Medical Student Research Opportunities

Summer Research Program

Year-long research activities

## Medical Alumni and Development

**Medical Alumni and Development Programs** works with individuals and organizations to secure the human and financial resources necessary to help the School of Medicine achieve and maintain excellence in research, teaching and patient care.

### Washington University Medical Center Alumni Association

The Washington University Medical Center Alumni Association was organized more than 60 years ago to foster a continuing spirit of fellowship among graduates, and to maintain and enhance the tradition of excellence of the School of Medicine. Membership is provided to graduates and former house staff of the medical center.

The association complements the goals and purposes of the School of Medicine through a variety of programs for its members and current students. Involvement in these activities also provides the opportunity to continue the relationships begun as students and to develop rewarding professional associations.

## Student-Alumni Programs

The Office of Medical Alumni and Development Programs and the WUMC Alumni Association assist students in a variety of ways. The association makes a substantial financial commitment each year to support 16 Distinguished Alumni Scholars. These promising medical students receive full-tuition, four-year scholarships in honor of great teachers and mentors who were also alumni of the School of Medicine. The association also provides an activity fund for both the first- and second-year classes and sponsors a reception for the graduating class, their families and faculty.

In addition, the association provides financial support to a number of student-initiated community service activities, including a variety of health-education programs in public schools and clinics.

Medical Alumni and Development coordinates an alumni resource bank that arranges more formal contacts between alumni and students. Alumni volunteers host students who wish to spend time with a practicing physician, provide information to help students choose a specialty, serve as preceptors for clerkships and electives, and provide overnight lodging to fourth-year students going on residency interviews.

## Reunions and Other Events

The School of Medicine's Reunion is held in April for medical classes who return at five-year intervals, beginning with the class observing its 10th year following graduation and continuing through the class celebrating its 65th reunion. The reunion schedule includes a scientific program, social events, tours of the medical center and the presentation of Alumni Achievement, Faculty Achievement, Resident/Fellow Alumni Achievement and Distinguished Service awards. Award recipients are chosen on the basis of personal accomplishment, professional achievement and/or service to the School of Medicine. Members of the graduating class are special guests at the awards banquet and are officially welcomed into the Alumni Association.

The Alumni Office sponsors special alumni activities in selected cities across the United States. Volunteers from each area assist in sponsoring these events, which help alumni stay abreast of the educational and research activities at the School of Medicine. The Alumni Office also compiles class newsletters for selected classes, including recent graduates and Emeritus alumni (all those classes who have celebrated their 55th reunion).

## Alumni Support

Supporting their school generously is a tradition for a large percentage of alumni of the medical school and the health professions programs. Each year alumni and friends make gifts to the Annual Fund, which supports the medical school's departments, divisions and health care professional programs, as well as scholarships and low-interest loan programs for students. Alumni also designate gifts for special purposes within the medical school, including specific research, education and training programs.

In 1977, School of Medicine members of the Eliot Society created the Alumni Endowed Professorship Program, through which gifts are used to establish an Alumni Endowed Chair in the medical school's departments. Nine such chairs have been created thus far.

# Schools of Washington University

All schools are located on the Danforth Campus at One Brookings Drive, St. Louis, Mo., 63130, except the School of Medicine, which is at 660 S. Euclid Ave., St. Louis, Mo., 63110. A University-sponsored shuttle bus travels between the Danforth Campus and the Medical Center at regular intervals.

## Arts & Sciences

- College of Arts & Sciences
- Graduate School of Arts & Sciences
- University College

## Sam Fox School of Design & Visual Arts

- College of Architecture
- Graduate School of Architecture & Urban Design
- College of Art
- Graduate School of Art

Olin Business School

School of Engineering & Applied Science

School of Law

School of Medicine

George Warren Brown School of Social Work

# Educational Programs

Washington University offers some of the nation's finest degree programs in medicine, biomedical research, allied health and public health. An outstanding education from the School provides graduates with solid opportunities for highly sought-after residencies and fellowships, engaging and challenging research endeavors, and successful, rewarding careers in medicine and related fields.

The Bulletin of the School of Medicine provides an overview of the courses, curriculum and faculty of each degree program. For complete information, please visit the program websites, accessible via the links at left.



# MD Programs

Washington University School of Medicine offers several programs and combined degree programs:

- Doctor of Medicine (four-year program)
- Doctor of Medicine (five-year program)
- Doctor of Medicine and Master of Arts
- Doctor of Medicine and Master of Science in Clinical Investigation
- Doctor of Medicine and Master of Population Health Sciences
- Doctor of Medicine and Doctor of Philosophy (MSTP)

## Doctor of Medicine

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.

### Four-Year Program

A course of medical education for the MD degree ordinarily consists of a minimum of four years of study. Students recommended for the Doctor of Medicine degree must be of good moral character, they must have completed an entire academic course of instruction as matriculated medical students, they must have passed all required subjects or the equivalent and have received satisfactory grades in the work of the full academic course, and they must have discharged all current indebtedness to the University. The School requires that students planning to practice clinical medicine take the USMLE Step 1 and Step 2 (CS and CK) examinations. All students must take and pass the School's Comprehensive Clinical Examination (CCX) prior to graduation.

At the end of the final academic year, students who have fulfilled these requirements will be eligible for the MD degree.

### Five-Year Program

In addition to the regular four-year program leading to the MD degree and the MD/MA degree program, 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 is subject to the approval of the Associate Dean for Student Affairs. The Student Research Opportunities brochure provides additional important information about

participating in this program. Students enrolled in the five-year program must maintain coverage through Student Health while in St. Louis.

### **Doctor of Medicine and Master of Arts**

The objective of the MD/MA program is to provide one full year of individual, full-time, in-depth research experience for medical students in preparation for a career in academic medicine. Program participants absent themselves from medical school and spend 12 months working on basic biomedical research or hypothesis-driven clinical research in the lab of a faculty member. Degree requirements include a presentation before a research advisory committee, submission of a publication-quality manuscript and participation in a research ethics seminar.

No academic credit toward the MD degree will be given, but research may be continued as senior elective for credit. Fellowship stipends and other support are available through the Howard Hughes Medical Institute (basic science research), National Institute of Diabetes and Digestive and Kidney Diseases (GI, hepatology, endocrinology, nutrition, nephrology and hematology research), and the Clinical Research Training Center – Predoctoral Program (clinical research). Students unable to qualify for one of these awards may also apply for support from the dean of the medical school. Funding amounts may vary, and some of these sources have deadlines in early January. Please contact the MD/MA program administrator at (314) 362-7190 or visit the website at <http://mamd.wustl.edu> for details.

### **Doctor of Medicine and Master of Science in Clinical Investigation**

Since 2006, the School of Medicine has offered a Master of Science in Clinical Investigation (MSCI) to young investigators committed to pursuing academic careers in clinical research. Visit the [MSCI section of this site](#) 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 [MPHS section of the Bulletin](#) for more information.

### **Doctor of Medicine and Doctor of Philosophy (MSTP)**

Washington University offers a combined MD/PhD degree program that uses the resources of the Graduate School of Arts & Sciences, the 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 is one of the oldest and largest in the country. The program,

normally completed in seven years, has been highly successful; more than 80 percent of those who have completed postgraduate training are actively involved in research programs at leading institutions.

All students in the program receive financial support in the form of stipends (currently \$28,500 per year), health coverage, disability and life insurance, and full tuition remission for both the MD and PhD phases of training.

Only students who have spent the equivalent of at least two semesters in laboratory research should apply to the Medical Scientist Training Program. Applicants must meet the requirements for admission to both the School of Medicine and the graduate program of their choice. The Graduate Record Examination is not required. Students planning to concentrate in disciplines related to the chemical or physical sciences should have completed mathematics through calculus, physics and physical chemistry, and advanced organic chemistry. A course in differential equations also is recommended. For those students whose major interests are in the more biological aspects of medical science, the quantitative requirements for chemistry are less extensive, but a strong background in mathematics, chemistry and physics is still important. Although most individuals enter the program as first-year students, applications will be accepted from students in their first or second year at this medical school. The program matriculates approximately 25 new students each year, which represents one-fifth of the entering medical school class.

The program consists of three parts: 1) two years of an enhanced medical curriculum, 2) at least three years of original research toward a thesis to satisfy the requirements for the PhD degree, and 3) at least 15 months of clinical training based on a student's career goals. Both degrees are awarded upon the completion of the program.

While the Medical Scientist Training Program includes all medical courses required for the MD degree, it incorporates a high degree of flexibility for individuals through a wide range of electives and graduate courses, some of which may be taken during the first year of the medical curriculum. Every effort is made to individualize each student's curriculum based on previous background and current interests. The medical and PhD curricula are integrated, which permits students to take PhD course work in lieu of certain medical school course work. In this way, students may substantially meet the course work requirements of the PhD program during the first two medical school years.

The MSTP Committee monitors the performance of each student, and a high scholastic standing as well as a commitment to research is expected.

Students normally spend between three and five years in the Graduate School of Arts & Sciences satisfying the following requirements:

1. Completion of required graduate course work;
2. Successful performance in qualifying examinations;
3. Execution of original research suitable for a dissertation;
4. Defense of the thesis; and
5. Completion of a teaching assistantship.

The PhD degree may be obtained in the Program in Biomedical Engineering, the Division of Biology and Biomedical Sciences or in other research-oriented departments such as Anthropology or Physics. The largest contingent of MSTP students is trained under the auspices of the Division of Biology and Biomedical Sciences. The division, now in its 40th year, is a leader in interdisciplinary biomedical education. Member departments of the division include all clinical and preclinical departments of the medical school, as well as the Departments of Biology and Chemistry. These departments jointly provide training in the following interdisciplinary programs:

- Biochemistry
- Computational and Molecular Biophysics
- 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 Biology

The MSTP also permits students to undertake doctoral studies in other disciplines, provided that the resulting thesis is a rigorous, hypothesis-based body of work that is medically relevant.

A series of weekly seminars featuring physician scientists is held for MD/PhD students. These seminars are aimed at stimulating student interest in clinical medicine, increasing awareness of major research problems in clinical medicine and exposing students to diverse career paths in academic medicine.

MD/PhD students attend an annual weekend retreat during which students present their research. The retreat also features discussions led by experts on topics selected by students.

To keep students in the PhD phase of training up to date on their clinical skills, monthly opportunities are offered for clinical interactions. Students are matched individually with a clinical mentor in the specialty of their choice. These interactions include going on rounds and attending conferences.

A two-week non-graded tutorial for MD/PhD students facilitates their transition into the clinical phase of training.

MSTP students are required to complete a minimum of 15 months of clinical training. Opportunities exist to meet part of the requirement while engaged in PhD training. Students may opt to extend clinical training up to 22 months. The intensive clinical training is the last formal requirement for the MD degree. Both the PhD and MD degrees will be granted at the conclusion of clinical training.

Application Procedure: Individuals interested in applying to the Medical Scientist Training Program must complete the MD-PhD section on the AMCAS and the Washington University School of Medicine secondary application. The MSTP requires letters of recommendation from the research mentor(s) of all applicants.

Individuals wishing additional information about the program may contact:

Medical Scientist Training Program

Washington University School of Medicine

Campus Box 8226

660 S. Euclid Ave.

St. Louis, MO 63110-1093

(800) 852-4625

[www.mstp.wustl.edu](http://www.mstp.wustl.edu)

## Learning Objectives

### Washington University School of Medicine Medical Student Competency-Based Learning Objectives

Washington University School of Medicine provides students with a supportive, stimulating and challenging environment in which to acquire a thorough foundation in scientific medicine and develop skills and professional attitudes necessary for the practice of medicine at the highest possible level of excellence. In addition, the medical school fosters a commitment to collegiality, respect of individuality, community involvement and leadership through many extracurricular organizations and activities supported by the school. The educational program is designed to ensure that each student will demonstrate the following:

**I. Medical Knowledge** - Medical students must demonstrate knowledge of core concepts and principles of human biology and genetics, the scientific foundations of medicine and the causations, epidemiology, diagnosis and treatment of diseases in individuals and diverse populations.

MK-1 Demonstrate knowledge of normal human structure and function at the molecular, genetic, cellular, tissue, organ-system and whole-body level in growth, development, and health maintenance.

MK-2 Describe the basic mechanisms involved in the causation and treatment of human disease and their influence on clinical presentation and therapy.

MK-3 Demonstrate knowledge of the epidemiology of common diseases.

MK-4 Demonstrate knowledge of the impact of ethnicity and culture, socioeconomic factors, and other social factors on health, disease, and individual patient approaches to health care.

MK-5 Describe the basic scientific and ethical principles of clinical and translational research.

**II. Patient Care** - Medical students must demonstrate the ability to provide appropriate patient care in a multidisciplinary setting for the promotion of health and treatment of health problems across the human life span.

PC-1 Obtain appropriate medical histories that include psychosocial and behavioral factors that influence health.

PC-2 Perform accurate physical examinations.

PC-3 Perform basic procedures necessary for the practice of medicine.

PC-4 Apply the scientific method to the practice of medicine including the processes of problem identification, data collection, hypothesis formulation, and the application of deductive reasoning to problem solving, clinical reasoning, and decision-making.

PC-5 Integrate collected clinical information, including history, physical examination, and relevant laboratory, radiologic, and other studies, to develop and carry out with supervision, appropriate, individualized diagnostic and treatment plans for patients across the broad spectrum of acute and chronic conditions.

PC-6 Perform basic risk assessments and formulate plans to promote patient wellness across the human lifespan.

PC-7 Counsel and educate patients and their families based upon consideration of patient lifestyle, culture, concomitant medical conditions, psychosocial, and socioeconomic factors.

**III. Interpersonal and Communication Skills** - Medical students must demonstrate their ability to communicate effectively with members of the medical community and with patients and their families from all socioeconomic and cultural backgrounds. (ED-10)

ICS-1 Demonstrate respectful and effective verbal and non-verbal interpersonal communication skills with patients.

ICS-2 Discuss diagnostic and treatment options in a manner that will facilitate the participation of patients and their families in shared decision-making.

ICS-3 Communicate effectively with members, including both physician and non-physician professionals, of the health care team.

ICS-4 Maintain accurate and thorough medical records and written documents.

**IV. Professionalism** - Medical students must demonstrate a commitment to professional responsibilities, adherence to ethical behaviors, and sensitivity to patients of diverse backgrounds.

PROF-1 Maintain a professionally appropriate demeanor, exhibit high standards of professional integrity, and demonstrate an awareness of potential conflicts of interest.

PROF-2 Apply legal and ethical principles governing the physician-patient relationship to interactions with patients and their families.

PROF-3 Act in the patient's best interest and serve as a patient advocate.

PROF-4 Work collaboratively and effectively in inter-professional teams.

PROF-5 Treat all patients and patients' family members respectfully and compassionately with respect for privacy.

**V. Systems-Based Practice** - Medical students must demonstrate an awareness of the larger context and system of health care and its impact on patients and the practice of medicine.

SBP-1 Demonstrate a knowledge of the U.S. health care delivery system, including the impact of financing, health policy, and the regulatory structure on health care.

SBP-2 Describe how health care disparities impact access and delivery of medical care for individuals and describe strategies for addressing these disparities.

SBP-3 Recognize the need for cost awareness and the role of risk benefit analysis in patient and population-based care.

SBP-4 Define patient safety and quality improvement, and discuss strategies to maximize the safety and quality of patient care.

**VI. Practice-Based Learning and Improvement** - Medical students must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve their patient care skills based on external feedback and self-evaluation.

PBLI-1 Demonstrate the skills needed for life-long 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.

PBLI-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.

PBLI-3 Participate in the education of peers and other members of the health care team.

PBLI-4 Identify and address biases (both personal and in others) that may impact health care delivery.

# Curriculum

The curriculum is an evolving product of prolonged and continuing study, by both faculty and students, of the present and probable future course of medical science and medical practice, and of the ways in which medical education can be kept abreast of this course. Our students enter medical school with diverse backgrounds and interests and upon graduation undertake a wide variety of careers. The curriculum provides the basic knowledge and skills essential for their further professional development. Modern medical education can no longer hope to be comprehensive; it must be selective. Yet students must develop facility in the understanding and use of several related technical languages: those of anatomy, chemistry, physiology and clinical medicine. They must share responsibility for the care of the patient. They also must learn how these areas of endeavor are interrelated, how the organization and needs of society influence the methods of providing medical care, and how new knowledge is acquired and old knowledge re-evaluated.

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.

In the final year of the medical school curriculum, the required elective program helps students to decide where major interests lie. It also enables them to benefit from the wide range of specialized knowledge and skills found in the faculty and lays the foundation for lifelong learning and application of principles. The elective program permits students to select, according to their desires, the areas they wish to explore or to study in depth.

Visit Learning Objectives for information about the competency-based learning objectives of the medical degree program.

## Description of Undergraduate Medical Education Program by Year

### First Year

The first-year curriculum focuses on the acquisition of a core knowledge of human biology, as well as on an introduction to the essentials of good patient care. Diversity among matriculants in undergraduate background and in approaches to learning is recognized and fostered. The courses are graded Pass/Fail, and a variety of didactic means are made available including lectures, small groups, extensive course syllabi, clinical correlations and a Lotus Notes computerized curriculum database. The Practice of Medicine I uses regular patient interactions and integrative cases to teach students to skillfully interview and examine patients, as well as the fundamentals of bioethics, health promotion/disease prevention, biostatistics and epidemiology. An optional summer research program between the first and second year provides an opportunity for students to explore various areas of basic science or clinical research.



## Second Year

The second-year curriculum is focused on human pathophysiology and pathology. Through lectures, small group discussions, laboratory exercises and independent study, students acquire broad, detailed knowledge of mechanisms of disease pathogenesis, clinopathological relationships and fundamental principles of therapy. The Practice of Medicine II course continues students' introduction to the fundamentals of patient care and emphasizes organizing and interpreting clinical information to form a problem list, differential diagnosis and treatment plan. Students also learn how to accurately document and concisely present clinical information. Supervised clinical experiences and small group discussions further engender development of the professional attitudes and high ethical standards required for the third-year clinical clerkships.

## Third Year

The overall goal of the third year is implementation of 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 involving 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 clinical clerkships, students learn to use the biomedical literature and other educational resources in the service of their patients and in self-directed learning. Students also use their personal experiences and rapidly expanding knowledge of human behavior and ethnic, cultural, socioeconomic and other social factors to develop their own personal standards of compassionate, respectful and ethical behavior in the practice of medicine.

## Fourth Year

The overall goals of the fourth year are to consolidate, enhance and refine the basic clinical skills developed during the clinical clerkships and to explore specialty areas within the field of medicine. This is accomplished by providing each student with optimal preparation for selecting and pursuing graduate medical education opportunities in his/her chosen field of medical practice and/or research. Students may select from a broad array of clinical rotations and research experiences and may arrange extramural experiences.

# Courses and Course Masters 2013-14

## First Year

First-year courses are taught during the 38-week academic year.

M75 503 Cell and Organ Systems Biology

Paul C. Bridgman, PhD (Histology)

Robert S. Wilkinson, PhD (Physiology)

M05 501B The Human Body: Anatomy, Embryology, Imaging

Glenn C. Conroy, PhD

M30 523 Immunology

Andrey S. Shaw, MD

M30 511 Medical Genetics

Susan Dutcher, MD

M30 526 Microbes and Pathogenesis

Henry V. Huang, PhD

Scott J. Hultgren, PhD

M15 502 Molecular Foundations of Medicine

Linda J. Pike, PhD

M35 554 Neural Sciences

David C. Van Essen, PhD

Timothy E. Holy, PhD

Joel Price, PhD

M25 507 The Practice of Medicine I

Gregory M. Polites, MD

• Clinical Skills

Alan Glass, MD

- Ethics and Health Policy

Rebecca Dresser, JD

- Community and Public Health

Jean Wang, MD

- Interpreting Illness

Stephen S. Lefrak, MD

- Communication Skills

Dehra Glueck, MD/ Alan Glass, MD

- Clinical Epidemiology & Evidence Based Medicine

Jay Piccirillo, MD

## First Year Selectives

The Selective Program provides first-year medical students with opportunities for enrichment and in-depth focus on areas beyond the core curriculum. All first year medical students are required to take and successfully complete at least four 10-hour Selective courses with a maximum number of six. Students must enroll in a minimum of one selective in humanities, one in the basic sciences, and one in a clinical area. They must also choose one additional selective from the clinical or basic science category.

Selective Category Descriptions:

**Basic:** Content or experience primarily deals with issues of cell biology, physiology, pathophysiology of diseases, and scientific and statistical methods.

**Clinical:** Content or experience primarily related to patient care in the inpatient or outpatient setting, communications, public or global health, palliative care or health care policy.

**Humanities:** Content or experience primarily deals with ethics, medicine as the subject of literature or the arts, or the history of medicine.

M04 • General Selectives

Michael M. Awad, MD, PhD

M04 • Medical Humanities

Stephen S. Lefrak, MD

Examples of selective offerings from last year include:

598H Advanced Interdisciplinary Bioethics Seminar-Ethical Issues in Human Reproduction

582 Alzheimer's Disease in the Clinic and the Lab

5881 Analysis of Clinical Data

520H Art and Medicine

587Z Beyond the Diagnosis: Social Perspectives on Mental Health

537 Cardiovascular Control Mechanisms

587V Clin Anat & Physio Sherlock Holmes' Way

587X Clinical Challenges in Health Literacy & Health Communication

5017 Clinical Correlations in Neurosciences

5351 Complementary and Alternative Medicine

530 Contemporary Molecular Immunology

500C Developmental Biology and Disease

538H Doctors on Film

5302 Frontiers in Leukemia

586H Health and Human Rights

5885 Health Street: Hands-On Comm Based Res-I

587L International Health

5878 Introduction to Clinical Neurosurgery

587W Introduction to Dentistry and Oral Medicine

5013 Introduction to Emergency Medicine-I

5016 Introduction to Emergency Medicine-II

581H Introduction to Medical Anthropology

587S Introduction to Newborn Medicine

524H Major Religious Traditions

5009 Medical Spanish

5061 Medicine of Laughter

5667 Microcirculation

588H Music and Medicine

5875 Olin Grand Rounds  
516H Patient, Physician and Drama  
582H Philosophy of Medicine  
587A Physician as Health Protector and Patient Advocate  
587N Public Health  
587U Saturday Neighborhood Clinic  
587T SPOTS (Sun Protection Outreach Teaching by Medical Students)  
587D Students Teaching AIDS to Students (STATS)  
528H Terminal Illness and Death  
580H The Healer's Art  
5876 Topics in Orthopaedic Surgery  
533 Tropical Medicine  
5863 Underserved Areas: Urban, Rural, Abroad  
587G WUMP — Washington University Medical Plunge

## Second Year

Second-year courses are taught during the 36-week academic year.

Course No/Course Title

M25 611B Cardiovascular Disease

Dana R. Abendschein, PhD

M25 614 Dermatology

David Sheinbein, MD

M35 632 Diseases of the Nervous System

Allyson Zazulia, MD

M55 660B Clinical Topics in Otolaryngology

Brian Nussenbaum, MD

M25 615A Endocrinology and Metabolism

William E. Clutter, MD

M25 620A Gastrointestinal and Liver Diseases/Nutrition

Deborah C. Rubin, MD

M25 625A Hematology and Oncology

Scot G. Hickman, MD

M25 605A Infectious Diseases

Nigar Kirmani, MD

M45 635B Obstetrics/Gynecology

D. Michael Nelson, MD, PhD

M60 665 Pathology

Erika C. Crouch, PhD, MD

M65 640A Physicians, Patients & Society: Pediatrics

Amanda Emke, MD

Erika Hayes, MD

M25 607 The Practice of Medicine II

Megan Wren, MD

- Clinical Skills

Alan Glass, MD

- Ethics and Health Policy

Rebecca S. Dresser, JD

- Community and Public Health

Jean Wang, MD

- Interpreting Illness

Stephen S. Lefrak, MD

- Medicine Patient Sessions

Alan Glass, MD

- Neurology Patient Sessions

Allyson Zazulia, MD

- Ophthalmology

Colin McClelland, MD

- Communication Skills

Dehra Glueck, MD

- Radiology

Catherine Appleton, MD

- Clinical Epidemiology & Evidence Based Medicine

Jay Piccirillo, MD

M70 670A Principles of Pharmacology

Tom Ellenberger, DVM, PhD

M85 676A Diseases of the Nervous System: Psychiatry

Melissa Harbit, MD

M25 612B Pulmonary Diseases

Michael B. Lippmann, MD

Adrian Shifren, MD

M25 613B Renal and Genitourinary Diseases

Steven Cheng, MD

M25 606A Rheumatology

Richard D. Brasington, Jr., MD

## Third Year

Clinical Clerkship (Third) Year is a 48-week academic year.

### **Course No./Course Title**

Required Clerkships:

### **M95 790 Integrated Surgical Disciplines Clerkship (12 weeks)**

John Kirby, MD

M25 710 Medicine Clerkship (12 weeks)

Thomas M. De Fer, MD

M35 720 Neurology Clerkship (4 weeks)

Robert Naismith, MD

M45 730 Obstetrics/Gynecology Clerkship (6 weeks)

Tammy Sonn, MD

M65 760 Pediatrics Clerkship (6 weeks)

Michele Marie Estabrook, MD

Colleen Wallace, MD

M25 707 The Practice of Medicine III

Greg Polites, MD

M85 770 Psychiatry Clerkship (4 weeks)

Fay Y. Womer, MD

**Selective Clerkships: (choice of one block)**

M25 714 Ambulatory: Emergency Medicine Clerkship (4 weeks)

Mark Levine, MD

M26 713 Ambulatory: Family Medicine Clerkship (4 weeks)

Amy Loden, MD

M85 771 Ambulatory: Psychiatry for Generalists Clerkship (4 weeks)

Fay Y. Womer, MD

M90 701 General Radiology Clerkship (4 weeks)

Matthew Parsons, MD

Michele Miller-Thomas

M25 740 Dermatology Clerkship (4 weeks)

Lynn Cornelius, MD

M25 750 Geriatrics Clerkship (4 weeks)

Ellen Binder, MD

M60 702 Laboratory Medicine Clerkship (4 weeks)



Mitchell Scott, MD

M25 730 Physical Medicine and Rehabilitation Clerkship (4 weeks)

Neringa Juknis, MD

M90 740 Radiation Oncology Clerkship (4 weeks)

Joseph R. Simpson, MD, PhD

M65 750 Surgical Pathology Clerkship (4 weeks)

James Lewis, Jr., MD

## Fourth Year

Elective (Fourth) Year is a 44-week academic year.

To qualify for the Doctor of Medicine degree at Washington University School of Medicine, fourth-year students are required to participate in a minimum of 36 weeks of electives (full-time clinical or research courses). Two-thirds of the minimum required time for the elective year must be taken exclusively in residence in the Washington University School of Medicine elective course program. A complete listing of fourth-year elective offerings at Washington University School of Medicine is available through the Office of the Associate Dean for Medical Student Education. Students may participate in clinical electives of four weeks duration. If a student takes a research elective, that elective must be of at least six weeks duration.

A maximum of 12 weeks of credit is allowed for full-time elective coursework taken at other academic institutions. These may be clinical or research electives. Students desiring credit for work to be done at other institutions must petition the Associate Dean for Medical Student Education. Absolutely no credit will be granted for electives undertaken prior to approval from the appropriate administrative committees.

Credit may be given for elective work done at any point in the standard four-year Doctor of Medicine degree program as long as participation conforms to current elective guidelines, and a) the student is a duly registered, full-time student for a minimum of three years and nine months, including scheduled vacation time, and tuition is paid for four complete academic years; or b) if transferring into the third-year class, the student is a duly registered, full-time student for a minimum of 22 months and tuition is paid for two complete academic years.

Students are encouraged to take lecture-seminar elective courses, but such offerings are optional. Clock hours for the year total 1,386 (36 weeks). Remuneration for work done while participating in electives for credit is prohibited.

## Interdisciplinary and Capstone Courses

## M80 849 Fourth-Year Capstone

Instructor(s): L. Michael Brunt, MD; Thomas De Fer, MD

Elective Contact: Dr. Brunt, 454-7194; Dr. De Fer, 747-4366

Other Information: Additional details will be provided at a later date.

Enrollment limit per period: 60

Valid start weeks for this four-week course: Weeks 37-40

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. The target group for this course is primarily students entering clinical residency training positions. As outlined in the course objectives, 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 and small group discussions and "hands-on" skills practice and simulation. Parts of the course will be tailored to individuals entering internal medicine, pediatrics and surgical disciplines. Students will be assessed by performance on simulation exercises and a written exam.

### Learning Objectives

By the end of this course:

The student will be able to respond to common acute patient problems as tested with simulation by rapidly assessing the patient, requesting relevant information from the patient, medical record, and nursing staff, generate a differential diagnosis and order appropriate diagnostic testing and initial treatment for the problem.

Demonstrate competence in a set of designated technical skills commonly needed in residency including basic suturing, chest tubes, central line, thoracentesis, and IV placement.

Demonstrate the ability to interpret diagnostic tests, such as chest X-ray and EKG, commonly used for initial evaluation of acute medical problems.

Demonstrate and discuss the key elements of obtaining informed consent, dealing with difficult patient and family situations, end-of-life issues and pain management.

Alternative clinical skills sessions will be offered on an ad hoc basis for students as have been done in the past. These will be available in March and April depending on demand and faculty availability. These will not be "for credit".

## Mo4 582 01 Alzheimer's Disease in the Clinic and in the Lab

Instructors: John C. Morris, MD, and other faculty affiliated with the Knight Alzheimer's Disease Research Center, Department of Neurology. For information, contact Jennifer Phillips at 286-2882 or [phillipsj@abraxas.wustl.edu](mailto:phillipsj@abraxas.wustl.edu).

Alzheimer's disease (AD) affects more than 5 million Americans, and will increase substantially as our population ages. Of the top 10 causes of death in the United States, AD is the only disease without any way to prevent, cure or slow the progression. The cost of caring for AD patients has been estimated at over \$172 billion annually, and the human toll on patients and family members can be devastating. Patients and families turn to primary care and specialist physicians (e.g., neurologists, psychiatrists, geriatricians) for answers to their plight. The good news for physicians is that research on AD is moving at a rapid pace. Exciting advances in our understanding of AD etiology, early diagnosis and treatment are changing the landscape of dementia care.

Students in this course are offered a dynamic and interactive overview of the most exciting areas of AD clinical and science research from one of the top Alzheimer's disease research centers in the world. Find out how amyloid plaques and other AD-related abnormalities form in the brain and new discoveries about their possible reversal! The course includes lecture and student presentation components, plus opportunities to observe patients and families in an active neurology memory disorder clinic, participate in neuropathology evaluations of demented individuals, experience and administer psychometric evaluation tools and interact with investigators from the fields of molecular genetics, cell biology and neuropathology.

## M35 851 Clinical Aspects of Aging and Dementia

Instructor(s): John C. Morris, MD, and B. Joy Snider, MD, PhD, Jennifer Phillips, MPA (coordinator), 286-2882

Location: Knight Alzheimer's Disease Research Center (ADRC) 4488 Forest Park Ave. (two-story brick building at intersection with Taylor)

Elective Contact: Jennifer Phillips, MPA (coordinator), 286-2882, [phillipsj@wustl.edu](mailto:phillipsj@wustl.edu).

Other Information: Contact Jennifer Phillips at least one week prior to first day of elective to set up orientation.

Enrollment limit per period: 1

Valid start weeks for four-week blocks: Weeks 9, 13, 17, 21, 33, and 37

This elective focuses on the characterization of the clinical and cognitive features of healthy brain aging and the distinction of dementia from healthy aging. Experienced clinicians will review the differential diagnosis of dementia with the students, including Alzheimer's disease, dementia with Lewy bodies, frontotemporal dementias, cerebrovascular disorders and affective disorders. The student will gain proficiency in interviewing techniques and in the neurologic examination of the geriatric patient, be introduced to neuropsychology, neuropathology, biomarkers, neuroimaging, genetics and other biomedical procedures important in the diagnostic evaluation of older adults. Experience in community assessment and long-term care is provided. Demonstration of clinical trials of experimental agents used in memory disorders and practical aspects of the management of the demented patient and his or her family is provided. An interdisciplinary approach is emphasized and students will have opportunity to interact with physicians, nurse clinicians, psychologists and social workers. Students have the option of becoming certified in the Clinical Dementia Rating, the gold standard in dementia staging.

Student time distribution: Research and Clinical Patient Evaluation 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attending neurologists, psychiatrists and geriatricians involved in the evaluation of memory and aging

Patients seen/weekly: 6-12

On call/weekend responsibility: None

## Course Evaluations

Systematic course evaluation is performed for each year of the curriculum by faculty peers, teaching faculty and students. This system permits problem identification, ensures timeliness of feedback, promotes discussion of new teaching methodologies, allows curriculum inventory, recommends changes in course offerings and provides better integration of the curriculum. These reviews are guided through a Curriculum Evaluation Committee (CEC) process for each of the preclinical years of instruction (i.e., CEC I = first year; CEC II = second year) and the clinical years of instruction (i.e., CEC III = third year; CEC IV = fourth year).

The Office of Medical Student Education (OMSE) oversees the course evaluation system. The collected data are forwarded to the respective course masters, the Committee on Medical Education and the Academic Affairs Committee.

## Humanities Program in Medicine

The Humanities Program in Medicine is a University-wide program dedicated to providing students with a broadened exposure to areas other than the biological sciences during their medical education. These areas include clinical ethics, jurisprudence, history, economics, literature and health policy. The program is directed from the dean's office at the School of Medicine and utilizes faculty at the Danforth Campus, medical school and School of Law, as well as extramural faculty.

The mission of the program is to generate an appreciation of the relationship of human experience, culture, institutions and values to medicine and thereby help to educate professionals who will apply that understanding to their activities as practicing physicians, biomedical researchers and/or medical administrators. This program is an enhancement of an already strong curriculum to prepare medical students to pursue their professional careers more effectively. It takes a major role in the Practice of Medicine course integrated over the first two years of medical school. In addition, several electives are offered during the fourth year.

## Courses

M80 541 TOPICS IN MEDICINE/MEDICAL HUMANITIES

Instructor: Stephen S. Lefrak, MD, 454-7116

This is a required course for the first year of medical school. This interdepartmental course is highly coordinated with Medical Humanities. Students select topics of interest for in-depth study initiated by discussions in a small-group seminar format. Development of topics includes input from a broad range of disciplines, including sociology, philosophy, ethics, history, communications and economics, as well as the biological and medical sciences. It is offered as a menu of mini-courses, each limited to approximately 15 students. Each section consists of six 1.5-hour sessions with a faculty member(s) devoted to an individual subject. Each student must select one course from the menu.

## MD Academic Calendar

### 2013

#### June

14 Friday: Clinic orientation for new third-year students.

17 Monday: Academic year begins for third- and fourth-year classes.

21 Friday: Deadline for registration and initial payment of tuition for the third- and fourth-year classes.

#### July

3 Wednesday: Independence Day holiday begins at 5 p.m.

4 Thursday: Independence Day observance.

#### August

13 Tuesday: Orientation, matriculation and initial fee payment for the first-year class.

19 Monday: Academic year begins for the first- and second-year classes.

23 Friday: Deadline for registration and initial payment of tuition for the second-year class.

#### September

1 Sunday: Labor Day holiday begins at 5 p.m.

2 Monday: Labor Day observance.

## November

27 Wednesday: Thanksgiving Day holiday begins at 5 p.m.

28 Thursday: Thanksgiving Day observance.

29 Friday: Holiday for all classes.

## December

20 Friday: Winter recess begins at 5 p.m. for all classes.

## 2014

### January

6 Monday: Classes resume for all students.

10 Friday: Deadline for payment of the balance of tuition for all classes.

19 Sunday: Martin Luther King Jr. Day holiday begins at 5 p.m.

20 Monday: Martin Luther King Jr. Day observance.

### March

28 Friday: Spring break begins at 5 p.m. for first- and second-year classes.

### April

3 Thursday: Spring break begins at 5 p.m. for third- and fourth-year classes.

7 Monday: Classes resume for all students.

### May

4 Sunday: Academic year ends at 5 p.m. for graduating students.

16 Friday: Academic year ends at 5 p.m. for the second-year class.

Commencement.

25 Sunday: Memorial Day holiday begins at 5 p.m.

26 Monday: Memorial Day observance.

30 Friday: Academic year ends at 5 p.m. for the first-year class. Academic year and clinical clerkships end at 5 p.m. for students in clinical clerkships.

Please note: Beginning and ending dates of each academic term will be published with individual class schedules.

#### Schedule of Clerkship and Elective Intervals 2013-14

Final examinations for clinical clerkships are administered at the end of each clerkship. Exact date, time and location are announced by the coursemaster.

#### Weeks/Dates

1-4: June 17, 2013-July 14, 2014

5-8: July 15, 2013-August 11, 2013

9-12: August 12, 2013-September 8, 2013

13-16: September 9, 2013-October 6, 2013

17-20: October 7, 2013-November 3, 2013

21-24: November 4, 2013-December 1, 2013

25-28: December 2, 2013-January 12, 2014 (Winter recess 5 p.m. December 20, 2013-January 5, 2014)

29-32: January 13, 2014-February 9, 2014

33-36: February 10, 2014-March 9, 2014

37-40: March 10, 2014-April 6, 2014

41-44: April 7, 2014-May 4, 2014

45-48: May 5, 2014-\* May 30, 2014 (\*clerkships only)

\*Clinical clerkships end May 30, 2014.

## Lectureships and Visiting Professorships

Several established lectureships enable the School to bring to the Medical Center each year distinguished guests who contribute significantly to the richness of student life.

**Ben T. Abelson Memorial Lectureship in Pediatric Hematology-Oncology.** Established by Mrs. Ben T. (Ann) Abelson, the first lecture was held on January 8, 1988.

**Harry Alexander Visiting Professorship.** Established in 1964 by former house staff and friends of Dr. Harry Alexander to provide an annual visiting professor in the Department of Medicine.

**Alpha Omega Alpha Lectureship.** Given each year by a faculty member of the students' selection.

**Daniel R. Biello Memorial Lectureship.** Established in 1986 by friends, students and colleagues of Dr. Daniel R. Biello to provide an annual lectureship devoted to advances in radiology and nuclear medicine.

**George H. Bishop Lectureship.** Supported by funds made available by friends interested in the advancement of neurology.

**Daniel Bisno, MD, Memorial Lecture on Ethics in Ophthalmology.** Established in 2001 by David C. Bisno, MD, in memory of his father.

**Dr. John P. Boineau Memorial Lecture Fund.** Established to honor one of the giants in the field of cardiac electrophysiology, Dr. John P. Boineau, who died in 2011. The lectureship was created to bring to Washington University internationally recognized speakers whose careers have been focused on either surgical or medical therapies related to the treatment of cardiac arrhythmias.

**Estelle Brodman Lectureship Fund.** Established in 1981 by friends and colleagues of Dr. Brodman in honor of her distinguished contributions to the School of Medicine.

**The James Barrett Brown Visiting Professorship in Plastic and Reconstructive Surgery.** Created in 1969 by patients, friends, colleagues and former students to honor Dr. Brown.

Thomas H. Burford Lectureship in Thoracic Surgery. Founded in 1971 by friends of Dr. Burford.

**H. Marvin Camel Lectureship.** Established in 1999 by family, friends and colleagues to honor Dr. H. Marvin Camel's retirement.

**Glover H. Copher Lectureship in Cancer.** Founded in 1971 with endowment provided by Dr. Copher and friends.

**The Carl F. and Gerty T. Cori Visiting Professorship.** Established in 1985 in honor of Nobel Laureates Carl and Gerty Cori by the Edward Mallinckrodt, Jr. Foundation, colleagues, faculty and former students.

**Dr. William S. Coxe Memorial Lectureship Fund.** Established by colleagues and friends in memory of Dr. William S. Coxe, a highly-esteemed Washington University neurosurgeon who died in 2012. The lectureship was created to bring to the School of Medicine internationally recognized speakers whose careers have been focused on neurological surgery.

**Philip R. Dodge Lectureship.** Established in 1987 by friends and colleagues to provide an annual lectureship in the Department of Pediatrics.

**Professor and Dean Jay M. Enoch and Rebekah Enoch Endowed Lecture on Vision Science in Ophthalmology.** Established in 2005 in gratitude to Dr. Bernard Becker. The lecture is meant to keep faculty abreast of new and emerging developments in Ophthalmology.

**Joseph Erlanger Lectureship.** Established in 1989 by the Department of Cell Biology and Physiology to honor Dr. Erlanger.

**I. Jerome Flance Visiting Professorship.** Established in 1977 by former students and friends of Dr. Flance to provide annually a visiting professor in the Division of Pulmonary Diseases.



**Julia Hudson Freund Lecture in Oncology.** Established in 1982 by S.E. Freund in memory of his wife to provide a visiting lectureship in clinical oncology in the Division of Oncology. This was endowed in 2002 by the Harry and Flora D. Freund Memorial Foundation.

**Harvey A. and Dorismae Hacker Friedman Lecture on Aging.** Established in 2001 to honor the Friedmans for their instrumental role in helping to create the Center for Aging and for their ongoing leadership and support.

**Edwin F. Gildea, Jr. Lectureship in Psychiatry.** Established in 1978 by friends, colleagues and former students of Dr. Gildea.

**Joseph J. Gitt Visiting Professorship in Clinical Neurology.** Established in 1971 by his family and friends to honor Dr. Gitt.

**Sidney Goldring Lectures.** Established in 1992 upon the death of Dr. Sidney Goldring, who was the founder of the Division of Pediatric Cardiology.

**Graham Colloquium.** A gift from Mr. and Mrs. Evarts Graham, Jr., in 1963 to encourage opportunities for students to expand their views on social, philosophical, artistic and political topics.

**The Evarts A. Graham Lecture.** Established in 1985 by the Washington University Alumni of the Phi Beta Pi medical fraternity to honor the memory of Dr. Evarts A. Graham.

**Samuel B. Guze Lectureship.** Established in 1990 by friends and colleagues to honor Dr. Guze.

**Carl Gayler Harford Lectureship.** Established in 1977 by the family of one of Dr. Harford's patients in gratitude for his contributions to teaching clinical medicine and virology.

**Alexis F. Hartmann, Sr. Lectureship.** Established in 1960 by friends interested in pediatrics to provide an annual lecture in Dr. Hartmann's honor.

**Alex H. Kaplan Visiting Professorship/Lectureship.** Established in 1986 by Dr. and Mrs. Alex H. Kaplan to support a visiting psychoanalyst.

**Michael and Irene Karl Lectureship in General Internal Medicine.** Created in 1983 by Mr. and Mrs. Meyer Kopolow to provide an annual lectureship in honor of Drs. Michael and Irene Karl.

**Michael A. Kass, MD, Endowed Lecture Fund in the Department of Ophthalmology.** Established in 2005 by the Horncrest Foundation, in honor of Dr. Michael A. Kass, HS73 and head of the Department of Ophthalmology.

**The Jack and Barry Kayes Lectureship in Ophthalmology and Visual Sciences.** Established in 2001 by Dr. Jack and Mrs. Barry Kayes to endow a lectureship in the Department of Ophthalmology and Visual Sciences.

**Charles Kilo, MD Lectureship in Internal Medicine.** Established in 1998 by Mrs. Ola H. Blodgett to pay tribute to the expert and compassionate care provided by Dr. Charles Kilo.

**David M. Kipnis Lectureship in Molecular Biology and Pharmacology.** Established in 1998 to provide an annual lecture in honor of Dr. Kipnis.

**Robert S. Klayman Memorial Lecture.** Established in 1997 by Mrs. Robert S. Klayman, in memory of her husband, to support an annual lecture on Parkinson's Disease Research.

**Rosalind Kornfeld Endowed Memorial Lectureship Fund.** Established in memory of Dr. Rosalind Kornfeld, a faculty member for 35 years, who died in 2007. She was very involved in promoting the careers of women faculty and was a founding member and first president of the Women's Academic Network. The fund was features lectures by outstanding women scientists.

**Stanley J. Korsmeyer Memorial Lecture.** Established by colleagues, family and friends in 2005 in memory of Dr. Stanley J. Korsmeyer, a renowned cancer cell researcher and former Washington University School of Medicine faculty member.

**Kroc Visiting Lectureship Program.** Established in 1985 by The Kroc Foundation in honor of Ray A. and Robert L. Kroc.

**Paul E. Lacy Lectureship in Pathology.** Established in 1987 by The Kilo Diabetes and Vascular Research Foundation in honor of Dr. Lacy's many contributions to pathology and diabetes research, and to recognize his collaboration over the years with the co-founders of The Kilo Foundation.

**William M. Landau Lectureship.** This lectureship was established in 1995 by friends, family and colleagues of Dr. Landau.

**Irwin Levy Memorial Fund.** Supports the Dr. Irwin Levy Visiting Lectureship in Neurology, which was established in 1978 by Mr. and Mrs. Meyer Kopolow.

**Oliver H. Lowry Lectureship.** Established in 1978 by friends, colleagues and former students of Dr. Lowry.

**H. Relton McCarroll, Sr. Visiting Professorship in Orthopaedic Surgery.** Created in 1972 by patients, friends, colleagues and former students in honor of Dr. McCarroll.

**Edward Massie Lectureship in Cardiovascular Disease.** Established in 1981 by Edward J. Simon, MD, Bernard Shanker and other grateful colleagues and patients.

**G. Leland Melson II Lectureship.** Established in 1993 in memory of Dr. Melson by his friends and colleagues.

**J. Neal and Lois Middelkamp Lectureship.** Established in 2001 by Dr. J. Neal and Lois Middelkamp to support a pediatric lectureship in infectious diseases and advances in pediatric education for medical students, residents and pediatricians, all life-long interests of Dr. Middelkamp.

**The Dr. and Mrs. William B. Mill, Jr. Lectureship.** Established in 2001 in the Department of Radiation Oncology by Dr. and Mrs. William B. Mill, Jr. This was given in recognition of the career accomplishments of Carlos A. Perez, MD, and the impact he had on the professional development of Dr. Mill.

**Carl V. Moore Lectureship.** Established in 1973 by friends and patients of Dr. Carl V. Moore.

**Carl A. Moyer Visiting Professorship of Surgery.** Established in 1978 by The Harry Freund Memorial Foundation to support an annual lecture in honor of Dr. Moyer's contribution to surgery.

**National Kidney Foundation — Saulo Klahr, MD Lectureship.** Established in 1991 by the Kidney Foundation to honor Dr. Klahr, past president of the National Kidney Foundation and the John E. and Adaline Simon Professor and Vice Chair of the Department of Medicine at Washington University.

**Joseph H. Ogura Lectureship.** Established in 1977 by friends and colleagues of Dr. Ogura as a tribute to his numerous scientific accomplishments and contributions to the School of Medicine and graduate medical education, and his commitment to patient care.

**Carlos A. Perez Endowed Lectureship in Oncology.** Established in 2002 in the Department of Radiation Oncology by Dr. Perez's friends, colleagues and current and former trainees in grateful recognition for his inspiration, guidance and leadership.

**Dr. Roy H. Petrie Lectureship.** Established in 2000 with gifts from various donors in memory of Roy H. Petrie, MD.

**Rose and Samuel Pollock Surgical Lectureship.** Established in 1976 by Dr. Joseph H. Pollock in memory of his parents.

**The Probststein Oncology Lectureship.** Established in 1985 by Mr. and Mrs. Norman K. Probststein in appreciation of professional services provided by William Fair, MD, former head of the urology division of the Department of Surgery, and Carlos Perez, MD, professor emeritus of radiology and head of radiation oncology at the medical center's Mallinckrodt Institute of Radiology.

**James A. Purdy Endowed Lectureship.** Established by Elekta Oncology Systems, Ltd. in 2002 to honor Dr. James Purdy for his contributions to the field of Radiation Oncology.

**Eli Robins Lectureship in Psychiatry.** Established in 1977 by friends, colleagues and former students of Dr. Robins.

**Peggy Sansone Memorial Lectureship.** Created in 2002 by Anthony F. Sansone, Jr. and the Peggy Sansone Special Angel Foundation to promote the exchange of ideas and scientific information on the topic of depression and the role of spirituality in personality development, happiness and mental health. The lecture is a memorial to Mr. Sansone's wife, Peggy Sansone.

**Julio V. Santiago Leadership.** Established in 1999 by the Department of Pediatrics as a lasting tribute to Julio V. Santiago, MD, for his long-standing contributions to the areas of diabetes, endocrinology and metabolism.

**The Rena Schechter Memorial Lectureship in Cancer Research in the Department of Medicine.** Established in 1996 by Dr. Samuel E. Schechter to create a lectureship in cancer research in memory of his wife, Rena Schechter.

**Dr. Alexander and Helena Schonfeld Lectureship.** This lectureship was established in 1994 by Mrs. Helena Schonfeld, in honor of her son, Gustav Schonfeld, Professor of Medicine at Washington University School of Medicine.

**Henry G. Schwartz Lectureship.** Created in 1983 by former residents and colleagues from the neurosurgery department to honor Dr. Schwartz.

**Wendell G. Scott Memorial Lectureship.** Established in 1972 by friends and colleagues of Dr. Wendell G. Scott.

**Major G. Seelig Lectureship.** Established in 1948 in the field of surgery by friends of Dr. and Mrs. Seelig.

**Philip A. Shaffer Lectureship.** Founded in 1957 by friends of Dr. Shaffer in recognition of his accomplishments in biochemistry.

Earl E. and Wilma Shephard Orthopaedics/Otolaryngology Memorial Lecture. Established in 1994 through a bequest by Dr. and Mrs. Shephard.

**Frank O. Shobe Lectureship.** Established in 1986 by friends of Dr. Shobe to honor him as a physician and teacher.

**Donald C. Shreffler Genetic Lectureship.** Established in 1995 by Mrs. Donald C. Shreffler as a memorial to her husband.

**Eduardo Slatopolsky Lectureship.** Established in 1988 by Mr. and Mrs. William Wolff in honor of Dr. Slatopolsky's 25-year association with the School.

**Carl and Sue Smith Lecture in Pediatrics.** Established in 2007 by Dr. Carl Smith, School of Medicine Professor of Pediatrics, with a focus on pediatric lab medicine.

**C.R. Stephen, MD, FFARCS, Fund for Lecture and Clinical Research in Anesthesiology.** Established in 1986 by former students, residents, faculty and friends in honor of Dr. Stephen, first Head of the Department of Anesthesiology.

**Sterling Drug Visiting Professorship in Pharmacology.** Established in 1986 to honor Ernst Zander, MD, former medical director of Sterling Drug, Inc.

**Arthur W. Stickle Lectureship in Pediatric Ophthalmology.** Established by Arthur and Emily Stickle in 1995 with their generous gift in recognition of Dr. Stickle's medical training in the Department of Ophthalmology and Visual Sciences and his special professional contribution to the field of pediatric ophthalmology.

**Strunk Family Lectureship in Asthma.** Established in 2005 by Dr. Robert C. Strunk and his family to provide lectures in the area of pediatric asthma.

**The Richard A. and Betty H. Sutter Visiting Professorship in Occupational and Industrial Medicine.** Established in 1985 by Dr. and Mrs. Sutter to encourage opportunities for students, faculty, other physicians and the St. Louis community to expand the understanding and practice of occupational medicine.

**Jessie L. Ternberg Pediatric Surgery Visiting Lectureship.** Made possible from a fund established in 1977 by Mr. Meyer Kopolow to honor Dr. Ternberg.

**Robert J. Terry Lectureship (1939) and Visiting Professorship (1982).** Established by alumni and Charles S. Terry, his son, respectively, "for the purpose of fostering greater appreciation of the study of anatomy."

**Donald L. Thurston Memorial Lectureship.** Established in 1988 by his wife, Dr. Jean Holowach Thurston, and his colleagues and friends, the lectureship is devoted to the history of biomedical advances.

**Leonard J. Tolmach Lectureship.** Established in 1995, this lectureship was endowed by friends and colleagues to honor the legacy of Dr. Tolmach. The lecture theme is radiation biology in clinical radiation oncology.

**Mildred Trotter Lectureship.** Established in 1975 by friends and former students of Mildred Trotter to bring a distinguished woman scientist to the School of Medicine each year.

**Rudolph A. Tuteur Pulmonary Lectureship.** This lectureship is endowed by family, friends, patients and colleagues of the Tuteur family to memorialize Rudolph A. Tuteur. The goal of this annual fall event is to promote further understanding of problems associated with chronic pulmonary disease from which he suffered.

**Dr. Todd Wasserman Visiting Lectureship in Radiation Oncology.** Established in 2004 by Dr. Wasserman and funded by MedImmune, Inc. and friends and colleagues of Dr. Wasserman.

## Primary Care Summer Preceptorships

Students appreciate early and sustained patient contact. Since 1996 the school has sponsored a primary care preceptorship program for 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.

## Student Research Fellowships

Student research is an important part of the educational program. Fellowships in basic science or clinical areas will be awarded each year to selected students who undertake research projects under the direction of faculty members. Research allows students to discover firsthand the problems and rewards of obtaining and assessing new information, thus adding another dimension to their experience as investigators.

Most students take the opportunity for research during the summer after their first year of classes, but incoming students to the school are also eligible. All research must be conducted at the School of Medicine. Students will be awarded a fellowship for the 2.5-month program.

Inquiries should be made to:

Koong-Nah Chung, PhD

Associate Dean for Medical Student Research

Director of the Office of Medical Student Research

Washington University School of Medicine

Campus Box 8107

660 S. Euclid Ave.

St. Louis, MO 63110

(314) 362-6844

[chungk@wusm.wustl.edu](mailto:chungk@wusm.wustl.edu)

## Adviser System

Student academic advising occurs within two broad programs.

1. **Advisers:** First-year students select faculty advisors from a list of volunteer faculty from their same academic society from both basic science and clinical faculty. Faculty meet and discuss with their group career paths and how to select among them. Many students particularly in first and second year, are interested in opportunities for clinical shadowing. Faculty meet with students 3-4 times a year as a group, but welcome more contact from students individually. These meetings are usually social and off-campus.
2. **Career (fourth-year) Advisers:** Each third-year student selects a fourth-year adviser from a list of faculty advisers. In most cases, the adviser is a faculty member in the field in which the student will be seeking a residency appointment. The career advisers have responsibility for reviewing the student's choice for fourth-year electives and making appropriate recommendations for the structure and content of the elective year. In addition, fourth-year advisers serve as valuable resources for information about residency programs. The assistant dean for career counseling is also available to provide individual counseling in planning for the residency application and match process. For more information about the Career Counseling Office:

<http://bulletinoftheschoolofmedicine.wustl.edu/EducationalPrograms/postgraduatetraining/Pages/Postgraduate-Training.aspx>

In addition to the advising programs described, students seek informal advising from faculty with whom they have had contact, either through classroom work, research or clerkships. Students also have faculty contact through membership in the academic societies.

## Alpha Omega Alpha

**Alpha Omega Alpha** is a national medical honor society. Members are selected by a standing AOA committee during the final year of medical school. Selection is based upon academic performance during the first three years, in addition to other qualities such as leadership. Approximately one-sixth of the class is elected to AOA.

Students elected to AOA are honored at an awards dinner during the final year and at a special AOA lecture.

# Awards and Prizes

Washington University School of Medicine publicly recognizes and rewards at two annual events 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 his or her peers in the second-year Practice of Medicine course. The November 2012 recipient: Brigid K. Marshall.

**Alpha Omega Alpha Book Prize.** Awarded to a member of the graduating class who has performed outstandingly for the entire medical course. The May 2013 recipient: Charles Elwood Kircher.

**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 2013 recipient: Jennifer Ann Hranilovich.

**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 2013 recipient: Christopher James Adkins.

**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 November 2012 recipient: Jennifer Chu.

**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 November 2012 recipient: Jeffrey S. Ketchersid.

**American Medical Women's Association Glasgow-Rubin Memorial Award.** Presented to the woman graduating first in her class. The May 2012 recipient: Maia Dorsett.

**American Medical Women's Association Glasgow-Rubin Memorial Achievement Citations.** Presented to women medical students graduating in the top 10 percent of their class. The May 2013 recipients: Mackenzie Capshaw Asel, Kristen Suzanne Grant, Amy Margaret Liang, Tammy Shirley Ruth, Jie Tang, and Jennifer Lee Troyer.

**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 November 2012 recipient: Guillermo J. Ares and Somalee Banerjee

**Alexander Berg Prize.** Awarded to the student presenting the best results in research in molecular microbiology. The May 2013 recipient: Matthew Raymond Vogt.

**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 2013 recipients: Agnieska Monika Milczarek and Carrie Morris Mintz.

**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 2013 recipient: Brian David Muegge.

**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 November 2012 Dr. Richard S. Brookings recipients: Nicholas M. Bontumasi, Amirali Modir Shanechi and Jared D. Wilkinson. The May 2013 Dr. Richard S. Brookings recipient: Leisha Carol Elmore. The November 2012 Robert Carter recipients: Matthew R. Schill, Jennifer L. Troyer and Robert D. Wojahn. The May 2013 Robert Carter recipient: Yuan James Rao.

**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 2013 recipient: Matthew Robert Schill.

**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 November 2012 recipient: Ann Leu.

**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 November 2012 recipient: David M. Rubins.

**Class of 2003 Award.** Dedicated to the memory of three classmates who died in a car accident, and is 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 November 2012 recipient: Jennifer S. Barklund and Lindsay Forbes.

**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 November 2012 recipient: Steven L. Bokshan.

**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 November 2012 recipient: Nicholas S. Yozamp.

**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 November 2012 recipient: Putzer J. Hung.

**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 2013 recipient: Kristen Suzanne Grant.

**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 November 2012 recipient: Tammy S. Shirley.

**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 2013 recipient: Andrew Robert Lee.



**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 2013 recipient: Brian David Muegge.

**The Family Health Foundation of Missouri Scholarship Award.** Awarded to the top graduating student entering the specialty of family medicine. The May 2013 recipient: Bethany Amber Davis.

**George F. Gill Prize in Pediatrics.** Awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics. The May 2013 recipient: Jie Tang.

**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 2013 recipient: Bahaa Ahmad Bedair.

**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 2013 recipient: Alexander Thien An Nguyen.

**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 2013 recipient: Alecia Cristen Vogel-Hammen.

**R.R. Hannas Award for Excellence in Emergency Medicine.** Offered annually by the Missouri Chapter of the American College of Emergency Physicians for exceptional performance in emergency medicine. The May 2013 recipient: Charles Elwood Kircher.

**Nathan Edward Hellman, MD, PhD, Memorial Award.** Recognizes a second-year student selected through a vote of fellow classmates. The recipient is distinguished as a student 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 November 2012 recipients: Andrew P. Jallouk and Philip S. Kemp.

**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 November 2012 recipient: Ignacio Becerra-Licha.

**Dr. John Esben Kirk Scholastic Award.** Established in 1975 and awarded to a graduating student of high scholastic standing. The May 2013 recipient: Jared Daniel Wilkinson.

**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 2013 recipient: Stacy Zhao Dai.

**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 2013 recipient: Tara Rachelle Skebba.

**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 2013 recipient: Tammy Shirley Ruth.

**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 November 2012 recipient: Jennifer Hranilovich.

**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 2013 recipient: Erica Paige Young.

**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 November 2012 recipient: Andrew P. Jallouk.

**McGraw-Hill/Lange Medical Student Book Award.** Awarded annually to medical students for high scholastic standing. The November 2012 recipients: Jacob K. Greenberg and Geoffrey E. Stoker.

**Medical Center Alumni Scholarship Fund Prize.** Given annually to students who have shown excellence in their work during the preceding year. The November 2012 recipient: Kristen S. Grant.

**Medical Fund Society Prizes.** One prize awarded annually to a graduating student who has excelled in the study of internal medicine; one prize awarded annually to a graduating student who has excelled in the study of surgery. No individual is eligible for both prizes. The May 2013 recipients: Jared Daniel Wilkinson (Medicine) and Wen Hui Tan (Surgery).

**Merck Manual Awards.** Given to three graduating medical students for scholastic achievement in medical studies. The May 2013 recipients: Amirali Modir Shanechi, Jennifer Lee Troyer, and Robert David Wojahn.

**Missouri State Medical Association Award.** Presented annually to honor School of Medicine graduates for outstanding achievement in the study of medicine. The May 2013 recipients: Mackenzie Capshaw Asel, Nicholas Michael Bontumasi, and Matthew Robert Schill.

**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 November 2012 recipients: Mackenzie C. Asel and Carrie L. Morris.

**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 November 2012 recipient Ugochi C. Okoroafor.

**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 2013 recipient: Antonina I. Frolova.

**The James L. O'Leary Neuroscience Prize.** Awarded annually to a student who demonstrates the best accomplishment in the Neuroscience course. The November 2012 recipient: Madeleine B. Chollet and Nicholas S. Yozamp.

**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 November 2012 recipient: Aaron S. Rudin.

**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 November 2012 recipients: Rahel G. Ghenbot, Uzoh E. Ikpeama and Philip L. Perez.

**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 2013 recipient: Isaac H. S. Solomon.

**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 November 2012 recipient: Michelle A. Jose-Kampfner.

**St. Louis Pediatric Society Senior Prize.** Presented to the senior student showing the greatest promise in clinical pediatrics. The May 2013 recipient: Kristen Marie Danley.

**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 November 2012 recipient: Ellen C. Merrick.

**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 2013 recipient: David Richard Pearson.

**Dr. Margaret G. Smith Award.** Given to a woman medical student for outstanding achievement in the first two years of medical school. The November 2012 recipients: Monica Kasbekar and Katelyn A. Ostendorf.

**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 2013 recipient: Ran Ran.

**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 2013 recipient: Stephen Andrew McCartney.

**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 November 2012 recipient: Rachel E. Amthor and Jennifer Hranilovich.

**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 2013 recipient: Brian David Muegge.

**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 November 2012 recipient: Stephen W. Chi and Nicholas S. Yozamp.

**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 2013 recipient: Leisha Carol Elmore.

**Doris P. and Harry I. Wexler Fund.** 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 2013 recipients: Ugochi C. Okoroafor and Tammy Shirley Ruth.

**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 2013 recipient: Jason W. Curtis.

**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 2013 recipients: Sarah Campbell Proehl and Puneet Kaur Chawla Sahota.

**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 2013 recipient: Emily Michelle Beck.

## 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 the School of Medicine (WUSM).

The benefit is provided to WUSM students for defense and indemnification of claims arising out of activities which are part of academic programs and only while a student is acting in his or her 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, or where the injury or damage resulted from intentional malicious conduct or wrongdoing, or in the event that the action or proceeding is brought by or on behalf of Washington University. This indemnification does not cover any liability which 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 which could lead to a claim, which you have knowledge of must be reported immediately to the Risk Management Office of the School of Medicine, (314) 362-6956.

## For More Information

If you have any questions about Washington University's professional liability program, please feel free to call the Risk Management Office.

# Student Constitution and Bylaws

## Article I:

### Name, Purpose, and Membership

- A. The name of this organization shall be the Medical Student Government of The Washington University School of Medicine.
- B. The purpose of the Medical Student Government shall be the advancement of student interests and welfare to achieve excellence in academic pursuits and professional interactions.
- C. The Medical Student Government shall represent all students pursuing a medical degree who are in good standing with the University.

## Article II:

### Class Officers

- A. **Offices:** Each Class shall elect the following officers: President, Medical Education Representative (MER), Representative to the Organization of Student Representatives (OSR Rep) of the Association of American Medical Colleges (AAMC), Representative to the Graduate-Professional Council (GPC Rep), and a Social Chair/Committee.
- B. **Duties:** Each class officer shall have specific responsibilities:
  1. **President:** Each class shall elect one President. This person shall serve as the official spokesperson for the class in dealings with the Student Government and with the University. The President shall disseminate information regarding medical student affairs and activities. The President shall have oversight and approve of all moneys spent by the Social Chair/Committee. The President shall perform any and all duties that are unique to the class represented.

2. **MER:** The MER shall represent the class at all meetings of the MERs and Curriculum Evaluation Committee and serve as a liaison between students and faculty on curricular matters. The MER shall poll the class as needed regarding course evaluations and selection of recipients for the various Faculty Awards presented each year.
  3. **OSR Rep:** The OSR Rep shall keep class members up to date with news from the OSR and from the AAMC. The OSR Rep shall represent the University at regional and national meetings of the OSR under an agreement with the University.
  4. **GPC Rep:** The GPC representatives shall represent the School of Medicine at GPC meetings and shall inform the GPC of issues affecting the School of Medicine, learn about issues affecting other schools, discuss and find solutions to problems affecting the whole graduate and professional student population, and plan and advertise social activities that foster communication between all graduate and professional students. The Reps shall be the liaison to the other programs within the School of Medicine, as well as to the rest of the University community. In addition, the four Reps will divide the responsibilities of serving on the Professional and Graduate Students Coordinating Committee (ProGrads), the Medical Campus Committee (temporarily named), and other inter-school/division committees as needed. Specifically in regards to the Health Professional Student Leadership Council (HPSLC), two of the four GPC representatives will serve as voting members on HPSLC. One of these voting members must be the 1st or 2nd year GPC representative. The selection of MSG's voting members on HPSLC must be made before the end of the sixth week of first-semester classes in the academic year.
  5. **Social Chair/Committee:** The Social Chair/Committee shall organize social functions for class members and interact with other Social Chairs/Committees to organize social functions with other classes and within the University community. The Social Chair/Committee shall consult and obtain approval from the class President for all moneys spent on such functions.
- C. **Elections:** An Election Official designated by the Student Government shall be responsible for the organization and execution of all elections held for offices specified under the Constitution, including President, MER, OSR, GPC, and social chair. Elections shall be held for each of the class officer positions according to the following format:
1. **Voting Eligibility:** All students who will be a member of the class during the term for which the elected officers will serve will be eligible to vote in the election. Efforts should be made by the appointed election official to extend the opportunity to vote to students who will be entering their respective classes in the upcoming year, including but not limited to the large number of MD/PhD students returning for their clinical clerkships.
    - a. **First and second year offices:** A member of the class will be considered to be an individual who is currently planning on taking the MD course of study for the upcoming year.

- b. **Third and fourth year offices:** A member of the class will be considered to be an individual who is planning on taking the MD course of study anytime during the upcoming two years, including any individual planning to pursue an MA degree for one year after either the second or third year of medical school.
- 2. **Nominations:** Nominations for each office shall be held starting at least one week prior to the election and ending no later than three days prior to the election. Nominations shall be submitted in writing to the Election Official. Any student eligible to run for office may nominate him/herself or another medical student in good standing. Candidates must have the firm intention of carrying out all the duties and obligations of the office for the entire term.
- 3. **Candidate Eligibility:** All students who will be a member of the class during the term for which the elected officers will serve, as defined in Article II.C.1, will be eligible to be nominated for election except as described below:
  - a. **President:** The class president does not need to be taking the same course of study as the classmates he or she represents. Any individual who meets the criteria defined in Article II.C.1 will be eligible to serve.
  - b. **MER**
    - i. **Third year MER:** Due to the duties of the third year MER, it is essential that the third year MER be an individual who is currently taking the MD course of study with the rest of his or her classmates.
    - ii. **Fourth year MER:** The fourth year MER rep does not need to be taking the same course of study as the classmates he or she represents. Any individual who meets the criteria defined in Article II.C.1 will be eligible to serve.
  - c. **OSR Rep:** An OSR rep does not need to be taking the same course of study as the classmates he or she represents. Any individual who meets the criteria defined in Article II.C.1 will be eligible to serve.
  - d. **GPC Rep:** A GPC rep does not need to be taking the same course of study as the classmates he or she represents. Any individual who meets the criteria defined in Article II.C.1 will be eligible to serve.
  - e. **Off-Campus Students:** Students who have chosen to pursue a course of study that results in his or her not being in Saint Louis will not be eligible to retain or be nominated for a position. This exclusion does not apply to students who will off-site temporarily for an away rotation.
- 4. **Elections and Terms:** All terms shall begin upon election. Regular elections shall be held according to the following schedule:
  - a. **First Year:** Elections shall be held within three to six weeks of the beginning of the first-semester classes. Each position carries a term of one academic year.
  - b. **Second Year:** Elections shall be held within six weeks prior to the completion of the first academic year. Each position carries a term of one academic year.

- c. **Third and Fourth Year:** Elections shall be held within six weeks prior to the completion of the second academic year. Each position carries a term of two academic years.
  5. **Class Officer Balloting:** To be elected a candidate must receive a simple majority (greater than 50 percent) of the votes cast for that particular office by at least a quorum of one-half of the eligible voters. Write-in candidates shall be allowed on this ballot. Absentee ballots shall be allowed if they are given in writing to the Election Official prior to the day of election. Ballot counting shall be the responsibility of the Election Official under the observation of a witness agreeable to all candidates.
  6. **Class Officer Runoff Procedures:** If no candidate receives a simple majority for a particular position, a runoff between the top two candidates shall be held within three days of the initial election. Write-in candidates will not be allowed on this ballot. To be elected a candidate must receive the most votes cast for that particular office by at least a quorum of one-half of the eligible voters.
  7. **Social Chair Election Procedure:** Social chair elections will be conducted in conjunction with MSG class officer elections. A maximum of four social chairs can be elected into office. Candidates do not have to receive a majority of votes to be elected into office. All other MSG election procedures apply.
  8. **Appeals:** All decisions are made by the Election Official during the election period. Appeals may be made by a candidate in writing to the Chair of the Medical Student Government and will be reviewed and ruled on by a group consisting of the current President, MER, OSR, and GPC from each of the four classes; the decisions of this group will be considered final.
  9. **Vacant Offices:** If any office is vacated before its set term, an election will be held for that office using the procedures outlined above within three weeks of the vacancy. If a current class officer runs for the vacated office, that officer must vacate the post he/she occupies.
  10. **Removal from Office:** In the unfortunate event that a class officer is not fulfilling his/her obligations and duties, MSG by a two-thirds majority of a quorum of one-half may vote to recommend that an officer be removed from office to the class that elected the officer. A vote of recall shall then be held within one week. If a three-fourths majority of a quorum of two-thirds of a class votes to recall the officer, the officer shall be removed from office. An election for vacant office shall then be held.
- D. **MD/PhD Research Students:** There shall be two Representatives of the MD/PhD students who are outside the core medical curriculum. These Representatives shall be selected by a method chosen by the Medical Scientist Training Program (MSTP.) In addition, these individuals shall be full voting members of the MSG. Each Representative shall serve a two-year term, with elections for one Representative each summer, so the terms of the two Representatives overlap by one year.
  - E. **Technology Liaison:** The responsibilities of the class appointed Technology Liaison include serving as the representative to the administration regarding the availability and utilization of



technology and addressing related class concerns. In addition, the Technology Liaison will work with Instructional Technologies and Library Systems (ITLS) to provide new services and assist the MER with technology-related education initiatives. One Technology Liaison will be appointed for each medical school class after the class-wide elections have taken place. After a call for applications from the class, the four (4) elected MSG members of that class review each application and select the Technology Liaison by consensus. The term of the Technology Liaison will be the same as the elected officials of that class.

## Article III:

### The Medical Student Government

- A. **Membership:** The Student Government shall consist of the President, the MER, the OSR Rep, and the GPC Rep from each of the four classes, as well as two representatives of MD/PhD Students.
1. **Additional voting members:** Any student who has served on MSG for a minimum of two years and is no longer eligible to serve as a class representative due to departure from the traditional four-year MD curriculum may remain on MSG as a voting member in an advisory role. All students will only be eligible to serve as a voting member for up to five total years.
  2. **Non-voting members:** In addition, the Student Government may offer a non-voting position to a duly elected representative of any student group which is recognized nationally, regionally or within the Medical School so long as such a group is open to all medical students without discrimination and that such a group is not in conflict with the goals of the Student Government.
- B. **Purpose and Responsibilities:** The Student Government shall carry out the business of the Student Government pursuant to the goals stated in Article I. The purpose of the Student Government shall be to represent and promote the interests and concerns of the medical student body through activities including but not limited to:
1. Forming and representing official student body opinions for interaction with the University, its Administration and other groups associated with medical education.
  2. Serving as a forum for interaction between student groups.
  3. Serving as a forum for student-initiated curricular review and reform in the pursuit of academic excellence.
  4. Promoting interaction among the School of Medicine students, faculty and administration, and with the wider University community.
  5. Establishing a funding mechanism and budget with the associated collection and disbursements of funds for activities pursuant to goals stated in Article I.
  6. Organizing elections for class officers and any other official representative of the student body at large.

7. Exercising any such additional authority as may be granted to it by the School of Medicine or by other organizations, so long as such authority is consistent with the purposes stated in Article I.
  8. Posting agenda of all meetings for public reference.
  9. Formulating all rules and bylaws necessary for the Student Government to carry out the responsibilities and powers granted through this constitution. Such rules and bylaws shall require a simple majority of a quorum of two-thirds of the voting Student Government members.
  10. The Student Government shall meet regularly and at intervals of no more than six weeks.
  11. Representatives from the various student groups sitting on the Student Government shall keep the Student Government informed of all activities associated with their posts in the form of a written brief to be presented at the Student Government meeting as appropriate for their group's activities.
- C. **Student Government Offices:** There shall be a Student Government Chair and Vice-Chair elected from the voting members of the Student Government. Election shall require a simple majority of the voting Student Government. The election shall be held within six weeks prior to the completion of the academic year. The terms of these offices shall be one academic year.
1. **Student Government Chair:** The Student Government Chair shall preside at all meetings of the Student Government and have specific responsibilities:
    - a. The Chair shall serve as official representative and spokesperson for the Student Government to the University, its Administration, and to other groups associated with medical education.
    - b. The Chair shall be responsible to ensure the duties of the Student Government are carried out efficiently and in a timely manner.
    - c. The Chair shall report the names of the Class Officers to the Dean, and post such a list for public reference.
    - d. The Chair shall be responsible for overseeing and maintaining records and to set the agenda for such meetings in written form for distribution to Student Government members prior to each meeting.
    - e. The MSG shall be responsible for overseeing and maintaining records of all financial transactions of the Student Government. The second-year class president shall regularly update the Student Government on its financial standing, and must make all financial records available to any medical student, member of the Administration, or to any official of the University. All transactions shall require the signatures of the Chair and the Vice-Chair.
    - f. The Chair shall be empowered to call for standing and ad hoc committees to evaluate and make recommendations about specific areas of concern to the Student Government, the School of Medicine and its students. MSG shall appoint these committees.

- g. The Chair shall be empowered to designate another Student Government member to take on one or more of his/her duties.

## Article IV:

### Ratification and Amendments

- A. In 1993 this Constitution was ratified by a 2/3 majority of a quorum of one-half of the student body pursuing a medical degree.
- B. This Constitution can be amended by either a 2/3 majority of a quorum of one-half of the students in their first, second, and third years, or by a unanimous vote of the elected members of the Medical Student Government.

## Applied Health Behavior Research

The Master of Science in Applied Health Behavior Research (MS AHBR) addresses the science of health behavior change and applies this to the development and evaluation of programs in clinical and community settings designed to improve health behavior. Sponsored by the Clinical Research Training Center and offered through Washington University School of Medicine, the MS AHBR is a multidisciplinary, 33-unit program that focuses on the applied skills required for the development, management and evaluation of health behavior programs or research studies. Students enrolled in this program choose one of two concentrations: 1) Health Education, Program Planning and Evaluation; or 2) Health Behavior Research.

The MS AHBR degree can be pursued on a part-time basis, with most courses held during the late afternoon or evening hours to accommodate the working professional. Course work is typically completed in two to three years. Applications are reviewed on a rolling basis with a recommended program start in the fall semester of each year.

A 15-unit Graduate Certificate in Health Behavior Planning and Evaluation is also available. This certificate is designed primarily for individuals who work in agencies and organizations that develop, implement and evaluate health behavior programs and want the formal course work and skills to complement their experience in the field and enhance their professional opportunities.

## Admissions Information

Please visit the [Applied Health Behavior Research](#) website for complete admissions information.

Applied Health Behavior Research Faculty

## Director

### **Mario Schootman, PhD**

University of Iowa, 1993 (Chief and Associate Professor of Epidemiology and Medicine, Division of Health Behavior Research, Departments of Internal Medicine and Pediatrics)

## Associate Director

### **Anjali D. Deshpande, PhD, MPH**

Emory University, 2000; University of Oklahoma Health Sciences Center 1995 (Research Assistant Professor, Division of Health Behavior Research)

## Instructors

### **Trent Buskirk, PhD**

Arizona State University, 1999 (Adjunct Associate Professor, Saint Louis University)

### **Patricia A. Cavazos-Rehg, PhD**

State University of New York, Buffalo, 2004 (Research Instructor, Department of Psychiatry)

### **Anjali D. Deshpande, PhD, MPH**

Emory University, 2000; University of Oklahoma Health Sciences Center 1995 (Research Assistant Professor, Division of Health Behavior Research)

### **Elizabeth Dodson, PhD**

Saint Louis University, 2008 (Assistant Professor, George Warren Brown School of Social Work)

### **Michael Elliott, PhD**

The Ohio State University School of Public Health, 2001 (Assistant Professor, Saint Louis University)

### **Cheryl A. Houston, PhD, RD, LD**

Saint Louis University, 2000 (Director of Dietetics, Program in Dietetics, Department of Environmental Sciences, Fontbonne University)

### **Donna B. Jeffe, PhD**

Washington University, 1993 (Research Assistant Professor, Division of Health Behavior Research, Departments of Internal Medicine and Pediatrics)

### **Dorina Kallogjeri, MD, MPH**

Tirana University School of Medicine, 1997; Saint Louis University, 2007 (Research Statistician, Department of Otolaryngology)

### **Jeanne Kloeckner, OTD, OTR/L**

Washington University, 2010 (Clinical Specialist, Washington University Program of Occupational Therapy)

### **Amy McQueen, PhD**

University of Houston, 2002 (Research Assistant Professor, Division of Health Behavior Research)

### **Shannon Nanna, PsyD**

Pacific University, 2007 (Clinical Psychologist, Psycho-Oncology Services, Siteman Cancer Center)

**Maria Perez, MA**

University of Missouri, 2004 (Research Patient Coordinator, Division of Health Behavior Research)

**Donald R. Rickert, PhD**

Saint Louis University, 1984 (Professor, St. Louis College of Pharmacy)

**Enbal Shacham, PhD**

Indiana University, 2006 (Research Assistant Professor, School of Social Work)

**Susan Sylvia, PhD**

Washington University, 1997 (Clinical Psychologist)

**Leigh E. Tenkku, PhD, MPH**

Saint Louis University, 2007 (Assistant Professor and Director for Research, Department of Community and Family Medicine, Saint Louis University School of Medicine)

## Audiology and Communication Sciences

The Program in Audiology and Communication Sciences (PACS) provides training and graduate programs in the fields of clinical audiology, deaf education, and speech and hearing sciences.

Established at Central Institute for the Deaf (CID) in 1914, the training programs are now a member of a consortium of programs known as CID at Washington University School of Medicine, which also includes affiliated clinical services and research programs operated by the Department of Otolaryngology.

### Doctor of Audiology (AuD)

The Doctor of Audiology (AuD) program is a four-year course of study that prepares students as independent clinical audiologists. Established in 1947, the 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 audiology program is accredited by the American Speech-Language-Hearing Association (ASHA) and the Accreditation Commission for Audiology Education (ACAЕ). Graduates are eligible for national certification by ASHA.

### Master of Science in Deaf Education (MSDE)

The Master of Science in Deaf Education (MSDE) program is a two-year course of study that prepares students as teachers of the deaf and hard of hearing. With its origins going back to 1914, the program is recognized internationally as one of the most prestigious of its kind in the world. The program's intensive curriculum, emphasis on immersion in practice teaching and experienced faculty attract students nationally from a wide variety of backgrounds.

The deaf education program is accredited by the State of Missouri's Department of Elementary and Secondary Education (DESE) and the Council on Education of the Deaf (CED). Graduates of the program are eligible for teacher certification in the State of Missouri (Deaf/Hearing Impaired, Birth-Grade 12) and for national certification by CED in the areas of early childhood and elementary education.

## Doctor of Philosophy (PhD) in Speech and Hearing Sciences

The PhD program prepares students for academic and research careers in speech and hearing sciences. Established in 1947, the program is dedicated to fostering scientific inquiry in speech and hearing sciences and related disciplines. The program is administered through Washington University's Graduate School of Arts & Sciences.

## Minor in Speech and Hearing Sciences

The Minor in Speech and Hearing Sciences 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 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.

## Further Information

Further information, including complete admissions details and full program descriptions, may be obtained by contacting:

Washington University School of Medicine  
Program in Audiology and Communication Sciences  
Campus Box 8042  
660 S. Euclid Ave.  
St. Louis, MO 63110  
Phone: (314) 747-0104  
Fax: (314) 747-0105  
Email: [pacs@wusm.wustl.edu](mailto:pacs@wusm.wustl.edu)  
Web: [pacs.wustl.edu](http://pacs.wustl.edu)

# Audiology and Communication Sciences Faculty

## Professors (Joint)

**Barbara A. Bohne, PhD**

Washington University, 1971

**Richard A. Chole, MD, PhD**

University of Minnesota, 1977

**William W. Clark, PhD**

Program Director

University of Michigan, 1975

**Nancy Tye Murray, PhD**

University of Iowa, 1984

**Michael Valente, PhD**

University of Illinois, 1975

**Mark E. Warchol, PhD**

Northwestern University, 1989

## Associate Professors (Joint)

**Jianxin Bao, PhD**

University of Florida, 1992

**Jill B. Firszt, PhD**

University of Illinois, 1998

**Keiko Hirose, MD**

Harvard Medical School, 1993

**Timothy E. Hullar, MD**

Harvard University, 1996

**Johanna G. Nicholas, PhD**

Washington University, 1990

**Kevin K. Ohlemiller, PhD**

Northwestern University, 1990

**L. Maureen Valente, PhD**

*Director of Audiology Studies*

Washington University, 2005

## Assistant Professors (Joint)

**Lisa S. Davidson, PhD**

Washington University, 2003

**Brian T. Faddis, PhD**

University of California-Davis, 1994

**Heather J. Hayes, PhD**

*Director of Deaf Education Studies*

Washington University, 2009

**Roanne K. Karzon, PhD**

Washington University, 1982

**Lisa G. Potts, PhD**

Washington University, 2006

**Rosalie M. Uchanski, PhD**

Massachusetts Institute of Technology, 1988

## Instructors

**Lynda C. Berkowitz, MSSH**

Washington University, 1983

**Carl D. Bohl, DSc**

University of Cincinnati, 1973

**Christine M. Clark, MAEd**

Maryville University, 1999

**Christine H. Gustus, MSSH**

Washington University, 1975

**Barbara A. Lanfer, MAEd**

University of Missouri-St. Louis, 1998

**E. Tracy Mishler, AuD**

Arizona School of Health Sciences, 2007

**Mary A. Shortal, MA**

Washington University, 1976

**Karen S. Stein, MAEd**

Washington University, 1974

## Lecturers

**Carol E. Bergmann, AuD**

Arizona School of Health Sciences, 2003

**Amy L. Birath, AuD**

University of Memphis, 2007

**Greta M. Bohnenkamp, MS**

Vanderbilt University, 2005

**Amanda L. Dunaway, MSDE**

Washington University, 2006

**Elizabeth A. Elliott, MAT**

Webster University, 2004



**Dave A. Harris, PhD**

University of Cincinnati, 2005

**Christina M. Koehler, MSSH**

Washington University, 2000

**Karen R. Kupper, MSSH**

Washington University, 1979

**Robert J. Mareing, AuD**

Pennsylvania College of Optometry, 2003

**James D. Miller, PhD**

Indiana University, 1957

**Jean S. Moog, MS**

Washington University, 1964

**Amanda J. Ortmann, MSSH**

Washington University, 2003

**Kimberly K. Ott, MS**

Southern Illinois University – Edwardsville, 1981

**Judy L. Peterein, AuD**

Salus University, 2009

**Justine L. Preston, MA**

Washington University, 2006

**Marie K. Richter, AuD**

Salus University, 2009

**Catherine M. Schroy, MSSH**

Washington University, 1998

**Brent P. Spehar, PhD**

Washington University, 2005

**Ellen R. White, MAEd, MSSH**

Washington University, 2003

## Professor Emeritus

**David P. Pascoe, PhD**

## Biology and Biomedical Sciences

The Division of Biology and Biomedical Sciences (DBBS), organized in 1973, is a consortium of university departments that together provide interdisciplinary training for full-time doctoral students. This unique organization was formed because of the realization that research and training in modern biology transcend the limits of departmental structure. The faculty consists of members of seven preclinical

departments in the School of Medicine: Anatomy and Neurobiology, Biochemistry and Molecular Biophysics, Cell Biology and Physiology, Genetics, Molecular Microbiology, Pathology and Immunology, and Developmental Biology; 11 clinical departments: Anesthesiology, Medicine, Neurological Surgery, Neurology, Obstetrics and Gynecology, Ophthalmology and Visual Sciences, Orthopaedic Surgery, Otolaryngology, Pediatrics, Psychiatry, Radiation Oncology, Radiology and Surgery; the Department of Biology; the Departments of Chemistry and Psychology in the School of Arts & Sciences; and the Departments of Computer Science and Biomedical Engineering in the School of Engineering & Applied Science. More than 450 faculty are affiliated with one or more of 12 broad training programs: Biochemistry; Computational and Molecular Biophysics; 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; and Plant Biology. Faculty in these programs take responsibility for all divisional activities, including recruiting, admissions, advising and research training. In addition, many divisional courses and seminars are offered by the participating faculty.

Currently, more than 650 graduate students are enrolled in the division, including approximately 200 students pursuing both the PhD and the MD through the Medical Scientist Training Program (see Degree Programs area of Admissions and Educational Programs section.) Requirements for the PhD include a series of courses tailored to a student's background and interests, qualifying examinations, execution of laboratory research and defense of a dissertation generated through original scientific investigation. Although students enter the division through an affiliation with one of the 12 programs, it is possible for a student to transfer to another program as interests evolve. During the first year, advisers are appointed to assist students in selecting courses and seminars, as well as to help them in choosing three laboratory rotations in which they will spend several months becoming acquainted with a particular area of scientific research. Most students choose a research adviser by the end of the first year.

Applications for admission to the PhD programs of the division are due December 1 for matriculation the following fall. Admission is based on demonstrated ability, future promise and the number of positions currently available. Applicants should have completed rigorous undergraduate training in biology, chemistry, physics, psychology, computer science, engineering or related fields at a high level of scholastic achievement. It is required that each applicant take the aptitude test of the Graduate Record Examination (GRE). Additional information and application for admission to the PhD programs may be obtained from our website at [dbbs.wustl.edu](http://dbbs.wustl.edu) or by writing to the Director of Admissions, Washington University School of Medicine, Campus Box 8226, 660 S. Euclid Ave., St. Louis, MO 63110-1093 ([admissions@dbbs.wustl.edu](mailto:admissions@dbbs.wustl.edu)). Students who wish to pursue both the PhD and MD degrees must apply to the Medical Scientist Training Program (see Degree Programs area of Admissions and Educational Programs section of this website.)

Students admitted to the graduate programs are guaranteed full stipend and tuition support contingent upon satisfactory performance. The stipend for the 2013-14 academic year will be \$28,500 annually. Tuition remission is provided to all students, and life, disability and health care also is provided by the

Medical Center Student Health Service. The division provides support for its PhD students from several sources, including federally funded training grants provided by the National Institutes of Health.

## Admissions Information

Please visit the [Division of Biology and Biomedical Sciences](#) website for admissions information.

## Courses

The following graduate courses are offered by the Division of Biology and Biomedical Sciences, and they are available both to PhD and MD students who meet the prerequisites for the appropriate course. Those courses particularly relevant to a given department are cross-listed under the department in this Bulletin.

### L41 (BIO) 501 THE HUMAN BODY: ANATOMY, EMBRYOLOGY, AND IMAGING

For full description, see Department of Anatomy and Neurobiology's M05 501A Human Anatomy and Development.

### L41 (BIO) 5011 ETHICS AND RESEARCH SCIENCE

Instructors: Staff, Division of Biology and Biomedical Sciences, 362-3365

Exploration of ethical issues that research scientists encounter in their professional activities. Topics will include, but are not limited to: student-mentor relationships, allegations of fraud, collaborators' rights and responsibilities, conflicts of interest, confidentiality and publications. Case study and scenario presentations will provide focus for discussions. Prerequisite: open to graduate students engaged in research. Six 90-minute sessions. Credit: 1 unit.

### L41 (BIO) 5014 BIOTECH INDUSTRY INNOVATORS

Instructor: Erwin H. Peters, PhD, 862-4867

The Basics of Bio-Entrepreneurship investigates issues and decisions that inventor/scientists encounter when they are considering the application and commercialization of early-stage scientific discoveries. This course is intended for anyone interested in working in the life sciences industry as a chief scientist, entrepreneur, manager, consultant or investor. It focuses on the issues and decisions that researchers typically face when considering how a discovery might be moved from a university laboratory to actual use. Credit: 3 units. Same as B63 MGT 500U.

### L41 (BIO) 502 GENERAL PHYSIOLOGY

Instructor: Robert S. Wilkinson, PhD, 362-2300

This course applies the fundamental physiological mechanisms of cell biology to the functions of the major organ systems of the body, namely, the cardiovascular, renal, respiratory, gastrointestinal and endocrine systems. The course is intended primarily for first-year medical students. The Physiology and

Microscopic Anatomy courses are closely coordinated within the same schedule. Course continues into the spring semester with a different schedule. Prerequisites: Bio 5061 or the equivalent and permission of course director. Credit: 6 units.

#### L41 (BIO) 5053 IMMUNOBIOLOGY I

Instructor: Paul Allen, PhD, 362-8758

Immunobiology I and II are a series of two courses taught by the faculty members of the Immunology Program. These courses cover in-depth modern immunology and are based on Janeway's Immunobiology 8th Edition textbook. In Immunobiology I, the topics include: basic concepts in immunology, innate immunity: the first lines of defense, the induce responses of innate immunity, antigen recognition by B-cell and T-cell receptors, the generation of lymphocyte antigen receptors, antigen presentation to T lymphocytes and signaling through immune system receptors. In Immunobiology II the topics include: the development and survival of lymphocytes, T cell-mediated immunity, the humoral immune response, dynamics of adaptive immunity, the mucosal immune system, failures of host defense mechanisms, allergy and allergic diseases, autoimmunity and transplantation, and manipulation of the immune response. These courses are open to graduate students. Advanced undergraduate students may take these courses upon permission of the coursemaster. Prerequisite: DBBS students and advanced undergraduates with permission. Credit 4 units.

#### L41 (BIO) 5054 IMMUNOBIOLOGY II

Instructor: Paul Allen, PhD, 362-8758

Immunobiology I and II are a series of two courses taught by the faculty members of the Immunology Program. These courses cover in-depth modern immunology and are based on Janeway's Immunobiology 8th Edition textbook. In Immunobiology I, the topics include: basic concepts in immunology, innate immunity: the first lines of defense, the induce responses of innate immunity, antigen recognition by B-cell and T-cell receptors, the generation of lymphocyte antigen receptors, antigen presentation to T lymphocytes and signaling through immune system receptors. In Immunobiology II the topics include: the development and survival of lymphocytes, T cell-mediated immunity, the humoral immune response, dynamics of adaptive immunity, the mucosal immune system, failures of host defense mechanisms, allergy and allergic diseases, autoimmunity and transplantation, and manipulation of the immune response. These courses are open to graduate students. Advanced undergraduate students may take these courses upon permission of the coursemaster. Prerequisite: DBBS students and advanced undergraduates with permission. Credit 4 units.

#### L41 (BIO) 5066 BIOSTATISTICS FOR RESEARCH WORKERS

For full description, see Division of Biostatistics, M21 505.

#### L41 (BIO) 5068 FUNDAMENTALS OF MOLECULAR CELL BIOLOGY

Instructor: Robert Mercer, PhD, 362-6924

This is a core course for incoming graduate students in Cell and Molecular Biology programs to learn about research and experimental strategies used to dissect molecular mechanisms that underlie cell

structure and function, including techniques of protein biochemistry. Enrolling students should have backgrounds in cell biology and biochemistry, such as courses comparable to L41 BIO 334 and L41 BIO 4501. The format is two lectures and one small group discussion section per week. Discussion section focuses on original research articles. Same as M15 5068 and M04 5068. Credit: 4 units. Same as E62 BME 5068.

#### L41 (BIO) 5123 EXPERIMENTAL HEMATOPOIESIS JOURNAL CLUB

Instructor: Daniel C. Link, MD, 362-8771

Journal club in which papers that describe significant advances in the field of experimental hematopoiesis are discussed. Students are expected to present one paper per semester and attend the weekly (1 hour) session. No prerequisites. Credit: 1 unit.

#### L41 (BIO) 5125 STUDENT-RUN CELL BIOLOGY JOURNAL CLUB

Instructor: Phyllis Hanson, MD, PhD, 747-4233

Participants (students) present summaries of current research published in various journals in the field of cell biology. A large component of this journal club includes coaching in oral presentation. Students receive one credit for regular participation and for making one presentation. Credit: 1 unit.

#### L41 (BIO) 5128 CELL BIOLOGY OF EXTRACELLULAR MATRIX JOURNAL CLUB

Instructor: Jeff Miner, PhD, 362-8235

This journal club covers a broad range of topics related to extracellular matrix and cell-cell communication, including the fields of biochemistry, molecular biology, cell biology and developmental biology. Speakers give a brief background to introduce the topic and then focus on one or two papers from the current literature. Presentations are given by students, faculty and postdoctorates. Students receive one credit for regular participation and for making one presentation. Credit: 1 unit.

#### L41 (BIO) 5137 ION CHANNELS JOURNAL CLUB

Instructor: Colin G. Nichols, PhD, 362-6630

Student will attend journal club every week and participate in group discussion of recent paper. Once per semester student will choose a paper and present it to the group. Credit: 1 unit.

#### L41 (BIO) 5138 JOURNAL CLUB FOR THE MOLECULAR MECHANISM OF AGING

Instructor: Shin-ichiro Imai, MD, PhD, 362-7228

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

#### L41 (BIO) 5139 SEMINAR IN IMAGING SCIENCE AND ENGINEERING

Instructor: Joseph O'Sullivan, PhD, 935-4173

This seminar course consists of a series of tutorial lectures on Imaging Science and Engineering with emphasis on applications of imaging technology. Students are exposed to a variety of imaging applications that vary depending on the semester, but may include multispectral remote sensing, astronomical imaging, microscopic imaging, ultrasound imaging and tomographic imaging. Guest lecturers come from several parts of the university. This course is required of all students in the Imaging Science and Engineering program; the only requirement is attendance. This course is graded Pass/Fail. Prerequisite: Admission to Imaging Science and Engineering Program.

#### L41 (BIO) 5147 CONTRAST AGENTS FOR BIOLOGICAL IMAGING

Instructor: Joseph Culver, PhD, 747-1341

Contrast Agents in Biological Imaging will build the chemistry foundations for the design and use of contrast agents in imaging applications such as nuclear medicine, magnetic resonance imaging (MRI) and optical imaging. The course will include lectures on the design of radiopharmaceuticals for gamma scintigraphy and positron emission tomography, MRI contrast agents and agents for optical imaging, including bioluminescence and fluorescence microscopy. Prerequisite: one year of general chemistry, one semester of organic chemistry. Credit 3 units. Same as L07 Chem 5147.

#### L41 (BIO) 5148 METABOLISM JOURNAL CLUB

Instructors: Daniel Ory, MD, 362-8737, Jean Schaffer, MD, 362-8717

The purpose of the Metabolism Journal Club is to introduce the graduate students to advanced topics spanning the biochemistry, cell biology and genetics of cellular and whole body metabolism. Under the guidance of the course directors (Drs. Ory and Schaffer), students will select recent topical articles for discussion in the weekly journal club. Students will be expected to provide a succinct introduction to the topic and lead discussion of the data presented in the journal article. Students will be evaluated on the basis of their presentation and their participation in the seminar throughout the semester. Prereqs: Successful completion of Fundamentals of Molecular Cell Biology (Bio 5068) and Nucleic Acids and Protein Biosynthesis (Bio 548). 1 unit.

#### L41 (BIO) 5152 DEVELOPMENT, REGENERATION AND STEM CELL BIOLOGY JOURNAL CLUB

Instructor: Craig Micchelli, PhD, 362-7036

Focuses on developing a dialog around current topics in developmental and regenerative biology at the molecular, cellular and systems levels. 1 unit.

#### L41 (BIO) 5171 MEDICAL IMMUNOLOGY

Instructor: Andrey S. Shaw, MD, 362-4614

An introduction to basic concepts in immunology and immunopathology. Lectures focus on antigen-antibody interactions, immunoglobulin structure and genetics, the cellular basis of the immune response and immune regulation, T cell effector mechanisms, the inflammatory response, complement, the positive and negative roles of hypersensitivity, and immune deficiency. Prerequisite: some background in

biochemistry and genetics helpful. Restricted to medical students only except in unusual circumstances, with permission of coursemaster. Offered during the first half of the second medical semester. Three-four lecture hours a week, two (2) two-hour lab periods, four (4) one-hour clinical discussion groups. Credit: variable, maximum 3 units.

#### L41 (BIO) 5191 PATHOBIOLOGY OF HUMAN DISEASE STATES

Instructors: Matthew Walter, MD, 362-9409, Thomas Baranski, MD, PhD, 747-3997

Three human disease states will be discussed in detail. Topics will include background clinical and epidemiological information, followed by a detailed examination of the molecular and cellular events that underlie the disease state. Examples of pertinent topics include Alzheimer's disease, AIDS, leukemia, cystic fibrosis, sickle cell anemia, diabetes, etc. Prerequisite: Must be a Markey Pathway student and have HIPAA training. Credit: 2 units.

#### L41 (BIO) 5192 CANCER BIOLOGY JOURNAL CLUB

Instructor: Jason D. Weber, PhD, 747-3896

This journal club covers current papers in molecular oncology, cancer genetics and contemporary molecular biology. Presentations will be given by students, post-docs and faculty, then discussed. Credit: 1 unit.

#### L41 (BIO) 5217 SPECIAL TOPICS IN MICROBIAL PATHOGENESIS

Instructor: Dong Yu, PhD, 362-7367; Douglas Berg, PhD, 362-2772

Primarily for graduate and MSTP students, this course involves oral presentation and discussion of current research articles on pathogenic microorganisms (bacteria, viruses, parasites and fungi) and the cellular and molecular basis of host-pathogen interactions. Emphasis will be placed on understanding experimental techniques and design of future experiments in the areas covered. Students are expected to prepare all articles covered and to participate actively in each discussion. Prerequisite: advanced elective course Molecular Microbiology and Pathogenesis or permission of instructors. Class meets twice per week for 1.5 hours each. Credit 2 units.

#### L41 (BIO) 5224 MOLECULAR, CELL AND ORGAN SYSTEMS

Instructor: Kendall Blumer, PhD, 362-1668

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

#### L41 (BIO) 5235 GENETICS JOURNAL CLUB

Instructor: Stephen L. Johnson, PhD, 362-0362

This journal club will be focused on the Genetics Department seminar series. Students will present one or a few recent papers by the seminar speaker scheduled for that week. Students will provide a brief written evaluation (on a form that will be provided) of their peers' presentations, and the faculty advisors will meet with each student after the presentation to provide feedback. Credit: 1 unit.

#### L41 (BIO) 5255 EXPERIMENTAL SKELETAL BIOLOGY JOURNAL CLUB

Instructor: Steven Teitelbaum, MD, 454-8463

The journal club, which meets weekly, focuses on cellular and molecular biology of the skeleton. Emphasis is placed on gaining insights into normal skeletal homeostasis as well as systemic disorders of bone. Papers presented for review are selected from the most competitive journals. Participants are encouraged to "think outside of the box" and discuss novel molecular discoveries that may impact bone cell function. Prerequisite: Permission of instructor. Credit: 1 unit.

#### L41 (BIO) 5272 ADVANCED TOPICS IN IMMUNOLOGY

Instructors: Erika Pearce, PhD, 286-2509; Deepta Bhattacharya, PhD, 362-8705

This course uses a journal club format to discuss contemporary issues in the cell and molecular biology of the immune system. Discussions focus on the use of current approaches to analyze the cellular and molecular basis of immunity. Topics include mechanisms of antigenic specificity, diversity, cell communication, differentiation, activation and effector activity. Prerequisite: L41 (Bio) 5051 and permission of instructor. Credit: 2 units. This is referenced in the Department of Pathology and Immunology.

#### L41 (BIO) 5284 CURRENT RESEARCH IN CHROMATIN, EPIGENETICS AND NUCLEAR ORGANIZATION

Instructors: Douglas L. Chalker, PhD, 935-8838; Sarah Elgin, PhD, 935-5348

This journal club considers papers from the current literature on chromatin structure and function, with an emphasis on regulation of transcription, epigenetics and genomics. Presentations are given by students, postdocs and faculty, with discussion by all. Students enrolled for credit are expected to attend regularly, and to present a minimum of one paper during the term, with consultation and critique from the faculty. Credit 1 unit.

#### L41 (BIO) 5285 FUNDAMENTALS OF MAMMALIAN GENETICS

Instructor: Shashikant Kulkarni, PhD, 454-8414

This course aims to provide both biologists and those with mathematical backgrounds with a basis in mammalian genetics. The course will include the following modules: Nucleic acid biochemistry; Gene and chromosome organization; Intro to human genetics; Mutations and DNA repair; Cancer genetics; Genomic methodologies; Biochemical genetics; Murine genetics; Epigenetics; Neurodegenerative diseases; Mitochondrial disorders; Pharmacogenetics; Intro to human population genetics; Applications of



modern human genetics; Intro to web-based informatics tools for molecular genetics. One of the required courses in the Human Statistical Genetics graduate program. Credit: 3 units.

#### L41 (BIO) 5288 SPECIAL TOPICS IN MOLECULAR GENETICS

Instructor: Lee Ratner, MD, PhD, 362-8836

A special topics course with lectures and discussion on the molecular basis of cancer including cell cycle regulation, tumor suppressor genes, tumor invasion, angiogenesis, immune evasion, resistance to apoptosis, signaling, imaging, gene expression, chromosomal translocations and viral oncology. Credit 2 units.

#### L41 (BIO) 5303 PROTEIN NMR JOURNAL CLUB

Instructor: Katherine Henzler-Wildman, PhD, 362-1674

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

#### L41 (BIO) 5311 DYNAMICS IN MESOSCOPIC MOLECULAR SYSTEMS

Instructor: Elliot Elson, PhD, 362-3346

This course will provide a background in the theory of the dynamics of mesoscopic systems and introduction to methods for measuring the dynamics of these systems. It will include measurement methods, some of which are in common use and others that have only recently been introduced. This course would be useful for biophysics students and others that are interested in molecular processes and mechanisms in small systems such as cells. Prerequisite: Physical Chemistry. Credit: 3 units.

#### L41 (BIO) 5312 MACROMOLECULAR INTERACTIONS

Instructor: Timothy M. Lohman, PhD, 362-4393

This course will cover equilibria, kinetics and mechanisms of macromolecular interactions from a quantitative perspective. Thermodynamics, multiple binding equilibria (binding polynomials), linkage phenomena, cooperativity, allostery, macromolecular assembly, enzyme catalysis and mechanism, steady-state and pre-steady state kinetics, and isotope effects. Modern methods of computer analysis using nonlinear least squares fitting and simulation to analyze binding isotherms and full kinetic time courses is emphasized. Prerequisite: Physical Chemistry, Biochemistry, Calculus and Organic Chemistry. Three class hours per week. Credit: 3 units.

#### L41 (BIO) 5314 MOLECULAR BIOPHYSICS GRADUATE SEMINAR

Instructor: Kathleen B. Hall, PhD, 362-4196

Student presentation of molecular biophysics topic. Second-year students present from literature; senior students give formal research seminar. Attendance required for all molecular biophysics students. Credit: 1 unit.

#### L41 (BIO) 5319 MOLECULAR FOUNDATIONS OF MEDICINE

Instructor: Linda J. Pike, PhD, 362-9502

This course is designed primarily for medical students and will cover fundamental aspects of biochemistry and cell biology from a medical perspective. The course begins with a treatment of protein structure and the function of proteins in the cytoskeleton and cell motility. The principles of enzyme kinetics and regulation are then discussed and basic pathways for the synthesis and metabolism of carbohydrates and lipids are introduced. This leads into a discussion of membrane structure and the function of cellular organelles in biological processes including energy production, protein degradation and protein trafficking. Prerequisite: Two semesters of organic chemistry. Coursemaster approval is required. Please note: This course is given on the medical school schedule and so it begins eight days before the grad school schedule. This course is cross-listed in the Department of Biochemistry and Molecular Biophysics as M15 502 (Molecular Foundations of Medicine). Credit: 3 units.

#### L41 (BIO) 5328 STRUCTURAL BIOLOGY JOURNAL CLUB

Instructor: Thomas Brett, PhD, 747-0018

Multi-laboratory research colloquia for DBBS graduate students focused on structural biology and complementary biophysical techniques. Course credit requires student presentation for credit. Credit: 1 unit.

#### L41 (BIO) 5352 DEVELOPMENTAL BIOLOGY

Instructor: Kerry Kornfeld, MD, PhD, 747-1480

Analysis of a selected set of key processes in development, such as pattern formation, cell-cell signaling and morphogenesis. The focus is on molecular approaches applied to important model systems, but framed in classical concepts. Prerequisite: L41 (Bio) 5068 Fundamentals of Molecular Cell Biology and L41 (Bio) 548 Nucleic Acids and Protein Biosynthesis. Credit: 3 units.

#### L41 (BIO) 5357 CHEMISTRY AND PHYSICS OF BIOMOLECULES

Instructor: Katherine Henzler-Wildman, PhD, 362-1674

This course covers three major types of biomolecular structure: proteins, nucleic acids and membranes. Basic structural chemistry is presented, as well as biophysical techniques used to probe each type of structure. Selected topics include: protein folding, protein design, X-ray crystallography, NMR spectroscopy, nucleic acid bending and supercoiling, nucleic acid:protein interactions, RNA folding, membrane organization, fluidity, permeability and transport, and membrane channels. Weekly discussion section will cover problem sets and present current research papers. One of the required courses for the Biochemistry and for the Molecular Biophysics graduate programs. Prerequisites: prior coursework in Biochemistry and in Physical Chemistry is recommended, but not required.

#### L41 (BIO) 5392 MOLECULAR MICROBIOLOGY AND PATHOGENESIS

Instructor: Joseph Vogel, PhD, 747-1029

First half focuses on prokaryotic physiology and genetics, with special attention to recent discoveries in

gene regulation and protein processing. Second half devoted to microorganisms that cause disease, with emphasis on the molecular interactions between pathogen and host. Prerequisite: first-semester core curriculum for programs in Cell and Molecular Biology. Credit: 3 units. This is referenced in the Department of Molecular Microbiology.

#### L41 (BIO) 5393 MOLECULAR VIROLOGY JOURNAL CLUB

Instructor: Michael Diamond, MD, PhD, 362-2842

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

Prerequisite: Permission of instructor. Credit: 1 unit.

#### L41 (BIO) 5398 MICROBIOLOGY PROGRAM GRANT WRITING WORKSHOP

Instructor: Michael Caparon, PhD, 362-1485

This grant writing workshop will focus on defining identifying key unanswered questions from the literature, formulating hypotheses for testing, defining Specific Aims, and developing a research plan. Students will submit specific aims on a topic of their choice, receive critiques from faculty members, and develop a NIH-style proposal to investigate them. Students will participate in class discussions and a mock study section to evaluate proposals. Prereq, completion of the MMMP advanced elective, Bio 5392 Molecular Microbiology & Pathogenesis or permission of the coursemaster. Credit: 1 unit.

#### L41 (BIO) 5412 TROPICAL AND MOLECULAR PARASITOLOGY

Instructor: L. David Sibley, PhD, 362-8873

Graduate-level seminar course focusing on current scientific literature in molecular parasitology. The journal club will meet biweekly during the Fall and Spring semesters. Students will attend both semesters in order to receive one credit. The seminar series will run jointly with a research conference in Tropical and Molecular Parasitology. Outside speakers will be invited for the seminar series to emphasize important developments in tropical medicine and molecular parasitology. In advance of the invited speakers, topics will focus on their previous research publications. Prerequisite: L41 (BIO) 5392 Molecular Microbiology and Pathogenesis. Credit 0.5 unit.

#### L41 (BIO) 5416 MOLECULAR MICROBIOLOGY AND PATHOGENESIS JOURNAL CLUB

Instructor: Amanda Lewis, PhD, 286-0016

Presentations by students and postdoctoral fellows on a broad range of topics of current interest in microbiology and pathogenesis including areas of research in bacteriology, mycology, parasitology, virology and immunology. The course will emphasize techniques used to give good presentations. Speakers usually provide a brief background to introduce the topic and then focus on one or two papers from the current literature. Credit requires attendance at all sessions and one presentation. Credit: 1 unit.

#### L41 (BIO) 5417 HEMATOLOGY/ONCOLOGY JOURNAL CLUB

Instructor: Monita Wilson, PhD, 362-8839

This journal club covers a broad range of topics of current interest, including the fields of biochemistry,

molecular biology, cell biology, developmental biology and immunology. Speakers usually give a brief background to introduce the topic and then focus on one or two papers from the current literature. Presentations are given by graduate students, postdoctorates and faculty. Each attendee presents two to three times per year. Participants are expected to attend all the sessions. This journal club was formed in 1966. Credit: 1 unit.

#### L41 (BIO) 5426 ID GATEWAY: TRANSLATIONAL AND PUBLIC HEALTH ASPECTS OF BASIC INFECTIOUS DISEASE RESEARCH

Instructors: Robyn Klein, MD, PhD, 286-2140; David Haslam, MD, 286-2888

This course provides an opportunity for students, postdoctoral fellows, infectious disease fellows and faculty to explore issues at the interface between patient care, public health and basic research in the area of microbial pathogenesis. Prerequisites: Application and L41 (BIO) 5392 or M30 526, or permission of instructor. Credit: 2 units.

#### L41 (BIO) 5445 DNA METABOLISM JOURNAL CLUB

Instructor: Peter Burgers, PhD, 362-3872

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

#### L41 (BIO) 5456 ADVANCED CRYSTALLOGRAPHY

Instructor: Daved Fremont, PhD, 747-6547

The advanced course in protein crystallography will address all aspects of modern protein crystallography including fundamentals of crystallography, the derivation of the structure factor and electron density equation, symmetry and space groups, direct methods, isomorphous replacement, molecular replacement, data collection, and crystal growing theory and techniques. Prerequisite: Physical Chemistry and BIO 5325 Protein Structure and Function. Two class hours per week. Credit: 2 units.

#### L41 (BIO) 5466 CURRENT TOPICS IN BIOCHEMISTRY

Instructor: Kathleen B. Hall, PhD, 362-4196

Student presentations of thesis research. Formal presentations require PowerPoint. Required of all Biochemistry graduate students; first- and second-year students get credit. Credit: 1 unit.

#### L41 (BIO) 5468 CARDIOVASCULAR BIOPHYSICS JOURNAL CLUB

Instructor: Sándor J. Kovács, PhD, MD, 454-7660

This journal club is intended for beginning graduate students, advanced undergraduates and MSTP students with a background in the quantitative sciences (engineering, physics, math, chemistry, etc.). The subjects covered are inherently multidisciplinary. We will review landmark and recent publications in quantitative cardiovascular physiology, mathematical modeling of physiologic systems and related topics such as chaos theory and nonlinear dynamics of biological systems. Familiarity with calculus, differential equations and basic engineering/thermodynamic principles is assumed. Knowledge of anatomy/physiology is optional. Same as E72 BME 5911. Credit: 1 unit.

#### L41 (BIO) 5472 CARDIOVASCULAR MRI — FROM PHYSICS TO CLINICAL APPLICATION

Instructor: Shelton Caruthers, PhD, 454-8242

This graduate course (seniors welcome) will cover the basic physics involved in creating an image by magnetic resonance technology. The use of this technology, specifically as it applies to the unique challenges of cardiovascular applications, will be examined. This will include topics such as motion compensation techniques, real-time imaging, exogenous contrast enhancement, and quantitative flow measurements, for example. As much as one-third of the class will involve actual case studies and the discussion of clinical use for cardiovascular MRI. Students will demonstrate competence in the subject through a combination of homework, a final examination and a small semester project. Prerequisites: Calculus, introductory human physiology/anatomy/biology course. Same as E62 BME 502. Credit: 3 units.

#### L41 (BIO) 548 NUCLEIC ACIDS AND PROTEIN BIOSYNTHESIS

Instructor: Peter Burgers, PhD, 362-3872

Fundamental aspects of structure, biosynthesis and function of nucleic acids and the biosynthesis of proteins. Emphasis on mechanisms involved in the biosynthetic processes and the regulation thereof. Prerequisite: L41 (Bio) 337, 449 or equivalent or permission of instructor. This is referenced in the Department of Biochemistry and Molecular Biophysics. Credit: 3 units.

#### L41 (BIO) 5483 HUMAN LINKAGE AND ASSOCIATION ANALYSIS

Instructor: John P. Rice, PhD, 286-2572

Basic Genetic concepts: Meiosis, inheritance, Hardy Weinberg Equilibrium, Linkage, segregation analysis, linkage analysis: definition, crossing over, map functions, phase, LOD scores, penetrance, phenocopies, liability classes, multi-point analysis, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis, determination of power for Mendelian and complex trait analysis, linkage disequilibrium analyses, allelic association (case control designs and family bases studies) whole genome association analysis, quantitative trait analysis, measured genotypes and variance components. Prerequisites: M21 515 Fundamentals of Genetic Epidemiology. Credit: 2 units. Same as M21 GEMS 5483.

#### L41 (BIO) 5484 GENETICS AND DEVELOPMENT OF C. ELEGANS JOURNAL CLUB

Instructor: Tim Schedl, PhD, 362-6162

Students will present a research paper (or present their current thesis research) and the appropriate background material. Credit: 1 unit.

#### L41 (BIO) 5488 GENOMICS

Instructors: Ting Wang, PhD, 286-0865; Donald Conrad, PhD, 362-4379

This course is designed for beginning students who want to become familiar with the basic concepts and applications of genomics. The course covers a wide range of topics including how genomes are mapped and sequenced as well as the latest computational and experimental techniques for predicting genes, splice sites and promoter elements. High throughput techniques for ascribing function to DNA, RNA and

protein sequences including microarrays, mass spectrometry, interspecies genome comparisons and genome-wide knockout collections will also be discussed. Finally, the use of genomic techniques and resources for studies of human disease will be discussed. A heavy emphasis will be put on students acquiring the basic skills needed to navigate databases that archive sequence data, expression data and other types of genome-wide data. Through problem sets the students will learn to manipulate and analyze the large data sets that accompany genomic analyses by writing simple computer scripts. While students will become sophisticated users of computational tools and databases, programming and the theory behind it are covered elsewhere, in Michael Brent's class, Bio 5495 Computational Molecular Biology. Because of limited space in our teaching lab, enrollment for lab credit will be limited to 24 students. Priority will be given to students in the DBBS program. Others interested in the course may enroll for the lectures only. If you have previous experience in computer programming, we ask that you do not enroll for the laboratory credit. Prerequisites: Molecular Cell Biology (Bio 5068), Nucleic Acids (Bio 548) or by permission of instructor. Lecture 3 units of credit; lab 1 additional unit, space limited. Credit: 3 or 4 units.

#### L41 (BIO) 5489 HUMAN GENETICS JOURNAL CLUB

Instructor: Nancy Saccone, PhD, 747-3263

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

#### L41 (BIO) 5491 ADVANCED GENETICS

Instructor: Tim Schedl, PhD, 362-6162

Fundamental aspects of organismal genetics with emphasis on experimental studies that have contributed to the molecular analysis of complex biological problems. Examples drawn from bacteria, yeast, nematodes, fruit flies and mammalian systems. Prerequisite: graduate standing or permission of instructor. This is cross-listed in the Department of Genetics. Credit: 3 units.

#### L41 (BIO) 5495 COMPUTATIONAL MOLECULAR BIOLOGY

Instructor: Michael R. Brent, PhD, 935-6621

This course focuses on genome sequence analysis, emphasizing computational and algorithmic issues. Topics covered include: the essential biology, the essential probability theory, base calling and quality clipping, predicting protein-coding genes (including Hidden Markov Models and comparative genomics approaches), sequence aligning, RNA folding, protein domain analysis, and an introduction to population biology. This includes both paper and pencil homework assignments and programming labs in "C." Prerequisite: CSE 241 or CSE 502N. Credit: 3 units. Same as E62 BME 537.

#### L41 (BIO) 5496 SEMINAR IN COMPUTATIONAL MOLECULAR BIOLOGY

Instructor: Jeremy Buhler, PhD, 935-6180, Gary D. Stormo, PhD, 747-5534

Students present current research papers and the appropriate background material in the field of computational biology. Same as E81 CSE 7801. Credit: 1 unit.

#### L41 (BIO) 550 MEDICAL GENETICS

Instructor: Susan Dutcher, PhD, 362-2765

Topics covered include population and quantitative genetics, clinical cytogenetics, biochemical genetics and metabolic defects. Lectures, clinics and small group discussions. Prerequisite: an introductory genetics course and permission of the instructor. This is cross-listed in the Department of Genetics as M30 511 Medical Genetics. Credit: 2 units.

#### L41 (BIO) 5501 THE BIOLOGY AND PATHOLOGY OF THE VISUAL SYSTEM

Instructors: Alan Shiels, PhD, 362-1637, Vladimir Kefalov, PhD, 362-4376

The purpose of the course is to provide a fascinating view of vertebrate eye development, anatomy, physiology and pathology. Topics to be covered include the molecules that control eye formation, ocular stem cells, the physiology of transparency, hereditary ocular diseases, phototransduction, the neurobiology of the retina and central visual pathways, age-related eye diseases, and many others. The course is open to all second-year graduate students and above. Ophthalmology residents and postdocs with an interest in vision are strongly encouraged to attend. Credit 3 units.

#### L41 (BIO) 5512 Diseases of Membrane Transport & Excitability

Instructor: Robert Mercer, PhD, 362-6924

Classes will consider the molecular basis of the disease as well as animal models and current clinical studies. Addressing studies from the level of basic biophysical and molecular properties of the underlying ion channels/transporters, to the cellular defects, to organ and animal outcomes and therapies, which will encourage and force students to develop their ability to integrate understanding at multiple levels. Students will be introduced to emerging ideas in clinical diagnosis, management and treatment, when appropriate, clinical specialists will allow student participants to directly observe and participate in the clinical experience. Prerequisites: Bio 5068 Fundamentals of Molecular Cell Biology. Credit: 2 units.

#### L41 (BIO) 554 NEURAL SCIENCES

For full description, see the Department of Anatomy and Neurobiology, M35 554 Neural Sciences.

#### L41 (BIO) 5565 ORAL PRESENTATION OF SCIENTIFIC DATA

Instructor: Staff, Neurosciences Program, 362-7189

Practical course on how to prepare and present scientific data to an audience. Prerequisite: first-year neuroscience program courses. Meets once a week for 90 minutes. Credit: 1 unit.

#### L41 (BIO) 5571 CELLULAR NEUROBIOLOGY

Instructor: Paul Taghert, PhD, 362-3641

This course will present a fully integrated overview of nerve cell structure, function and development at the molecular and cellular level. Broad topics to be covered include gene structure and regulation in the

nervous system, quantitative analysis of voltage- and chemically-gated ion channels, presynaptic and postsynaptic mechanisms of chemical neurotransmission, sensory transduction, neurogenesis and migration, axon guidance and synapse formation. Two lectures plus one hour of discussion per week for 14 weeks. There will be three exams, as well as homework problems and summaries of discussion papers. Prerequisite: graduate standing or permission of the instructor. Credit: 4 units.

#### L41 (BIO) 5577 SYNAPSES JOURNAL CLUB

Instructor: Steven Mennerick, PhD, 747-2988

The synapse is fundamental to our understanding of information transfer in the nervous system. Malleability of the synapse is considered key to our understanding of organisms' ability to learn and remember and key to understanding nervous system dysfunction in many disease states. This is an advanced seminar in the development, structure and function of the synapse in health and disease. It is a natural extension of topics covered in Bio 5571 and may be primarily of interest to students in the Neurosciences Program. It may also be of interest to students in MCB, Development, Biochemistry, Computational Biology and Molecular Biophysics. Generally a topic for the semester helps focus the group; past topics have included Synapses and Disease, Neurotransmitter Transporters, Glutamate Receptors, Dendrites, GABA receptors. Participants (students, postdocs and faculty) alternate responsibility for choosing a paper from the primary literature to present for the club. Critical discussion of the paper ensues. Active participation offers the opportunity for students to hone their critical thinking and presentation skills. Students enrolling for credit will be expected to attend each week and will be expected to lead discussion once per semester. Prerequisites: Graduate standing in DBBS; BIO 5571 preferred.

#### L41 (BIO) 5619 ADVANCED COGNITIVE, COMPUTATIONAL AND SYSTEMS NEUROSCIENCE

Instructor: Todd Braver, PhD, 935-5143

This course will develop critical thinking and analysis skills with regard to topics in Cognitive, Computational and Systems Neuroscience. Course format will be a series of modules composed of intensive, faculty-led case studies on interdisciplinary topics at the intersection of psychology, computation and neuroscience. The goal will be to highlight the benefits of integrative, interdisciplinary approaches, by delving into a small set of topics from a variety of perspectives, rather than providing a survey-level introduction to a broader set of topic areas. Modules will involve a combination of lectures and student-led discussion groups, with students further expected to complete a multidisciplinary integrative final review paper. Case-study topics will vary somewhat from year to year, but are likely to include some of the following: temporal coding as a mechanism for information processing, coordinate transformations in sensory-motor integration, mechanisms of cognitive control, motor control strategies including application to neural prosthetics, and memory systems in health and disease. Credit: 3 units. Same as L33 Psych 519.

#### L41 (BIO) 5622 COGNITIVE, COMPUTATIONAL AND SYSTEMS NEUROSCIENCE PROJECT BUILDING

Instructor: Deanne M. Barch, PhD, 935-8729

The goal of this course is to help students in the CCSN Pathway develop the critical thinking skills



necessary to develop and implement high-quality, interdisciplinary research projects. Throughout the course of the semester, students will develop a research plan in their chosen area of interest. The plan will be developed in consultation with at least two faculty members (from at least two different subdisciplines within the pathway) as well as the other students and faculty participating in the course. The culmination of this course will be for each student to produce an NIH-style grant proposal on the research project of their choosing. For most students, this will serve either as their thesis proposal or a solid precursor to the thesis proposal. The course will be designed to help facilitate the development of such a research plan through didactic work, class presentations, class discussion, and constructive feedback on written work. The course will begin with a review of written examples of outstanding research proposals, primarily in the form of grant submissions similar to those that the students are expected to develop (i.e., NRSA style proposals, R03 proposals). Review of these proposals will serve as a stimulus to promote discussion about the critical elements of good research proposals and designs in different areas. Each student will be expected to give three presentations throughout the semester that will provide opportunities to receive constructive feedback on the development and implementation of research aims. The first presentation (toward the beginning of the semester) will involve presentation of the student's general topic of interest and preliminary formulation of research questions. Feedback will emphasize ways to focus and develop the research hypotheses into well-formulated questions and experiments. The second presentation will involve a more detailed presentation of specific research questions (along the lines of NIH-style Specific Aims) and an initial outline of research methods. The final presentation will involve a fuller presentation of research questions and proposed methods. Feedback, didactic work and group discussion throughout the semester will include guidance on critical components of the development of a research plan, including how to perform literature searches, formulate testable hypotheses, write critical literature summaries and design experiments and analyses. The course will meet once a week, with faculty members from different tracks within the pathway present at each meeting. This will allow students to receive feedback from several perspectives. Prerequisite: Member of CCSN Pathway, permission of instructor. Credit: 3 units. Same as L33 Psych 5191.

#### L41 (BIO) 5646 NEUROSCIENCES PROGRAM 1ST YEAR FUNDAMENTALS

Instructors: Paul Shaw, PhD, 362-2703; Lawrence Snyder, MD, PhD, 747-3530; John Pruett, MD, PhD, 747-6751

This course will provide a two-part introduction to Neuroscience Research fundamentals. Namely, it will introduce elementary statistical analysis for Neuroscience research and an introduction for grant-writing to support Neuroscience-related research. Prereq, limited to first year neuroscience students. Credit: 0.5 units.

#### L41 (BIO) 5651 NEURAL SYSTEMS

Instructor: Lawrence Snyder, MD, PhD, 747-3530

The course will consist of lectures and discussions of the sensory, motor and integrative systems of the brain and spinal cord, together with a weekly lab. The lectures will present aspects of most neural systems and will be given by faculty members who have specific expertise on each topic. The discussions will include faculty-led group discussions and papers presented and discussed by students. The labs will

include human brain dissections, examination of histological slides, physiological recordings, behavioral methods, computational modeling and functional neural imaging. Credit: 6 units.

#### L41 (BIO) 5657 BIOLOGICAL NEURAL COMPUTATION

Instructor: Baranidharan Raman, PhD , 935-8538

This course will consider the computations performed by biological nervous systems. Readings and discussions will investigate the biophysical and physiological bases of computations made by ion channels, synapses, dendrites, neurons and neuronal networks. Computer laboratories and a semester-long independent project will determine how simple mathematical models succeed or fail to represent observed biological function and organismal behavior. Readings will include classic and current primary research papers. (Note: Graduate students in psychology or neuroscience who are in the Cognitive, Computational and Systems Neuroscience curriculum pathway may register for one credit. These students will attend all course meetings and complete the homework assignments, but will not participate in the semester-long independent project. Registration may be Pass/Fail. All BME students should register for three credits). Prerequisites for 3-credit option: calculus, some experience with differential equations and cell or systems biology. Junior and senior undergraduates need permission of instructor. Prerequisites for 1-credit option: permission of instructor, calculus II and introductory biology. Credit: 3 units. Same as E62 BME 572.

#### L41 (BIO) 5663 NEUROBIOLOGY OF DISEASE

Instructors: Conrad Wehl, MD, PhD, 362-6981, Bradley Schlaggar, MD, PhD, 362-8871

This is an advanced graduate course on the pathology of nervous system disorders. This course is primarily intended to acquaint Neuroscience graduate students with a spectrum of neurological diseases and to consider how advanced neuroscientific approaches may be applied to promoting recovery in the brain. The class will meet for two hours each week. Each session will be led by a faculty guest with expertise in a specific neurological or psychiatric disease. In the first hour, the speaker will discuss clinical manifestations and pathophysiology. Where possible, the clinical presentation will be supplemented with a patient demonstration or videotape. The second hour will follow a journal club format. Two or three students will review current papers assigned by the speaker or course director. This course is offered in alternate years. Credit: 2 units.

#### L41 (BIO) 5678 CLOCKSCLUB

Instructors: Erik Herzog, PhD, 935-8635; Paul Taghert, PhD, 362-3641

Clocksclub focuses on recent advances in the study of biological timing including sleep and circadian rhythms. Participants discuss new publications and data on the molecules, cells and circuits underlying daily rhythms and their synchronization to the local environment. Students registered for this journal club will lead a discussion once during the semester. Prereqs: BIO 2970 or permission of instructor. Credit: 1 unit.

#### L41 (BIO) 572 SEMINAR IN PLANT BIOLOGY

Instructor: Staff, Plant Biology Program, 362-3364

A weekly discussion of modern research in plant biology including topics in molecular genetics, development, biochemistry, physiology, population dynamics and plant-pathogen interactions. Research seminars by local and outside speakers will be intermixed with journal club presentations in alternating weeks. Credit will be contingent on one journal club presentation per semester, regular attendance and active participation in group discussions. Credit: 1 unit.

#### L41 (BIO) 580 SEMINAR IN POPULATION BIOLOGY

Instructor: Staff, Evolution, Ecology and Population Biology, 362-3364

This weekly seminar, covering different topics each semester, should be taken by graduate students in the program. Prerequisite: graduate standing or permission of the instructors. Credit: variable; 2 or 3 units.

#### L41 (BIO) 582 ETHNOBIOLOGY JOURNAL CLUB

Instructors: Jan Salick, PhD, 577-5165; Gayle Fritz, PhD, 935-8588

Students in this journal club will meet weekly with ethnobotanists, ethnozoologists and ecologists from various St. Louis institutions (including Washington University, University of Missouri-St. Louis, Saint Louis University and the Missouri Botanical Garden) to discuss recent publications and ongoing research. Enrolled students will attend the journal club every week, and once per semester will choose a paper and lead the discussion. Credit: 1 unit. Same as home course L48 Anthro 560.

#### L41 (BIO) 585 SEMINAR IN FLORISTIC TAXONOMY

Instructor: Peter Hoch, PhD, 577-5175

A survey of angiosperm families, their morphology, cytology, anatomy, palynology, chemistry and evolution. Prerequisite: L41 (Bio) 4132 or equivalent. Credit: 1 unit.

#### L41 (BIO) 590 RESEARCH

Instructors: Staff, Division of Biology and Biomedical Sciences, 362-3365

Credit to be arranged. Research is listed as 900-level course in each department.

#### L41 (BIO) 5902 INTRO TO TEACHING-AS-RESEARCH (TAR)

Instructors: Regina Frey, PhD, 935-7474; Carolyn Dufault, PhD, 935-9660

In this course, students will be introduced to the fundamentals of teaching as research (TAR)--the practice of developing, reflecting on, and evaluating teaching methods to improve student learning. Students will develop a working knowledge of teaching as research, which incorporates knowledge from educational and cognitive-psychology research and leads to the dissemination of new knowledge to a broad audience of educators through publication and presentations. By the end of the course, the students will have developed the central elements of a teaching-as-research project: 1) articulating questions about classroom teaching that can be addressed in a TAR research project; 2) developing working hypotheses in response to the questions; 3) designing an evaluative plan, including specific research methods, the type of data to be collected, and how the data will be analyzed in relation to the hypotheses; and 4) identifying and understanding necessary procedures to obtain IRB approval for the

research. Prereqs, must be an advanced graduate student or post-doc with some teaching experience and have attended 4 basic TA training workshops provided by the Teaching Center. Credit:1 unit.

#### L41 (BIO) 5911 SEMINAR IN BIOLOGY AND BIOMEDICAL SCIENCES

Instructors: Staff, Division of Biology and Biomedical Sciences, 362-3365

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

#### L41 (BIO) 5913 BIOLOGICAL SYSTEMS ENGINEERING

Instructor: Kristen Naegle, PhD, 935-7665

This project-based (MATLAB) class will introduce several current techniques for systems-level measurement of molecules and a set of computational techniques for inferring biological meaning from such experiments. Several molecular types and measurement techniques will be covered. How to determine the quality of measurements will lay the groundwork for understanding a new measurement technique. From there, computational topics will include dimensionality reduction techniques, correlations between measurements and outcomes, and network modeling and inference. A working knowledge of molecular biology, differential equations, linear algebra, and statistics is required. Credits: 3 units.

#### L41 (BIO) 5915 TEACHING PRACTICE IN BIOLOGY AND BIOMEDICAL SCIENCES

Instructor: John H. Russell, PhD, 362-2558

Students serve as teaching assistants for undergraduate and graduate-level courses. Faculty-supervised activities include lecture preparation and presentation, leading discussion and problem-solving sessions and laboratory instruction. Prerequisite: restricted to graduate students in the Division of Biology and Biomedical Sciences. Credit: 1 unit.

#### L41 (BIO) 5922 ENTERING MENTORING

Instructor: Kathryn Miller, PhD, 935-7305

This course is a series of facilitated discussions aimed at developing and improving mentoring skills for those involved in supervising undergraduate research experiences. It is designed for post-docs and graduate students who are or will be "bench mentors" for undergraduates doing Bio 500 and/or Summer Research. Participants will receive "Entering Mentoring" materials, including articles and worksheets to facilitate mentoring interactions with their mentee, plus several resource books relevant to mentoring. They will develop a mentoring philosophy statement, work on specific assignments designed to improve their relationship with their mentee and share their present and past experiences as mentors and mentees. Bench mentors will be eligible for a travel award to help defray expenses for attending a meeting with their mentee, if that student wins one of the HHMI SURF travel awards (4-5 awarded annually) or is otherwise being supported to present at a scientific meeting. Grad students and postdocs do NOT need to be mentoring a student at the time of the course; it is open to all with an interest in mentoring now or in the future. Note: interested postdocs can register through University College. Credit: 1 unit. Same as U29 Bio 492.

## L41 (BIO) 5999 INDEPENDENT WORK

Instructors: Staff, Division of Biology and Biomedical Sciences, 362-3365

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

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts & Sciences.

# Biomedical Engineering

Biomedical engineering is the integration of engineering methods with biological science and medical practice. It strives to provide increased quantitative and analytical understanding of complex living organisms. Through this increased understanding, biomedical engineers can contribute to advances in biomedical research and to improvements in health care.

In many areas of medicine and biology, advances are being driven by technology. For example, modern computer technology is fundamental to the new fields of computational molecular biology, genome analysis and computational neuroanatomy. Systems approaches are increasingly important to advancing knowledge of many biological processes. Other facets of biomedical engineering will lead to improved diagnostic and therapeutic agents, improved prostheses, and new approaches to tissue and organ repair including the use of bio-resorbable materials, reconstituted tissue and regenerated cells. With the increased understanding that comes from scientific research and the tools of biomedical engineering, a bountiful era of increased understanding of disease, health care informatics, new biomaterials and revolutionary medical devices can be realized.

Biomedical engineering has been a focus of activity for almost 40 years in both the School of Engineering & Applied Science and the School of Medicine at Washington University in St. Louis. Contributions of the university include advances in imaging technologies for biology and medicine; positron emission tomography, confocal optical microscopy, advanced ultrasound imaging, magnetic resonance imaging and X-ray tomography. The university has played a leading role in applying high-speed communications systems to transmit scientific and medical information. Furthermore, the university is recognized worldwide for its work in mapping and sequencing the human genome, in computational molecular biology, in mapping of the human brain, and in cardiovascular engineering.

Biomedical engineering is an extremely diverse field encompassing the activities of faculty at Washington University in departments at the medical school as well as the engineering school. Recognizing the strength and diversity of existing programs, the Department of Biomedical Engineering was established on July 1, 1997. Together with the newly established Institute of Biomedical and Medical Engineering, involving faculty from the School of Engineering & Applied Science, the School of Medicine and also from the College of Arts & Sciences, this network facilitates and promotes the graduate educational training of

biomedical engineers at Washington University. The Executive Council of the Institute, with broad representation from both the School of Engineering & Applied Science and the School of Medicine, has the responsibility to facilitate and coordinate student access to these various research opportunities. A graduate committee composed of members of the full-time faculty and the Institute determines the guidelines for graduate students in biomedical engineering.

The goals of graduate education in biomedical engineering at Washington University are to continue the university's innovative and nationally recognized research programs and to train a new generation of leaders who apply engineering science throughout biology and medicine in government, industry and academia. This is a broad vision of biomedical engineering as a field and defines a role for which Washington University is ideally suited.

## Admissions Information

Please visit the [Biomedical Engineering website](#) for admissions information.

## Courses

BME 501 Graduate Seminar  
BME 502 Cardiovascular MRI-Physics to Clinical Application  
BME 503A Cell and Organ Systems Biology  
BME 506 Seminar in Imaging Science and Engineering  
BME 5068 Fundamentals of Molecular Cell Biology  
BME 511 Biotechnology Techniques for Engineers  
BME 521 Kinetics of Receptor-Mediated Processes  
BME 523 Biomaterials Science  
BME 524 Tissue Engineering  
BME 525 Engineering Aspects of Biotechnology  
BME 527 Design of Artificial Organs  
BME 530A Molecular Cell Biology for Engineers  
BME 533 Biomedical Signal Processing  
BME 537 Computational Molecular Biology  
BME 557 Cellular and Subcellular Biomechanics  
BME 558 Biological Transport  
BME 559 Intermediate Biomechanics  
BME 5610 Principles of Protein Structure  
BME 562 Mechanics of Growth and Development  
BME 563 Orthopaedic Biomechanics-Bones and Joints  
BME 564 Orthopaedic Biomechanics-Cartilage/Tendon  
BME 568 Cardiovascular Dynamics  
BME 572 Biological Neural Computation

BME 573A Special Topics: Applied Bioelectricity  
BME 574 Quantitative Bioelectricity and Cardiac Excitation  
BME 575 Molecular Basis of Bioelectrical Excitation  
BME 589 Biological Imaging Technology  
BME 5901 Integrative Cardiac Electrophysiology  
BME 5902 Special Topics: Cellular Neurophysiology  
BME 5903 Physical Methods for Biomedical Scientists  
BME 5904 Special Topics: Nanostructured Surfaces and Materials and Their Applications in Biomedical Research  
BME 5905 Neural Computation & Motor Behavior  
BME 5906 Brain Networks  
BME 5907 Advanced Concepts in Image Science  
BME 5908 The Cell as a Machine  
BME 5909 Physiology of the Heart  
BME 591 Special Topics: Biomedical Optics I: Principles  
BME 5910 Reverse Engineering the Human Brain  
BME 5911 Cardiovascular Biophysics Journal Club  
BME 5912 Applied Mathematics for Biomedical Sciences  
BME 5913 Biological Systems Engineering  
BME 592 Special Topics: Biomedical Optics II: Imaging  
For additional related courses, see the courses of the School of Engineering & Applied Science at <http://engineering.wustl.edu/courseinformation.aspx>

## Department of Biomedical Engineering Faculty

### Professor and Interim Chair of Department

**Mark Anastasio, PhD**

The University of Chicago, 2001

### Professors Emeriti

**Salvatore P. Suter, PhD**

California Institute of Technology, 1960

## Full-Time Professors

**Jianmin Cui, PhD**

State University of New York Stony Brook, 1992

**Igor R. Efimov, PhD**

Moscow Institute of Science and Technology, 1992

**Rohit V. Pappu, PhD**

Tufts University, 1996

**Yoram Rudy, PhD**

Case Western Reserve University, 1978

**Shelly E. Sakiyama-Elbert, PhD**

California Institute of Technology, 2000

**Larry A. Taber, PhD**

Stanford University, 1979

**Lihong Wang, PhD**

Rice University, 1992

**Frank Chi-Pong Yin, PhD, MD**

University of California, San Diego, 1970; MD, 1973

## Full-Time Associate Professors

**Dennis L. Barbour, MD, PhD**

The Johns Hopkins University, 2003

**Donald L. Elbert, PhD**

University of Texas at Austin, 1997

**Daniel W. Moran, PhD**

Arizona State University, 1994

**Jin-Yu Shao, PhD**

Duke University, 1997



**Kurt A. Thoroughman, PhD**

The Johns Hopkins University, 1999

## Full-Time Assistant Professors

**Jan Bieschke, PhD**

Max-Planck-Institute for Biophysical Chemistry, 2000

**John Cunningham, PhD**

Stanford University, 2009

**Vitaly Klyachko, PhD**

University of Wisconsin, 2002

**Kristen Naegle, PhD**

Massachusetts Institute of Technology, 2009

**Baranidharan Raman, PhD**

Texas A & M University, 2005

**Jon Silva, PhD**

Washington University in St. Louis, 2008

## Graduate Group

**Samuel Achilefu, PhD**

University of Nancy, France, 1991

**Beau Ances, MD, PhD**

University of Pennsylvania, 2001

**Philip V. Bayly, PhD**

Duke University, 1993

**Michael R. Brent, PhD**

Massachusetts Institute of Technology, 1991

**Paul C. Bridgman, PhD**

Purdue University, 1980

**Andreas H. Burkhalter, PhD**

University of Zurich, 1977

**Joseph Culver, PhD**

University of Pennsylvania, 1987

**Gautam Dantas, PhD**

University of Washington, 2005

**Anthony French, MD, PhD**

University of Illinois, Urbana-Champaign, 1995; MD, 1996

**James Havranek, PhD**

Stanford University, 2003

**Katherine Henzler-Wildman, PhD**

University of Michigan, 2003

**Tim Holy, PhD**

Princeton University, 1997

**Yanle Hu**

Stanford University, 2007

**James Huettnner, PhD**

Harvard University, 1987

**Sándor J. Kovács, PhD, MD**

California Institute of Technology, 1977; MD, University of Miami, 1979

**Spencer Lake, PhD**

University of Pennsylvania, 2009

**Gregory M. Lanza, PhD**

University of Georgia, 1981

**Suzanne Lapi, PhD**

Simon Fraser University, 2007

**Jin-Moo Lee, MD, PhD**

Cornell University Medical College, 1993

**Eric Leuthardt, MD**

University of Pennsylvania, 1999

**H. Harold Li, PhD**

Friedrich-Alexander-Universität Erlangen-Nürnberg, 2001

**Christopher Lingle, PhD**

University of Oregon, 1979

**Timothy Lohman, PhD**

University of Wisconsin, Madison, 1977

**Garland R. Marshall, PhD**

Rockefeller University, 1966

**Josh Maurer, PhD**

California Institute of Technology

**Robert P. Mecham, PhD**

Boston University, 1976

**James G. Miller, PhD**

Washington University, 1969

**Robi Mitra, PhD**

Massachusetts Institute of Technology, 2000

**Jeanne Nerbonne, PhD**

Georgetown University, 1978

**Colin G. Nichols, PhD**

Leeds University, 1985

**Joseph A. O'Sullivan, PhD**

University of Notre Dame, 1986

**Camillo Padoa-Schioppa, PhD**

Massachusetts Institute of Technology, 2002

**Parag J. Parikh, MD**

Washington University, 2001

**Steven E. Petersen, PhD**

California Institute of Technology, 1982

**Jay W. Ponder, PhD**

Harvard University, 1984

**Marcus E. Raichle, MD**

University of Washington, 1964

**Linda Sandell, PhD**

Northwestern University, 1980

**Kooresh Isaac Shoghi**

University of California, Los Angeles, 2005

**Matthew J. Silva, PhD**

Massachusetts Institute of Technology, 1996

**Lawrence H. Snyder, MD, PhD**

University of Rochester, 1992

**Joseph H. Steinbach, PhD**

University of California, San Diego, 1973

**Gary D. Stormo, PhD**

University of Colorado, 1981

**S. Joshua Swamidass, MD/PhD**

University of California, Irvine, 2009

**Yuan-Chuan Tai, PhD**

University of California, Los Angeles, 1998

**Stavros Thomopoulos, PhD**

University of Michigan, 2001

**David C. Van Essen, PhD**

Harvard University, 1971

**Xiaowei Wang, PhD**

Tufts University Medical School, 2000

**Samuel A. Wickline, MD**

University of Hawaii, 1980

**Robert S. Wilkinson, PhD**

University of Texas at Austin

**Pamela Woodard, MD**

Duke University School of Medicine, 1990

**Jie Zheng**

University of Cincinnati, 1994

## Affiliated Faculty

**R. Martin Arthur, PhD**

University of Pennsylvania, 1968

**Thomas Conturo, MD, PhD**

Vanderbilt University, 1989

**Elliot L. Elson, PhD**

Stanford University, 1966

**William A. Franzier III, PhD**

Washington University, 1973

**Eric Galburt, PhD**

University of Washington

**Robert J. Gropler, MD**

University of Cincinnati, 1981

**Dennis Hallahan, MD**

Rush University, 1984

**Stephen M. Highstein, MD**

University of Maryland, 1965; PhD, University of Tokyo, 1976

**Enrique Izaguirre, PhD**

Drexel University, 1997

**Joseph W. Klaesner, PhD**

Vanderbilt University, 1995

**Stanley Mislner, PhD, MD**

New York University, 1976; MD, 1978

**Michael K. Pasque, MD**

University of Oklahoma, 1978

**William D. Richard, PhD**

University of Missouri-Rolla, 1988

**Alan R. Templeton, PhD**

University of Michigan, 1972

**M. Victor Wickerhauser, PhD**

Yale University, 1985

## Biostatistics

The Division of Biostatistics engages in research, biostatistical consultation and training activities. Interested students may pursue intensive studies through the Master of Science in Biostatistics, a Certificate in Genetic Epidemiology, or individual courses offered by the division. Research activities include several independent lines of research as well as numerous collaborative projects with various departments of the medical school. Biostatistical consultation represents an important activity of the division, providing expertise in both theoretical and applied areas. The division participates actively in a post-doctoral training.

Research activities of the division span a wide range of topics dealing with a number of disease areas and provide research opportunities at both theoretical and applied levels. Several research projects involve close interaction and collaboration with a number of research groups at the Washington University Medical Center. Independent research programs of the division deal with genetic epidemiology of cardiovascular and metabolic diseases, bioinformatics and statistical issues in imaging sciences and Alzheimer's disease. A number of theoretical and applied problems are addressed, including nature-nurture resolution and identification of the genetic basis of risk factor domains such as lipids, obesity,

blood pressure and hypertension, and insulin resistance and diabetes; exploration of gene-gene and gene-environment interactions; and multivariate associations among multiple risk factors.

Current and recent collaborative research projects include: a coordinating center for a multicenter study to assess the genetic basis of response to exercise training (HERITAGE); a coordinating center for a multicenter NETWORK study on the genetics of hypertension (HyperGEN), and the Family Blood Pressure Program (FBPP); coordinating centers for a multicenter study to assess the genetic basis of response to intervention through incorporation of gene-environment interactions (Gensalt); the coordinating center for the PRIDE program with the goal of mentoring junior faculty in underrepresented minorities and/or faculty with disabilities into independent research careers in biomedical sciences; the coordinating center for the Data Analysis and Coordinating Center (DACC) which tracks the education and careers of people who have participated in the NHGRI Diversity Action Plan (DAP) and NHGRI T-32s that concentrate on genomics and genetics; important collaborative studies through support roles as biostatistics cores on the Washington University Institute of Clinical and Translational Sciences, the Alzheimer's Disease Research Center, the Adult Children's Study, Healthy Aging and Senile Dementia (HASD), The Dominantly Inherited Alzheimer Network (DIAN), the Alvin J. Siteman Cancer Center, the Silent Infarct Transfusion Study, the Optimization of Chemotherapy for Control and Elimination of Onchocerciasis, the Washington University Spotrias Center, the Washington University Intellectual & Developmental Disabilities Research Center and Childhood Obesity Treatment. We also have a significant role on studies that focus on lung transplants, asthma, COPD, pediatric heart and ischemic heart disease and on several epidemiological research projects developing methods for increasing public awareness and utilization of measures that are known to decrease the likelihood of developing heart disease and for encouraging behaviors that will improve prognosis following a heart attack.

The division provides consultation through the Washington University Institute of Clinical and Translational Sciences (ICTS), the Washington University Intellectual & Developmental Disabilities Research Center, and the Biostatistics Consulting Service in a wide range of areas including the statistical design of experiments and clinical trials, protocol development, database management, analysis of data and interpretation of results. Some of the areas of special strength and expertise include cardiovascular biostatistics, computing and statistical packages. The division is well-equipped to provide assistance at the stage of preparing grant applications, including careful discussions of study design, sample size calculations, randomization schemes, computer resources and data analysis.

One of the division's specialties is statistical genetics/genetic epidemiology. We participate in a postdoctoral training in this area. Statistical genetics is the scientific discipline that deals with an analysis of the familial distribution of traits, with a view to understanding any possible genetic basis. However, one cannot study genes except as they are expressed in people living in certain environments, and one cannot study environmental factors except as they affect people who have certain genotypes. Statistical genetics is a unique interdisciplinary field that seeks to understand both the genetic and environmental factors and how they interact to produce various diseases and traits in humans. These studies are carried out in relatively large samples of participants in relevant populations, thus, the population history and

dynamics often come into play. Population dynamics alter the frequency and distribution of both genetic and environmental factors, and thus, their net effect on the phenotype of interest. Some population characteristics also can be exploited for the purposes of gene discovery and mapping because the history has affected the genomic structure in a way that specific genotypes associated with disease can be identified.

Human diseases have been the focal point of these studies, and recent efforts are directed toward complex disorders such as coronary heart disease, hypertension, diabetes, obesity, cancer, atopy and allergies, and neurological and psychiatric disorders, to name a few. It is commonly thought that an understanding of the genetic underpinnings of such disorders will revolutionize medicine in the 21st century, enabling better preventive measures, diagnosis, prognosis and novel treatments. Given progress in the Human Genome Project, in computing power and in the creation of powerful statistical methods of analysis, we are poised to shepherd this revolution. It is an exciting time in science, and opportunities for careers in statistical genetics/genetic epidemiology abound.

## NIH Sponsored Training Programs

The PRIDE Summer Institute in Cardiovascular Genetic Epidemiology with a focus on Cardiovascular and other Heart, Lung, Blood and Sleep Disorders: An all-expense-paid summer institute continues in the summer of 2011 with funding from the NHLBI. The goal is to mentor junior faculty in underrepresented minorities and/or faculty with disabilities into independent research careers in biomedical sciences. For further information, visit the website at <http://www.biostat.wustl.edu/pridege/> or contact the program administrator at [pride-ge@wubios.wustl.edu](mailto:pride-ge@wubios.wustl.edu).

## Graduate Studies

The Division of Biostatistics sponsors a Master of Science in Biostatistics (MSIBS), a Master of Genetic Epidemiology (for post doctoral students only) and a Certificate in Genetic Epidemiology. The Division had sponsored the The Genetic Epidemiology Masters of Science (GEMS) program from 2002 - 2012. In 2012 the GEMS program was streamlined into the MSIBS program. Students who would benefit from the GEMS program should look into the Statistical Genetic pathway of the MSIBS program.

## Masters of Science in Biostatistics (MSIBS)

This 18-month program offers excellent training in biostatistics and statistical genetics for students who earned undergraduate or higher degrees with majors in mathematics, statistics, computer science, biomedical engineering or other related major. It prepares graduates for rewarding employment in academia and industry and for further graduate studies.



## Academic Calendar

The MSIBS program begins approximately July 1 each year with preparatory workshops, followed by intensive summer semester courses. For the fall and spring courses, the MSIBS program follows the calendar of the College of Arts & Sciences. See the current MSIBS calendar at <https://biostatistics.wustl.edu>.

## Location

The MSIBS program is in the Division of Biostatistics, on the third floor of Shriners Building (706 S. Euclid Ave. at Clayton Road), Rooms 3301-3312.

## Further Information

See our web site, <https://biostatistics.wustl.edu>, contact the Program Manager at (314) 362-1384, send email to [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or write to:

The MSIBS Program  
Division of Biostatistics  
Campus Box 8067  
660 S. Euclid Ave.  
St. Louis, MO 63110-1093  
Telephone: (314) 362-1384  
Fax: (314) 362-2693

## Courses

M21 503 STATISTICAL COMPUTING WITH SAS®

Department: Division of Biostatistics

Course masters: Karen Schwander

Credit hours: 2 units

Frequency: Every summer (Section 1 – early July, Section 2 – late August)

Intensive hands-on summer training in SAS® during nine full weekdays. Students will learn how to use the SAS® system for handling, managing and analyzing data. Instruction is provided in the use of the SAS® programming language, procedures, macros and SAS® SQL. The course will include exercises using existing programs written by SAS® experts. Instruction manual and computer lab will be provided. This course meets the prerequisite for M21 560 Biostatistics I offered in fall. The registration/grade option of "Audit" is not available.

Participants are required to participate in the Computing/Unix Workshop and are strongly encouraged to take the Math/Statistics Workshop offered free of charge immediately prior to this course in early July.

For details, to register and to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 506 R PRIMER

Department: Division of Biostatistics

Course master: Jeff Gill

Credit hours: 1 unit

Frequency: Every summer

This is a short 1-credit primer to introduce the R Statistical Environment to 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.

For details, to register and to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 515 FUNDAMENTALS OF GENETIC EPIDEMIOLOGY

Department: Division of Biostatistics

Course masters: Treva Rice and Yun Ju Sung

Credit hours: 3 units

Frequency: Every summer

Intensive two-week summer course. 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, QTD and PLINK). Auditors will not have access to the computer lab sessions.

Participants are strongly encouraged to participate in the computing/UNIX Workshop offered free of charge prior to this course in early July. For details, to register and to obtain the required permission of the course master, contact the MSIBS pProgram mManager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 550 INTRODUCTION TO BIOINFORMATICS

Department: Division of Biostatistics

Course master: Jingqin (Rosy) Luo, Co-Coursemaster: C. Charles Gu

Credit hours: 3 units

Frequency: Every summer

Intensive two-week summer course designed to provide broad exposure to the basic concepts, methodology and application of bioinformatics to solve biomedical problems. Specifically, students will learn the basics of online genomic databases and database mining tools and will acquire understanding of mathematical algorithms in genome sequence analysis (alignment analysis, gene finding/predicting), gene expression microarray (genechip) analysis, and the impact of recent developments such as protein microarrays or whole-genome DNA chips for genome-wide association studies. Students will also take computer labs and learn basics of bioinformatics tools and databases (BLAST/WUBLAST, Prospector, etc.), practice basics of R/Bioconductor programming, and apply specialized R packages to solve bioinformatics problems pertinent to real medical research of human diseases. Auditors will not have access to the computer lab sessions.

Participants are strongly encouraged to participate in the computing/UNIX Workshop offered free of charge prior to this course in early July. Prerequisite: M21 506, R Primer.

For details, to register and to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 5483 HUMAN LINKAGE AND ASSOCIATION ANALYSIS

Department: Department of Genetics

Course master: John Rice

Credit hours: 3 units

Frequency: Every fall

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, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis, determination of power for mendelian and complex trait analysis; linkage disequilibrium analyses: allelic association (case control designs and family 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. Cross-listed as L41 5483.

For details, to register and to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

### M21 560 BIOSTATISTICS I

Department: Division of Biostatistics

Course masters: Kenneth Schechtman and Kathryn Trinkaus

Frequency: Every fall (ending mid-October)

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®.

For details, to register and/or to obtain the required permission of the Course Master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

### M21 570 BIOSTATISTICS II

Department: Division of Biostatistics

Course masters: Kenneth Schechtman and Kathryn Trinkaus

Credit hours: 3 units

Frequency: Every fall (from mid-October to mid-December)

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 towards 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 masters.

For details, to register, and/or to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 580 ADVANCED TOPICS IN BIOSTATISTICS

Department: Division of Biostatistics

Course master: Chengjie Xiong

Credit hours: 3 units

Frequency: Every spring

The primary objective of this course is to provide students with a solid foundation of most used statistical methods in biology and medicine. The focus will be on likelihood-based approaches for general linear models, random effect models, general and generalized linear mixed models, longitudinal data analysis, meta-analysis, categorical data analyses, multivariate analysis, as well as Bayesian approaches for some of these models. The emphasis will be on linear statistical models, including both the methodology (the interpretation of the models and parameters, point and confidence interval estimation, hypothesis tests) and their biomedical applications as well as the computer implementation. SAS® will be extensively used for computation, both in homework assignments and term projects. Auditors will not have access to the computer lab sessions. Prerequisites: M21 560 Biostatistics I and M21 570 Biostatistics II. Permission of the course master required.

For details, to register, and/or to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 617 STUDY DESIGN AND CLINICAL TRIALS

Department: Division of Biostatistics

Course masters: Jingxia (Esther) Liu

Credit hours: 3 units

Frequency: Every spring

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 to practice power analysis during lab sessions. Prerequisites: M21 560 Biostatistics I and M21 570 Biostatistics II. Permission of the course master required.

For details, to register, and/or to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

## M21 618 SURVIVAL ANALYSIS

Department: Division of Biostatistics

Course masters: Gina Marie D'Angelo

Credit hours: 3 units

Frequency: Every spring

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. Prerequisites: Calculus I and II, M21-560 Biostatistics I and M21-570 Biostatistics II. Permission of the course master required.

For details, to register, and/or to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

## M21 621 COMPUTATIONAL STATISTICAL GENETICS

Department: Division of Biostatistics

Course masters: Michael Province and Aldi Kraja

Credit hours: 3 units

Frequency: Every spring

This course covers the theory and application of both classical and advanced algorithms for estimating parameters and testing genomic hypotheses connecting genotype to phenotype. Students learn the key methods by writing their own program to do (simplified) linkage analysis in pedigrees in SAS for a simulated dataset provided by the coursemaster. Topics covered in the course include Maximum Likelihood theory for pedigrees and unrelated individuals, Maximization routines such as Newton-Raphson and the E-M Algorithm, Path analysis, Variance components, Mixed model algorithms, the Elston-Stewart and Lander-Green Algorithms, Simulated Annealing and the Metropolis Hastings algorithm, Bayesian and MCMC methods, Hidden Markov Models, Coalescent Theory, Haplotyping Algorithms, Genetic Imputation Algorithms, Permutation/Randomization Tests, classification and Data Mining Algorithms, Population Stratification and Admixture Mapping Methods, Loss of Heterozygosity models, Gene Networks, Copy Number Variation methods, Multiple comparisons corrections and Power and Monte-carlo simulation experiments. Course not available to auditors. Prerequisites: M21 5483 Human Linkage & Association, M21 560 Biostatistics I, and M21 570 Biostatistics II or, with permission of the course master.

For details, to register, and/or to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

## M21 628 RESEARCH METHODS FOR GENOMIC STUDIES OF HUMAN DISEASE

Department: Division of Biostatistics

Course master: C. Charles Gu

Credit hours: 3 units

Frequency: Every spring

The course provides in-depth coverage of quantitative aspects of biomedical studies employing contemporary '-omics' technologies and a global approach to uncovering disease biology. Students will acquire understanding of research design and methods including statistical theory and concepts, computational algorithms, and popular programming tools for conducting such studies. We will cover seasonally selected set of topics concerning the study of human diseases from among genomic analysis of variations, transcriptomic study of regulatory mechanisms, metagenomic analysis of human diseases, and research methods for epigenomics, proteomics, and interactomics and pathway analysis. As part of this course, students will perform critical appraisal of case studies employing these research methods and take part in classroom discussions of their appraisals. It is expected that by taking this course, students will gain a solid grasp of how contemporary '-omics' technologies are used in studying human diseases, what are important design and analytical issues involved, where to find related resources, and how to deal with practical difficulties in real disease studies. Prerequisites: M21 550: Intro to Bioinformatics and permission of the course master.

For details, to register, and/or to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

## M21 610 MENTORED RESEARCH

Department: Division of Biostatistics

Course masters: DC Rao and Chengjie Xiong

Credit hours: 6 units

Frequency: Every spring, summer and fall

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 who is willing to work with him/her 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.

For details, to register, and/or to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

## M21 630 INTERNSHIP

Department: Division of Biostatistics

Course masters: D.C. Rao and J. Philip Miller

Credit hours: 3 or 6 units

Frequency: Every summer beginning in 2012

The primary goal of the Internship program is for all 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 test-drive the job market, develop contacts, build marketable skills and perceive likes and dislikes in the chosen field. Students are required to spend a total of 440 hours in the laboratories of their chosen mentors. One of two types of projects may be pursued as part of the Internship experience. A student may elect to pursue a "Data Analysis Project" involving data management and extensive analyses of data which may lead to a publication-quality manuscript (possibly earning co-authorship for the student). Alternatively, a student may choose a highly focused research-oriented project and carry out "Mentored Research" by working closely with the mentor. In this case, the student will assist the mentor by preparing a publication-quality manuscript as part of the Internship. In either case, 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 5-minute presentation of the Internship experience. Internship presentations will be scheduled in late summer. The grade for each student will be determined in consultation with the mentor. Internships will be facilitated and coordinated by an Internship Committee consisting of professors J. Philip Miller & D.C. Rao (Co-Chairs), Ken Schechtman and Chengjie Xiong. Available to Master of Science in Biostatistics (MSIBS) students only.

## M21 640 BIOSTATISTICS CONSULTING LAB

Department: Division of Biostatistics

Course masters: Karen Steger-May and Kenneth Schechtman

Credit hours: 1 unit

Frequency: Every fall beginning in 2012

All M.S. in Biostatistics students are required to take this course with the primary goal to train the students to develop competency for collaborating with and providing biostatistics consultation services to clinical and applied scientists. Students will be trained to develop the art and skill necessary to be good collaborators. Students will work on real time consultation projects and will have opportunities to interact with the Principal Investigators on the projects under close supervision from experienced faculty and staff. This is an invaluable opportunity for students to develop contacts with potential employers upon graduation. Prerequisites: M21 560 Biostatistics I and M21 570 Biostatistics II. Required of Master of Science in Biostatistics (MSIBS) students and to pre-selected others who have the prerequisites and the specific permission of the course master.



For details, to register, and/or to obtain the required permission of the course master, contact the MSIBS Program Manager: [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

## Biostatistics Faculty

Ingrid B Borecki, MS, PHD

Associate Professor of Biostatistics

Ling Chen, MS, MPH, PHD

Research Instructor in Biostatistics

Robert Culverhouse, MA, PHD

Research Assistant Professor of Biostatistics

Lisa De Las Fuentes, MD

Assistant Professor of Biostatistics

Feng Gao, PHD

Research Assistant Professor of Biostatistics

Mae Etsuko Gordon, MS, PHD

Professor of Biostatistics

Chi Gu, MS, PHD

Associate Professor of Biostatistics

Jingxia Liu, MS, PHD

Research Instructor in Biostatistics

Jingqin Luo, MS, MS1, PHD

Research Instructor in Biostatistics

J. Philip Miller

Professor of Biostatistics

Jay Francis Piccirillo, MD

Professor of Biostatistics

Michael A Province, MA, PHD

Professor of Biostatistics

Dabeeru C Rao, MS, PHD

Professor of Biostatistics

Director of the Division of Biostatistics

John P Rice, MA, PHD

Professor of Biostatistics

Treva Kay Rice, MA, PHD

Research Professor of Biostatistics

Nancy L. Saccone, MS, PHD

Associate Professor of Biostatistics

Kenneth B Schechtman, MS, PHD, MA

Associate Professor of Biostatistics

William D Shannon, MS, PHD

Professor of Biostatistics

Jeannette M Simino, MS, MS1, PHD

Research Instructor in Biostatistics

Yun Ju Sung, PHD

Research Assistant Professor of Biostatistics

Chengjie Xiong, MS, PHD

Professor of Biostatistics

Yan Yan, MD, MHS, PHD

Research Associate Professor of Biostatistics

## Master of Science in Clinical Investigation Program

The Master of Science in Clinical Investigation (MSCI) Program provides high-quality, multidisciplinary training in clinical research to promote the successful career development of clinical investigators. It is designed as a one- to three-year full- or part-time degree program for young investigators committed to pursuing academic careers in clinical research. The unique program combines didactic coursework with mentored research and career development opportunities and provides students with the knowledge and tools to excel in the areas of clinical investigation most relevant to their careers. The MSCI is available to postdoctoral scholars, junior faculty and predoctoral students enrolled in established clinical research training programs. The program is also available to other Washington University affiliated postdoctoral health sciences scholars. Postdoctoral scholars and junior faculty must be within the medicine and allied health professions, conducting clinical research at Washington University or with an affiliated program.

Predoctoral students in medicine, psychology, the Division of Biology and Biomedical Sciences, social work, audiology, physical therapy, occupational therapy and related disciplines in the Graduate School of Arts & Sciences who have completed or are enrolled in the Predoctoral Interdisciplinary Clinical Research Training Program (PICRT) are also eligible. For further information, email Angela Wilson at [abwilson@dom.wustl.edu](mailto:abwilson@dom.wustl.edu) or visit <http://crtc.wustl.edu>.

## Program Requirements

The MSCI requires the following core curriculum in clinical investigation:

### M17 513 DESIGNING OUTCOMES AND CLINICAL RESEARCH

3 credits, Fall Semester, Wednesdays, 3:30 p.m. to 5:45 p.m., Brian Gage, MD, MSc, course master

This course includes lectures from faculty of Medicine, Surgery, Otolaryngology and Pediatrics. DOC Research covers how to select a clinical research question, write a research protocol and execute a clinical study. Topics include subject selection, observational and experimental study design, sample size estimation, clinical measurements, questionnaires and data management. The course is designed for clinicians and health-care professionals who wish to conduct outcomes and patient-oriented clinical research. Students receive ongoing feedback as they incorporate research design concepts into their own research proposals. At the end of the course, students are required to submit a research protocol or a draft of a manuscript describing their research and pass the final exam. The course consists of lectures. Each student gives an oral presentation and presents a written paper or grant protocol for discussion and critique by faculty and other students.

### M17 522 INTRODUCTION TO STATISTICS FOR CLINICAL INVESTIGATION

3 credits, Fall Semester, Thursdays, 4:30 p.m. to 7 p.m., Dorina Kallogjeri, MD, MPH, course master

This is a basic course in statistics with particular focus on the health sciences. It is taught in a user-friendly manner with emphasis on use of SPSS, statistical analysis software commonly used in clinical research. The course will teach basic statistical methods in which clinical researchers should have facility to execute their own analyses.

### M17 524 INTERMEDIATE STATISTICS FOR THE HEALTH SCIENCES

3 credits, Spring Semester, Thursdays, 4:00 p.m. to 6:30 p.m., Dorina Kallogjeri, MD, MPH, course master

This 15-week course is designed to build on skills developed in Introduction to Statistics for the Health Sciences and to foster basic expertise required to independently use common multivariate biostatistical methods to analyze clinical research data for peer-review presentation and publication.

#### M17 510 ETHICAL AND LEGAL ISSUES IN CLINICAL RESEARCH

2 credits, Fall and Spring Semesters, Mondays, 4:00 p.m. to 6 p.m., Stephanie Solomon, PhD, course master

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.

#### M17 588 EPIDEMIOLOGY FOR CLINICAL RESEARCH

3 credits, Spring Semester, Wednesdays, 4:30 p.m. to 7 p.m., Mario Schootman, PhD, course master

This course introduces principles of epidemiology as they apply to clinical research. The course provides basic tools used in descriptive and analytical epidemiology, which are crucial for making informed decisions in the care of patients. Critical thinking and scientific/analytic competencies are emphasized throughout the course.

#### M17 528 GRANTSMANSHIP

3 credits, Fall Semester, Tuesdays, 4:15 p.m. to 6:15 p.m., Jay Piccirillo, MD, Karen Dodson, course masters

Scholars create a focused research plan that incorporates well-formulated hypotheses, rationales, specific objectives and long-range research goals; organize and present a sound research plan that accurately reflects the ideas and directions of the proposed research activities; develop and justify a budget for the proposed research activities; avoid many common grant-writing mistakes; discuss the peer-review process in grant evaluation and formulate a grant proposal that is maximally compatible with that process.

OR

#### M17 529 SCIENTIFIC WRITING AND PUBLISHING

2 credits, Spring Semester, Tuesdays, 4:15 p.m. to 6:15 p.m., Jay Piccirillo, MD, and Karen Dodson, course masters

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.

Scholars also:

- Conduct independent research under the tutelage of a mentorship committee (7 credits)
- Participate in an ongoing seminar series to present and discuss research as a work-in-progress (1 credit each semester, minimum of 4 semesters)
- Take elective course work related to their research interests (minimum 6 credits)
- Submit a final thesis consisting of a submitted manuscript

Advanced placement credit can be earned for past equivalent course work as determined on an individual basis. The MSCI is a 33-credit degree and typically takes two to three years to complete.

## Tuition

Tuition is \$1,100 per credit hour. Training grant or departmental funds are typically used to cover tuition costs. However, some costs of the degree may be the responsibility of the scholar. Trainees currently enrolled in other medicine and allied health programs should contact the program director or program coordinator to discuss entry into the MSCI program.

## Location

Most courses and seminars are taught during late afternoon or early evening hours in the CRTTC, located on the second floor of Wohl Hospital Building.

## Further Information

Further information, including complete admissions details and program descriptions, may be obtained from the [Clinical Research Training Center](#) website or through the following contacts:

Angela Wilson

Curriculum and Evaluation Coordinator

(314) 454-8936

[abwilson@dom.wustl.edu](mailto:abwilson@dom.wustl.edu)

Washington University in St. Louis

School of Medicine

Master of Science in Clinical Investigation Program

Campus Box 8051

660 S. Euclid Ave.

St. Louis, MO 63110

[crtc.wustl.edu](http://crtc.wustl.edu)

# Clinical Investigation Faculty

## Program Directors

### **David K. Warren, MD, MPH**

Associate Professor of Medicine

Director, Master of Science in Clinical Investigation Program

Co-Director, Postdoctoral Program

Division of Infectious Diseases, Department of Medicine, Washington University School of Medicine

### **Bradley A. Evanoff, MD, MPH**

Richard A. and Elizabeth Henby Sutter Professor of Occupational, Industrial and Environmental Medicine

Chief, Division of General Medical Sciences, Department of Medicine

Co-Director, Clinical Research Training Center

Division of General Medical Sciences, Department of Medicine, Washington University School of Medicine

### **Victoria J. Fraser, MD**

Interim Chair, Department of Medicine

J. William Campbell Professor of Medicine

Co-Director, Division of Infectious Diseases

Director, Clinical Research Training Center, Career Development Award Program and KM1 Program

Division of Infectious Diseases, Department of Medicine, Washington University School of Medicine

### **Jane M. Garbutt, MBChB, MHSc**

Research Associate Professor of Medicine and of Pediatrics

Medical Director of Washington University Pediatric and Adolescent Ambulatory Research Consortium (WU PAARC)

Director, Postdoctoral Program

Co-Director, Career Development Award Program

Division of General Medical Sciences, Department of Medicine, Washington University School of Medicine

### **Jay F. Piccirillo, MD**

Professor, Department of Otolaryngology

Director, Clinical Outcomes Research Office  
Director, Predoctoral Interdisciplinary Clinical Research Training Program, Doris Duke Clinical Research Fellowship and ASPIRE Program  
Department of Otolaryngology, Washington University School of Medicine

**Jeffrey F. Peipert, MD, MPH, MHA**

Robert J. Terry Professor of Obstetrics and Gynecology  
Vice Chair of Clinical Research  
Obstetrics and Gynecology Residency Program Director  
Co-Director, Predoctoral Interdisciplinary Clinical Research Training Program  
Associate Director, Postdoctoral Program  
Department of Obstetrics and Gynecology, Washington University School of Medicine

**Mario Castro, MD, MPH**

Professor of Medicine Co-Director, Mentored Training Program in Clinical Investigation  
Department of Medicine, Washington University School of Medicine

**Susan L. Stark, PhD, OTR/L**

Assistant Professor of Occupational Therapy and of Neurology  
Co-Director, Predoctoral Interdisciplinary Clinical Research Training Program  
Program in Occupational Therapy, Washington University School of Medicine

**Allyson R. Zazulia, MD**

Associate Professor of Neurology and of Radiology  
Associate Director, Postdoctoral Program  
Department of Neurology, Washington University School of Medicine

## Course Masters

**Dorina Kallogjeri, MD, MPH** (Introduction to Statistics for Clinical Investigation, Intermediate Statistics for the Health Sciences)

Research Statistician, Department of Otolaryngology, Washington University School of Medicine

**Karen L. Dodson** (Scientific Writing, Grantsmanship)

Adjunct Instructor, Department of Medicine; Director of Faculty Development and Academic Publishing Services, Office of Faculty Affairs, Washington University School of Medicine

**Brian F. Gage, MD, MSc** (Designing Outcomes and Clinical Research)

Associate Professor of Medicine, Division of General Medical Sciences, Department of Medicine, Washington University School of Medicine



**Jefferson M. Gill, PhD** (Multilevel Models in Quantitative Research)

Professor of Political Science, Department of Political Science, Washington University School of Arts & Sciences

**Leslie McIntosh, MPH, PhD** (Introduction to Biomedical Informatics)

Research Assistant Professor of Pathology and Immunology, Division of Laboratory and Genomic Medicine, Department of Pathology and Immunology, Washington University in St. Louis

**Rakesh Nagarajan, PhD** (Introduction to Biomedical Informatics)

Associate Professor of Pathology and Immunology, Division of Laboratory and Genomic Medicine, Department of Pathology and Immunology, Washington University School of Medicine

**Jay F. Piccirillo, MD** (Scientific Writing, Grantsmanship)

Professor, Department of Otolaryngology  
Director, Predoctoral Interdisciplinary Clinical Research Training Program  
Department of Otolaryngology, Washington University School of Medicine

**Rachel M. Presti, MD, PhD** (Bench Fundamentals of Translational Research)

Assistant Professor of Medicine, Division of Infectious Diseases, Department of Medicine, Washington University School of Medicine

**Mario Schootman, PhD** (Epidemiology for Clinical Research)

Professor of Epidemiology and Medicine  
Chief, Division of Health Behavior Research, Department of Medicine  
Washington University School of Medicine

**Stephanie Solomon, PhD** (Ethical and Legal Issues in Clinical Research)

Assistant Professor of Health Care Ethics  
Albert Gnaegi Center for Healthcare Ethics  
Saint Louis University

## Instructors and Guest Lecturers

**Thomas C. Bailey, MD**

Professor of Medicine, Division of Infectious Diseases, Department of Medicine, Washington University School of Medicine

**Laura J. Bierut, MD**

Professor of Psychiatry, Department of Psychiatry, Washington University School of Medicine

**Bijoy George**

Biomedical Informatics Program Manager, Department of Laboratory and Genomic Medicine, Washington University School of Medicine

**Graham A. Colditz, MD, DrPH**

Niess-Gain Professor in the School of Medicine

Chief, Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine

Associate Director, Prevention and Control, Siteman Cancer Center

Adjunct Professor, Community Health, Division of Epidemiology, Saint Louis University School of Public Health

**Anjali D. Deshpande, PhD, MPH**

Research Assistant Professor PEFA, Division of Health Behavior Research, Department of Medicine, Washington University School of Medicine

**Bettina F. Drake, PhD, MPH**

Assistant Professor of Surgery, Division of Public Health Sciences, Department of Surgery, Washington University School of Medicine

**Rebecca Dresser, JD**

Daniel Noyes Kirby Professor of Law and Professor of Ethics in Medicine, Washington University School of Law

**Jim Dubois, PhD, DSc**

Hubert Mader Endowed Chair and Director, Bander Center for Medical Business Ethics, Social Science Research Group and Center for Research Ethics and Integrity, Albert Gnaegi Center for Health Care Ethics, Saint Louis University

**Bradley A. Evanoff, MD, MPH**

Richard A. and Elizabeth Henby Sutter Professor of Occupational, Industrial and Environmental Medicine  
Director, Institute of Clinical and Translational Sciences

Division of General Medical Sciences, Department of Medicine, Washington University School of Medicine

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Director, Postdoctoral Program

Division of General Medical Sciences, Department of Medicine, Washington University School of Medicine

**Jonathan M. Green, MD**

Associate Dean for Human Studies and Executive Chair of the Institutional Review Board (IRB),  
Washington University School of Medicine

**Snehil Gupta**

Bioinformaticist, Division of Laboratory and Genomic Medicine, Department of Pathology and  
Immunology, Washington University School of Medicine

**Christine M. Hoehner, PhD**

Assistant Professor, Department of Surgery, Washington University School of Medicine

**Dorina Kallogjeri, MD, MPH**

Research Statistician, Department of Otolaryngology, Washington University School of Medicine

**Marin H. Kollef, MD**

Golman Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Department of  
Medicine, Washington University School of Medicine; Director, Medical Intensive Care Unit and Director,  
Respiratory Care Services, Barnes-Jewish Hospital

**Laura B. Langton, PhD**

Research Development Manager, Office of the Vice Chancellor for Research, Washington University  
School of Medicine

**Judith E. Lieu, MD**

Assistant Professor, Department of Otolaryngology, Washington University School of Medicine

**Mark J. Manary, MD**

Professor of Pediatrics, Division of Emergency Medicine, Department of Pediatrics, Washington  
University School of Medicine

**Timothy McBride, PhD**

Professor and Associate Dean for Public Health, George Warren Brown School of Social Work,  
Washington University

**Jay R. McDonald, MD**

Assistant Professor of Medicine, Division of Infectious Diseases, Department of Medicine, Washington  
University School of Medicine

**Leslie D. McIntosh, PhD**

Research Instructor, Department of Pathology and Immunology, Washington University School of Medicine

**J. Phillip Miller**

Professor of Biostatistics, Division of Biostatistics, Washington University School of Medicine

**David A. Mulvihill**

Project Manager IS, Division of Laboratory and Genomic Medicine, Department of Pathology and Immunology, Washington University School of Medicine

**Peter Nagele, MD**

Assistant Professor of Anesthesiology, Department of Anesthesiology, Division of Clinical Research, Washington University School of Medicine

**Anthony O. Odibo, MD, MSCE**

Associate Professor of Obstetrics and Gynecology, Division of Maternal-Fetal Medicine and Ultrasound, Department of Obstetrics and Gynecology, Washington University School of Medicine

**Chijioke G. Ogbuka, MDiv, MA**

Pre-doctoral Fellow, Center for Clinical Research Ethics, Albert Gnaegi Center for Health Care Ethics, Saint Louis University

**Margaret A. Olsen, PhD, MPH**

Research Associate Professor of Medicine, Division of Infectious Diseases, Department of Medicine, Washington University School of Medicine

**Diana L. Owyong**

Research Administrator, Department of Cell Biology and Physiology, Washington University School of Medicine

**Jay F. Piccirillo, MD**

Professor, Department of Otolaryngology

Director, Clinical Outcomes Research Office

Director, Predoctoral Interdisciplinary Clinical Research Training Program, Doris Duke Clinical Research Fellowship and ASPIRE program

Department of Otolaryngology, Washington University School of Medicine

**Fred W. Prior, PhD**

Lab Director, Electronic Radiology Lab

Research Associate Professor, Department of Radiology, Washington University School of Medicine

**Michael A. Province, PhD**

Professor of Genetics and Director, Division of Statistical Genetics, Department of Genetics, Washington University School of Medicine

**Erica K. Salter, PhD**

Instructor, Albert Gnaegi Center for Health Care Ethics, Saint Louis University

**Cathy C. Sarli**

Librarian, Washington University School of Medicine

**Mario Schootman, PhD**

Associate Professor of Medicine, Division of Health Behavior Research, Department of Medicine, Washington University School of Medicine

**Stephanie Solomon, PhD**

Assistant Professor of Health Care Ethics, Albert Gnaegi Center for Health Care Ethics, Saint Louis University

**Kathryn M. Trinkaus**

Research Statistician, Department of Biostatistics, Washington University School of Medicine

**Mark A. Watson, MD, PhD**

Associate Professor of Pathology and Immunology, Division of Laboratory and Genomic Medicine, Department of Pathology and Immunology, Washington University School of Medicine

**Roger D. Yusen, MD, MPH**

Associate Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Division of General Medical Sciences, Department of Medicine, Washington University School of Medicine

## More Information

Please visit our website at <http://crtc.wustl.edu>.; contact Angela Wilson, Curriculum and Evaluation Coordinator, (314) 454-8936, or write to:

Washington University in St. Louis School of Medicine

Master of Science in Clinical Investigation Program

Campus Box 8051

660 S. Euclid Ave.

St. Louis, MO 63110

## Doctor of Philosophy

The Division of Biology and Biomedical Sciences (DBBS) at Washington University in St. Louis offers exceptional doctoral training at one of the nation's preeminent biomedical research centers. The DBBS is organized into twelve academic programs, each representing a different scientific area.

Prospective students apply to the Division rather than to an individual program. Students are admitted into a specific program but may change their Program affiliation as their interests develop. Faculty members from 30 plus departments across the university contribute to the admission, teaching and research training of the Division's students. Each Program has its own steering committee to provide students with personal attention, guiding them and addressing their needs during the first years of training. Steering committee members are conversant with the broad range of opportunities available to the student pursuing a graduate degree at Washington University, and they work for a precise match of interest, aptitude, Program and course of study.

Each of the 12 Programs establishes its own requirements for earning the PhD degree, and progress toward the degree is monitored by the Program steering committee. The PhD degree is granted by Washington University's Graduate School of Arts and Sciences.

### Doctoral programs:

- Biochemistry
  
- Computational and Molecular Biophysics
- 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 Biology

### For More Information

For complete admissions details and program descriptions, visit the [DBBS website](#) or contact:

**Mailing Address:**

Division of Biology & Biomedical Science  
Washington University in St. Louis  
Campus Box 8226  
660 South Euclid Ave.  
St. Louis, MO 63110

**Physical Location:**

660 South Euclid Ave.  
Bernard Becker Medical Library, Fifth floor

**Main Phone Numbers:**

Phone: (314) 362-3365  
Toll Free: (800) 852-9074  
Fax: (314) 362-3369

## Masters in Genetic Epidemiology (GEMS) for Post Doctoral Students

The Division of Biostatistics now offers an option for those who have completed a doctoral degree (PhD, MD, or equivalent) to pursue a post-doctoral masters degree in Genetic Epidemiology (GEMS). The Division of Biostatistics includes world-renowned scientific leaders in their respective areas. D.C. Rao, PhD, Director of the Division of Biostatistics and the Program Director, is one of the founding fathers of the field. The 32-credit-hour program can be pursued either full time or part time but must be completed in within three years. See <https://biostatistics.wustl.edu/training/msibs> for details.

The GEMS program for post doctoral students has eight required courses, listed below, as well as two electives:

M21 503 STATISTICAL COMPUTING WITH SAS

M21 506 R PRIMER

M21 515 FUNDAMENTALS OF GENETIC EPIDEMIOLOGY

M21 550 INTRODUCTION TO BIOINFORMATICS

M21 5483 HUMAN LINKAGE AND ASSOCIATE ANALYSIS

M21 560 BIOSTATISTICS I

M17 510 ETHICAL AND LEGAL ISSUES IN CLINICAL RESEARCH

M21 618 RESEARCH METHODS

## M21 610 MENTORED RESEARCH

### Prospective Students

Anyone interested in pursuing the post-doctoral GEMS degree should contact the Program Manager in the Division of Biostatistics for information regarding the application process.

### Location

The program is located in the Division of Biostatistics, on the third floor of Shriners Building (706 S. Euclid Ave. at Clayton Road), Rooms 3301-3312.

### More Information

See our website, <http://biostatistics.wustl.edu/training/msibs/prospectivestudents/GEMS>, contact the Program Manager at (314) 362-1384, send email to [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or write to:

GEMS Post-Doctoral Program Division of Biostatistics  
Campus Box 8067  
660 S. Euclid Ave.  
St. Louis, MO 63110-1093  
Telephone: (314) 362-1384  
Fax: (314) 362-2693

### Certificate in Genetic Epidemiology

The Certificate in Genetic Epidemiology training program provides a multidisciplinary educational opportunity for people who want to work at the dynamic nexus of genetics and medicine. There are growing needs for scientists with this training both in academia and industry. With the wealth of data from the Human Genome Project and the availability of powerful new computational approaches, abundant opportunities are now available to explore and characterize the interplay between genes and the environment that affect the biological processes that underlie disease.

The GEMS Certificate program is sponsored by the Division of Biostatistics and includes world-renowned scientific leaders in their respective areas. D.C. Rao, PhD, director of the Division of Biostatistics and the Program Director, is one of the founding fathers of the field. The 18-credit-hour program is designed to prepare students to work at the interface of genetics, biostatistics, epidemiology and computing. See <https://biostatistics.wustl.edu/training/msibs/pages> for details.

The Certificate in Genetic Epidemiology is earned after successful completion (with a minimum of a “B” average) of six core courses plus labs (18 credit hours) that are normally offered to master’s candidates in Biostatistics. To earn the certificate, these courses may be taken over one or two years:

M21 503 STATISTICAL COMPUTING WITH SAS (summer)  
M21 506 R PRIMER (summer)  
M21 515 FUNDAMENTALS OF GENETIC EPIDEMIOLOGY (summer)  
M21 550 INTRODUCTION TO BIOINFORMATICS (summer)  
M21 560 BIOSTATISTICS I (fall)  
M21 570 BIOSTATISTICS II (fall)  
M21 5483 HUMAN LINKAGE AND ASSOCIATION (fall)



## Prospective Students

Since genetic epidemiology is a multidisciplinary field, we expect applicants to come from a variety of backgrounds, but primarily those who have earned a terminal degree such as 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 computer programming through course work, documented experience or by passing a proficiency exam. Promising candidates who do not meet all the prerequisites will work with the Program Director to take the appropriate courses or training to rectify weaknesses.

## Location

The program is located in the Division of Biostatistics, on the third floor of Shriners Building (706 S. Euclid Ave. at Clayton Road), Rooms 3301-3312.

## Registration Instructions

All students will register with the Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu). Before registering, current Washington University students must obtain appropriate consent from their division or department. Students outside of the program wishing to enroll in individual courses must have permission of the course master.

## Academic Calendar

The certificate program begins approximately July 1 each year with preparatory workshops, followed by intensive summer semester courses. For the fall courses, the certificate program follows the [calendar of the College of Arts & Sciences](#).

## Further Information

For complete admissions details and program descriptions, please visit our website, <https://biostatistics.wustl.edu/training/msibs>, contact the Program Manager at (314) 362-1384, send email to [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or write to:

The MSIBS Program  
Division of Biostatistics  
Campus Box 8067  
660 S. Euclid Ave.  
St. Louis, MO 63110-1093  
Telephone: (314) 362-1384  
Fax: (314) 362-2693

## Courses

M21 503 STATISTICAL COMPUTING WITH SAS® (Required for both Certificate and GEMS)  
Department: Division of Biostatistics  
Course master: Karen Schwander

Credit hours: 2 units

Frequency: Every summer (Section 1 – early July, Section 2 – late August)

Intensive hands-on summer training in SAS® during nine full weekdays. Students will learn how to use the SAS® system for handling, managing and analyzing data. Instruction is provided in the use of the SAS® programming language, procedures, macros and SAS® SQL. The course will include exercises using existing programs written by SAS® experts. Instruction manual and computer lab will be provided. This course meets the prerequisite for M21 560 Biostatistics I offered in fall. The registration/grade option of "Audit" is not available.

Participants are required to participate in the Computing/Unix Workshop and are strongly encouraged to take the Math/Statistics Workshop offered free of charge immediately prior to this course in early July.

For details, to register and to obtain the required permission of the course master, contact the MSIBS Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

M21 506 R PRIMER (Required for both Certificate and GEMS)

Department: Division of Biostatistics

Course master: Jeff Gill

Credit hours: 1 unit

Frequency: Every summer

This is a short 1-credit primer to introduce the R Statistical Environment to 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.

M21 515 FUNDAMENTALS OF GENETIC EPIDEMIOLOGY (Required for both Certificate and GEMS)

Department: Division of Biostatistics

Course masters: Treva Rice and Yun Ju Sung

Credit hours: 3 units

Frequency: Every summer

Intensive two-week summer course. 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, QTD T and PLINK). Auditors will not have access to the computer lab sessions.

Participants are strongly encouraged to participate in the computing/UNIX Workshop offered free of charge prior to this course in early July. For details, to register and to obtain the required permission of the course master, contact the MSIBS Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 550 INTRODUCTION TO BIOINFORMATICS (Required for both Certificate and GEMS)

Department: Division of Biostatistics

Course master: Jingqin (Rosy) Luo, Co-Coursemaster: C. Charles Gu

Credit hours: 3 units

Frequency: Every summer

Intensive two-week summer course designed to provide broad exposure to the basic concepts, methodology and application of bioinformatics to solve biomedical problems. Specifically, students will learn the basics of online genomic databases and database mining tools and will acquire understanding of mathematical algorithms in genome sequence analysis (alignment analysis, gene finding/predicting), gene expression microarray (genechip) analysis, and the impact of recent developments such as protein microarrays or whole-genome DNA chips for genome-wide association studies. Students will also take computer labs and learn basics of bioinformatics tools and databases (BLAST/WUBLAST, Prospector, etc.), practice basics of R/Bioconductor programming, and apply specialized R packages to solve bioinformatics problems pertinent to real medical research of human diseases. Auditors will not have access to the computer lab sessions.

Participants are strongly encouraged to participate in the computing/UNIX Workshop offered free of charge prior to this course in early July. Prerequisite: M21 506, R Primer.

For details, to register and to obtain the required permission of the course master, contact the MSIBS Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 5483 HUMAN LINKAGE AND ASSOCIATION ANALYSIS (Required for both Certificate and GEMS)

Department: Department of Genetics

Course master: John Rice

Credit hours: 3 units

Frequency: Every fall

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, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis, determination of power for Mendelian and complex trait analysis; linkage disequilibrium analyses: allelic association (case control designs and family 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. Cross-listed as L41 5483.

For details, to register and to obtain the required permission of the course master, contact the MSIBS Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 560 BIOSTATISTICS I (Required for both Certificate and GEMS)

Department: Division of Biostatistics

Course masters: Kenneth Schechtman and Kathryn Trinkaus

Frequency: Every fall (ending mid-October)

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®.

For details, to register and/or to obtain the required permission of the course master, contact the Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 570 BIOSTATISTICS II (Required for Certificate)

Department: Division of Biostatistics

Course masters: Kenneth Schechtman and Kathryn Trinkaus

Credit hours: 3 units

Frequency: Every fall (from mid-October to mid-December)

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 towards 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 masters.

For details, to register, and/or to obtain the required permission of the course master, contact the Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 628 RESEARCH METHODS FOR GENOMIC STUDIES OF HUMAN DISEASE (Required for GEMS)

Department: Division of Biostatistics

Course master: C. Charles Gu

Credit hours: 3 units

Frequency: Every spring

The course provides in-depth coverage of quantitative aspects of biomedical studies employing contemporary '-omics' technologies and a global approach to uncovering disease biology. Students will acquire understanding of research design and methods including statistical theory and concepts, computational algorithms, and popular programming tools for conducting such studies. We will cover seasonally selected set of topics concerning the study of human diseases from among genomic analysis of variations, transcriptomic study of regulatory mechanisms, metagenomic analysis of human diseases, and research methods for epigenomics, proteomics, and interactomics and pathway analysis. As part of this course, students will perform critical appraisal of case studies employing these research methods and take part in classroom discussions of their appraisals. It is expected that by taking this course, students will gain a solid grasp of how contemporary '-omics' technologies are used in studying human diseases, what are important design and analytical issues involved, where to find related resources, and how to deal with practical difficulties in real disease studies. Prerequisites: M21 550: Intro to Bioinformatics and permission of the course master. For details, to register and/or to obtain the required permission of the course master, contact the Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

#### M21 610 MENTORED RESEARCH (Required for GEMS)

Department: Division of Biostatistics

Course masters: DC Rao and Chengjie Xiong

Credit hours: 6 units

Frequency: Every spring, summer and fall

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 who is willing to work with him/her 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. For details, to register and/or to obtain the required permission of the course master, contact the Program Manager at [msibs@wubios.wustl.edu](mailto:msibs@wubios.wustl.edu) or (314) 362-1384.

## Biostatistics Faculty

Ingrid B Borecki, MS, PHD

Associate Professor of Biostatistics

Ling Chen, MS, MPH, PHD

Research Instructor in Biostatistics

Robert Culverhouse, MA, PHD

Research Assistant Professor of Biostatistics

Lisa De Las Fuentes, MD

Assistant Professor of Biostatistics

Feng Gao, PHD

Research Assistant Professor of Biostatistics

Mae Etsuko Gordon, MS, PHD

Professor of Biostatistics

Chi Gu, MS, PHD

Associate Professor of Biostatistics

Jingxia Liu, MS, PHD

Research Instructor in Biostatistics

Jingqin Luo, MS, MS1, PHD

Research Instructor in Biostatistics

J. Philip Miller

Professor of Biostatistics

Jay Francis Piccirillo, MD

Professor of Biostatistics

Michael A Province, MA, PHD

Professor of Biostatistics

Dabeeru C Rao, MS, PHD

Professor of Biostatistics

Director of the Division of Biostatistics

John P Rice, MA, PHD

Professor of Biostatistics

Treva Kay Rice, MA, PHD

Research Professor of Biostatistics

Nancy L. Saccone, MS, PHD

Associate Professor of Biostatistics

Kenneth B Schechtman, MS, PHD, MA

Associate Professor of Biostatistics

William D Shannon, MS, PHD

Professor of Biostatistics

Jeannette M Simino, MS, MS1, PHD

Research Instructor in Biostatistics

Yun Ju Sung, PHD

Research Assistant Professor of Biostatistics

Chengjie Xiong, MS, PHD

Professor of Biostatistics

Yan Yan, MD, MHS, PHD

Research Associate Professor of Biostatistics



# Occupational Therapy

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, in addition, can 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 and psychological, environmental and occupational factors that enable persons to fulfill roles, and lead meaningful and productive lives. Students interact with leading physicians and scientists whose practice and science is contributing to better methods of treatment of persons with disabilities. In addition, students are linked with community agencies and leaders that are 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. Applicants must hold a bachelor's degree or be a participant in an approved three-two program and 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. Graduates of the program will be eligible to sit for the national certification examination administered by the NBCOT. (Note: A felony conviction may affect a graduate's ability to sit for NBCOT certification examination or attain state licensure.)

## Master of Science in Occupational Therapy Degree Program

The professional Master of Science in Occupational Therapy degree requires courses that develop the knowledge and skills necessary to practice occupational therapy. Each candidate for a Master of Science in Occupational Therapy degree must complete a minimum of 70 hours of course work, usually accomplished in five semesters of study (two academic years and the intervening summer.) Six months of supervised clinical fieldwork (12 credits) is required to be completed within 12 months of completion of course work.

## Doctor of Occupational Therapy Degree Program

The Doctor of Occupational Therapy (OTD) is a degree providing students the opportunity to focus their occupational therapy studies in one of five areas of concentration: Productive Aging, Social Participation and the Environment, Rehabilitation, Work and Industry, and Pediatrics. The OTD requires seven semesters of study and three clinical placements for students entering professional practice. Postprofessional students enrolled in the OTD have varying program lengths based on prior degree and experience.

## Fees

Tuition and fieldwork fees (MSOT, full time) per semester: \$13,907 for first five semesters, \$6,953 per semester for last two semesters while on fieldwork.

Tuition and fieldwork fees (OTD, full-time): \$13,907 per semester first five semesters, \$14,371 per semester last two academic semesters, and \$6,953 for each semester student is on clinical fieldwork or apprenticeship.

Part-time tuition: \$1,112 per credit

## More Information

Complete admissions information and a full description of degrees in Occupational Therapy are available from the office of the Program in Occupational Therapy:

Program in Occupational Therapy  
Washington University School of Medicine  
Campus Box 8505, 4444 Forest Park Ave.  
St. Louis, MO 63108-2212  
(314) 286-1600  
(800) 279-3229  
TDD: (314) 286-1651  
[wuotinfo@wusm.wustl.edu](mailto:wuotinfo@wusm.wustl.edu)  
Website: [ot.wustl.edu](http://ot.wustl.edu)

## Courses

### OT 5023 THEORY AND FOUNDATIONS FOR OCCUPATIONAL THERAPY PRACTICE (3)

Students explore the knowledge, skills and attitudes of the professional occupational therapist through the study of occupation, participation and well-being, some of the core concepts of the profession. The course acquaints students with the profession's history, current health issues and emerging areas of practice. Students explore the relationship between occupation, development, culture and health at the person, organization and population levels. Students are introduced to the Occupational Therapy Practice Framework and the International Classification of Function. The theoretical foundation of practice is emphasized.

### OT 5225 FUNDAMENTALS OF HEALTH CARE AND PROFESSIONAL PRACTICE (3)

This course prepares students to manage the changing paradigms of practice that will be encountered over their career, with particular focus on bridging biomedical perspectives with narratives regarding organizational, community, and population health and well-being. Understanding the current continuum of care settings, professional team roles, and health policy sets the foundation for this course. Professional behavior and ethics will be introduced. Preparation of leadership skills and an entrepreneurial approach to practice will be introduced. Partnering with community agencies to meet the unmet needs of those we serve and to open up new potential markets will be explored.

### OT 5630 FUNDAMENTALS OF PROFESSIONAL COMMUNICATION (3)

The ability to communicate and work with individuals and groups are essential skills for an occupational therapist. Effective practitioners employ therapeutic use of self, activity analysis, behavioral management, and group leadership skills to effect change in those served. Concepts of self-management and basic tenets of learning theories will be explored and applied to various populations served. Occupational therapists must be able to meet the psychosocial needs of all clients across the continuum of care.

### OT 5452 FUNDAMENTALS OF EVIDENCE-BASED PRACTICE (3)

Through critical reading and analysis of professional scientific literature, students build a foundation for life-long learning and evidence-based clinical practice. Students will be introduced to measurement principles, learn qualitative and quantitative analysis, and apply concepts learned to designing single case studies for clients served. Evaluation is at the core of evidence based practice: Interactions with clients

are dependent on the ability to measure therapeutic effect.

#### OT 5315 TOOLBOX TO SUPPORT PROFESSIONAL PRACTICE (3)

This course serves as an introduction to the essential skills required of therapists in contemporary clinical practice. Students will be introduced to resources supporting professional practice and will learn and apply a variety of skills including transfers, documentation, goal-writing, common precautions, infection control, monitoring of vital signs, basic splinting techniques, chart reading, orientation to residential care environments, fundamentals of activity analysis, and searching relevant literature to facilitate evidence-based practice.

#### OT 5120 CONTEMPORARY ISSUES IN OT PRACTICE I (1)

This first of a series of three seminar courses provides students with the opportunity to explore current, emerging, and future trends in OT practice. Students will utilize the most recent research and policy information to critically examine and discuss potential developments in OT practice, including new areas of practice such as habilitation and telemedicine, effects of legislation and novel technologies, and a focus on community and population health, participation, and well-being.

#### OT 5782 NEUROSCIENCE PRINCIPLES OF PERFORMANCE I (3)

In this first of a two-course sequence, students learn how the brain and nervous system support the sensory, perceptual, cognitive, emotional, and physiological capacity of individuals as they perform activities of daily life. Emphasis is placed on sensory processing, motor processing, cognitive performance, learning and memory, and communication. Students will also learn about specific neurological conditions commonly encountered in clinical practice.

#### OT 5762 BODY STRUCTURES SUPPORTING DAILY FUNCTION I (3)

Students engage in the study of the contribution of the structure, function, and development of body systems that support daily activity. This semester emphasizes anatomical systems and neuromusculoskeletal substrates for activity, joint integrity, strength and cardiopulmonary function.

#### OT 5770 FUNDAMENTALS OF ASSESSMENT I (3)

The course runs concurrently with Body Structures Supporting Daily Function and Neuroscience Principles of Performance. In this first of a two-course sequence, students apply anatomical and kinesiological principles to occupational performance through assessment of anatomical structures and physiological health. Students learn how to identify sensory, cognitive, perceptual, and emotional performance capacities of individuals by focusing on neuroanatomical and neuro-physiological substrates of sensory, motor, arousal, cognitive, motivational and emotional systems. The students connect the neuroscience of the physiological, neurobehavioral, cognitive and psychological systems to the motor, process and communication performance skills and performance patterns that support occupational performance. Additionally, selected chronic diseases, disorders and conditions will be introduced. Etiology, pathology, clinical course, prognosis and medical management will inform the evaluation process as it impacts occupational performance. Students will build clinical reasoning for core OT practice skills including assessment of person, occupation and environment factors, activity analysis and activity gradation, observation, administering and interpreting assessments, building measurement models, and documenting the evaluation process. Evidence based practice is emphasized through exploration of the scientific and medical literature. Students will apply measurement principles and skills in selection, administration and interpretation of assessments through case studies, laboratory and fieldwork or in-context experiences.

#### OT 5163 ENVIRONMENTAL FACTORS FACILITATING PERFORMANCE AND PARTICIPATION I (2)

In this first of a two-course sequence, students gain in- depth understanding of the psychological, social,

political, physical, and cultural elements of the environment that influence occupational performance, participation, and health. Disability and chronic health conditions as consequences of environmental barriers and the relationship between the person and environments as both change across the life span will be discussed. Assessment and intervention strategies that promote health and maximize participation in daily activities will be examined in home, school, workplace, and other community settings. Students are provided with opportunities to practice and demonstrate skills acquired through community based experiences including a group community consultation project.

#### OT 5125 CONTEMPORARY ISSUES IN OT PRACTICE II (1)

This second of a series of three seminar courses provides students with the opportunity to explore current, emerging, and future trends in OT practice. Students will utilize the most recent research and policy information to critically examine and discuss potential developments in OT practice, including new areas of practice such as habilitation and telemedicine, effects of legislation and novel technologies, and a focus on community and population health, participation, and well-being.

#### OT 5610 FIELDWORK I (1)

This is the first course in a series that emphasizes the growth of the student as a professional. Students will build on the electronic professional portfolio developed in the fall semester and participate in self-directed learning experiences to enhance personal growth and professional competence. An intensive one week, 40 hour, supervised fieldwork experience in a clinical or community setting allows the student to practice the skills learned in the classroom.

OT 601 APPLIED CLINICAL RESEARCH I (3) is the first of a four course sequence offering the students opportunities to: 1) perform a systematic investigation, 2) develop a research project, and 3) perform testing and evaluation. The class is designed to develop or contribute to generalizable knowledge of occupational therapy or occupational performance. Activities that meet this definition include ongoing work in the laboratories of the faculty, controlled clinical trials, pilot studies to determine feasibility of future studies, demonstrations and community programs that may lead to new services or policy demonstrations. In the sequence, the student will work on his/her research project. The project will include collecting, processing, and analyzing data. The student will also begin to write about their work. Students may observe practitioners who work with the population related to their research projects.

OT 605 APPLIED CLINICAL PRACTICE I (3) is the first of a four course sequence offering students opportunities to: 1) enhance clinical skills, 2) support evidence based practice, 3) provide leadership opportunities, and 4) allow specialization in an area of clinical practice. The opportunities will present themselves by associating with clinics or other OT related facilities in the greater St. Louis area. The course is a self-directed learning experience under the guidance of an OT clinical faculty member and a community practitioner. The student will be guided by a clinical mentor and work on a clinical project related to the needs of the facility. A final report and presentation will be made and the end of the sequence.

#### OT 5783 NEUROSCIENCE PRINCIPLES OF PERFORMANCE II (1)

In this second of a two-course-sequence, students learn how the brain and nervous system support the sensory, perceptual, cognitive, emotional, and physiological capacity of individuals as they perform activities of daily life. Emphasis is placed on sensory processing, motor processing, cognitive performance, learning and memory, and communication. Students will also learn about specific neurological conditions commonly encountered in clinical practice.

#### OT 5763 BODY STRUCTURES SUPPORTING DAILY FUNCTION II (1)

Students examine the complexity of movement and the integration of functions that are necessary to

enable participation in everyday activities. Biomechanical principles are presented and applied to the body structures, allowing students to understand the kinesiological underpinnings of occupational performance.

#### OT 5771 FUNDAMENTALS OF ASSESSMENT II (2)

The course runs concurrently with Body Structures Supporting Daily Function and Neuroscience Principles of Performance. In this second of a two-course-sequence, students apply anatomical and kinesiological principles to occupational performance through assessment of anatomical structures and physiological health. Students learn how to identify sensory, cognitive, perceptual, and emotional performance capacities of individuals by focusing on neuroanatomical and neuro-physiological substrates of sensory, motor, arousal, cognitive, motivational and emotional systems. The students connect the neuroscience of the physiological, neurobehavioral, cognitive and psychological systems to the motor, process and communication performance skills and performance patterns that support occupational performance. Additionally, selected chronic diseases, disorders and conditions will be introduced. Etiology, pathology, clinical course, prognosis and medical management will inform the evaluation process as it impacts occupational performance. Students will build clinical reasoning for core OT practice skills including assessment of person, occupation and environment factors, activity analysis and activity gradation, observation, administering and interpreting assessments, building measurement models, and documenting the evaluation process. Evidence based practice is emphasized through exploration of the scientific and medical literature. Students will apply measurement principles and skills in selection, administration and interpretation of assessments through case studies, laboratory and fieldwork or in-context experiences.

#### OT 5164 ENVIRONMENTAL FACTORS FACILITATING PERFORMANCE AND PARTICIPATION II (1)

In this second of a two-course sequence, students gain in-depth understanding of the psychological, social, political, physical, and cultural elements of the environment that influence occupational performance, participation, and health. Disability and chronic health conditions as consequences of environmental barriers and the relationship between the person and environments as both change across the life span will be discussed. Assessment and intervention strategies that promote health and maximize participation in daily activities will be examined in home, school, workplace, and other community settings. Students are provided with opportunities to practice and demonstrate skills acquired through community based experiences including a group community consultation project.

#### OT 5130 CONTEMPORARY ISSUES IN OT PRACTICE III (1)

This third of a series of three seminar courses provides students with the opportunity to explore current, emerging, and future trends in OT practice. Students will utilize the most recent research and policy information to critically examine and discuss potential developments in OT practice, including new areas of practice such as habilitation and telemedicine, effects of legislation and novel technologies, and a focus on community and population health, participation, and well-being.

OT 602 APPLIED CLINICAL RESEARCH II (2) is the second of a four course sequence offering the students opportunities to: 1) perform a systematic investigation, 2) develop a research project, and 3) perform testing and evaluation. The class is designed to develop or contribute to generalizable knowledge of occupational therapy or occupational performance. Activities that meet this definition include ongoing work in the laboratories of the faculty, controlled clinical trials, pilot studies to determine feasibility of future studies, demonstrations and community programs that may lead to new services or policy demonstrations. In the sequence, the student will work on his/her research project. The project will include collecting, processing, and analyzing data. The student will also begin to write about their work. Students may observe practitioners who work with the population related to their research projects.

OT 606 APPLIED CLINICAL PRACTICE II (2) is the second of a four course sequence offering students opportunities to: 1) enhance clinical skills, 2) support evidence based practice, 3) provide leadership opportunities, and 4) allow specialization in an area of clinical practice. The opportunities will present themselves by associating with clinics or other OT related facilities in the greater St. Louis area. The course is a self-directed learning experience under the guidance of an OT clinical faculty member and a community practitioner. The student will be guided by a clinical mentor and work on a clinical project related to the needs of the facility. A final report and presentation will be made and the end of the sequence.

#### OT 5825 INTERVENTIONS SUPPORTING RECOVERY AND PARTICIPATION OF INDIVIDUALS WITH SENSORIMOTOR CHALLENGES (3)

Sensorimotor deficits and delays impact daily life and participation. Throughout this course, students will explore how to utilize assessment results to implement theory driven evidence-based treatment plans to improve occupational performance and participation in daily life. Lifespan and practice setting issues from birth to older adults will be addressed in relation to sensory and motor deficits and delays. Students will utilize a variety of hands on, case-based, and self-directed learning activities to develop clinical skills.

#### OT 5835 INTERVENTIONS SUPPORTING RECOVERY AND PARTICIPATION OF INDIVIDUALS WITH COGNITIVE AND LEARNING CHALLENGES (3)

This 3 credit course is designed to provide the foundation skills for evidence based intervention for individuals with cognitive impairment across the lifespan. Students will explore various intervention approaches and therapeutic techniques for individuals faced with cognitive challenges arising from developmental issues, injuries, and/or disease processes focused on increasing independence and participation in daily life activities. Lectures, case studies, lab experiences, and client treatments in the community will provide the foundation for the learning experiences. Related skills in documentation, goal setting, and ethical issues which may arise will be incorporated into classroom discussions and assignments.

#### OT 5380 HEALTH PROMOTION, PARTICIPATION AND WELLNESS FOR PERSONS WITH CHRONIC DISEASE (3)

The impact of chronic disease on daily participation affects health-related quality of life and well-being. Students will study health promotion and preventive individual and group models of service delivery for community-dwelling people. Using Healthy People 2020 topic areas, students will explore theory-driven, evidence-based health education solutions for consumers with chronic conditions to strengthen their community participation. Students will discover therapeutic interventions to empower people to self-manage their conditions and connect with community resources for health promotion, prevention and wellness.

#### OT 5801 CASE BASED LEARNING I (2)

In this first course of a two semester sequence, students are engaged in learning experiences that includes divergent case method, inquiry learning, and problem-based learning. Using a self-directed learning process, clinical reasoning and group process skills, students explore practice problems and apply specific occupational therapy evaluations and intervention techniques for persons of all ages and disability categories. The context of cases are integrated with material covered concurrently in the Interventions courses and focus on direct clinical treatment interventions.

#### OT 5615 FIELDWORK I (1)

This is the second course in a series that emphasizes the growth of the student as a professional. Students will continue to build on their electronic professional portfolio and participate in self-directed learning experiences to enhance personal growth and professional competence. An intensive one week,

40 hour, supervised fieldwork experience in a clinical or community setting allows the student to practice the skills learned in the classroom.

OT 603 APPLIED CLINICAL RESEARCH III (3) is the third of a four course sequence offering the students opportunities to: 1) perform a systematic investigation, 2) develop a research project, and 3) perform testing and evaluation. The class is designed to develop or contribute to generalizable knowledge of occupational therapy or occupational performance. Activities that meet this definition include ongoing work in the laboratories of the faculty, controlled clinical trials, pilot studies to determine feasibility of future studies, demonstrations and community programs that may lead to new services or policy demonstrations. In the sequence, the student will work on his/her research project. The project will include collecting, processing, and analyzing data. The student will also begin to write about their work. Students may observe practitioners who work with the population related to their research projects.

OT 607 APPLIED CLINICAL PRACTICE III (3) is the third of a four course sequence offering students opportunities to: 1) enhance clinical skills, 2) support evidence based practice, 3) provide leadership opportunities, and 4) allow specialization in an area of clinical practice. Students will have an opportunity to develop occupation-based programs for clinics or other community agencies in the St. Louis region. The course is a collaborative self-directed service learning experience under the guidance of an OT faculty member and a community partner. The student will be guided by the needs of the agency in helping to build the agency's capacity.

#### OT 5220 SUPPORTING PARTICIPATION WITH TECHNOLOGY AND ENVIRONMENTAL INTERVENTIONS (3)

This course introduces technology and environment related interventions to preserve, augment or improve social, emotional, physical and academic well being. Intervention strategies that promote health and maximize participation in daily activities for people with chronic conditions and disabilities will be examined in home, school, workplace, and community settings. The tools and interventions will include descriptions of special equipment (i.e. self-care tools and compensatory techniques), assistive technology devices (i.e. computer access, mobility devices, augmentative communication systems, environmental control units, vehicles adaptations and recreational equipment), and environment adaptations and modifications (i.e. universal design, home and work modifications). Lectures will focus on the ethical, legislative, funding, assessment and psychosocial issues. Labs will provide an opportunity for hands on learning experiences with a broad range of tools in context specific personal, community and organizational settings.

#### OT 5845 INTERVENTIONS SUPPORTING RECOVERY AND PARTICIPATION OF INDIVIDUALS WITH PSYCHOSOCIAL CHALLENGES(3)

#### OT 5285 PROMOTING POPULATION HEALTH THROUGH COMMUNITY PARTNERSHIPS (2)

This course offers a service learning experience through partnership with local community agencies to enhance population health. Mentored teams collaborate with personnel in community non-profit agencies. Students provide a capacity-building service through a needs assessment and a written program plan with an evaluation component. The intent is to enhance sustainability of the organizations' programs. The target population served by the organization benefits from expansion and/or enhancement of services. Examples of programs include: parent education, youth skill development, worker health advocacy, neighborhood/ residential services, and employee/ volunteer programs.

#### OT 5093 MANAGEMENT IN A CHANGING PRACTICE ENVIRONMENT (3)

This course applies management and organizational principles to occupational therapy services in current and potential practice environments, and entrepreneurial opportunities. Through discussions with

business professionals, and case studies, this course highlights organizational, managerial, marketing, financial, regulatory, and funding influences on the development, delivery and evaluation of OT practice. Business plans are developed through case studies. Fieldtrips and interactions with managers and corporate leaders allow students the opportunity for experiential learning.

#### OT 5802 CASE BASED LEARNING II (2)

In this second of a two-course sequence, students are engaged in a learning process that includes divergent case method, inquiry learning, self-directed learning, problem-based learning, clinical reasoning and group process skills. Students explore practice problems, and apply specific occupational therapy evaluations and intervention techniques for persons of all ages and disability categories within the context of cases integrated with material covered concurrently in the Interventions courses. The focus is on direct clinical treatment interventions. This is a small seminar class with 8-9 students and a faculty mentor.

#### OT 5620 PREPARATION FOR PROFESSIONAL PRACTICE (1)

This course emphasizes the growth of the student as a professional. Topics include the preparation for national certification and state requirements for credentialing, standards of practice, ethical behaviors and continuing competence. Students will prepare a personal marketing package and participate in self-directed learning experiences. Preparation for the students' fieldwork Level II and Apprenticeships will be emphasized in this course. Topics include the FWII evaluation process, completing FWII prerequisites, communicating with FW Educators and other professionals.

OT 604 APPLIED CLINICAL RESEARCH IV (2) is the fourth of a four course sequence offering the students opportunities to: 1) perform a systematic investigation, 2) develop a research project, and 3) perform testing and evaluation. The class is designed to develop or contribute to generalizable knowledge of occupational therapy or occupational performance. Activities that meet this definition include ongoing work in the laboratories of the faculty, controlled clinical trials, pilot studies to determine feasibility of future studies, demonstrations and community programs that may lead to new services or policy demonstrations. In the sequence, the student will work on his/her research project. The project will include collecting, processing, and analyzing data. The student will also begin to write about their work. Students may observe practitioners who work with the population related to their research projects.

OT 608 APPLIED CLINICAL PRACTICE IV (2) is the fourth of a four course sequence offering students opportunities to: 1) enhance clinical skills, 2) support evidence based practice, 3) provide leadership opportunities, and 4) allow specialization in an area of clinical practice. The opportunities will present themselves by associating with clinics or other OT related facilities in the greater St. Louis area. The course is a self-directed learning experience under the guidance of an OT clinical faculty member and a community practitioner. The student will be guided by a clinical mentor and work on a clinical project related to the needs of the facility. A final report and presentation will be made and the end of the sequence.

#### M01 593A FIELDWORK II

Instructor: Jeanenne Dallas

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.

#### M01 593B FIELDWORK II



Instructor: Jeanenne Dallas

Provides a second fieldwork experience 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. Because this is the second of two fieldwork experiences, students are expected to build on their first fieldwork and assume increasing responsibilities related to patient or client care. The fieldwork experience is designed to progressively build competencies in clinical reasoning, professionalism and entry level skills. Duration is 12 weeks.

#### M01 595 INDEPENDENT STUDY

Instructor: Varied

Active participation in research activities with program faculty. A written plan of study agreed upon by faculty and student.

### OTD Only Courses

#### M01 630 SEMINAR IN PROPOSAL DEVELOPMENT AND APPLIED CLINICAL RESEARCH

Instructor: Jack Engsborg

This course is designed to prepare the OTD student to write a research proposal supporting the identified direction of their clinical doctorate work under the supervision of their graduate faculty mentor. Using a seminar format, students will support each other in this endeavor. After a systematic review of interventions, proposals are developed that may lead to policy work that supportS clinical services, development or piloting of clinical interventions, developing a program evaluation proposal, writing a business plan to support funding of research, or writing a grant. In all cases the student will refine a problem statement and will have a clear understanding of the research design and methods that will develop into the research proposal.

#### M01 750 DIRECTED PRACTICE RESEARCH I

Instructor: Varied

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 OT630, the Proposal Seminar course.

#### M01 751 DIRECTED PRACTICE/RESEARCH II

Instructor: Varied

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.

#### M01 752 DIRECTED PRACTICE/RESEARCH III

Instructor: Varied

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.

#### M01 760A OT PRACTICE SEMINAR I

Instructor: Carolyn Baum

The seminar will focus on the World Health Organization's International Classification of Function, Health, and Disability. This class focuses on the relationship of person factors to occupation. Students engage in critical readings and discussion as they construct a model that will support their area of practice.

#### M01 760B OT PRACTICE SEMINAR II

Instructor: Carolyn Baum

The seminar will focus on World Health Organization's International Classification of Function, Health, and Disability. This class focuses on the relationship of environment to occupation. Students engage in critical readings and discussion as they construct a model that will support their area of practice.

#### M01 762 SEMINAR IN EDUCATION STRATEGIES

Instructor: Christine Berg

This seminar offers an opportunity for students to reflect on and examine concurrent occupational therapy teaching assistantship (TA) experiences. Attention is given to teaching and learning theories underlying practice, teaching tools and strategies, and situated and distributed learning. Activities will include critical reading, journaling, Washington University Teaching Center Workshops and shared critical incident reflection.

#### M01 793C FIELDWORK III — APPRENTICESHIP

Instructor: Varied

Provides a customized fieldwork 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 and their doctoral chair. Duration is 12 weeks.

## Occupational Therapy Faculty

**Parul Bakhshi**

Research Assistant Professor of Occupational Therapy

**Peggy Barco, MED**

Instructor in Occupational Therapy

**M. Carolyn Baum, MA, PHD**

Professor of Occupational Therapy

Elias Michael Executive Director of the Program in Occupational Therapy

**Christine R. Berg, BSOT, MS, PHD**

Assistant Professor of Occupational Therapy

**Anjali Maruti Borade, MD**

Associate Professor of Occupational Therapy

**Ellen F Binder, MD**

Associate Professor of Occupational Therapy

Rebecca L Birkenmeier, MS

Research Assistant Professor of Occupational Therapy

Marghuretta Dakota Bland, DPT, MS

Assistant Professor of Occupational Therapy

Alexandre Carter, PHD, MD

Assistant Professor of Occupational Therapy

Lisa Tabor Connor, MA, PHD

Assistant Professor of Occupational Therapy

Ann Marie Dale, PHD

Research Assistant Professor of Occupational Therapy

Jeanenne M Dallas, MA

Instructor in Occupational Therapy

Michael N Diringer, MA, MD

Professor of Occupational Therapy

Alexander W Dromerick, MD

Adjunct Associate Professor of Occupational Therapy

Dorothy F Edwards, PHD

Adjunct Associate Professor of Occupational Therapy

Jack R. Engsborg, MS, MS1, PHD

Professor of Occupational Therapy

Bradley A Evanoff, MD, M PH

Professor of Occupational Therapy

Susan M Fitzpatrick, PHD

Adjunct Associate Professor of Occupational Therapy

David B Gray, MS, PHD

Professor of Occupational Therapy

Meredith P Gronski, OTD

Instructor in Occupational Therapy

Linda Ann Hunt

Adjunct Associate Professor of Occupational Therapy

William Edward Janes, OTD, MS

Instructor in Occupational Therapy

Victoria Kaskutas, MHS, OTD

Assistant Professor of Occupational Therapy

Allison A King, MD

Assistant Professor of Occupational Therapy

Kathleen Marie Kniepmann, DED, M PH

Instructor in Occupational Therapy

Catherine Eckels Lang, MS, PHD

Associate Professor of Occupational Therapy

Huiping C Lieser, MA, PHD

Research Instructor in Occupational Therapy (Pending Dean's Approval)

Susan E Mackinnon, MD

Professor of Occupational Therapy

Marian A Minor, M PH, PHD

Research Associate Professor of Occupational Therapy

Kerri A Morgan, MS

Instructor in Occupational Therapy

John Carl Morris, MD

Professor of Occupational Therapy

John Gail Neely, MD

Professor of Occupational Therapy

Monica S Perlmutter, BSOT, MA, OTD

Asst Prof of Occupational Therapy

Joel S Perlmutter, MD

Professor of Occupational Therapy

Jay Francis Piccirillo, MD

Professor of Occupational Therapy

Roberta G Pineda, MHS, PHS

Assistant Professor of Occupational Therapy

Timothy L Shurtleff, MS

Instructor in Occupational Therapy

Susan L Stark, MS, PHD

Assistant Professor of Occupational Therapy

Steven D Taff, MS, PHD

Instructor in Occupational Therapy

Erin Foster Voegtli, OTD

Assistant Professor of Occupational Therapy

Timothy J Wolf, OTD

Assistant Professor of Occupational Therapy

## Pharmacy Student Research Training Program

A key academic institution in our biomedical and clinical health center environment is the St. Louis College of Pharmacy. It is one of the premier institutions in the country for the teaching and training of pharmacists. The College's extensive pharmaceutical sciences curriculum has generated interest by a number of their students in laboratory biomedical research. Students beyond their fourth year at St. Louis College of Pharmacy who demonstrate interest in science and research, and are recommended by the College faculty, will have an opportunity to complete 10- to 14-week fellowships in any of the laboratories at the School of Medicine. Students can, with consent of their advisors at the College of Pharmacy and the laboratory principal investigator, extend their stay. This joint research collaboration should encourage those students in the program to pursue graduate degrees in the Division of Biomedical Sciences at the School of Medicine.

# 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 three formal curricula that collectively foster opportunities for lifelong learning and comprehensive career development.

## The Professional Doctor of Physical Therapy

The professional curriculum is an intensive three-year experience leading to the degree of Doctor of Physical Therapy. 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, this curriculum provides students with the scientific expertise, critical thinking skills and interpersonal communication necessary for effective clinical practice, comprehensive treatment design, patient advocacy, patient education and health promotion. Applicants for admission must have completed 1) a bachelor's degree at an accredited institution, and 2) prerequisite courses in biology, chemistry, physics, mathematics, anatomy, physiology, English, psychology, social sciences and humanities, 3) have a minimum math/science, core prerequisites and science GPA of 3.0 and 4) the Graduate Record Examination.

## The Postprofessional Doctor of Physical Therapy

The postprofessional clinical doctorate curriculum offers practicing physical therapists an opportunity to enhance their roles as diagnosticians, evidence-based practitioners and educators for an advanced model of practice. Designed to refine the practicing physical therapist's scientific and clinical expertise, the postprofessional program also leads to a Doctor of Physical Therapy. Applicants for admission must 1) have graduated from an accredited professional physical therapy program, 2) have attained acceptable grade-point averages in previous academic endeavors, 3) have achieved acceptable scores on the Graduate Record Examination and 4) be licensed to practice in the United States.

## Doctor of Philosophy 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.

## Tuition

Professional curriculum: \$17,052 per semester

Post-professional curriculum: \$320 per credit

Doctoral curriculum: \$22,050 per semester

## Further Information

Further information, including complete admissions instructions and program descriptions, may be obtained by direct correspondence with the Program in Physical Therapy:

Program in Physical Therapy  
Washington University School of Medicine  
Campus Box 8502  
4444 Forest Park Ave.  
St. Louis, MO 63108-2212.  
Phone: (314) 286-1400  
Fax: (314) 286-1410  
Email: [ptprog@wustl.edu](mailto:ptprog@wustl.edu)  
Web site: [pt.wustl.edu](http://pt.wustl.edu)

## Courses

### Courses - Doctor of Physical Therapy Degree

#### Semester 1

M02 601 DIAGNOSIS AND EVIDENCE ANALYSIS IN PT I

Department: Program in Physical Therapy

Course Master: Nancy Bloom, PT, DPT, MSOT

Credit Hours: 2The program is located in the Division of Biostatistics, on the third floor of Shriners Building (706 S. Euclid Ave. at Clayton Road), Rooms 3301-3312. Includes processes required for effective clinical decision-making such as the use of models for classifying patient problems, decision trees, diagnostic classification systems, patient interviewing, health histories and outcome measures. Patient cases will be used to practice clinical decision-making skills. An introduction to basic research methods and systematic review of the literature.

M02 602 PROFESSIONAL ISSUES AND SKILL DEVELOPMENT I

Department: Program in Physical Therapy

Course Masters: Jennifer Stith, PT, PhD, LCSW, and Suzanne Cornbleet, PT, DPT

Credit Hours: 3

Semester: 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. Interpersonal skills and issues related to human diversity will be addressed.

Students will complete a personal and family health history. Students will learn and practice using principles of patient teaching, negotiation and team building. Students will spend 80 hours at clinical sites.

#### M02 603 ESSENTIAL SKILLS IN PHYSICAL THERAPY I

Department: Program in Physical Therapy

Course Master: Susan Strecker, PT, DPT

Credit Hours: 4

Semester: 1

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, infection control. Skill and safety in positioning, draping and managing wheelchairs and other equipment during patient-care activities such as walking and transfers will be developed.

#### M02 604 CELLS, SYSTEMS AND DISEASE I

Department: Program in Physical Therapy

Course Master: Ruth Clark, PT, PhD

Credit Hours: 4

Semester: 1

The first of a two-semester course, this course focuses on a comprehensive review of normal physiology of the organ systems: musculoskeletal, cardiovascular, respiratory, renal, gastrointestinal, endocrine, immune and digestive. Regulatory mechanisms to maintain homeostasis will be emphasized throughout the course. Students will be introduced to pharmacology and to the relevance of clinical laboratory values. Patient case studies will be used to integrate information. Introduction to the medical management will be provided for some diseases.

#### M02 605 NEUROSCIENCE

Department: Program in Physical Therapy

Course Master: Gammon Earhart, PT, PhD

Credit Hours: 3

Semester: 1

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.

#### M02 606 KINESIOLOGY I

Department: Program in Physical Therapy

Course Master: Marcie Harris Hayes, PT, DPT, MSCI, OCS

Credit Hours: 3

Semester: 1

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.



## Semester 2

### M02 610 CELLS, SYSTEMS AND DISEASE II

Department: Program in Physical Therapy

Course Master: Ruth Clark, PT, PhD

Credit Hours: 4

Semester: 2

A continuation of the first semester. Physicians will discuss medical management of selected diseases including the etiology, diagnosis, medical management and prognosis of medical diseases frequently encountered in the practice of physical therapy. Three areas of clinical competency will be emphasized through assigned readings and case studies: 1) screening for medical referral including emergent medical referral; 2) clinical decision skills pertaining to pathological implications of underlying disease processes and their relevance to guiding physical therapy intervention; 3) clinical decision skills pertaining to implications of medical management and their relevance to guiding physical therapy activity and exercise prescription.

### M02 611 HUMAN ANATOMY

Department: Program in Physical Therapy

Course Master: Stacy Tylka, PT, DPT, WCS, CLT

Credit Hours: 5

Semester: 2

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.

### M02 612 DIAGNOSIS AND EVIDENCE ANALYSIS IN PT II

Department: Program in Physical Therapy

Course Master: Barbara Norton, PT, PhD, FAPTA

Credit Hours: 2

Semester: 2

Continuation of research methods from the first semester. Includes descriptive, experimental and quasi-experimental research designs and statistics, hypothesis testing, continuation of measurement issues, hierarchy of credibility for rating research articles.

### M02 613 KINESIOLOGY II

Department: Program in Physical Therapy

Course Master: Renee Ivens, PT, DPT

Credit Hours: 5

Semester: 2

Emphasizes principles of maturation and motor learning relative to the application of biomechanical principles to the analysis of human movement. 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.

### M02 614 DIAGNOSIS AND MANAGEMENT OF MUSCULOSKELETAL CONDITIONS IN PT I

Department: Program in Physical Therapy

Course Masters: Suzanne Cornbleet, PT, DPT, and Gregory Holtzman, PT, DPT

Credit Hours: 3

Semester: 2

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.

#### M02 615 PROFESSIONAL ISSUES AND SKILL DEVELOPMENT II

Department: Program in Physical Therapy

Course Master: Gregory Holtzman, PT, DPT

Credit Hours: 0.5

Semester: 2

Students will be assigned to part-time clinical experiences for 40 hours to allow practice of acquired skills in patient care, documentation and communication. Additional class time allows students to role play a clinical situation involving a patient examination and supervision by a clinical instructor.

#### M02 691 CLINICAL EXPERIENCE I (8 WEEKS)

Department: Program in Physical Therapy

Course Master: Tamara Burlis, PT, DPT, CCS

Credit Hours: 4

Semester: 2

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.

### Semester 3

#### M02 621 EXERCISE PHYSIOLOGY

Department: Program in Physical Therapy

Course Masters: Susan Racette, PhD, and David Sinacore, PT, PhD, FAPTA

Credit Hours: 3

Semester: 3

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 PT.

#### M02 622 DIAGNOSIS AND MANAGEMENT OF CARDIOPULMONARY CONDITIONS IN PT

Department: Program in Physical Therapy

Course Masters: Tamara Burlis, PT, DPT, CCS, and Ethel Frese, PT, DPT

Credit Hours: 3

Semester: 3

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.

#### M02 623 ORTHOPEDIC MEDICINE

Department: Program in Physical Therapy

Course Master: Renee Ivens, PT, DPT

Credit Hours: 2

Semester: 3

Physician lectures will provide students with information on surgical and nonsurgical procedures and post-operative management of patients with orthopedic 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.

#### M02 624 DIAGNOSIS AND MANAGEMENT OF MUSCULOSKELETAL CONDITIONS IN PT II

Department: Program in Physical Therapy

Course Masters: Mary Kate McDonnell, PT, DPT, OCS and Judith Gelber, PT, DPT

Credit Hours: 3

Semester: 3

Students will acquire the skills needed to manage and prevent movement-related musculoskeletal problems of the spine, hip, knee and shoulder. 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.

#### M02 625 NEUROLOGY MEDICINE

Department: Program in Physical Therapy

Course Master: Brendan Tanner, PT, DPT

Credit Hours: 2

Semester: 3

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 their natural progression, and management of selected conditions to prepare the student to use this information in Diagnosis and Management of Neuromuscular Conditions in PT. Students attend class with occupational therapy students and work independently to meet the objectives of the course.

#### M02 627 ESSENTIAL CLINICAL SKILLS IN PT II

Department: Program in Physical Therapy

Course Masters: Tracy Spitznagle, PT, DPT, WCS and Gregory Holtzman, PT, DPT

Credit Hours: 3

Semester: 3

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.

#### M02 628 CASE INTEGRATION LAB I

Department: Program in Physical Therapy

Course Masters: Cheryl Caldwell, PT, DPT, CHT and Patricia McGee, PT, DPT, PCS

Credit Hours: 1

Semester: 3

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. Students participate in faculty-facilitated small groups to discuss their own patient cases and to develop skill in asking clinical questions, using the literature to support, practice and write a modified case report.

#### M02 629 DIAGNOSIS AND MANAGEMENT OF NEUROMUSCULAR CONDITIONS IN PT I

Department: Program in Physical Therapy

Course Masters: Beth Crowner, PT, DPT, NCS, MPPA, and Susan Strecker, PT, DPT

Credit Hours: 4

Semester: 3

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.

#### M02 604 CLINICAL EXPERIENCE II (8 WEEKS)

Department: Program in Physical Therapy

Course Master: Tamara Burlis, PT, DPT, CCS

Credit Hours: 4

Semester: 3

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.

## Semester 4

#### M02 626 MODERATORS OF HEALTH, WELLNESS AND REHABILITATION

Department: Program in Physical Therapy

Course Master: Jennifer Stith, PT, PhD, LCSW

Credit Hours: 3

Semester: 4

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.

#### M02 635 PROFESSIONAL ISSUES AND SKILL DEVELOPMENT III

Department: Program in Physical Therapy

Course Master: Jennifer Stith, PT, PhD, LCSW

Credit Hours: 3

Semester: 4

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 résumés and begin career planning.

#### M02 636 DIAGNOSIS AND MANAGEMENT OF GENERAL MEDICAL CONDITIONS IN PT

Department: Program in Physical Therapy

Course Master: Tamara Burlis, PT, DPT, CCS and Traci Norris, PT

Credit Hours: 3

Semester: 4

Students will acquire the skills needed to manage movement-related problems in patients with diabetes, burns, arthritis, wounds, amputation, obesity, oncological problems, incontinence, pregnancy, pain, genetic conditions and orthotic needs. Students will become familiar with care in both the neonatology unit and emergency room. 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.

#### M02 638 DIAGNOSIS AND MANAGEMENT OF MUSCULOSKELETAL CONDITIONS IN PT III

Department: Program in Physical Therapy

Course Master: Gregory Holtzman, PT, DPT

Credit Hours: 3

Semester: 4

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.

#### M02 642 CASE INTEGRATION II

Department: Program in Physical Therapy

Course Masters: Beth Crowner, PT, DPT, NCS, MPPA, and Susan Strecker, PT, DPT

Credit Hours: 1

Semester: 4

Students will be updated on the use of movement-related diagnostic systems and hear a practice case from a faculty member. Using data on a patient studied during CE II, students will work in small groups with a faculty mentor to 1) orally present the case in five minutes using a rounds fashion; 2) develop a clinical question; 3) search the literature for 6-8 articles that will address the clinical question, summarizing the articles and completing a systematic review using matrix method; and 4) complete a modified case report.

#### M02 643 DIAGNOSIS AND MANAGEMENT OF NEUROMUSCULAR CONDITIONS IN PT II

Department: Program in Physical Therapy

Course Masters: Beth Crowner, PT, DPT, NCS, MPPA, and Susan Strecker, PT, DPT

Credit Hours: 4

Semester: 4

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.

#### M02 693 CLINICAL EXPERIENCE III (10 WEEKS)

Department: Program in Physical Therapy

Course Master: Tamara Burlis, PT, DPT, CCS

Credit Hours: 5

Semester: Summer

A 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.

#### M02 694 CLINICAL EXPERIENCE IV (12 WEEKS)

Department: Program in Physical Therapy

Course Master: Tamara Burlis, PT, DPT, CCS

Credit Hours: 6

Semester: Fall

A 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.

#### M02 650 DIAGNOSIS AND EVIDENCE ANALYSIS IN PT III

Department: Program in Physical Therapy

Course Masters: Nancy Bloom, PT, DPT, MSOT, and Tracy Spitznagle, PT, DPT, WCS

Credit Hours: 3

Semester: 5

Students will prepare written case reports based on patients seen during their clinical experiences. Students will defend the use of diagnostic classifications and integrate the literature to support their case. Students will practice selecting appropriate outcome measures, designing clinical research questions, and using data to make decisions about individual and group treatment. Students will apply concepts of reliability and validity to assess their measurements.

#### M02 651 ORGANIZATIONAL AND MANAGEMENT ISSUES

Department: Program in Physical Therapy

Course Master: Beth Crowner, PT, DPT, NCS, MPPA

Credit Hours: 3

Semester: 5

Dynamics of organizations and department 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.

## M02 652 ALTERNATIVE SKILLS AND PRACTICE ENVIRONMENTS

Department: Program in Physical Therapy

Course Master: Lynette Khoo-Summers, PT, DPT

Credit Hours: 3

Semester: 5

Physical therapy practice in work and community settings will be addressed. Special PT tests and the interpretation of other tests will be integrated into cases. Students also will be introduced to care in the ER, issues related to genetics and genomics and the importance of changes in medical care to PT. A unit on ergonomics is included. Alternative medicine and alternative PT practice (using an evidence-based practice approach) will be studied. PT topics may include craniosacral therapy, pilates, tai-chi, functional stabilization, therapeutic horsemanship, muscle energy, magnets and others. Student will learn about chiropractic, acupuncture, functional capacity evaluation and focus more on chronic pain. Students will also explore recreational options for disabled populations.

## M02 653 HEALTH, FITNESS AND PREVENTION

Department: Program in Physical Therapy

Course Master: Tamara Burlis, PT, DPT, CCS

Credit Hours: 3

Semester: 5

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.

## M02 654 CASE INTEGRATION LAB III

Department: Program in Physical Therapy

Course Masters: Mary Kate McDonnell, PT, DPT, OCS, and Suzanne Cornbleet, PT, DPT

Credit Hours: 3

Semester: 5

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.

## M02 655 PROFESSIONAL ISSUES AND SKILL DEVELOPMENT IV

Department: Program in Physical Therapy

Course Master: Tamara Burlis, PT, DPT, CCS

Credit Hours: 4

Semester: 5

Focus will be on the professional skills students need to function in entry-level practice in a variety of settings. Students will study licensure, participate in lobbying and a mock House of Delegates. Skills in serving as an expert witness, a leader, peer instructor and clinical instruction will be developed. Students will be expected to participate in a service project and activities of the APTA. Cultural and race issues will be actively explored.

Courses – Post-Professional Doctor of Physical Therapy Degree

#### M22 600 MUSCLE STRUCTURE, FUNCTION AND MUTABILITY

Department: Physical Therapy

Course Master: W. Todd Cade, PT, DPT

Credits: 3

Semester: Spring

The purpose of this course is to emphasize the importance of using information about muscle structure, function and mutability as a basis for understanding, explaining and predicting clinical phenomena. The course consists of a series of lecture/discussion sessions and written assignments. Each student will be required to complete two written examinations and to prepare an 8-10 page written paper.

#### M22 601 DEVELOPMENT, CONTROL AND ANALYSIS OF HUMAN MOVEMENT

Department: Physical Therapy

Course Master: Gammon Earhart, PT, PhD

Credits: 3

Semester: Spring

The purpose of this course is to expand the student's understanding of changes in movement patterns across the life span, the mechanisms underlying the control of human movement, the effects of neuropathological processes on the production and control of human movement, and some of the techniques and instrumentation used to analyze human movement. The course consists of a series of lecture/discussion sessions, student presentations and written assignments.

#### M22 620 CLINICAL IMPLICATIONS OF TISSUE MECHANICS

Department: Physical Therapy

Course Master: Michael Mueller, PT, PhD, FAPTA

Credits: 3

Semester: Fall

The focus of this course is on the presentation of a theoretical model based on tissue adaptation to physical stress that can be used to guide physical therapy practice and research. Other current theories and approaches will be presented and related to the "Physical Stress Theory." Students will be required to write a paper and present a case history, with emphasis on how their physical therapy evaluation and treatment relate to the theoretical model. Class format will be lecture, discussion and student presentations.

#### M22 640 DYNAMICS OF THE HEALTH-CARE SYSTEM

Department: Physical Therapy

Course Master: Susan Deusinger, PT, PhD, FAPTA

Credits: 3

Semester: Fall

The purpose of this course is to focus on the issues of organizational dynamics and culture, negotiation and conflict resolution within the health-care environment, blending the cultures of the clinical and academic environments, and establishing partnerships among patients and providers. Format is lecture, discussion, student presentation.

#### M22 710 ISSUES IN SCREENING AND MANAGEMENT FOR GENERAL MEDICAL CONDITIONS

Department: Physical Therapy

Course Master: Tammy Burlis, PT, DPT, CCS



Credits: 3  
Semester: Fall

The emphases of this course are on screening by physical therapists for the potential presence of medical conditions, examining the relationship between medical conditions, pharmacologic agents and diagnostic categories used to guide intervention by physical therapists and modeling collegial interactions between physicians and physical therapists. Format is lecture, discussion, student presentation.

#### M22 730 DIAGNOSIS AND MANAGEMENT FOR MUSCULOSKELETAL CONDITIONS: LOWER QUARTER

Department: Physical Therapy  
Course Master: Shirley Sahrman, PT, PhD, FAPTA  
Credits: 3  
Spring

The focus of this course is on the acquisition of knowledge and skill in a) making discipline-specific diagnoses related to the lower extremity as well as lumbar spine, and b) selecting diagnosis-specific treatment. As appropriate, region-specific screening concerns, diagnostic imaging and critical analysis of relevant research literature will be incorporated. Format is lecture, discussion, demonstration and lab. Students will be required to present patient case reports.

#### M22 740 DIAGNOSIS AND MANAGEMENT FOR MUSCULOSKELETAL CONDITIONS: UPPER QUARTER

Department: Physical Therapy  
Course Master: Shirley Sahrman, PT, PhD, FAPTA  
Credits: 3  
Semester: Spring

The focus of this course is on the acquisition of knowledge and skill in a) making discipline-specific diagnoses related to the upper extremity, as well as cervical and thoracic spine, and b) selecting diagnosis-specific treatment. As appropriate, region-specific screening concerns, diagnostic imaging and critical analysis of relevant research literature will be incorporated. Format is lecture, discussion, demonstration and lab. Students will be required to present patient case reports.

#### M22 800 EVIDENCE ANALYSIS AND SYNTHESIS SEMINAR

Department: Physical Therapy  
Course Master: Barb Norton, PT, PhD, FAPTA  
Credits: 3  
Semester: Fall

The purpose of this course is to promote the use of clinically-relevant evidence in everyday clinical practice. Emphasis will be placed on finding relevant research reports, critically assessing the credibility of each report, and summarizing the evidence across reports. Format is lecture, discussion, student presentation.

#### M22 810 CASE STUDY SEMINAR

Department: Physical Therapy  
Course Master: Shirley Sahrman, PT, PhD, FAPTA  
Credits: 3  
Semester: Fall

The primary purposes of this course are to a) provide students the opportunity to interact with faculty and classmates about patient cases, b) prepare students to conduct the type of comprehensive case study that is required for the Capstone Project and c) prepare students to report case studies in the format prescribed by Physical Therapy, Journal of the American Physical Therapy Association (PTJ). The course will include a) a series of class sessions devoted to examination, diagnosis and treatment of patients with various movement system diagnoses, b) class sessions focused on measurement of patient adherence (compliance) and outcomes, and c) a class session on the format for written case reports. Each student will be required to a) present and discuss patient cases informally during weekly patient discussion sessions, b) prepare a written case report of a patient and c) present an oral summary of their case report.

#### M22 820 CAPSTONE PROJECT

Department: Physical Therapy

Course Master: Faculty

Credits: 3-6

Semester: Fall and Spring

The capstone project offers students the opportunity to demonstrate attainment of the knowledge and skills addressed throughout the curriculum by developing a case-related, evidence-based treatise on a specific aspect of clinical practice under the supervision and guidance of a specific faculty member. Requirements include both a written report and an oral presentation. Students may not register for the capstone project until all other required course work has been completed successfully.

#### M22 900 TEACHING PRACTICUM

Department: Physical Therapy

Course Master: Ruth Clark, PT, PhD

Credits: 3

Semester: Fall and Spring

The teaching practicum provides an opportunity for the post-professional student 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. Students are expected to provide at least 6 hours of formal classroom instruction to include a minimum of 4 hours of lecture presentation to an appropriate educational audience within the profession of physical therapy.

#### M22 910 CLINICAL PRACTICUM

Department: Physical Therapy

Course Master: Faculty

Credits: 3-6

Semester: Fall and Spring

The clinical practicum offers students the opportunity to pursue a topic of special clinical interest under the supervision and guidance of a specific faculty member. Students may register for 1-6 credits of Clinical Practicum in a semester. A maximum of 6 units of Clinical Practicum may be credited toward the DPT degree. Each unit of credit for Clinical Practicum should reflect approximately 45 hours of work by the student.

#### M22 920 CLINICAL RESEARCH PRACTICUM

Department: Physical Therapy

Course Master: Faculty

Credits: 3-6  
Semester: Fall and Spring

The clinical research practicum offers students the opportunity to develop and implement a clinical research project under the supervision and guidance of a specific faculty member. Students may register for 1-6 credits of Clinical Research Practicum in a semester. A maximum of 6 units of Clinical Research Practicum may be credited toward the DPT degree. Each unit of credit for Clinical Research Practicum should reflect approximately 45 hours of work by the student.

M22 500 INDEPENDENT STUDY  
Department: Physical Therapy  
Course Master: Faculty  
Credits: 3-6  
Semester: Fall and Spring

Independent study offers students the opportunity to pursue a topic of special interest under the supervision and guidance of a specific faculty member. Students may register for 1-6 credits of Independent Study in a semester. A maximum of 6 units of Independent Study may be credited toward the DPT degree. Each unit of credit for Independent Study should reflect approximately 45 hours of work by the student.

M22 510 READINGS  
Department: Physical Therapy  
Course Master: Faculty  
Credits: 3-6  
Semester: Fall and Spring

The Readings course offers students the opportunity to pursue a topic of special interest under the supervision and guidance of a specific faculty member. Students may register for 1-6 credits of Readings in a semester. A maximum of 6 units of Readings may be credited toward the DPT degree. Each unit of credit for Readings should reflect approximately 45 hours of work by the student.

## Courses – PhD in Movement Science Program

L63 5110 INSTRUMENTATION THEORY AND APPLICATION I  
Department: Movement Science  
Course Master: Joe Klaesner, PhD  
Credit Hours: 4  
Semester: Fall

This course is designed for the student to have a greater understanding of computer hardware, software and the interaction between these two which makes the use of the computer so useful in research. Basic computer architecture and operating systems will be discussed in this class. The student will gain a basic understanding of software programming logic and structures. The student will use “C” to write several programs for the class. The students will also be exposed to software packages that may include LabView, Matlab, Visual-3D and Excel. The class is organized in a lecture/lab structure.

L63 5115 INSTRUMENTATION THEORY AND APPLICATION II  
Department: Movement Science  
Course Master: Joe Klaesner, PhD

Credit Hours: 3  
Semester: Spring

The main goal of this class is to make students comfortable in the identification of data acquisition equipment that is appropriate for their chosen research area. Instrumentation II is an introduction to electrical components and circuits and their role in the function of laboratory instrumentation. The student will be exposed to basic electronic design of filters, amplifiers and A/D sampling. Also included is exposure to selected pieces of laboratory instrumentation. The class is organized in a lecture/lab structure.

#### L63 5210 TEACHING PRACTICUM I

Department: Movement Science  
Course Master: Ruth Clark, PT, PhD  
Credit Hours: 2  
Semester: Fall and Spring

The teaching practicum provides an opportunity for the doctoral student 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. Students are expected to provide at least 6 hours of formal classroom instruction; to include a minimum of 4 hours of lecture presentation to an appropriate educational audience.

#### L63 5220 LAB PRACTICUM I

Department: Movement Science  
Course Master: Faculty  
Credit Hours: 1-2  
Semester: Fall and Spring

Supervised and focused laboratory research experience. Development of a specific portion of ongoing research by generating a project proposal and pilot data. Culminates with the production of a written report on the project.

#### L63 5230 LAB PRACTICUM II

Department: Movement Science  
Course Master: Faculty  
Credit Hours: 1-2  
Semester: Fall and Spring

Supervised and focused laboratory research experience. Development of a specific portion of ongoing research by generating a project proposal and pilot data. Culminates with the production of a written report on the project.

#### L63 5410 MOVEMENT SCIENCE I: BIOENERGETICS

Department: Movement Science  
Course Master: W. Todd Cade, PT, PhD  
Credit Hours: 3  
Semester: Spring

This didactic course is designed to provide a comprehensive examination of skeletal muscle bioenergetics: structure, function, physiologic regulation of substrate utilization and physiological/pathological adaptation (mutability) to external and internal stimuli. The course is designed

to provide the student with a solid basis in muscle structure, function and physiology needed for high-level clinical care. Course content will include skeletal muscle histology, function of intracellular and extracellular muscle proteins, mechanisms of contraction, myogenesis, utilization of fuel substrates including hormonal control and the effects of exercise, mechanical properties of muscle and the response of muscle to training, disuse and selected pathologies.

#### L63 5510 MOVEMENT SCIENCE II: BIOMECHANICS

Department: Movement Science  
Course Master: Dequan Zou, DSc  
Credit Hours: 3  
Semester: Fall

The focus of this course will be upon understanding mechanical principles as they relate to the study of human movement. The course will use an integration of quantitative principles and published literature to explore methods to study biomechanics and also to learn how the human body responds to mechanical stimuli in healthy and selected disease conditions.

#### L63 5610 MOVEMENT SCIENCE III: BIOCONTROL

Department: Movement Science  
Course Master: Catherine Lang, PT, PhD  
Credit Hours: 3  
Semester: Fall

This goal of this course is to understand how the nervous system controls movement and how human movement is affected after pathology to the nervous system. Each class session will consist of an introductory lecture followed by student-led discussions of selected papers. During the course, we will gain insight into how the enormous repertoire of human movements (e.g., gait, posture, voluntary hand movements) is controlled by a distributed motor system (e.g., spinal cord, basal ganglia, motor cortex), how pathology to the system alters movements and how various structures in the system may or may not be able to compensate for each other.

#### L63 5710 INDEPENDENT STUDY IN MOVEMENT SCIENCE

Department: Movement Science  
Course Master: Faculty  
Credit Hours: 1-6  
Semester: Fall and Spring

Opportunity to pursue individual projects under supervision of a Movement Science faculty member.

#### L63 5720 RESEARCH IN MOVEMENT SCIENCE

Department: Movement Science  
Course Master: Faculty  
Credit Hours: 1-6  
Semester: Fall and Spring

Opportunity to pursue non-dissertation research on an individual basis under the supervision and direction of a Movement Science faculty member.

#### L63 5730 READINGS IN MOVEMENT SCIENCE

Department: Movement Science  
Course Master: Faculty

Credits 1-6  
Semester: Fall and Spring

Opportunity to pursue individual work under the supervision and direction of an IPMS faculty member.

L63 5850 PROGRAM SEMINAR  
Department: Movement Science  
Course Master: Michael Mueller, PT, PhD, FAPTA  
Credit Hours: 1  
Semester: Fall and Spring

Departmental seminar focused on review of current literature, scholarly presentation and the development of skills in developing and presenting grant proposals. Required for each of the first four semesters of enrollment in the Movement Science program.

M17 522 INTRODUCTION TO STATISTICS FOR THE HEALTH SCIENCES  
Department: Clinical Investigation  
Course Master: Sarah Boslaugh, PhD  
Credit Hours: 3  
Semester: Every Fall

This is a basic course in statistics with particular focus on the health sciences. It is taught in a user-friendly manner with emphasis on use of SPSS, statistical analysis software commonly used in clinical research. The course will teach basic statistical methods in which clinical researchers should have facility to execute their own analyses.

M17 524 INTERMEDIATE STATISTICS FOR THE HEALTH SCIENCES  
Department: CRTc  
Course Master: Sarah Boslaugh, PhD  
Credit Hours: 3  
Semester: Every Spring

This 15-week course is designed to build on skills developed in Introduction to Statistics for the Health Sciences and to foster basic expertise required to independently use common multivariate biostatistical methods to analyze clinical research data for peer-review presentation and publication.

M17 588 EPIDEMIOLOGY FOR CLINICAL RESEARCH  
Department: CRTc  
Course Master: Mario Schootman, PhD  
Credit Hours: 3  
Semester: Every Spring

This course introduces principles of epidemiology as they apply to clinical research. The course provides basic tools used in descriptive and analytical epidemiology, which are crucial for making informed decisions in the care of patients. Critical thinking and scientific/analytic competencies are emphasized throughout the course.

BIO 5011 ETHICS AND MEDICAL RESEARCH  
Department: Division of Biology and Biomedical Sciences  
Course Master: Robert Mercer, PhD

Credit Hours: 1  
Semester: Spring

# Physical Therapy Faculty

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Rebecca L Birkenmeier, MS

Research Assistant Professor of Physical Therapy

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Sylvia Lin Czuppon, MS, DPT

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John Carl Morris, MD

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## 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 specialities. 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 coursework 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.

## Prospective Students

Applicants should be in the process of completing a degree in a clinical training program at the doctoral level or should have completed such a degree. The pace of course work assumes students have familiarity with clinical medicine.

## Program Format

The MPHS program is a full-time, 10-month format. A minimum of 12 credit hours is required for full-time student status, and the maximum course load is 18 credit hours per semester. Part-time study options are available.

## Core MPHS Courses

Introduction to Statistical Analysis Software (M21 503)

Introductory Clinical Epidemiology

Intermediate Clinical Epidemiology

Applied Epidemiology

Biostatistics 1

Biostatistics 2

Ethics in Population and Clinical Health Research

Current Topics in Public Health (medical and health sciences students only)

Information on elective courses is available at <http://www.mphs.wustl.edu/courses>.

## MD/MPHS Program

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, which 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.

## Application Deadlines

For 2014-15 academic year: January 10, 2014

Notification of students of admission decision: February 13, 2014

Commitment deadline: April 4, 2014

## Further Information

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# Population Health Sciences Faculty

**Jenifer Allsworth, PhD**

Assistant Professor, Department of Obstetrics and Gynecology

**Ken Carson, MD**

Instructor, Department of Medicine

**Graham Colditz, MD, DrPH**

Niess-Gain Professor, Department of Surgery

**Bettina Drake, PhD, MPH**

Assistant Professor, Department of Surgery

**Sarah Gehlert, PhD**

E. Desmond Lee Professor, George Warren Brown School of Social Work

**Anne Glowinski, MD, MPE**

Associate Professor, Department of Psychiatry

**Richard Griffey, MD, MPH**

Assistant Professor, Department of Internal Medicine

**Aimee James, MD, MPH**

Assistant Professor, Department of Surgery

**Kim Kaphingst, ScD**

Assistant Professor, Department of Surgery

**Allison King, MD, MPH**

Assistant Professor, Department of Occupational Therapy

**Esther Liu, PhD**

Faculty, Institute of Clinical and Translational Sciences

**Margaret Olsen, PhD, MPH**

Associate Professor, Department of Internal Medicine

**Pamela Owens, PhD**

Research Assistant Professor, Division of Infectious Diseases

**Jeffery Peipert, MD, MPH, MHA**

Robert J. Terry Professor, Department of Obstetrics and Gynecology

**Mary Politi, PhD**

Assistant Professor, Department of Surgery

**Rumi Price, PhD, MPE**

Professor, Department of Psychiatry

**D.C. Rao, PhD**

Director, Division of Biostatistics

**Kathleen Stamatakis, PhD, MPH**

Assistant Professor of Surgery

**David Stamillio, MD**

Associate Professor, Department of Obstetrics and Gynecology

**Seth Strope, MD, MPH**

Assistant Professor, Division of Urologic Surgery

Adetunji Toriola, MD, MPH, PhD

Assistant Professor of Surgery

**Methodius Tuuli, MD, MPH**

Assistant Professor of Obstetrics and Gynecology

**Esteban Varela, MD, MPH**

Associate Professor, Department of Surgery

**Jean Wang, MD, PhD**

Assistant Professor, Department of Medicine

**Erika Water, PhD, MPH**

Assistant Professor of Surgery

**Anke Winter, MD, MSc**

Assistant Professor of Surgery

## Postgraduate Training

### Residency Training

Postgraduate residency training in an approved hospital is considered essential preparation for the practice of medicine. Most Washington University graduates serve three or more years of residency training, and many will gain additional experience as postdoctoral fellows.

To aid students in obtaining desirable residency appointments, an active counseling program is maintained. Students in their preclinical years can participate in a career counseling workshop in which they are given specific information about subspecialties. They are encouraged to look at their own interests, attributes and priorities and, with this information, begin to make decisions about the specialty best suited for them. In addition, small group conferences are held for students to meet with faculty members from a variety of the specialty divisions at Washington University to learn more about the fields that they are interested in.

During their third and fourth years, students interact closely with the Career Counseling Office, which provides them with individual counseling to help plan for the residency application process. Students receive general background information about the kinds of residencies available, special issues concerning certain extremely competitive residencies and help identifying faculty members for further assistance. The Career Counseling Office maintains a web site ([residency.wustl.edu](http://residency.wustl.edu)) where students can

find information regarding 20 residency specialties. The number of U.S. seniors applying in the match each year has been steadily increasing while the number of residency training positions has not increased at the same rate. Students must make their choices with considerable care. The School participates in the National Resident Matching Program, which offers distinct advantages to applicants.

Results of these efforts have been gratifying. The PGY-1 residencies selected in the most recent residency matching (2013) are identified in the Alphabetical List of Students in the Register of Students section of this web site.

The school maintains an active interest in its graduates and is pleased to assist them in subsequent years as they seek more advanced training or staff appointments in the communities in which they settle.

## Postdoctoral Training

Those departments that offer postdoctoral fellowships individualize such educational activity up to a maximum of 36 months of academic time. Such fellowships lead integrally to certification by the appropriate specialty and/or subspecialty boards of the American Medical Association.

## Fellowship And Other Funds

**Alexander and Gertrude Berg Fellowship Fund.** Created in 1952 through the bequest of Gertrude Berg to provide a fellowship in the Department of Molecular Microbiology.

**Glover H. Copher Fellow in Surgical Research.** Established in 1971 to support a postdoctoral fellow in surgery.

**William H. Danforth Loan Fund for Interns and Residents in Surgery.** Provides financial assistance in the form of loans for postdoctoral students in surgery.

Antonio Hernandez, Jr. Fellowship in Pediatric Cardiology. Established in 1987 as a memorial to Dr. Hernandez.

**Leopold and Theresa Hofstatter Fellowship.** Established in 2000 from the estate of Leopold and Theresa Hofstatter to be used to support fellowships in neurological research.

**J. Albert Key Fellowship Fund.** Provides a stipend for a fellow in orthopaedic surgery.

**Louis and Dorothy Kovitz Fellowship Fund.** Established in 1970 by an alumnus and his wife to provide support for research by qualified residents or students interested in surgery, at the discretion of the Head of the Department of Surgery.

**Carol B. and Jerome T. Loeb Teaching Fellowships at the School of Medicine.** Established in 2004 to honor and thank St. Louis-area physicians with clinical excellence to encourage teaching that excellence to residents and students.

**Stephen I. Morse Fellowship.** Established in 1980 by Carl and Belle Morse in memory of their son; awarded to predoctoral or postdoctoral students pursuing research careers in microbiology, immunology and infectious diseases.

**William D. Owens Anesthesiology Research Fellowship.** Established in 2000 in honor of William D. Owens, MD. This fund will allow an individual to do a clinical or basic research fellowship for a two-year period.

**The Esther and Morton Wohlgemuth Foundation Fellowship.** Established to support a fellow in the Division of Cardiovascular Diseases.

## Continuing Medical Education

The study of medicine is a lifelong process with continuing medical education being an integral component of the continuum. Since 1973 the School of Medicine has supported this learning endeavor through the operation of the Continuing Medical Education Program. Continuing Medical Education's mission is to facilitate lifelong learning through providing learning opportunities for educational renewal and advancement in order to assist health care professionals to maintain and enhance professional competencies and performance to improve health care.

Pursuant to this mission the objectives of the continuing medical education program include the following:

Enable the acquisition of new knowledge and skills for the delivery of quality patient care

Translate the results of research to clinical diagnosis and treatment for practicing physicians

Apply educational approaches in support of continuous quality improvement in health care delivery

Integrate clinical outcome measures into the educational process

Assist the physicians' adaptation to changing health care delivery environments

Support faculty development as postgraduate medical educators and leaders

Evaluate and refine educational activities

Each year more than 150 symposia and more than 170 recurring academic rounds and conferences as well as videos and monographs are provided with CME credit by this office. About 8,000 registrants attend these courses annually and receive more than 100,000 hours of instruction. CME-Online provides educational programs via the Internet. Since starting in 2000, the CME online program has grown to include more than 120 hours of potential CME credit. The URL is <http://cme.wustl.edu>. The educational program is fully accredited by the Accreditation Council for Continuing Medical Education and provides credits to physicians pursuant to the Physician's Recognition Award of the American Medical Association, as well as various other types of state and specialty recertification and relicensure activities.

## Admission

Costs, admission requirements and application procedures vary from program to program. Please contact individual programs for more information.

# MD Program

Visit [medadmissions.wustl.edu](http://medadmissions.wustl.edu) for full admissions information and to check the status of your application.

## Admission Requirements for the Study of Medicine

Entrance requirements to the School of Medicine include:

Evidence of superior intellectual ability and scholastic achievement;

Completion of at least 90 semester hours of college courses in an approved college or university;

Completion of the Medical College Admission Test of the Association of American Medical Colleges; and

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, including integral equations and differential equations; 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 in other areas of science.

A major goal of undergraduate college work should be development of the intellectual talents of the individual. This often involves the pursuit of some area of knowledge in-depth, whether in the humanities, social sciences or 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.

## 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 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.

## Application Procedure

General information for prospective medical students and how to apply can be found at <http://medadmissions.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, common to all participating medical schools, is available online at <https://www.aamc.org/students/>. 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. On receipt of the application from AMCAS, the Office of Admissions contacts the applicant regarding the additional steps to be taken to complete the application. These include completing a supplemental application via the Internet at <http://wumsapply.wustl.edu>, submission of letters of recommendation and payment of a nonrefundable Application Service Fee of \$80. These materials must be received no later than December 31. Applicants can check the status of their application via the Internet at the <http://wumsapply.wustl.edu> web site. Once the application is complete, the Committee on Admissions evaluates it.

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 to contact us by email ([wumscoa@wustl.edu](mailto:wumscoa@wustl.edu)) to inquire 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 8:30 a.m. to 5 p.m. Central Time.

Admission decisions are made by the Committee on Admissions on a rolling schedule beginning in early October. Applicants are notified as soon as a final decision has been made on their application, but by April 15, every applicant should be notified whether he or she is accepted, on the waiting list or not accepted.

Upon notification of acceptance for admission to the School, the applicant is required to file a Statement of Intent to Matriculate within two weeks. Three options are presented: 1) accept the offer of admission and submit the \$100 acceptance deposit; 2) accept the offer of admission, submit the \$100 deposit and request financial aid materials; or 3) decline the offer of admission. The \$100 acceptance deposit reserves a place in the class and is applied to the tuition charge at the time of matriculation. If an accepted applicant withdraws from the class with written or e-mail notification to the Admissions Office prior to May 15, the deposit is refunded. The School of Medicine abides by the traffic rules regarding application timelines as established by AMCAS. Accepted applicants who are non-compliant with AMCAS traffic rules and medical school deadlines may have their acceptance into the class rescinded.

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 all institutional judicial or academic sanctions and/or legal actions in which he/she has 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 or dismissal from the School of Medicine or revocation of the Doctor of Medicine degree.

## Background Checks and Screening for Controlled Substances

Students entering the School of Medicine who will have contact with patients are required to have criminal background checks and screening for controlled substances (THC-cannabis, cocaine, opiate, amphetamine, PCP-phencyclidine) in order to qualify for participation in patient care activities at Washington University School of Medicine-affiliated facilities. Drug screening usually will be conducted during student orientation prior to the start of classes. Incoming, prematriculant students, or 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.

In addition, no final action will be taken on an application until the Admissions Committee has received satisfactory statement(s) ("Dean's Certification" form(s)) from each college or university at which the applicant has completed a program of study. The certification form(s) inquire whether the applicant was subject to disciplinary charges or actions and must be completed by institutional official(s) with access to the applicant's disciplinary records. The certification inquires about past, current, pending or future disciplinary charges or actions.

## Merit-Based Scholarships

Please see the [Financial Assistance](#) section.

## 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 LCME-accredited U.S. medical schools. Applicants must also have a compelling personal reason for requesting transfer and must have the full approval of the dean of their current school. Accepted students are required to successfully complete the 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 submission of applications is March 31. Those applicants selected for 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 to:

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  
wumscoa@wustl.edu

## Cost of Education

For the first-year class matriculant, tuition and estimated expenses for the 2013-14 academic year are listed below. Students who enter in 2013 will benefit from a tuition stabilization plan, which provides that their annual tuition of \$54,050 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 registrar. The items listed below provide an estimate of the expenses for a single student in the 38-week first-year class. The total of these figures suggests a basic minimum budget of approximately \$71,992. Allowances for entertainment, travel, clothing and other miscellaneous items must be added to this estimate.

Tuition (includes Student Health Service and Microscope Lending Plan): \$54,050  
Books, supplies and instruments: \$1,606  
Housing and food: \$11,894  
Travel and personal: \$4,442

## Registration, Payment of Financial Obligations, Withdrawal and Refund Policy

For the convenience of our students, the Washington 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, dormitory charges, parking, library fines, etc. 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 will result in a late fee of \$50 to be added to the amount due. The late fee will 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 registration time and again at the middle of the academic year as listed on the schedule on the academic calendar.

Any payment due from the student and not paid by the specified date will accrue interest at the usury 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 suspension from classes.

If a student fails to settle such unpaid amounts 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 his/her delinquent financial obligations to Washington University (tuition, Olin Residence Hall rental, parking, etc.) one month before the end of the end of the academic year will not be allowed to progress to the next academic year, or 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. Examples of the application of the refund policy may be requested from the Registrar's Office.

## Standards for Satisfactory Academic Progress for Financial Aid Eligibility - Medical Students

Federal law and regulations require that all students receiving financial assistance from Federal Title IV funds maintain satisfactory academic progress (SAP). This policy presents the standards adopted by the Washington University School of Medicine and applies to all MD students.

The School of Medicine at Washington University in St. Louis evaluates SAP annually, at the end of each spring term. If you are not maintaining progress, you 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 you appeal your status and it is approved by CAPES and the Director of Financial Aid.

In order to be considered to be maintaining SAP, and thus eligible for financial aid, students must be satisfactorily progressing toward their academic objectives. Federal regulations require three measurements for determining SAP; qualitative, quantitative and timeframe.

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 nine years if a two-year MA is pursued)

Periods of non-enrollment are NOT counted in the measurement of satisfactory academic progress but all periods of attendance, regardless of whether 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 percent maximum after six years of full-time enrollment, and the half-time student is expected to complete in twelve years. If a student vacillates between full-time and half-time enrollment, that student would have a maximum time frame between six and 12 years, and the maximum time frame for that student would be continuously adjusted.

If you reach a point where you cannot complete your program within the 150% maximum, students become 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 Evaluation of Students (CAES). Refer to the Assessing Academic Achievement section in the Bulletin under 'Policies' for more information.

A student failing to meet the standards of 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 he or she 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 Aid 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.

## Financial Assistance - Medical Students

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 solely on the basis of documented financial need which 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 (Box 8059) will assist students in making these arrangements.

In responding to the Admissions Committee's offer of admission, an accepted student may request financial aid application materials. The Financial Aid Office acknowledges the student's intent and provides instructions for completing the FAFSA. Everyone applying for financial aid must complete a Free Application for Federal Student Aid (FAFSA) and designate Washington University School of Medicine, School Code #G24620, as a recipient. Medical school financial aid application documents and detailed instructions will be made available after January 1.

The financial aid application materials solicit information about the applicant and 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 income and assets of their spouse, 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 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 payment of tuition and fees. Proceeds from loans may be disbursed directly to the borrower. 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. Students may reapply for financial assistance in succeeding years if they remain in good academic and personal standing, and if there is continued financial need. Awards made to a student may vary from year to year, depending upon the student's needs and upon the availability of funds to the Committee. Students are responsible for filing applications for renewal of awards in the spring of each year.

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 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 provides assistance to students' spouses seeking employment.

## 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 2002-2003 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:

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  
Elmer B. Brown, MD  
J. William Campbell, MD  
David B. Clifford, MD  
Jennifer W. Cole, MD  
John N. Constantino, MD  
Justin J. Cordonnier, MD  
Michael Crowder, MD, PhD  
John D. Davidson, MD  
Louis P. Dehner, MD

Robert C. Drews, MD  
Bradley Evanoff, MD, MPH  
Ronald G. Evens, MD  
Lewis C. Fischbein, MD  
I.J. Flance, MD  
James W. Fleshman, MD  
Mark E. Frisse, 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  
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  
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  
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

## Distinguished Alumni Scholarship Program honorees 2013-14:

Leonard Bacharier, MD '92  
Carlos Daughaday, MD '71  
Linda Peterson, MD '90  
William F. Stenson, MD '71

## 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. In addition, it links each of the scholarship recipients with a member of the faculty who has contributed to the diversity of the medical school. This faculty member will serve as a mentor to the scholarship recipient.

These awards 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 (as, for example, by having been involved in diversity initiatives in their schools or communities); and,

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.

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.

Dr. Arthur I. Auer MD '56 and Marian D. Auer NU '55 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.

William L. Becker, M.D. Scholarship. 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.

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, M.D. Scholarship. Established in 2012 by an anonymous donor.

Ruth Elizabeth Calkins Scholarship Fund. Established by Dr. Delevan Calkins in honor of his granddaughter.

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.

T. H. Cheng, M.D. Endowed Scholarship in Medicine. Established in 2007 by Dr. Tien Hsin Cheng, MD '76, for deserving medical students with financial need.

Dr. Larry T. Chiang Endowed Scholarship. Established in 2003 to endow a scholarship fund for medical students.

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 Daniel 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 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.

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, M.D. Scholarships. 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.

Robert Emmet Connor Family Scholarship Fund. Established in 2010 by Dr. Robert Connor in appreciation for the medical education he received at Washington University.

T. Griswold Comstock Scholarships. Established under the will of Marilla E. Comstock for students who would otherwise be unable to obtain a medical education.

Clark and Mildred Cox Scholarship for Women. Established in 1998 with a donation from the Clark Cox Trust.

Arpad Csapo, M.D. 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 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.

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.

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, and her husband, Mr. Frank Dominguez, to make it easier for students to attend medical school.

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, M.D. 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, M.D., 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, HS44, 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 Memorial Student Fund. 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.

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.

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 Fund. 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.

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.

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.

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.

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 in the School of Medicine. Established in 2004 by the Meltzer Family Foundation to honor Dr. Gerald Meltzer's MD '63, parents, who established the foundation.

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.

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.

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. 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.

William B. Parker Scholarship. Established in 1976 by the School of Medicine in honor of William B. Parker's 51 years of service.

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.

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.

Philpott Family Scholarship. Established in 1995 by the Philpott family to provide support for medical students with financial need and excellent academic achievement.

The Virginia Keck, George M. (M.D. '32) and George K. (M.D. '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.

Lyman K. Richardson, MD Scholarship Fund. Established in 1993 by Mrs. Ellen Richardson to provide scholarship support to medical students.

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. 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.

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. 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.

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.

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.

Stanley B. Smith, MD Scholarship. Established in 2001 in memory of Samuel and Dora Smith, Dr. Smith's parents, to support student scholarships.

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 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.

George and Irene Wolf Medical Scholarship Fund. Established by the donors to benefit students in the School of Medicine.

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.

Robert Emmet Connor Family Loan Fund. Established in 2000 by Dr. Connor, MD '79, to provide "zero interest" loans to deserving medical students with need of an unforeseen or emergency nature.

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.

Goldie H. Penn and Lloyd L. Penn, MD Student Loan Fund. 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.

## Applied Health Behavior Research

Please visit the [Applied Health Behavior Research](#) website for admissions information about this program.

## Financial Assistance - Graduate and Professional Programs

The ability to finance a graduate/professional education at Washington University School of Medicine does not influence the student selection process. As all students accepted for admission have proven scholastic ability, financial assistance is awarded solely on the basis of documented financial need which cannot be met by student and family resources.

Accepted students interested in applying for financial aid will receive electronic communication from the Financial Aid Office providing instructions for completing the FAFSA and additional forms necessary for a financial aid award to be determined. Everyone applying for financial aid must complete a Free Application for Federal Student Aid (FAFSA) and designate Washington University School of Medicine, School Code #G24620, as a recipient. Financial aid application documents and detailed instructions will be made available after January 1.

The financial aid application materials solicit information about the applicant and their spouse, if married, including a detailed description of resources and liabilities. The School expects the applicant to complete and submit the financial aid documents within two weeks from the date the applicant receives them. Specific items will always be outlined on your individual student portal, [Netpartnerstudent.wustl.edu](#), to which access is granted after students are accepted by their program and their information is forward to the Financial Aid Office.

Once all documentation has been received and evaluated, an award package is determined for that student. He or she will then be notified via email once the award is available to view online. All awards must be accepted online using the student portal. Financial aid awards are credited toward payment of tuition and fees on the student's WebSTAC account. If there is an excess of funds on a student's account after tuition and other charges, the Registrar's Office will issue a student refund check.

Students may reapply for financial assistance in succeeding years if they remain in good academic and personal standing, and if there is continued financial need. Awards made to a student may vary from year to year, depending upon the student's needs and upon the availability of funds. Students are responsible for filing applications for renewal of awards in the spring of each year.

The financial aid 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 receipt of a scholarship not anticipated at the time the application was submitted.

All scholarship funding is awarded by a student's specific program and not through the Financial Aid Office. The Financial Aid Office applies all program scholarships to a student's financial aid award and awards Federal and Institutional program-specific loans when applicable.

## Audiology and Communication Sciences

Please visit the [Program in Audiology and Communication Sciences](#) website for admissions information.

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## Biology and Biomedical Sciences

Please visit the [Division of Biology and Biomedical Sciences](#) website for admissions information.

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## Biomedical Engineering

Please visit the [Biomedical Engineering website](#) for admissions information.

## Financial Assistance - Graduate and Professional Programs

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## Biostatistics

Please visit the [Division of Biostatistics website](#) for admissions information.

## Financial Assistance - Graduate and Professional Programs

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## Clinical Investigation

Please visit the [Clinical Research Training Center website](#) for admissions information.

## Financial Assistance - Graduate and Professional Programs

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Accepted students interested in applying for financial aid will receive electronic communication from the Financial Aid Office providing instructions for completing the FAFSA and additional forms necessary for a financial aid award to be determined. Everyone applying for financial aid must complete a Free Application for Federal Student Aid (FAFSA) and designate Washington University School of Medicine, School Code #G24620, as a recipient. Financial aid application documents and detailed instructions will be made available after January 1.

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Students may reapply for financial assistance in succeeding years if they remain in good academic and personal standing, and if there is continued financial need. Awards made to a student may vary from year to year, depending upon the student's needs and upon the availability of funds. Students are responsible for filing applications for renewal of awards in the spring of each year.

The financial aid 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 receipt of a scholarship not anticipated at the time the application was submitted.

All scholarship funding is awarded by a student's specific program and not through the Financial Aid Office. The Financial Aid Office applies all program scholarships to a student's financial aid award and awards Federal and Institutional program-specific loans when applicable.

## Doctor of Philosophy

Please visit the [Division of Biology and Biomedical Sciences website](#) for admissions information.

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## Genetic Epidemiology

Please visit the [Division of Biostatistics website](#) for admissions information.

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## Occupational Therapy

Please visit the [Program in Occupational Therapy website](#) for admissions information.

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## Physical Therapy

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## Population Health Sciences

Please visit the [Master of Population Health Sciences website](#) for admissions information.

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## Student Life

Students at Washington University of School of Medicine meet the highest academic standards and also possess many talents outside of their studies. With full support and encouragement from the School of Medicine, its students initiate and run a number of student organizations; their missions run the gamut from serving the community to professional development to pursuing personal interests in the arts. Students also participate in intramural sports and fully enjoy all that the city of St. Louis has to offer.

## Intramural Programs

Students enrolled in Washington University School of Medicine enjoy an active and diverse Intramural (IM) Program. The IM Program offers students the opportunity to participate in a wide range of sports. Utilizing the state-of-the-art facilities in the University's Athletic Complex, medical students pursue personal athletic interests and enjoy interaction with students enrolled in both undergraduate and graduate degree programs. The IM Program provides an excellent opportunity to socialize with colleagues as well as other graduate students. Differences in curricular demands among participants are considered in scheduling games so that neither academic nor athletic goals are compromised.

Traditionally, the School of Medicine is represented each year by teams or individuals in over 10 intramural sports. In recent years, medical student teams competed in men's and women's flag football, soccer, volleyball, basketball, and softball, as well as coed ultimate Frisbee, volleyball, inner tube water polo and softball. In addition, there are different levels of competition so that the needs of both the competitive and recreational athlete can be met.

The School has always made a strong showing in both the mixed and graduate school division, as evidenced by the many championship T-shirts team members sport.

## Student Organizations

Students at Washington University School of Medicine are active participants in medical student organizations on the local, state and national levels. The American Medical Student Association (AMSA), the Student National Medical Association (SNMA), the American Medical Women's Association (AMWA), the Asian-Pacific American Medical Students Association (APAMSA), the Medical Student Section of the American Medical Association (AMA-MSS), the Missouri State Medical Association (MSMA), the Organization of Student Representatives (OSR) in the Association of American Medical Colleges (AAMC) and the Student Organized Community Clinic (SOCC) provide forums for addressing the educational, social and political concerns of medical students. The School of Medicine supports student participation in these national organizations and provides partial funding for travel and other expenses on an annual basis. Medical Student Government (MSG) represents the student interests, supports social and educational activities and expands the perspectives of the future graduates of the medical school.

Visit the [Student Groups Directory](#) for a complete list of student organizations.

## Academic Societies

To foster communication between students and faculty, three academic societies — The Joseph Erlanger and Evarts Graham Society, The Carl and Gerty Cori Society, and The Oliver Lowry and Carl Moore Society — meet independently throughout the academic year to enjoy a social hour, dinner and conversation. The societies promote a collegial environment for the medical school's diverse faculty and student body. Medball, held in March of each year, is hosted in part by the academic societies and provides a formal social evening with medical faculty and medical students.

## AMA-MSS

Washington University has an active chapter of the **American Medical Association Medical Student Section**. WUSM students are involved at the local, state and national levels and represent Washington University in policy development.

## AMSA

On the local level, **AMSA** is the major student organization at the School of Medicine. The chapter's annual activities include a speaker series and several community service projects.

## AMWA

The **American Medical Women's Association** is a national organization designed to address issues of concern to women in medicine. Washington University has an active student group, and funding is available for student representation at regional and national meetings.

## APAMSA

The **Asian-Pacific American Medical Students Association** was founded to address issues and needs specific to Asian-Pacific American medical students. To that end, it serves as a support group for students, fosters student-faculty interaction and promotes cultural awareness, as well as providing a framework for community service programs.

## Forum for International Health and Tropical Medicine

The **Forum for International Health and Tropical Medicine (FIHTM)** was formed to promote awareness of international health concerns and facilitate international health experiences for medical students. In addition, the group has worked closely with administration in the design of a formalized international health elective program and funding structure.

## Program for Women in Science and Medicine

The Program for Women in Science and Medicine is designed to foster interaction among women at all levels at the medical school. The program sponsors a variety of informal discussions, receptions and dinners with informative speakers throughout the academic year.

## SNMA

The **Student National Medical Association (SNMA)** is the oldest and largest medical student organization focused around the needs and concerns of African-American, Latino and Native American medical students. This organization is concerned with providing services to medically underserved communities, promoting minority student recruitment and retention to schools that train health personnel and assisting in ways to provide quality education to minorities and women. Washington University has an active SNMA chapter, and funds are available for representation at regional and national meetings as well as for community service activities.

## Saturday Neighborhood Health Clinic

As the number of uninsured citizens in America continues to rise, the **Saturday Neighborhood Health Clinic (SNHC)** provides an important service to the community of St. Louis. The clinic provides the sole access that many patients have to the health care system. It provides a close-up look for our student volunteers at how severe the problem of the uninsured in America is.



## Washington University Medical Center Housestaff Auxiliary

WUMCHA, the Washington University Medical Center Housestaff Auxiliary (a department of Barnes-Jewish Hospital) is an organization made up of female medical students, residents, fellows, attending physicians, as well as the female spouses, partners and "significant others" of those affiliated with Washington University Medical Center, including Barnes-Jewish and St. Louis Children's hospitals, the School of Medicine and Mallinckrodt Institute of Radiology. The purpose of the organization is to provide friendship and social support among its members. In addition to sponsoring numerous recreational and educational activities, WUMCHA publishes a welcome guide containing information about relocating to St. Louis and area attractions. Annual dues are \$30. Information about membership and applications can be obtained by contacting Laura Hastie at (832) 215-1037 or [laura.hastie@gmail.com](mailto:laura.hastie@gmail.com), or by visiting <http://www.wumcha.com>.

## Community Service Experience

Participation in a host of community service projects nurtures students' altruistic nature and provides an alternative educational experience. University-sponsored, student-run, community-based service activities include the Perinatal Project, which provides information concerning well-baby care and prenatal care to women from lower socioeconomic groups. **Students Teaching AIDS to Students (STATS)** allows trained medical students to provide sixth- and seventh-graders with information about AIDS. The combined efforts of medical students, faculty, middle school teachers, parents and speakers with AIDS have made STATS a very successful program. **The Geriatrics Outreach Program** helps prepare students for the challenges and rewards of working with older patients. **Pediatric Outreach Program (POP)** matches children in the St. Louis area who are suffering from chronic illnesses and the siblings of these children with big brothers and big sisters from Washington University School of Medicine. Community CPR trains medical students to become instructors in CPR for the medical school curriculum and in the community of St. Louis. **The Mental Health Outreach Program (MHOP)** works to increase the awareness of mental health issues among medical students and the general public. **The Family Medicine Interest Group** works with the local community by providing health screenings and nutritional classes. **SPOTS (Sun Protection Outreach Teaching by Students)** is piloted to teach middle school students about the dangers of skin cancer and how to protect themselves from the sun. A newer group, the **Public Health Interest Group (PHIG)** is a student organization committed to partnering in the St. Louis community to include health screenings, nutrition outreach and public policy discussions. The **Smoking Cessation Project** works with the American Lung Association Freedom from Smoking Program and students are trained in counseling smoking cessation groups.

## Student Publications

Students organize and spearhead several publications at the School of Medicine. **The Dis-Orientation Guide** is produced annually as a student-to-student guide to the curriculum and the city. **Hippocrene** is a literary magazine published once a year where you will find poetry, short stories, essays and photographs submitted by members of the WUSM community.

## St. Louis

Situated at the confluence of two great North American rivers — the Mississippi and the Missouri — the St. Louis region has been a favored destination since Lewis & Clark began their historic westward "Corps of Discovery" here in 1804.

Today, the pioneers of St. Louis are the engineers, scientists, business leaders, educators, artists and other innovative and creative professionals who are working at the forefront of a multitude of fields and endeavors. Thanks in large part to Washington University, other regional universities and key Fortune 500 corporations, St. Louis has developed into a national hub for important research and business development, especially in the fields of biotechnology and plant science.

Consistently ranked among the nation's most affordable and best places to live and raise a family, the St. Louis region offers many opportunities to watch or participate in a wide range of sports, recreational activities and cultural events. Not far from St. Louis' urban core are the beautiful rolling hills of the Ozark Mountain region and outdoor activities such as hiking, canoeing and spelunking in some of Missouri's more than 6,000 caves.

## Cultural Opportunities

New St. Louisans discover the rich cultural life here in theaters, galleries, museums and festivals. **The Saint Louis Symphony**, among the finest in the nation, performs at historic Powell Hall. Symphony members bring their skills to the community through teaching and chamber concerts as well. In the downtown area, the rich St. Louis traditions in jazz, blues and ragtime music are continued in a number of lounges and clubs. **The Community Music School of Webster University** offers community music education to all ages, and **COCA** (Center of Creative Arts) is the largest multidisciplinary arts institution in the metropolitan area.

**The Opera Theatre of St. Louis** has been enormously successful, nationally and internationally, bringing English-language versions of the classics and presentation of contemporary operas to the stage. **The Repertory Theatre of St. Louis** has an extensive annual season, which includes experimental works and traditional dramas. The Stages St. Louis Theatre Co., **Kirkwood Theatre Guild**, **West End Players Guild**, **Act. Inc.** and the **Saint Louis Black Repertory Company** enrich the dramatic offerings available in the immediate area. On campus, Edison Theatre offers the highest quality in national and international programs in theater, dance and music. For open-air summer entertainment, the **Shakespeare Festival of St. Louis** and **The Muny**, both in Forest Park, are prime destinations.

Broadway comes to St. Louis at the **Fox Theatre**, a renovation of a 1929 example of exotic cinema temple art. Galleries sprinkled throughout the area bring current visual arts to St. Louis, while antique shops remind us of the past. **The St. Louis International Film Festival** takes place every fall. Supplementing the standard movie fare available throughout the metropolitan area are two cinemas close to campus, the **Hi-Pointe** and the **Tivoli**, both offering excellent foreign and independent films.

When the **Saint Louis Art Museum** was built for the 1904 World's Fair, much of the Washington University collection was housed in it. Ties with the Art Museum remain very close. Students in art and in business intern at the Art Museum, working in arts management and gallery organization. St. Louis also features **Laumeier Sculpture Park**, which displays large-scale sculptures by artists of international renown.

St. Louis has two major history museums as well: the **Missouri History Museum** in Forest Park and the **Museum of Westward Expansion** under the Gateway Arch.

## Recreation

For recreation, St. Louisans may use any of the numerous parks that dot the metropolitan area. In Forest Park, which lies between the two Washington University campuses, are the Art Museum, The Muny, Missouri History Museum, the **Saint Louis Zoo**, municipal golf courses, tennis and handball courts, a skating rink, and acres of paths, picnic areas, gardens and wooded groves. **Tower Grove Park** is in south

St. Louis, and adjacent is the [Missouri Botanical Garden](#), world famous for its research, collections and facilities.

Farther afield, St. Louis residents find outdoor adventure in the countryside beyond the city. In the Ozark Mountains, on the rivers of Missouri, on the lakes of neighboring Illinois, variety abounds. Camping, hiking, floating, rock climbing and caving are among the many possibilities within a few hours' drive of St. Louis. For those who like to sail, there is Carlyle Lake in Illinois. And for those with rod and reel, Missouri streams are made to order.

The Washington University Athletic Complex provides outstanding resources to athletes at every level of ability. Open to all members of the University community, it includes an eight-lane, 25-meter pool, two gymnasiums, weight rooms, racquetball courts, outdoor tennis courts and a track complex. Built on the site of the 1904 Olympic Games, this facility offers recreational opportunities year-round for students, faculty and staff.

For the spectator, St. Louis is a great sports town. For more than a century, it has hosted one of the oldest traditions in baseball — [the St. Louis Cardinals](#). Dizzy Dean and the Gashouse Gang, Stan Musial, Lou Brock, Ozzie Smith and Mark McGwire are all part of Cardinal history. The current Busch Stadium opened in spring of 2006 and played host to the 2009 All-Star Game.

[St. Louis' NFL Rams](#) brought home the Super Bowl trophy in 2000, after being welcomed to the community in the fall of 1995. The St. Louis Blues hockey team moved here in 1967 and enjoys loyal fans. St. Louis also supports a number of semi-pro sports teams.

## Employment and University Ties with St. Louis

St. Louis is a great place to work; job opportunities are varied and abundant. Many companies are distinguished for their excellent working conditions, and commuting is easier than in many other large cities.

Many major corporations are located here, as are a variety of retail, transportation and banking organizations. Among the top firms are Ameren, Boeing, Edward Jones, Emerson Electric, Enterprise Rent-a-Car and Express Scripts. Many support services have grown up around these corporations — including law, accounting, data processing, advertising, public relations and design firms, as well as photographic and audio-visual studios.

Employing more than 20,000 people, the Washington University Medical Center (WUMC) is made up of the [School of Medicine](#), the [Alvin J. Siteman Cancer Center](#), [Barnes-Jewish Hospital](#) and [St. Louis Children's Hospital](#). The medical center generates an annual economic impact of nearly \$4.3 billion for the St. Louis area, according to an economic model maintained by the St. Louis Regional Commerce and Growth Association.

[The John M. Olin School of Business](#) at Washington University enjoys a rich and varied partnership with the business community. As a laboratory for internship opportunities, entrepreneurship study, and student practicums offered through Olin's Center for Experiential Learning, St. Louis plays an integral role in the education of business students. In turn, Olin creates value for area businesses by matching top Olin talent with pivotal positions in their firms.

Similarly, the [School of Law](#) has close ties with the St. Louis legal community and, through its clinical program, offers internships in private and local government offices and in state and federal courts. In

addition, the law school is fortunate in the active and interested role of the local bar associations in the development of the school's special programs.

The **George Warren Brown School of Social Work** also is linked in many ways to the St. Louis social work community. Students find practicum assignments throughout the area, and both students and faculty do research and consult with local agencies.

A strong partnership exists between technology-based businesses and industries in St. Louis and the **School of Engineering & Applied Science**. There is a network of more than 80 faculty members associated with Department of Biomedical Engineering, representing numerous divisions of the university, including many from the School of Medicine.

In addition to their ties to local business, both the Danforth Campus and the School of Medicine at Washington University are dedicated to the support of K-12 education. Students from the medical school participate in a variety of outreach programs, including Students Teaching AIDS to Students (STATS), designed to teach awareness and responsible behavior to junior high school students; the **Young Scientist Program**, an interactive learning experience that brings high school students to the medical center; and health and preventive programs on drug and sex education.

In short, Washington University enjoys a special relationship with St. Louis.

## Interesting St. Louis Area Facts

St. Louis has many nicknames, including the "Gateway City," "Gateway to the West," "The Mound City," "St. Louie," "River City," and "The 'Lou."

There are more free, world-class attractions in St. Louis than any place in the nation outside of Washington, DC.

The **Saint Louis Zoo** was the first municipally supported zoo in the world and a pioneer in the use of open enclosures, placing animals in natural environments without bars.

Some of the world's favorite foods were popularized and introduced to a wide audience at the 1904 World's Fair in St. Louis. The ice cream cone, iced tea and hamburgers all became food favorites there. It is said that the fair was the first place where hot dogs met French's mustard.

The Eads Bridge over the Mississippi River, near the present site of the Gateway Arch, was the first arched steel truss bridge in the world. When it was first proposed, it was scoffed at as impossible to build. Completed in 1874, it is still in use today.

In 1904, the first World Olympics in the United States and the Western Hemisphere was held in St. Louis at Washington University's Francis Field.

The **Cathedral Basilica of St. Louis** contains the largest collection of mosaic art in the world.

In 1876, St. Louis hosted the first national political convention west of the Mississippi.

In 1927, a group of St. Louis businessmen gave financial backing to the first solo transatlantic flight from New York to Paris. The pilot was Charles Lindbergh and the plane was named "The Spirit of St. Louis."

St. Louis' McDonnell Douglas Corporation, now Boeing, designed and built the space capsule that carried the first men into space in the 1960s.

C.L. Grigg, a soft drink salesman, introduced a drink to St. Louisans in 1929 that would eventually become known as 7-Up.

## Student Services

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:

**Office of Diversity Programs:** Offers programs and services to prepare students to become leaders in a global society

**The Office of Education:** Supports School of Medicine educational programs at all levels, including graduate, postgraduate and continuing medical education

**Office of Financial Aid:** Guides students through the process of understanding and applying for financial aid

**The Office of Medical Student Education:** Supports all aspects of medical student education for students, faculty and staff

**Office of Student Affairs:** Provides support services in areas of physical and mental wellness, academics, mentoring and shadowing, and **extracurricular activities**

**Office of the Registrar:** Offers information about obtaining transcripts, access to student records, and tuition payment

**Protective Services:** Protects the Washington University School of Medicine campus and certain off-campus properties

**Transportation Services:** Offers campus parking passes, free passes for MetroLink and MetroBus, and access to shared WeCar services

**Student Health Services:** Provides quality medical care, including preventive services, for all students and their covered family members

## Financial Aid / Student Financial Planning

<http://wumfsinaid.wustl.edu/>

# Housing

Those who come to St. Louis to be associated with Washington University School of Medicine find apartments, houses, condos, lofts, and short-term housing that range in price from \$680 to \$2,000 per month, all in the immediate area. [Apartment Referral Services](#), located on North Campus, maintains listings of housing appropriate for married and single students. For information, contact [Apartment Referral Services](#) at [ars@wustl.edu](mailto:ars@wustl.edu), Campus Box 1016, 700 Rosedale Ave., St. Louis, MO 63112 or (314) 935-5092. Visit [Quadrangle Housing](#) for more information about Washington University-owned housing options.

## Olin Residence Hall

The Spencer T. Olin Residence Hall, (314) 362-3230, at 4550 Scott Ave. at the Washington University Medical Center, has accommodations for approximately 168 single men and women. The building was made possible by generous gifts from Spencer T. Olin, alumni and friends of the School of Medicine. Olin Hall is planned for the convenience of students in the medical or paramedical sciences and includes shared cooking facilities, a gymnasium, weight room and state-of-the-art workout facility, laundry room and penthouse with a recreational area and large-screen television with satellite system. Every effort is made to provide an atmosphere that not only aids residents in meeting their study obligations, but also recognizes their privileges as graduate students.

## Rates for 2013-14

### Summer 2013 (May 25 – August 4) 10 weeks

#### Current Resident

Single Room: \$1,326  
Large Single: \$1,628  
Solo Suite: \$1,973  
Double Room: \$888\*  
Double Suite: \$1,326\*

\*Price per student

#### New Resident

Single Room: \$1,423  
Large Single: \$1,747  
Solo Suite: \$2,118  
Double Room: \$953\*  
Double Suite: \$1,423\*

\*Price per student

### School Year: August-Mid May (Nine Months)

#### Current Resident

Single Room: \$4,428  
Large Single: \$5,311  
Solo Suite: \$6,451

Double Room: \$2,982\*

Double Suite: \$4,428\*

\*Price per student

#### **New Resident**

Single Room: \$4,751

Large Single: \$5,699

Solo Suite: \$6,923

Double Room: \$3,200\*

Double Suite: \$4,751\*

\*Price per student

## Medical Student Carrels, Lockers and Mail

### Medical Student Carrels

The **Farrell Learning and Teaching Center** offers study carrels for every first- and second-year student, equipped with personal desk space, secure storage and data ports.

### Lockers

Student lockers with combination padlocks are on the third and fourth floors of the Farrell Learning and Teaching Center. Locker assignments are made by the **Registrar's Office** for a nominal fee to cover the cost of the padlock. Only padlocks issued by the Registrar's Office may be used.

### Mail

First-class student mail sent to the School of Medicine will be put in student mailboxes. This can serve as a temporary mailing address until students are settled in St. Louis. It is important that mail addressed and sent to the School of Medicine include both student status (WUMS = Washington University Medical Student) and year, as follows:

Jane Doe, WUMS I

Washington University School of Medicine

Campus Box 8077

660 S. Euclid Ave.

St. Louis, MO 63110-1093

# Voter Registration

The 1998 Higher Education Act requires all postsecondary institutions to make available voter registration forms to all degree-seeking students.

Voter registration forms are made available to students at various sites on campus several months prior to each federal election cycle.

To register to vote in Missouri, you must:

- be a citizen of the United States
- be a resident of Missouri (new residents may register immediately, but proof of residency shall be required.)
- register at least 28 days prior to the election
- be at least 17-1/2 years of age (you must be 18 to vote)
- not be on probation or parole after conviction of a felony, until finally discharged from such probation or parole
  
- not be convicted of a felony or misdemeanor connected with the right of suffrage
- not be adjudged incapacitated by any court of law
- not be confined under a sentence of imprisonment.

You may register to vote:

- By mail through the postcard registration application
  
- At the office of the local election authority — Board of Election Commissioners for the City of St. Louis, Saint Louis County Board of Election Commissioners
  
- At any Department of Motor Vehicles office, or state agency which provides a service to the public, including libraries.

For additional information on voter registration, contact:

Secretary of State

Elections Division

James C. Kirkpatrick State Information Center

P.O. Box 1767

Jefferson City, MO 65102-1767

(573) 751-2301 (voice)

(800) NOW-VOTE (669-8683)

(573) 526-3242 (Fax)

[http://www.sos.mo.gov/elections/s\\_default.asp?id=voter](http://www.sos.mo.gov/elections/s_default.asp?id=voter)



# Office of Diversity Programs

<http://medschooldiversity.wustl.edu/>

# Office of Education

<http://wusmeducation.wusm.wustl.edu/Pages/Welcome.aspx>

# Office of Medical Student Education

<http://omse.wustl.edu/>

# Parking and Transportation (UPass and Enterprise CarShare)

Hourly, daily and permit parking is available in the 2300-space School of Medicine Clayton Garage (corner of Clayton and Taylor avenues) and the 700-space School of Medicine Metro Garage (corner of Children's Place and Taylor Avenue). Unreserved WUSM surface lots are available Monday-Friday from 2 p.m. to 7 a.m. and all day Saturday and Sunday. Parking in patient or visitor spaces by faculty, staff or students is strictly prohibited at all times. Additional information, maps and fees are available at <http://wusmparking.wustl.edu>, by calling (314) 362-6824 or in our office in Becker Medical Library Lobby, 660 S. Euclid, from 9 a.m. to 3 p.m.

If you are interested in carpooling, vanpooling, **Metro** passes or coupon books, please contact the School of Medicine's **Transportation Services**. For those who occasionally drive to the medical school, you can purchase a Prepaid Exit Pass (PEP) for either the WUSM Clayton or Metro Garage. The PEP can be purchased in advance via cash or check from WUSM Transportation Services in denominations of 5, 10 or 20 exits. Each card has bonus exits based on the number of exits purchased. The PEP is perfect for those who usually carpool, bike, walk or use Metro to get to campus.

Shuttle service is available for transportation from one site to another within the Medical Campus in accordance with specific shuttle schedules. If additional information, maps or shuttle schedules are needed, please visit <http://wusmparking.wustl.edu> or stop by our office in Becker Medical Library Lobby, 660 S. Euclid, from 9 a.m. to 3 p.m.

If you are a registered full-time student of Washington University, Washington University School of Medicine, or a benefit-eligible employee of the same; you can register for a U-PASS online at <http://parking.wustl.edu/upass.htm>. There is no charge for the U-PASS. The U-PASS allows you to access the **MetroBus** and **MetroLink** system; however, you must show your valid Washington University ID in conjunction with a valid U-PASS to ride free. The Danforth Campus, West Campus, North Campus

and Medical Campus all have MetroLink stations. The Medical Campus also has the Central West End MetroBus hub located on the first level of the Metro Garage. Please note: Until an employee is fully approved in HRMS, or full time students register for semester classes, your application will not be accepted for a U-PASS. This can take several days.

For those needing a car to run an errand or for overnight, we have a car-sharing program called Enterprise CarShare. Located on Lot B (off McKinley Avenue), an Enterprise CarShare is available for use for a minimal fee (there is a separate rate for overnight use). Go to <http://enterprisecarshare.com/university/overview/>, print the agreement and within three to six business days after membership approval, you will be issued your personal key fob and customer PIN number. Then go online and reserve a time.

## Registrar's Office

<http://wusmregistrar.wustl.edu/>

## Security

Security at the School of Medicine is the responsibility of **Protective Services**. Uniformed Protective Services Officers are on duty 24 hours a day, seven days a week to provide for personal safety, reduce the opportunity for crime, apprehend law violators, provide crime prevention and awareness training and assist in enforcement of University rules and regulations. Armed Response Officers and unarmed Public Safety Officers are radio-dispatched. They respond immediately to telephone calls made to 362-HELP (4357). Officers patrol the campus on foot, on bicycles and in marked mobile units. Contract Agency guards staff a few fixed posts to supplement the in-house officers.

The Medical School access control program makes the campus easily accessible after hours and on weekends. Faculty, staff and students are issued a photo identification badge that identifies the wearer as a member of the medical school community. The badge has a magnetic strip that activates the computerized door lock entrances to the School's buildings. These entrances have two-way intercoms for direct communication with Protective Services' Communications Officers, as do direct-ring telephones located outside selected campus buildings and "Code Blue" emergency telephones on surface parking lots and in the garages.

Each year Protective Services publishes a summary of statistical information concerning campus crime, as required by federal law, on the medical school web page at <http://wusmproserv.wustl.edu/>. This information may be found under "Campus Crime Statistics 2010-2011-2012." A daily crime log, information on crime prevention tips and the many services and programs provided by Protective Services also appear on the web. For a printed copy of the annual security report, contact Washington University School of Medicine, Protective Services Department, Campus Box 8207, 660 S. Euclid Ave., St. Louis, MO 63110, or by calling (314) 362-0460.

# Student Health Services

**Director:** Karen S. Winters, MD

**Information/Appointments:** (314) 362-3523

**Billing/Benefits:** (314) 362-2346

For a complete description of benefits please visit the [Student Health Services](#) website.

The Student Health Service provides a complete service for full-time students registered in the School of Medicine. The WUSM Student Health Service provides preventative and therapeutic health benefits through a mandatory self-funded program of services available to all full time medical degree seeking students and their eligible dependents. The goal of the Student Health Service is to deliver efficient, accessible, high-quality essential medical care in order prevent and treat health problems that may interfere with a student's education and professional goals while attending WUSM. The Student Health Service is under the direction of Karen S. Winters, MD. Benefits provided through this service include: ambulatory patient services, emergency services, ambulance services, hospitalization, maternity and newborn care, on and off campus mental health, including behavioral health treatment, prescription drugs, allergy services, physical therapy services, dermatology services, rehabilitative and habilitative services and devices, laboratory service, x-rays, preventive and wellness services, and chronic disease management, vision and dental care, and pediatric services. Students also receive disability and life insurance. Most medical care will be provided at no cost, except for applicable deductibles or co-pays.

The Student Health Service is a multidisciplinary facility conveniently located on campus and dedicated to providing quality health care to WUSM students and their covered family members. The well-qualified staff consists of physicians, nurses, psychologist, and other medical support personnel. The Student Health Service offers easy access to medical and psychiatric care so that physical and emotional problems will not interfere with university life.

The Health Service is open Monday through Friday from 8:00 a.m. to 4:00 p.m. The Student Health Service is closed Saturday, Sundays and University holidays. Services are available by appointment at 4525 Scott Ave., Suite 3420. The Health Service offers an after-hour phone service monitored by Dr. Winters. Students may call 362-3526 after hours for non-urgent care.

There is a \$2,000,000 per person annual benefit maximum that applies to benefits through Student Health Service. The student or his/her family is responsible for meeting the costs of hospital care in excess of those paid by the Student Health Service. There are no benefits for outpatient care or medication away from the Medical Center. The responsibility of the Student Health Service for hospitalization and emergency care will end 30 days after an individual ceases to be an officially enrolled student.

The Health Service pre-screens every incoming student prior to their arrival at the School to ensure all federal requirements have been met regarding communicable diseases. Entering students are required to have a medical examination and tuberculosis testing within one year of matriculation and to provide proof of immunity to measles (rubeola), rubella and mumps, varicella, hepatitis B and a tetanus-diphtheria (tdap at least one dose required since 2005). The Health Service tracks all immunizations during and prior to enrollment. Statements of Health for internships and practicums are provided.

## Spouses, Dependents

Students may enroll their eligible dependents in the Student Health Service by paying an additional Student Health Service access fee. Students may enroll dependents into this program only at the following times: At the time the student enrolls in WUSM (at student matriculation), or within thirty-one (31) days of a Qualifying Event. If a student elects to enroll his or her eligible dependents at matriculation, coverage for dependents will become effective on the same date the covered student's benefits become effective, provided enrollment for the dependents occurs on or before the deadline. No enrollment for dependents is allowed after the deadline unless a Qualifying Event occurs. Dependent coverage terminates when the student's coverage terminates or when the dependent no longer meets the definition of a Dependent as described above, if earlier.

## Dental Care

Benefits provided by Student Health Service for injury to a sound natural tooth only. Coverage for injury to a sound natural tooth is 100% of the first \$300 of expenses, and 80% of the balance, not to exceed \$1,000 as a result of any one accident. Student Health Services will provide a list of private dentists upon request.

In addition to the benefit provided by Student Health Service, all eligible full-time students registered in the medical and allied professional schools of the Medical Campus and their enrolled dependents will be covered by a prepaid dental plan through Assurant Employee Benefits Heritage. All full-time students are covered automatically, with the coverage premium paid for by WUSM Student Health Service. There are no enrollment forms for the student to complete. However, you will NOT officially have coverage until a participating dentist is selected. To select a participating dentist, you may call Assurant Customer Service at (800) 443-2995 or visit their web site at [www.assurantemployeebenefits.com](http://www.assurantemployeebenefits.com). You must select a participating general dentist in Assurant's Heritage network before you can use your benefits. This plan is available to your family members as well for the yearly premium; see Student Health Benefit office for details.

## Counseling Services

Students at the Medical Center may have concerns over poor concentration, ineffective study habits, anxiety over their performance, low self-esteem, getting along with others, grief or depression. The psychiatry and clinical psychology staff members are available to help students cope with these concerns. Initial evaluations are made at the Student Health Service. Subsequent care may be at the Medical Campus or a designated physician's office. Call 362-3523 for more information. All records are confidential and may not be seen by anyone without the student's written consent.

In addition, Student Health Service provides a Student Assistance Program (SAP) for all enrolled students and their immediate family members. This prepaid benefit is offered as a way to help our Students resolve issues that may have an impact upon their personal lives and their school performance.

The SAP provides confidential, professional assistance to full-time enrolled students and their family members to help resolve problems that are affecting their personal life or school performance. The program is managed by ENI, a nationally known professional consulting firm specializing in SAP services.

Students can contact ENI 24 hours a day, seven days a week to arrange a confidential appointment with an SAP specialist. SAP specialists have professional training and expertise in a wide range of issues such as academic problems, eating disorders, credit problems, adjusting to school, marriage and family

problems, alcohol and drug abuse, emotional and psychological concerns, financial difficulties, stress and much more.

The SAP can be reached by calling (800) 327-2255 and selecting prompt #3.

## Disability Insurance

All students are covered by group disability insurance. A student who is completely disabled for six consecutive months is eligible to receive \$500 per month benefit. Coverage increases to \$1,500 per month in the third year. Individual disability policies are issued to fourth-year students, increasing the total monthly benefit to \$2,000. Individual policies are portable, guaranteed issue and can be increased after graduation up to a maximum \$4,700 per month benefit. Call 362-2346 for more information.

## Life Insurance

All eligible full-time students registered in the Washington University Medical School and allied professional schools are covered automatically, premium paid for by WUSM Student Health Service. An enrollment form listing your beneficiaries is required to complete enrollment. In brief, the term life insurance plan and AD&D plan for medical students and affiliated programs provided by Guardian is as follows: term life plan provides \$10,000 of term life insurance and the AD&D plan \$10,000 of accidental death and dismemberment protection. A detailed description of the plan is available at Student Health Services.

Upon graduation, you can convert the amount of your term life insurance to a participating whole life plan underwritten by Guardian.

## Departments

Washington University School of Medicine has 20 academic departments, all of which support the School's tripartite mission of conducting outstanding patient care, education and research. The School excels applying a multidisciplinary approach to all its endeavors, allowing faculty to easily cross administrative boundaries to address medicine's biggest challenges.

For more information about the faculty, please visit [Faculty at a Glance](#).

(<http://bulletinoftheschoolofmedicine.wustl.edu/About/facultyataglance/Pages/Faculty-at-a-Glance.aspx>)

For more information about department research, please visit [Research Activities](#).

(<http://bulletinoftheschoolofmedicine.wustl.edu/About/researchactivites/Pages/Research-Activities.aspx>)

For more information about departmental educational activities, please visit the departmental links at left.

## Department of Anatomy and Neurobiology

The structure of the human body is presented in two courses: [The Human Body: Anatomy, Embryology and Imaging](#), offered in the first semester, and Microscopic Anatomy, which extends over the first and second semesters. A third course, [Neural Sciences](#), is taught at the end of the second semester.

**Human Anatomy and Development** is largely a laboratory course, and lectures deal with anatomical principles and human growth and development. Instruction in **Microscopic Anatomy** focuses on cell and tissue biology, with laboratory sessions paralleling the lectures in these areas. This is a component of the **Cell and Organ Systems Biology** course jointly taught with the **Department of Cell Biology** and Physiology. **Neural Sciences** is an integrated course that deals with the structure, function and development of the nervous system from molecular, cellular and systems perspectives. Throughout all three courses, attention is paid to the results of recent investigations and to major developments in each field. In addition, the departmental faculty have a lead role in many graduate courses that may be taken as electives by students in any of the four years.

The department is well-equipped for specialized work in several areas, including gross anatomy, electron microscopy, tissue culture and all aspects of neurobiology.

## MD Courses

### First Year

#### M35 554 NEURAL SCIENCES

Instructors: David C. Van Essen, PhD, 362-7043; Timothy E. Holy, PhD, 362-0086; Joseph L. Price, PhD, 362-7043 (Co-Coursemasters)

Neural Sciences is an intensive seven-week course that covers the structure, function and development 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 material presented. The course includes regular lectures, conference sessions and laboratories, plus a number of clinically oriented presentations. Computer-aided instructional programs, accessible from a variety of locations, provide auxiliary modes of self-paced learning and review. The midterm and final emphasize the core body of important facts and principles presented in lectures and laboratories. (SPRING ONLY).

#### M05 501B THE HUMAN BODY: ANATOMY, EMBRYOLOGY AND IMAGING

Instructor: Glenn C. Conroy, PhD, 362-3397

The course is based largely on the 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. An extensive museum of labeled dissected specimens is housed in the dissection room for ready reference by students who encounter abnormalities or variations in their dissections. Frequent use of CT, MRI, and X-ray images aid in the synthesis of knowledge gained through dissection. Small group discussions emphasize radiological anatomy and clinical correlations. This course is restricted to first year medical students, but limited space is sometimes available for nonmedical students enrolled in the PhD program with instructor's permission. Cross-listed with L41 (Bio) 501.

#### M75 503 CELL AND ORGAN SYSTEMS BIOLOGY

Instructor: Paul C. Bridgman, PhD, 362-3449

The structure of cells, tissues and organs is studied with regard to the functional significance of the morphological features. Lectures integrate histology with cell biology and physiology. The laboratories consist of the study of prepared slides, electron micrographs and digital images. A dual-view microscope

will be provided for each pair of students. Limited space is available for non-medical students with instructor's permission. This course is cross-listed in the Department of Cell Biology and Physiology.

## Selectives

### M04 552 GENETICS AND MOLECULAR BIOLOGY OF ION CHANNELS

Instructor: Lawrence B. Salkoff, PhD, 362-3644

A functional genomics approach to studying membrane excitability. How the new DNA sequence data from genomic and EST sequencing projects can be exploited to get a comprehensive picture of gene families that contribute to membrane excitability. How DNA sequence data can contribute to understanding questions of physiology, development, regulation and structure-function relationships.

## Fourth Year

### Electives

The department offers a number of graduate-level courses that may be taken as electives by medical students. The department participates in the Division of Biology and Biomedical Sciences, which also offers courses relevant to anatomy and neurobiology.

These course descriptions are presented in the section on Biology and Biomedical Sciences.

L41 (Bio) 5571 CELLULAR NEUROBIOLOGY

L41 (Bio) 5651 NEURAL SYSTEMS

L41 (Bio) 590 RESEARCH OPPORTUNITIES

Note — The number preceding the course title indicates that the course is offered by the Division of Biology and Biomedical Sciences and carries credit in the Graduate School of Arts & Sciences.

### M05 810 ADVANCED DISSECTION

Instructor(s): Staff, 362-3397

Location: North Building

Elective Contact: Glenn Conroy, PhD, 362-3397

Other Information: Self Study. High Pass/Fail. Contact Dr. Conroy one week prior to the start of the elective.

Enrollment limit per period: 14

Valid start weeks for four-week blocks are: Weeks 29, 33, 37, and 41.

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.

Student time distribution: A minimum of 40 hours is required.

Major teaching responsibility: N/A

Patients seen/weekly: N/A

On call/weekend responsibility: N/A

### M05 820 TEACHING ASSISTANT IN HUMAN ANATOMY

Instructor(s): Glenn Conroy, PhD, 362-3397

Location: North Building

Elective Contact: Glenn Conroy, PhD, 362-3397

Other Information: Students should contact Dr. Conroy one week prior to the start of the elective.

Enrollment limit per period: 3

Valid start weeks for four-week blocks are: Weeks 13 and 21.

Offers the student the opportunity to review human anatomy by assisting the Anatomy faculty in teaching first-year medical students in the Anatomy laboratory.

Student time distribution: N/A

Major teaching responsibility: N/A

Patients seen/weekly: N/A

On call/weekend responsibility: N/A

## Research

(M05 900)

Cross-listed with L41 (Bio) 590

**Nancy L. Baenziger, PhD**, Ninth Floor McDonnell Science Building, 362-2817. Environmental stress impact on receptor signal transduction and neuronal connectivity in cellular models of Alzheimer's disease.

**Paul Bridgman, PhD**, Fourth Floor McDonnell Science Building, 362-3449. Cell biology of the developing nervous system.

**Andreas Burkhalter, PhD**, Fourth Floor North Building, 362-4068. Organization and function of neuronal circuits in mouse visual cortex.

**Harold Burton, PhD**, Third Floor East McDonnell, 362-3556. Cortical functional reorganization in response to sensory changes due to unilateral deafness or strabismus.

**Valeria Cavalli, PhD**, Fourth Floor McDonnell Science Building, 362-3540. Cellular and molecular mechanisms of nerve regeneration. Regulation of molecular motors in neurons.

**James M. Cheverud, PhD**, Third Floor North Building, 362-4188. Evolutionary quantitative genetics, genetics of growth and morphology, gene mapping for obesity and diabetes-related traits in mice.

**Glenn C. Conroy, PhD**, Third Floor North Building, 362-3397. Paleoanthropology; Geographical Information Systems (GIS).

**Krikor Dikranian, PhD**, Third Floor North Building, 362-3548. Development and morphology of the amyloid plaques in experimental animals, neuropathological changes after head trauma.

**David I. Gottlieb, PhD**, Ninth Floor McDonnell Science Building, 362-2758. Embryonic stem cell models of neural development and disease.

**Paul A. Gray, PhD**, Ninth Floor McDonnell Science Building, 362-9063. Molecular development of neural circuits underlying simple behavior.

**Timothy E. Holy, PhD**, Fourth Floor North Building, 362-0086. Mammalian pheromones: neural mechanisms of action.



**Arthur D. Loewy, PhD**, Ninth Floor McDonnell Science Building, 362-3930. Analysis of brain circuits controlling cardiovascular functions.

**Michael L. Nonet, PhD**, Ninth Floor McDonnell Science Building, 747-1176. Molecular genetic analysis of synaptic development and function.

**Karen L. O'Malley, PhD**, Ninth Floor McDonnell Science Building, 362-7087. Molecular mechanisms underlying neurodegenerative processes. Signaling mechanisms associated with intracellular receptors.

**Jane Phillips-Conroy, PhD**, Third Floor North Building, 362-3396. Behavior, morphology and biology of living primate populations.

**Camillo Padoa Schioppa, PhD**, Third Floor East McDonnell Science Building, 362-3530. Neuronal bases of economic choice and decision making.

**Narendrakumar Ramanan, PhD**, Ninth Floor McDonnell Science Building, 362-0233. Transcriptional control of synaptic plasticity.

**Lawrence B. Salkoff, PhD**, Ninth Floor McDonnell Science Building, 362-3644. The roles of ion channels in neuronal long term excitability changes.

**Paul J. Shaw, PhD**, Ninth Floor McDonnell Science Building, 362-2703. Molecular genetics of sleep and circadian rhythms.

**Lawrence H. Snyder, MD, PhD**, Third Floor East McDonnell, 747-3530. Computational and cognitive issues in cortical control of eye and arm movement: electrophysiology and imaging.

**Paul H. Taghert, PhD**, Ninth Floor McDonnell Science Building, 362-3641. (i) Neurobiology of circadian rhythms. (ii) Neurobiology of peptidergic neurotransmission.

**David C. Van Essen, PhD**, Second Floor East McDonnell, 362-7043. Organization, function, and development of primate cerebral cortex, especially in humans; generation and utilization of neuroinformatics tools for data mining.

## Department of Anatomy and Neurobiology Faculty

**Azad Bonni, MD, PHD**

Edison Professor of Neurobiology

Head of the Department of Anatomy and Neurobiology

**Nancy L Baenziger, PHD**

Research Associate Professor of Neurobiology

Kevin J. Black, MD

Professor of Neurobiology

Paul C Bridgman, MS, PHD

Professor of Neurobiology

Andreas H Burkhalter, MS, PHD

Professor of Neurobiology

Harold Burton, PHD

Professor of Neurobiology

Valeria Cavalli, MS, PHD

Assistant Professor of Neurobiology

Theodore J Cicero, MS, PHD

Professor of Neurobiology

Glenn C Conroy, M PHIL, PHD

Professor of Anatomy

Maurizio Corbetta, MD

Professor of Neurobiology

Krikor T Dikranian, MD, PHD

Associate Professor of Anatomy

Gammon Marie Earhart, MS, PHD

Associate Professor of Neurobiology

Susan M Fitzpatrick, PHD

Adjunct Associate Professor of Neurobiology

Robert W Gereau, PHD

Professor of Neurobiology

Paul A. Gray, PHD

Assistant Professor of Neurobiology

Timothy E. Holy, MA, PHD

Associate Professor of Neurobiology

Timothy Everett Hullar, MD

Associate Professor of Neurobiology

Vladimir Jivkov Kefalov, PHD

Associate Professor of Neurobiology

Daniel Kerschensteiner, PHD

Assistant Professor of Neurobiology

Robyn Sue Klein, MS, MD, PHD

Associate Professor of Neurobiology

Vitaly A Klyachko, MS, PHD

Assistant Professor of Neurobiology

Eric Claude Leuthardt, MD

Associate Professor of Neurobiology

Christopher J Lingle, PHD

Professor of Neurobiology

Arthur D Loewy, PHD

Professor of Anatomy and Neurobiology

Peter David Lukasiewicz, PHD

Professor of Neurobiology

Steven James Mennerick, PHD

Professor of Neurobiology

Bruce L Nock, MS, PHD

Associate Professor of Neurobiology

Michael L Nonet, PHD

Associate Professor of Neurobiology

Karen Laurel O'Malley, MS, PHD

Professor of Neurobiology

Camillo Padoa-Schioppa, MS, PHD

Assistant Professor of Neurobiology

Tae Sung Park, MD

Professor of Neurobiology

Joel S Perlmutter, MD

Professor of Neurobiology

Steven E Petersen, PHD

Professor of Neurobiology

Jane Phillips Conroy, MA, PHD

Professor of Anatomy

Marcus E Raichle, MD

Professor of Neurobiology

Keith M Rich, MD

Professor of Neurobiology

Joshua Bennett Rubin, MS, PHD, MD

Associate Professor of Neurobiology

Lawrence B Salkoff, PHD

Professor of Neurobiology

Celia Maria Santi Grau Perez, MD, PHD

Research Assistant Professor of Neurobiology

Bradley L Schlaggar, PHD, MD

Professor of Neurobiology

Paul Joseph Shaw, MA, PHD

Associate Professor of Neurobiology

Lawrence H Snyder, AB, MS, PHD, MD

Professor of Neurobiology

Joseph H Steinbach, PHD

Professor of Neurobiology

Paul H Taghert, PHD

Professor of Neurobiology

Kwee L Thio, PHD, MD

Associate Professor of Neurobiology

Robert Lawrence Tychsen, MD

Professor of Neurobiology

David C Van Essen, PHD

Alumni Endowed Professor of Neurobiology

Mark Edward Warchol, PHD

Professor of Neurobiology

Michael Wong, MD, PHD

Associate Professor of Neurobiology

Thomas A Woolsey, MD

Professor of Anatomy and Neurobiology

Charles F Zorumski, MD

Professor of Neurobiology

## Department of Anesthesiology

Anesthesiology is a medical specialty encompassing a broad range of medical and scientific activities.

The clinical practice of anesthesiology includes:

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 (CPR).

The realm of scientific investigation in anesthesiology also spans a broad range. Scientific efforts at the cellular and molecular levels are directed to understanding the molecular mechanisms of anesthesia and analgesia. Clinical research in anesthesia includes broad epidemiological approaches to identifying indicators of outcome as well as prospective clinical studies examining new technologies, anesthetic agents and methods.

The **Department of Anesthesiology** presents the student with the opportunity to:

1. acquire and apply pharmacologic knowledge related to anesthetic, narcotic, paralytic and sedative drugs and to 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 in the clinical evaluation and management of patients, and in applied physiology and pharmacology. The **Department of Anesthesiology** offers student experiences in the operating room, the intensive care unit, the pain clinic and the laboratory.

This clerkship introduces all of the basic aspects of anesthetic practice, including preoperative assessment, intraoperative anesthetic administration, placement and interpretation of invasive and noninvasive physiologic monitoring, airway management and regional anesthetic administration. Students taking this clerkship work one-on-one with attending anesthesiologists and are an integral part of the anesthetic care team. By the end of the clerkship, the student should be able to provide (under supervision) anesthesia for an uncomplicated surgical procedure. This rotation offers a unique opportunity for the student to work directly with attending physicians and to acquire fundamental skills (airway management, invasive monitoring, regional anesthesia) applicable to all aspects of acute medicine.

Students who have taken the anesthesia clerkship in the third year may elect to repeat this rotation in the fourth year. These students will be exposed to more complicated cases and techniques, and will be given increased responsibility for perioperative patient management. Students who have taken the clerkship in the third year also may elect to take an elective in the subspecialty areas of **Cardiothoracic Anesthesiology**, **Pediatric Anesthesiology**, **Obstetric Anesthesiology** or **Anesthesia for Neurosurgery**. Students taking these electives will be exposed to surgical cases of increased complexity requiring specialized invasive monitoring and anesthetic techniques.

Four-week electives are also offered in surgical critical care and cardiothoracic critical care. In these electives, the student is an integral part of the intensive care team. Students learn techniques of mechanical ventilation, hemodynamic monitoring, resuscitation and vasoactive drug treatment while managing all aspects of patients assigned to their care.

The clerkship in pain management offers the student the opportunity to participate in comprehensive, multidisciplinary management of acute, chronic and cancer pain problems. Students will be expected to

assist in the care of both inpatients and outpatients. Students will learn fundamental aspects of pain management, which should provide the knowledge with which to manage routine acute and cancer pain in their subsequent practice.

Special electives in basic science research as it applies to anesthesiology can be arranged with the principal investigators in the **Department of Anesthesiology**, in the Anesthesiology Research Unit under the direction of C. Michael Crowder, MD, PhD, the Washington University Pain Center under the direction of Rob Gereau, PhD, or the Division of Clinical and Translational Research under the direction of Evan Kharasch, MD, PhD. These laboratories focus on various aspects of molecular neurobiology, including ion channel structure and function; G-protein molecular biology; molecular mechanisms of volatile anesthetic action; genetics of anesthetic responsiveness; and the molecular, cellular and genetic basis of acute and chronic pain. Arrangements for these special electives are made through the specific investigators: Walter A. Boyle III, MD; Zhou-Feng Chen, PhD; C. Michael Crowder, MD, PhD; Alex S. Evers, MD; Narasimhan Gautam, PhD; Richard S. Hotchkiss, MD; Christopher J. Lingle, PhD; Joseph H. Steinbach, PhD; Michael Bruchas, PhD; Yu-Qing Cao, PhD; or Robert W. Gereau, PhD. In addition, opportunities exist for clinical research in the Clinical Research Division, under the direction of Evan Kharasch, MD, PhD.

## MD Courses

### Fourth Year

#### Electives

##### M10 805 ANESTHESIOLOGY

Instructor(s): Andrea Parsons, MD, 362-6936; [parsonsa@anest.wustl.edu](mailto:parsonsa@anest.wustl.edu)

Location: Barnes-Jewish Hospital, South Campus; Department of Anesthesiology, Third Floor

Elective Contact: Maurice Rackley, 362-2446

Other Information: Please contact the department student secretary, Maurice Rackley, 362-2446, prior to the elective for specific instructions. Students should meet in the Clinical Simulation Center, third floor Barnes-Jewish Hospital Service Building, 8:30 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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. 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. NOTE: Presence and participation in the three Friday Simulator Sessions and the Presentation on the last day of the rotation are required to receive a grade. If there is a conflict with scheduled interviews, prior arrangements can be made to accommodate the student.

Student time distribution: Inpatient 85%, Conferences/Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: Single attending and/or Senior Resident

Patients seen/weekly: 15

On call/weekend responsibility: Medical students are not required to take call during their rotation, but they may volunteer to work in the main operating rooms or in the obstetrical suite any evening or weekend.

#### M10 811 CARDIOTHORACIC ANESTHESIOLOGY

Instructor(s): Rocco Huneke, MD, 362-1196

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Lydia Swink, 362-1196

Other Information: Students should meet at the offices of the Division of Cardiothoracic Anesthesia, Third Floor Barnes-Jewish Service Building, 8:30 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This clinical elective offers practical experience in the perioperative assessment and management of surgical patients undergoing cardiothoracic procedures. The student, as part of the cardiothoracic anesthesia team 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 in clinical decision making and treatment approach during anesthesia and surgery. During this rotation, the student will also gain practical experience in endotracheal intubation and the placement of intravenous lines, and invasive monitoring lines, including radial artery and pulmonary artery catheters. 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 or paper will be assigned.

Student time distribution: Inpatient 100%; Subspecialty Care 100%

Major teaching responsibility: Rocco Huneke, MD

Patients seen/weekly: 15

On call/weekend responsibility: None

#### M10 812 PEDIATRIC ANESTHESIA

Instructor(s): Kelly Chilson, MD; Gary Hirshberg, MD; Tessa King, MD; and David Murray, MD, 454-6215

Location: Fifth Floor, St. Louis Children's Hospital

Elective Contact: Kelly Chilson, MD, 454-6215

Other Information: Students should contact Martha Severn, 454-6215, one week prior to the start of the elective.

Enrollment limit per period: 3

Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 four weeks of active participation with pediatric anesthesiologists at St. Louis Children's Hospital and St. Louis Shriners Hospital learning preanesthetic 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.

Student time distribution: Inpatient Surgery 5%, Outpatient Surgery 80%, Conferences/ Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: Attending, fellows and senior anesthesiology residents; students will generally spend most of each day with a single attending or senior anesthesiology trainee (fellow or resident).

Patients seen/weekly: 25

On call/weekend responsibility: None

#### M10 819 CARDIOTHORACIC CRITICAL CARE

Instructor(s): Charl de Wet, MD; Course Master; Heidi Atwell, DO; Michael Avidan, MD; Daniel Emmert, MD; TJ Graetz, MD; Isaac Lynch, MD; Adnan Sadiq, MD; and Mike Wall, MD

Location: Barnes-Jewish Hospital, Southwest Tower

Elective Contact: Maureen Arends, 747-4155

Other Information: Students should meet in the Cardiothoracic Intensive Care Unit, 5600 ICU, Fifth Floor Southwest Tower Physician Workroom, 6:30 a.m. first day of elective.

Enrollment limit per period: 3

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This clinical elective offers practical experience in the postoperative management of cardiothoracic patients. The student will be fully integrated into the intensive care team and have the opportunity to contribute to the management of critically ill patients. Students will be afforded the opportunity to follow specific patients over the course of their stay on 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. Cardiorespiratory physiology and pharmacology will be demonstrated at the patients' bedside, an invaluable and unforgettable learning experience. Students will have numerous opportunities to assist with and learn procedures, such as central lines, chest tubes, bronchoscopy and pulmonary artery catheter insertion. Principles of management and resuscitation of hemodynamically unstable patients following surgery will be emphasized. Students will also see and help manage patients on ventricular assist devices, ECMO and following heart and lung transplantation. 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 cardiac echo exams. Students will be encouraged to present on their patient at morning ward rounds, during which constructive feedback and interactive teaching will occur. Students will present on a topic related to one of their patients at the end of the block.

Student time distribution: Inpatient 100%; Subspecialty Care 100%

Major teaching responsibility: CTICU attendings

Patients seen/weekly: 21

On call/weekend responsibility: None

#### M10 820 CRITICAL CARE

Instructor(s): Heidi Atwell, DO, 314-362-1196, Course Master;

Watler Boyle, MD; Grant Bochicchio, MD; Stephanie Bonne, MD; Anne Drewry, MD; Stephen Eaton, MD; Daniel Emmert, MD; Alex Evers, MD; Brian Fuller, MD; Thomas J. Graetz, MD; Richard Hotchkiss, MD; Kareem Husain, MD; Jacob Keeperman, MD; Paul Kerby, MD; John Kirby, MD; Isaac Lynch, MD; John Mazuski, MD; Tiffany Osborn, MD; Patricia Penkoske, MD; Adnan Sadiq, MD; Doug Schuerer, MD;

Jessica Smith, MD; Robert Southard, MD; George Tseng, MD; Mike Wall, MD; Brian Wessman, MD; and Robert Winfield, MD

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Barbara McKinney, 747-3581

Other Information: Students should meet in the 4400 Surgical Intensive Care Unit, Fourth Floor of Barnes-Jewish Hospital at 7:30 a.m. on the first day of the elective.

Enrollment limit per period: 4

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 neurologic injuries, liver and/or renal 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 provide adequate nutrition. Practical experience is gained in placement of vascular access devices, interpretation of laboratory data, and use of guidelines, protocols and quality assurance tools in the management of critically ill patients.

Student time distribution: Inpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: ICU Attendings

Patients seen/weekly: 50

On call/weekend responsibility: Variable

#### M10 821 PAIN MANAGEMENT

Instructor(s): Robert A. Swarm, MD, 747-0202

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Robert A. Swarm, MD, 747-0202

Other Information: Students should report to Tenth Floor CAM Building, 8:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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.

Student time distribution: Inpatient 30%, Outpatient 60%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: 70

On call/weekend responsibility: One weekend per rotation

#### M10 822 ANESTHESIA FOR NEUROSURGERY

Instructor(s): Ren, Tempelhoff, MD, 362-2330

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Ren, Tempelhoff, MD, 362-2330

Other Information: Students should meet on Third Floor Barnes-Jewish Hospital, South Campus, Department of Anesthesiology, 7:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Challenging neurosurgical procedures. Student will become familiar with complex procedures for brain monitoring, cardiovascular support and airway management and will be exposed to all kinds of neurosurgical ailments. Student must be prepared to participate in the complex anesthetic management of patients undergoing surgery in our novel intraoperative MRI rooms.

Student time distribution: Inpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attending, fellow, and senior resident

Patients seen/weekly: 8

On call/weekend responsibility: None

#### M10 823 OBSTETRICAL ANESTHESIA

Instructor(s): Swarup Varaday, MD, 362-6252

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Swarup Varaday, MD, 362-6252 or 362-2628

Other Information: Students should report to 5400 Labor and Delivery, 7:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for two- or four-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, and 43.

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).

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attending, Senior Resident

Patients seen/weekly: 20

On call/weekend responsibility: None (optional)

## Department of Anesthesiology Faculty

Alex S Evers, MD

Henry E Mallinckrodt Professor of Anesthesiology

Head of the Department of Anesthesiology

Sirajuddin Agha, MBBS

Assistant Professor of Anesthesiology

Gustav Akk, PHD

Assistant Professor of Anesthesiology

Michael Simon Avidan, MBBCH

Professor of Anesthesiology

Arbi Ben Abdallah, PHD

Instructor in Anesthesiology

George Richard Benzinger III, PHD, MD

Assistant Professor of Anesthesiology

Michael M Bottros, MD

Assistant Professor of Anesthesiology

Laila M Bottros, MD

Assistant Professor of Anesthesiology

Walter A Boyle III, MD

Professor of Anesthesiology

Bernard H Brownstein, PHD

Research Associate Professor of Anesthesiology

Michael Raymond Bruchas, PHD

Assistant Professor of Anesthesiology

Scott D Campbell, MHS, D SC

Research Instructor in Anesthesiology

Yuqing Cao, PHD

Assistant Professor of Anesthesiology

Laura Francesca Cavallone, MD

Assistant Professor of Anesthesiology

Zhoufeng Chen, MS, PHD

Professor of Anesthesiology

Ziwei Chen, MBBS, MS, PHD

Research Assistant Professor of Anesthesiology

Lee-Kui Chen, PHD

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**Kelly Lynne Chilson, MD**

Associate Professor of Anesthesiology

**Jacob L Christensen, MD**

Assistant Professor of Anesthesiology

**Heidi Atwell Coco, DOST**

Assistant Professor of Anesthesiology

**Albert Murray Cohen, MD**

Assistant Professor of Anesthesiology

**Beth A Conrardy, MD**

Instructor in Anesthesiology

**Douglas Floyd Covey, MA, PHD**

Professor of Anesthesiology

**Thomas E Cox, MD**

Associate Professor of Anesthesiology

**Charles M Crowder, MD, PHD**

Dr. Seymour and Rose T. Brown Professor of Anesthesiology

**Bakul Dave, MD**

Assistant Professor of Anesthesiology

**Victor G Davila-Roman, MD**

Professor of Anesthesiology

**Charl Johan De Wet, MBCHB**

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**George J Despotis, MD**

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Professor of Anesthesiology

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Nicole Marie Durko, DOST

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**Ryan C Guffey, MD**

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**Robert E Herold, MD**

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**Barbel Holtmann, MD**

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**Richard S Hotchkiss, MD**

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**Hawpeng Stephen Hsu, MD, MS**

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Assistant Professor of Anesthesiology

Rainer Kentner, MD

Assistant Professor of Anesthesiology

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Assistant Professor of Anesthesiology

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Catherine P Krucylak, MD



Assistant Professor of Anesthesiology

Anand Lakshminarasimhachar, MBBS

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Chakrapol Lattanand, MD

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Heather McKenzie, MD

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Jeremiah J Morrissey, PHD

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Carl Helge Nielsen, MD

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Daniel C Nieva, MD

Assistant Professor of Anesthesiology

Sydney Marie Nykiel-Bailey, MD

Assistant Professor of Anesthesiology

Margaret Mary Oakley, MD

Assistant Professor of Clinical Anesthesiology

Ben Julian Palanca, MD

Assistant Professor of Anesthesiology

Patricia A. Penkoske, MD

Instructor in Anesthesiology

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Adnan Sadiq, MD

Assistant Professor of Anesthesiology

Angela K Saettele, MD

Instructor in Anesthesiology

Matthew Verne Satterly, MD

Instructor in Anesthesiology

Charles R Schrock, MD

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James Serot, MD

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Sonia Malhotra Shahrawat, MD

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Anshuman Sharma, MD

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Assistant Professor of Anesthesiology

Swarup Varaday, MBBS

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Gershon Ram Volotzky, MD

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Choendal Marlaan Zasaretti, MD

Instructor in Anesthesiology

Jessica Ann Zenga, MD

Assistant Professor of Anesthesiology

Yu Zhou, MS, PHD

Research Instructor in Anesthesiology

## Department of Biochemistry and Molecular Biophysics

The [Department of Biochemistry and Molecular Biophysics](#) encompasses research on understanding the energetics, structure and mechanisms of biological processes. Investigators use a variety of experimental methods such as X-ray crystallography, NMR, optical spectroscopy, thermodynamics and 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. High throughput screening of chemical libraries and synthetic medicinal chemistry to develop small molecule probes of biological systems add strength to our growing efforts toward experimental therapeutics and translational research.

Faculty in the [Department of Biochemistry and Molecular Biophysics](#) teach basic science courses in the medical school curriculum, including [The Molecular Foundations of Medicine and Principles of Pharmacology](#). Advanced courses in [Molecular Medicine \(Bio 5326\)](#), [Nucleic Acids and Protein Synthesis \(Bio 548\)](#), [Chemistry and Physics of Biological Molecules \(Bio 5357\)](#), and [Macromolecular Interactions \(Bio 5312\)](#) describe the principles of molecular interactions underlying the biology of health and disease. Students in the School of Medicine and the Graduate School of Arts & Sciences are eligible for these courses and may elect to pursue biomedical research under the direction of our faculty. A full listing of advanced courses topics can be found at [biochem.wustl.edu/studentinfo/courses](http://biochem.wustl.edu/studentinfo/courses).

Our faculty members are engaged in a broad spectrum of biomedically relevant research areas, including nucleic acids structure and enzymology, mechanisms of protein folding, misfolding and aggregation, cellular mechanics and signaling across membranes, and hemostasis, thrombosis and vascular biology. The Department offers unique training opportunities at the crossroads of biochemistry, biophysics, systems biology, computational science and pharmacological sciences.

# MD Courses

## First Year

### M15 502 MOLECULAR FOUNDATIONS OF MEDICINE

Instructor: Linda J. Pike, PhD, 362-9502

This course is designed primarily for medical students and will cover fundamental aspects of biochemistry and cell biology. The course begins with a treatment of protein structure and the principles of enzyme kinetics. This leads to a description of the basic pathways for the synthesis and metabolism of carbohydrates and lipids, with a focus on how the body maintains glucose homeostasis and provides energy under various metabolic stresses. This leads into a discussion of membrane structure and the function of cellular organelles in biological processes, culminating in the replication of DNA and the control of cell proliferation. Non-medical students should register under L41 (Bio) 5319. Please note that Molecular Foundations of Medicine runs on the medical school calendar and thus starts on August 20.

## Second Year

### M70 670A PRINCIPLES OF PHARMACOLOGY

Instructor: Tom Ellenberger, DVM, PhD, 362-0261

This introductory course focuses on mechanisms of drug action (pharmacodynamics), drug distribution and metabolism (pharmacokinetics), autonomic nervous system pharmacology, analgesics and anesthetics, anti-inflammatory therapies, toxicology, and clinical trials of drugs. Our emphasis on basic principles of pharmacology creates a foundation for understanding the rational treatment of diseases covered in other courses during the second year of the medical curriculum. Students who have not completed the first year of the medical school curriculum must have permission from the coursemaster to enroll.

## Fourth Year

### Electives

Descriptions of the elective courses are listed under the Division of Biology and Biomedical Sciences. In some instances, these courses are offered in alternate years. The faculty member in charge of the course should be contacted for specific times.

L41 (Bio) 5312 MACROMOLECULAR INTERACTIONS

L41 (Bio) 5318 DNA REPAIR

L41 (Bio) 5357 CHEMISTRY AND PHYSICS OF BIOMOLECULES

L41 (Bio) 548 NUCLEIC ACID AND PROTEIN BIOSYNTHESIS

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts & Sciences.

## Research

(M15 900)

Cross-listed with L41 (Bio) 590

**Wayne M. Barnes, PhD**, Second Floor McDonnell Science Building, 362-3351. We are developing a new way to sequence DNA, under the "\$1000 Genome Project". This project involves the addition of experimental fluorescent probes to DNA polymerase, with the goal of watching a single molecule flicker as it copies DNA. Student involvement may be at the level of making mutations and purifying mutant enzymes, testing ways to prepare the templates, or testing observations of working molecules.

T7 RNA polymerase is used to express our proteins, and we have double and triple mutants of it that improve expression of problematic proteins, but we only have theory as to how they work better: we think they are slower, and that slower is better. Student involvement may be in constructing comparative strains that use the enzyme, and measuring the speed somehow, in vivo and in vitro.

**Peter M. J. Burgers, PhD**, First Floor South Building, 362-3872. Molecular biology of yeast chromosomal DNA replication and DNA repair.

**Elliot L. Elson, PhD**, Second Floor McDonnell Science Building, 362-3346. Cellular mechanics and cytoskeletal structure and function. Fluctuation spectroscopy.

**Carl Frieden, PhD**, Second Floor McDonnell Science Building, 362-3344. Investigation of apolipoproteins E as they relate to Alzheimer's Disease. Mechanisms of protein aggregation. Fibril formation and bacterial infections.

**Eric A. Galburt, PhD**, Second Floor McDonnell Science Building, 362-5201. Use of single-molecule biophysical techniques such as magnetic and optical trapping to study DNA transcription.

**Roberto Galletto, PhD**, Second Floor McDonnell Science Building, 362-4368. Mechanistic studies of DNA motor proteins and telomere binding proteins; single-molecule approaches.

**Kathleen Hall, PhD**, Second Floor North Building, 362-4196. RNA structure/function. RNA protein interactions. NMR spectroscopy.

**Katherine A. Henzler-Widman, PhD**, Second Floor North Building, 362-1674. Functional dynamics of integral membrane proteins using NMR spectroscopy structure and dynamics of small multidrug resistance transporter proteins.

**Timothy M. Lohman, PhD**, Second Floor North Building, 362-4393. Biophysical chemistry of proteins, nucleic acids and their mechanism of interaction. Mechanisms of DNA unwinding and translocation by helicases and SSB proteins.

**Garland R. Marshall, PhD**, Second Floor Cancer Research Building, Center for Chemical Genomics, 935-7911. Targeting Epigenetic Control in Pathology. A major concern regarding the use of therapeutics targeting the epigenetic control of gene expression is undesirable side effects, particularly those associated with fetal development. Despite the intense interest in targeting histone deacetylases (HDACs, eleven zinc-based enzymes expressed in humans) for multiple therapeutic applications and the fact that two non-specific HDACs are already FDA-approved in oncology, isoform-specific HDACs are not available. Professor Marshall and his collaborators in Rome have a comprehensive program to develop isoform-specific inhibitors for applications for reversing HIV latency with Professor Lee Ratner for treatment of HIV, with Dr. Michael D. Onkin for treatment of uveal melanoma, and for potential antiparasitics with Professors Dan Goldberg, Eva Istvan, Makedonka Mitreva and Audrey Odom. Two uniquely specific inhibitors of HDAC6 have already been discovered in the Marshall lab in the past month.



The research involves bioinformatics to identify homologs of HDACs in parasites, molecular modeling to generate homology models of target proteins, virtual screening to identify potential inhibitors and bioassays to quantitate efficacy. Projects can be customized to fit individual preferences.

**Linda Pike, PhD**, First Floor South Building, 362-9502. Mechanism of EGF and ErbB receptor function. We use a combination of radioligand binding and molecular imaging via luciferase fragment complementation to study the interactions of ErbB family receptors. The goal is to gain insight into structure/function relationships within these receptors to better understand how to target them therapeutically.

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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** 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 **Cell and Organ Systems** course, 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.

# MD Courses

## First Year

### M75 503 CELL AND ORGAN SYSTEMS BIOLOGY

Instructor: Robert S. Wilkinson, PhD, 362-2300

This course integrates and extends the basic principles of cell biology and physiology to the functions of the major organ systems of the body: muscle, cardiovascular, renal, respiratory, gastrointestinal and endocrine. Limited space is available for nonmedical students with instructor's permission. This course is cross-listed in the Department of Anatomy and Neurobiology.

## Selectives

### M04 537 CARDIOVASCULAR CONTROL MECHANISMS

Instructors: David Murray, MD, 747-2136; Robert Moore, MD, 747-2136

The purpose of this selective is to demonstrate cardiovascular physiologic principles and control mechanisms using interactive patient simulators (computerized mannequins) to replicate common cardiovascular disease conditions and potential treatment modalities. The course includes four interactive simulation laboratory sessions. During these four laboratory sessions, simulations of clinical scenarios with case histories will be presented using the full-size electromechanical mannequins at the Howard and Joyce Wood Simulation Center. The mannequins are able to be used to demonstrate and manipulate hemodynamic information used in clinical practice including ECG, arterial, venous, ventricular and pulmonary capillary wedge pressures, cardiac output, stroke volume, heart rate, systemic and pulmonary vascular resistance. In small group sessions, students will explore simulated clinical conditions that demonstrate perturbations in chronotropism, preload, inotropism and afterload. The sessions will be used to provide clinical implications of various reflex responses such as the Frank-Starling and baroreceptor-mediated reflex responses. Scenarios will include hypovolemic shock, congestive heart failure, myocardial infarction and various arrhythmias.

### M04 596 ION CHANNELS AND DISEASE

Instructor: Colin G. Nichols, PhD, 362-6630

Ion channels are present in all cells and direct intracellular events by controlling the membrane electrical activity. Many widely used clinical drugs act by altering the behavior of ion channels, including epilepsy, diabetes, cardiac arrhythmias and cystic fibrosis. We will consider the basis of ion channel diseases and ion channel modulation therapies. Students will research a topic of choice in the library over two to three weeks and then present their findings to the whole class. After the initial course meeting, we will not meet formally for three weeks, and will then meet once per week for presentations.

## Fourth Year

## Electives

Descriptions of the following courses may be found under Division of Biology and Biomedical Sciences.

L41 (Bio) 5062 CENTRAL QUESTIONS IN CELL BIOLOGY

L41 (Bio) 5068 FUNDAMENTALS OF MOLECULAR CELL BIOLOGY

L41 (Bio) 5122 CELL-MATRIX INTERACTIONS

L41 (Bio) 5132 CELL MOTILITY AND CYTOSKELETON JOURNAL CLUB

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts & Sciences. See course descriptions in the Graduate Programs section of this catalog.

## Research

(M75 900)

Cross-listed with L41 (Bio) 590

**Kendall Blumer, PhD**, 506 McDonnell Science Building, 362-1668. Signaling mechanisms in cardiovascular and neurological disorders.

**John Cooper, MD, PhD**, 416 McDonnell Science Building, 362-3964. The roles of actin and microtubules in cell motility and the cell cycle.

**Phyllis I. Hanson, MD, PhD**, 4625 Cancer Research Building, 747-4233. Study of protein-protein and protein-membrane interactions involved in neuronal and synaptic membrane trafficking using biochemical, biophysical, and cell biological techniques.

**John Heuser, MD**, 4900 South Building, 362-6948. Development of new methods for visualizing cells and molecules in three dimensions by means of electron microscopy, and for capturing macromolecular mechanisms through rapid freezing techniques.

**James Huettner, PhD**, 6600 Cancer Research Building, 362-6628. Excitatory amino acid receptors and synaptic transmission in the central nervous system; neural differentiation of embryonic stem cells.

**Vitaly Klyachko, PhD**, 9405 BJC Institute of Health, 362-5517. The mechanisms and regulation of neurotransmitter release at individual synapses; the functional roles of presynaptic processes in synaptic plasticity and information processing.

**Robert Mecham, PhD**, 4606 Cancer Research Building, 362-2254. Understanding 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. Cell-matrix interactions in development and cellular mechanisms associated with connective tissue remodeling in vascular disease and heritable diseases of connective tissues.

**Robert Mercer, PhD**, 5518 Cancer Research Building, 362-6924. Structure and function of cation transport proteins. Molecular biology of the Na, K-ATPase. Polarized sorting of membrane proteins in cultured epithelial cells.

**Mike Mueckler, PhD**, 6606 Cancer Research Building, 362-4160. Molecular biology of mammalian glucose transporters. Regulation of glucose transport by insulin and the mechanism of insulin signaling. Subcellular trafficking of the insulin-regulated glucose transporter. Structure and function relationships of glucose transporters. Mechanism of insertion of complex polytopic proteins into the rough endoplasmic reticulum membrane.

**Colin Nichols, PhD**, 9405 BJC Institute of Health, 362-6630. Ion channel biology. Multiple levels of analysis from the molecular basis of channel function to in vivo physiology and disease.

**Helen Piwnica-Worms, PhD**, 7611 BJC Institute of Health, 362-6812. Cell cycle- and checkpoint-control in normal and cancer cells.

**Paul Schlesinger, MD, PhD**, 401 McDonnell Science Building, 362-2223. Molecular mechanism of BCl-2 family protein function, intracellular channels, biophysics of lipids, proteins and their interaction in cells and nanotechnology.

**Philip Stahl, PhD**, 4929 South Building, 362-6950. The discovery and function of human-specific genes that play a role in cell signaling and transport. Current focus is on TBC1D3, a multi-copied gene in humans that regulates signaling by growth factor receptors such as insulin and epidermal growth factor (EGF). Human-specific genes represent a new frontier in understanding human physiology and pathophysiology — i.e., why humans are human.

**Sheila A. Stewart, PhD**, 7610 BJC Institute of Health, 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 Science Building, 362-3934. Biological consequences of yeast prions -in both their capacity to function as a novel epigenetic elements, and in their utility to serve as a tractable model for the analysis of protein misfolding and aggregation that occurs in several neurodegenerative disorders.

**Robert S. Wilkinson, PhD**, 6615 Cancer Research Building, 362-2300. Cellular physiology of nerve-muscle synapses, especially the regulation of synaptic strength and the role of vesicle processing in determining synaptic properties.

**Zhongsheng You, PhD**, 514 McDonnell Science Building, 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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Research Instructor in Cell Biology and Physiology

# Edward Mallinckrodt 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, 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.

## MD Courses

### First Year

#### **Selective**

M04 500C DEVELOPMENTAL BIOLOGY AND DISEASE

Instructor: Kerry Kornfeld, MD, PhD, 747-1480

This course presents discoveries arising from research in the broad field of developmental biology and focuses on how these discoveries are contributing to understanding, diagnosis and the treatment of human disease.

## Research

### Fourth Year

(M70 900)

Cross-listed with L41 (Bio) 590

**Irving Boime, PhD**, Third Floor McDonnell Science Building, 362-2556. Secretion, targeting and structure-function of the human placental and pituitary glycoprotein hormones.

**Douglas F. Covey, PhD**, Third Floor McDonnell Science Building, 362-1726. Medicinal chemistry of steroids.

**Aaron DiAntonio, MD, PhD**, 333 McDonnell Medical Sciences Building, 362-9925. Neurodevelopment, neurodegeneration, and axon regeneration in *Drosophila* and mouse.

**Gregory A. Grant, PhD**, Fourth Floor Biotechnology Science Building, 362-3367. Mechanism of allosteric regulation in enzymes.

**Shin-Ichiro Imai, MD, PhD**, Room 362A McDonnell Medical Sciences Building, 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.

**Raphael Kopan, PhD**, Room 361 McDonnell Medical Sciences Building, 747-5520. We study Notch signaling and two organ systems (skin, kidney) in the context of development, maintenance, and disease. Skin-specific projects include elucidation of the molecular components of a barrier defect sensor in skin, the impact of chronic barrier defects on the respiratory system, and the regulation of tumor formation by the cytokine TSLP. Kidney projects include reconstruction of the embryonic stem cell niche in vitro, the role of Notch signaling in nephron differentiation, and lineage analysis. The efforts in Notch signaling involve screening adult stem cell niches that require Notch1 or Notch2 signaling. We are also developing innovative technology for whole genome analysis of sites bound by transcription factor complexes, which we plan to apply to dissect targets of major signaling pathways (Notch, Wnt, FGF).

**Kerry Kornfeld, MD, PhD**, Third Floor Cancer Research Building, 747-1480. Signal transduction during development. Zinc metabolism. Aging.

**Kristen Kroll, PhD**, Room 320 McDonnell Sciences Building, 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.

**Craig Micchelli, PhD**, Room 328 McDonnell Sciences Building, 362-7036. Our lab studies the regulation of stem cell biology in development, homeostasis, and disease.

**Kelly Monk, PhD**, Room 3601, Cancer Research Building, 362-3825. Mechanisms of myelin formation, demyelination, and remyelination in zebrafish and mouse.

**Jeanne M. Nerbonne, PhD**, Third Floor McDonnell Science Building, 362-2564. Structure, function and regulation of voltage-dependent ion channels in the cardiovascular and nervous systems. Regulation of membrane excitability in health and disease.

**David M. Ornitz, MD, PhD**, Third Floor South Building, 362-3908. Fibroblast Growth Factor signaling pathway regulation of development and regeneration. Intracellular FGF regulation of neuronal excitability.

**John H. Russell, PhD**, Third Floor McDonnell Science Building, 362-2558. Mechanisms of lymphocyte-mediated inflammation and pathogenesis in the central nervous system.

**Lila Solnica-Krezel, PhD**, 3911A South Building, 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.

**Andrew Yoo, PhD**, Room 3602, Cancer Research Building, 362-1811. Direct Cell Fate Reprogramming of Human Fibroblasts to Neurons. Our lab studies neurogenic activities of microRNAs, and develop strategies to convert human dermal fibroblasts into specific subtypes of neurons and tissue culture models of neurological diseases.

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# James S. McDonnell Department of Genetics

The **Department of Genetics** is at the forefront of the rapidly developing field known as genomic (or personalized) medicine, in which genetic and epigenetic analysis coupled with clinical information enables treatments to be tailored specifically to the individual patient. The rapid evolution of sequencing technologies, 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 genes responsible for human disease and treatment responses. The department supports a broad program of preclinical and graduate instruction in genetics, with research opportunities ranging from studies of transcriptional networks, population genetics, protein evolution, neurological disorders, developmental genetics, models of human disease, genome architecture, statistical genetics and computational biology, genome technologies, and infertility.

A significant portion of the first-year course in basic medical sciences is devoted to human and clinical genetics, with emphasis on how genomic information will transform the practice of medicine. This includes specialized selective courses in addition to the core genetic curriculum. Advanced training in clinical genetics and in genetic research is available from the faculty in the **Department of Genetics** and from geneticists with principal appointments in many other departments within the **School of Medicine**.

Advanced courses and seminars are offered that focus on the genetics of complex disease, gene expression, genetic mapping, molecular genetics, genetic epidemiology, biostatistics, computational biology, developmental genetics, microbial genetics, immunogenetics, 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.

## MD Courses

### First Year

#### M30 511 MEDICAL GENETICS

Instructor: Susan Dutcher, MD, 362-2765; [dutcher@genetics.wustl.edu](mailto:dutcher@genetics.wustl.edu)

The course is divided into halves. The first half focuses on the mechanisms of regulation of gene expression in eukaryotes. This includes discussions of the structure of DNA and its means of replication, the organization and packaging of eukaryotic genomes, chromatin structure and the nucleosome, the organization of polymerase II class genes, the processing of their primary transcripts, and the molecular basis for transcriptional and translational regulation including the use of transgenic mice to study cell-specific gene regulation. The second half focuses on how these concepts can be applied to an understanding of medical genetics. Topics covered include principles of Mendelian genetics, the molecular basis for various inborn errors of metabolism-their diagnosis and prenatal screening, the genetics of cancer, and finally, current strategies for mapping and characterizing the human genome. This course is cross listed with L41 (Bio 550).

## Electives

L41 (Bio) 5285 FUNDAMENTALS OF MAMMALIAN GENETICS  
L41 (Bio) 5488 GENOMICS  
L41 (Bio) 5491 ADVANCED GENETICS  
L41 (Bio) 5495 COMPUTATIONAL MOLECULAR BIOLOGY  
L41 (Bio) 4342 RESEARCH EXPLORATION IN GENOMICS  
L41 (Bio) 5483 HUMAN LINKAGE AND ASSOCIATION ANALYSIS

## Special Topics Courses/Journal Clubs

For complete descriptions, see Division of Biology and Biomedical Sciences.

L41 (Bio) 5235 GENETICS JOURNAL CLUB  
L41 (Bio) 5484 GENOMICS AND DEVELOPMENT OF *C. ELEGANS* JOURNAL CLUB  
L41 (Bio) 5489 HUMAN GENETICS JOURNAL CLUB  
L41 (Bio) 5496 SEMINAR IN COMPUTATIONAL MOLECULAR BIOLOGY

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts & Sciences.

## Research

(M20 900)

Cross-listed with L41 (Bio 590)

**Ingrid Borecki, PhD**, Suite 6318, 4444 Forest Park Ave., 362-3690. Statistical genetic analysis of complex human traits, especially cardiovascular disease, obesity, metabolism, and cancer.

**Barak Cohen, PhD**, Room 5509, 4444 Forest Park Ave., 362-3674. Functional genomics in yeast. Gene regulatory networks, complex trait genetics, synthetic biology studies of cis-regulation.

**Don Conrad, PhD**, 10617 BJC-IH, 362-4379. Our group has a long-standing interest in developing new methods for characterizing the origin and functional impact of human genetic variation. Recently completed projects have covered the following topics: mapping of copy number variants, measurement of sex-specific mutation rate and variation in mutation rate among decomposing the relative impact of different types of mutation (SNPs, indels, CNVs, etc.) on gene expression variation and disease susceptibility. Currently, we have a number of active projects that address fundamental unsolved problems related to human reproduction. First, we are trying to unravel the genetic basis for a common form of male infertility, non-obstructive azoospermia, using oligonucleotide arrays and exome sequencing. The short-term goal of this project is to define causal mutations in the >400 cases in which we have access. Our ultimate goal is to provide an unbiased view of the genetic architecture of the disease and establish a definitive reference panel of causal mutations that clinicians can use to facilitate diagnosis of spermatogenic failure. Second, we are using sperm DNA from a longitudinal cohort of semen donors to study the processes of mutation and selection within the population of germ cells of individuals. There are a number of other potential projects ranging from topics of medical relevance such as the biology of the placenta and maternal-fetal compatibility to more basic questions regarding genome biology and evolution. Training in this elective will be primarily computational, and can cover skills such as population genetic analysis, rare-variant association study methodology and other aspects of statistical genetics. However, parties interested in using other approaches to address the topics discussed here are welcome.

**Joseph Dougherty, PhD**, 864A McDonnell Science Building, 286-0752. 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 disorder, particularly those that mimic genetic variations we've identified from human patient populations, with the goal of trying to understand the cellular and molecular underpinnings of these disorders.

**Susan K. Dutcher, PhD**, 875 McDonnell Science Building, 362-2765. Studies on the role of centrioles and basal bodies in ciliary signaling, assembly, and motility using molecular genetics, computational, and biochemical approaches.

**Justin Fay, PhD**, Room 5526, 4444 Forest Park Ave., 747-1808. Population and evolutionary genetics, evolution of gene regulation in yeast, human evolution.

**James Havranek, PhD**, 1914 South Building, 362-2535. Computational and experimental studies of specificity in protein-DNA interactions. We are using computational and experimental approaches to understand the specificity of protein-DNA binding, using the winged helix-turn-helix family of bacterial transcription factors as a model system. We aim to construct structure-based models of transcription factors that enable both the prediction of binding preferences and the design of mutants with altered specificities.

**Stephen L. Johnson, PhD**, 711 McDonnell Science Building, 362-0362. Growth control and morphogenesis in vertebrate development. Focus on genes and mechanisms affecting proportionate fin growth, fin regeneration and pigment stripe patterning in zebrafish.

**Elaine Mardis, PhD**, Room 4122, 4444 Forest Park Ave., 286-1805. Technology development for second-generation DNA sequencing with an emphasis on methods and applications development. Non-human primate genomics.

**Jeffrey Milbrandt, MD, PhD**, 130 Biotechnology Center, 362-4651. Studies of metabolic control of glial/axonal interactions necessary for proper nerve function. The use of high throughput genetic and pharmacologic screens using primary neurons and induced pluripotent stem cells to identify molecular mechanisms of axonal degeneration in neuropathy and neurodegenerative disease.

**Rob Mitra, PhD**, 6201A, 4444 Forest Park Ave., 362-2751. Systems Biology and Technology Development. We are developing tools to make quantitative biological measurements and applying these tools to build mathematical models of biological processes.

**Gary J. Patti, PhD**, 214 Biotechnology Building, 362-8358. Metabolomics. Our laboratory is focused on extending our understanding of comprehensive cellular metabolism and defining its association with physiology. By using state-of-the-art mass spectrometry, we are interested in globally quantifying metabolite alterations in biological systems under perturbation (e.g., during disease). Our program applies this approach, called metabolomics, to understand mechanisms associated with neuropathic pain and explore novel therapeutics. Additionally, we are applying metabolomics to study the contribution of skeletal muscle degeneration to whole-organism aging.

**Michael A. Province, PhD**, Suite 6318, 4444 Forest Park Ave., 362-3616. 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**, 308 Biotechnology Building, 747-3263. Statistical genetics and psychiatric genetics. Development and application of analysis methods for studying the genetics of human disease and complex traits.

**Tim Schedl, PhD**, 870 McDonnell Science Building, 362-6162. 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**, 2903 South Building, 362-0535. 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 CNS.

**Gary D. Stormo, PhD**, Room 5524, 4444 Forest Park Ave., 747-5534. Computational biology of protein-DNA interactions, RNA folding, gene and promoter finding. Biochemical analysis of DNA-protein interactions and gene regulation.

**Ting Wang, PhD**, Room 6203, 4444 Forest Park Ave., 286-0865. 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.

**George Weinstock, PhD**, Room 4121, 4444 Forest Park Ave., 286-1879. Genome and metagenome analysis. Genome sequencing of individual genomes and metagenomes of microbial communities using next generation sequencing platforms; bioinformatic and statistical analysis of data.

**Richard K. Wilson, PhD**, Room 4122, 4444 Forest Park Ave., 286-1804. Genome research. Large-scale DNA sequence analysis of genomes and expressed genes (cDNAs) from humans, non-human primates, mammals, invertebrates, plants and various bacterial species. Targeted genomic analysis of genes and regulatory elements in human cancers and other hereditary diseases. Development of novel technology for large-scale DNA sequence analysis and genetic analysis.

## James S. McDonnell Department of Genetics Faculty

**Jeffrey D Milbrandt, MD, PHD**

James S McDonnell Professor of Genetics

Head of the Department of Genetics

**Haley J Abel, MA, PHD**

Research Instructor in Genetics

**Ping An, MD**

Research Assistant Professor of Genetics

Lucinda L. Antonacci-Fulton, MS

Research Instructor in Genetics

John Rutledge Bermingham Jr

Research Associate Professor of Genetics (Pending Executive Faculty Approval)

Patrick Michael Blanner, MA

Research Instructor in Genetics

Ingrid B Borecki, MS, PHD

Associate Professor of Genetics

Paul F Cliften, MS, PHD

Research Associate Professor of Genetics

C. Robert Cloninger, MD

Professor of Genetics

Barak Alon Cohen, PHD

Associate Professor of Genetics

Alvin Golfarb Distinguished Professor of Computational Biology

Janet M Connolly, MS, PHD

Research Professor of Genetics

Donald Franklin Conrad, M RESEAR, PHD

Assistant Professor of Genetics

Joseph C. Corbo, AB, PHD, MD

Associate Professor of Genetics

James P Crane, MD

Associate Professor of Genetics

Peter A. Crawford, MD, PHD

Assistant Professor of Genetics

Sharon Cresci, MD



Assistant Professor of Genetics

Seth Daniel Crosby, MD

Research Assistant Professor of Genetics

Li Ding, PHD

Academic Rank held in Genetics

Assistant Professor of Genetics

Joseph D Dougherty, PHD

Assistant Professor of Genetics

Todd Druley, MD, PHD

Assistant Professor of Genetics

Susan K. Dutcher, PHD

Professor of Genetics

Justin C. Fay, PHD

Associate Professor of Genetics

Mary F Feitosa, MA, PHD

Research Associate Professor of Genetics

Robert S. Fulton, MS

Research Instructor in Genetics

Narasimhan Gautam, MS, PHD

Professor of Genetics

Alison Goate, PHD

Professor of Genetics

Matthew I Goldsmith, MS, MD

Assistant Professor of Genetics

Malachi Griffith, PHD

Research Instructor in Genetics

Chi Gu, MS, PHD

Associate Professor of Genetics

David H Gutmann, MS, PHD, MD

Professor of Genetics

James J Havranek, PHD

Assistant Professor of Genetics

Richard D Head, MS

Research Associate Professor of Genetics

Andrew C Heath, PHD

Professor of Genetics

Patrick Y Jay, PHD, MD

Associate Professor of Genetics

Stephen L Johnson, PHD

Professor of Genetics

Beth Ann Kozel, PHD, MD

Assistant Professor of Genetics

Aldi T Kraja, PHD

Research Associate Professor of Genetics

Shashikant Kulkarni, MS, PHD

Associate Professor of Genetics

David Ernfrid Larson, PHD

Research Instructor in Genetics

Heather A Lawson, MA, PHD

Instructor in Genetics

Timothy J Ley, MD

Professor of Genetics

Vincent J Magrini, PHD

Research Assistant Professor of Genetics

Elaine Rene Mardis, PHD

Professor of Genetics

James P Mc Carter, MD, PHD

Adjunct Professor of Genetics

Shondra Michelle Miller, PHD

Research Instructor in Genetics

Robi D. Mitra, PHD

Associate Professor of Genetics

Alvin Goldfarb Distinguished Professor of Computational Biology

Makedonka Mitreva, MS, PHD

Academic Rank held in Genetics

Assistant Professor of Genetics

Peter Nagele, MD

Assistant Professor of Genetics

Gary J Patti Jr, PHD

Assistant Professor of Genetics (Pending Executive Faculty Approval)

Zachary Scott Pincus, PHD

Assistant Professor of Genetics

Michael A Province, MA, PHD

Professor of Genetics

Dabeeru C Rao, MS, PHD

Professor of Biostatistics in Genetics

John P Rice, MA, PHD

Professor of Genetics

Elisha D.O. Roberson, PHD

Instructor in Genetics

Nancy L. Saccone, MS, PHD

Associate Professor of Genetics

Lawrence B Salkoff, PHD

Professor of Genetics

Mark Steven Sands, PHD

Professor of Genetics

Yo Sasaki, MS, PHD

Research Assistant Professor of Genetics

Tim B Schedl, PHD

Professor of Genetics

Cherilynn Maria Reynolds Shadding, PHD

Research Instructor in Genetics

Alan Shiels, PHD

Professor of Genetics

James B Skeath, PHD

Professor of Genetics

Erica Jean Sodergren Weinstock, PHD

Research Associate Professor of Genetics

Gary D Stormo, MA, PHD

Professor of Genetics

Joseph Erlanger Professor

Brian K Suarez, MA, PHD

Professor of Genetics

Michael H. Tomasson, MD

Associate Professor of Genetics

Matthew John Walter, MD

Associate Professor of Genetics

Ting Wang, MS, PHD

Assistant Professor of Genetics

Wesley Charles Warren, MS, PHD

Research Associate Professor of Genetics

George Matthew Weinstock, PHD

Professor of Genetics

Michael C Wendl, MS, PHS, D SC

Research Assistant Professor of Genetics

Michael Aaron White, MS, PHD

Research Instructor in Genetics

Michael Peter Whyte, MD

Professor of Genetics

Richard K Wilson, PHD

Professor of Genetics

Mary Kaye Wojczynski, PHD

Research Instructor in Genetics

Hiroko Yano, MS, PHD

Assistant Professor of Genetics

Kai Ye

Research Assistant Professor of Genetics

Jinsheng Yu, MS, PHD, MD

Research Instructor in Genetics

Qunyuan Zhang, MS, PHD

Research Assistant Professor of Genetics

## John Milliken Department of Medicine

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:

**Barnes-Jewish Hospital**

Victoria J. Fraser, MD  
(Chairman, Department of Medicine)

Veterans Administration Medical Center  
Daniel P. Goodenberger, MD, Chief

In addition, for the purposes of both teaching and research, the Department of Medicine is divided into specialty divisions and sections at Barnes-Jewish Hospital under the following chiefs:

**Allergy and Immunology**

H. James Wedner, MD, Chief

Bioorganic Chemistry and Molecular Pharmacology  
Richard W. Gross, MD, PhD, Chief

**Bone and Mineral Diseases**

Robert Civitelli, MD, Chief

Cardiology/Cardiovascular Diseases  
Douglas L. Mann, MD, Chief

**Dermatology**

Lynn A. Cornelius, MD, Chief

Endocrinology/Metabolism/Lipid Research  
Clay F. Semenkovich, MD, Chief

**Gastroenterology**

Nicholas O. Davidson, MD, Chief

**General Medical Sciences**

Bradley A. Evanoff, MD, MPH, Chief

Geriatrics and Nutritional Science  
Samuel Klein, MD, Chief

**Health Behavior Research**

Mario Schootman, PhD, Chief

**Hematology**

J. Evan Sadler, MD, PhD, Chief

**Hospital Medicine**

Mark S. Thielke, MD, Chief

**Infectious Diseases (Clinical)**

William G. Powderly, MD, Co-Chief

**Infectious Diseases (Basic Science)**

Daniel E. Goldberg, MD, PhD, Co-Chief

### **Medical Education**

Melvin S. Blanchard, MD, Chief

### **Oncology**

John F. DiPersio, MD, PhD, Chief

Pulmonary and Critical Care Medicine

Michael J. Holtzman, MD, Chief

### **Renal Diseases**

Marc R. Hammerman, MD, Chief

### **Rheumatology**

John P. Atkinson, MD, Chief

Instruction in Medicine is provided during all four years of the medical curriculum, beginning with **The Practice of Medicine I** in the first year. Teaching in the second year has two main objectives: the correlation of the basic sciences with clinical aspects of disease and training in the technical methods of physical examination and laboratory diagnosis. By the beginning of the third year, the student is ready for 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. In the final year, students may elect a subinternship in general medicine and a series of elective courses in the medical specialties.

## MD Courses

### First Year

M25 507 THE PRACTICE OF MEDICINE I

Instructor: Gregory M. Polites, MD, 747-5268

POM I is a large course which spans all 3 blocks of the first year. It is composed of three content areas:

Clinical Skills

Patient, Physician, and Society

Scientific Basis of Clinical Medicine

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 WUMS IV mentors, standardized patient experiences with videotape review, physicians' offices, patient's homes with and without home care professionals, and a city clinic.

## Selectives

### M04 5009 MEDICAL SPANISH

Instructor: Marcos Rothstein, MD, 286-0801

This course is designed to provide educational opportunities for people speaking at all levels of Spanish fluency. The classes will consist of basic grammar and the movie/book club/charlas (chats)/roundtables with physicians interspersed throughout the course. Students will learn medically relevant vocabulary, cultural sensitivity and fluency with the goal to improve treatment of the growing U.S. Latino population.

### M04 5061 MEDICINE OF LAUGHTER

Instructor: Dana R. Abendschein, PhD, 362-8909

The course involves reading selected literature describing the physiologic and psychological benefits of laughter; at least two group meetings for discussion of the papers and a paragraph that each student will write addressing a question of interest; a video of the life of Hunter "Patch" Adams, MD; and a site visit to the Children's Hospital Clown Docs program, where clowning is used as a vehicle for humor therapy. Those interested in a 'super selective' experience (with no additional credit) could sign up for clown training, in which the skills of makeup application, costuming, juggling, magic tricks and slapstick would be taught. The latter would be limited to four to six students (per semester) because of the time needed to develop a clown character. The student clowns may round with the Clown Docs and may also possibly be helpful at the WUMS free clinics to entertain those in the waiting area. Students will be able to:

Understand the benefits of laughter on physiologic and psychologic systems based on reading and discussion of published research;



Understand the benefits of laughter and humor therapy on physician/patient interactions, compliance with therapy and patient wellness;

Experience first-hand the effects of humor on patients, family and hospital staff by observing the SLCH Clown Docs during a regular rounding session.

#### M04 520H ART AND MEDICINE

Instructor: Peter G. Tuteur, MD, 454-7116

This course is designed for students to improve observational skills through viewing works of art. Structured visual analysis will be a primary tool used to refine skills to recognize and scrutinize visual cues. The images viewed will be selected to contain specific components conducive to developing these skills and will be of increasing complexity over time. Students will view multiple works of art and share observations in group discussion. How individuals attach meaning to visual images will be discussed.

Sessions will be held at the Saint Louis Art Museum, Contemporary Art Museum, Pulitzer Foundation, Kemper Museum and other art display venues as appropriate. A private collection may be viewed as well. Each session will begin with a discussion of the relevance of the previous class to recent experiences. An opportunity to interpret a single major art work by individual creative effort will be shared among the group. Students will be able to:

1. Improve observational skills potentially crucial to medical practice.
2. Increase their ability to discuss visual observations.
3. Analyze and contextualize how images may apply to clinical situations.

#### M04 528H TERMINAL ILLNESS AND DEATH

Instructor: Ellen F. Binder, MD, 314-286-2707, ebinder@wustl.edu

In this seminar we will examine such topics as: 1) psychological, social, and professional responses to terminal illness and death; 2) communicating bad news to patients; 3) grief and bereavement; 4) palliative care and physician-assisted suicide. Teaching sessions will include discussion of readings, interviews with practitioners and/or patients, and will rely heavily on student participation. Students are also required to spend a half-day making rounds with a BJC Hospice nurse.

#### M04 5302 FRONTIERS IN LEUKEMIA

Instructor: Timothy Graubert 747-4437

Hematopoietic research is rapidly and in some cases dramatically changing the clinical management of patients with leukemia. Most notably, the development of imatinib, a drug specifically designed to inhibit the bcr-abl oncogene, has fundamentally altered the way we treat patients with chronic myelogenous leukemia (CML). The objective of this course is to introduce students to scientific investigation in hematopoiesis with an emphasis on leukemogenesis. We will focus on how research is advancing our understanding of the pathogenesis and treatment of this group of diseases. Specific topics will include CML and the development of imatinib and newer inhibitors, acute myelogenous leukemia, and the preleukemic syndromes severe congenital neutropenia and myelodysplasia. The faculty is all physician-scientists actively engaged in these areas of research. Students will be able to demonstrate the impact of molecular biology on the understanding of the pathogenesis of leukemia and its clinical management.

#### M04 538H DOCTORS ON FILM

Instructor: Thomas M. De Fer, MD, 747-4366

This course will explore the relevant social themes of films in which physicians and/or the medical profession are the main focus. There are countless portrayals of physicians in the cinema. There are also many films that deal extensively with various features of health care delivery. For good or for bad, viewers of these films outside our profession are strongly influenced by these portrayals. Common stereotypes are perpetuated — “If it’s in the movies, there must be some truth to it.” Depictions of physicians and major medical themes have evolved with time and under the influence of social and scientific developments. The course will investigate these depictions and themes using a selection of films (from the classic era to more modern films) to provoke thought and discussion. Some discussion of film craft is also included. Emphasis is given to older movies, 1940s to 1970s. Those not interested in film craft or classic films should consider these latter points very carefully. The essence of this selective is the collective group experience of watching the movies and the discussion that follows. Most of the films are not readily available for rental or purchase, and lending of the VHS tapes or DVDs is not practical. For these reasons, attendance at five of the six sessions is required (all students must attend the introductory session). Each session will run from 3:15 p.m. to 4:55 p.m. (1 hour and 40 minutes). Students will be able to:

Discuss the common themes in doctor movies

Discuss the evolution of these themes over time in the context of social and scientific developments

Discuss the various portrayals of physicians frequently seen in doctor movies

Discuss the effects of these themes and portrayals on patient expectations

Appreciate how an understanding of these portrayals and themes can be used to improve medical care

#### M04 582H PHILOSOPHY OF MEDICINE

Instructor: Stephen S. Lefrak, MD, 454-7116

Medicine is a complex enterprise that has a major impact on our society. As such it draws increasing attention from those within the health care professions as well as those outside medicine whose expertise may lie in law, social science, philosophy, policy, etc. Physicians, in addition to their clinical and research responsibilities, must become increasingly adept at interdisciplinary activities. It is never too early in a career to begin to examine “medical” concepts that are frequently employed without being clarified, thus hindering communication rather than solving problems. It is this clarification process that philosophy addresses. The very issues that philosophy has dwelled on throughout the centuries are the very ones that are critical for medicine; think of “death” or “personhood,” for example. Also, whether medical concepts are “real” or “constructed” is important for both the disciplines of medicine and philosophy. And dare we even mention such issues as the relationship between mind and body, notions of causality, how and what we mean when we “know something” and “free will.” This selective is looking for students who would be interested in beginning such a study with the goals of developing their own understanding as well as introducing it into the medical school curriculum in a formal way. The classical subdivisions of philosophy such as ontology (science of being, existence), epistemology (science of knowing), ethics (moral philosophy) and social philosophy may all serve to clarify important issues in medicine. For example, physicians focus on disease in many ways, yet are diseases descriptive realities or normative (value) concepts? The impact of which answer is accepted is felt throughout society — as what will be reimbursed as health care, what is enacted into policy and law (Americans with Disability Act), and to what the range of medicine is and where are its boundaries. The epistemology of medicine may also be somewhat unique. What physicians take as evidence and what we mean by causality may be very different than what is meant in other scientific disciplines. The terms used by physicians such as

evidence, causality, explanation, hypothesis, theory, etc. should be critically analyzed by physicians. The impact of our understanding of this has great effect on our patients both in clinical care and what research is pursued and accepted. Of course, ethics plays an important role in medicine, but this course is focused on a philosophical analysis of the medical concepts and the constructs of medicine with emphasis on ontology and epistemology. Students will be able to:

1. Expound the “arguments” whether “philosophy of medicine” exists or is needed.
2. Thoughtfully discuss what “medicine” is and some of the legitimate “goals of medicine.”
3. Discuss some of the major domains of philosophy.
4. Become familiar with some of the major philosophical problems and methods.
5. Describe what metaphysics are.
6. Discuss the “concept of disease.”
7. Discuss what kind of activities clinical medicine and reasoning are.
8. Become familiar with the analysis of “scientific method” and how that model compares, fits with clinical medicine.
9. Discuss the method of medicine and compare it to other fields.
10. Think critically about what is required of a mechanistic explanation.
11. Think carefully about the nature of causal relevance.
12. Discuss the virtues and limits of reductive explanations and methods in neuroscience and physiology.
13. Understand the principles of evidence-based medicine.
14. Understand some individuals believe evidence-based medicine is not scientifically sound.
15. Understand the care of individual patients is complex, and rigid adherence to one model may not be sufficient.
16. Discuss the relationship between the metaphysics of medicine, the epistemology of clinical medicine and clinical ethics.
17. Attempt to adopt a unified outlook toward the commonly employed concepts of clinical medicine and their relationship to the patient, physicians and their interaction.
18. Proceed throughout their medical education and careers more aware of the impact of the views that are taken of “disease,” clinical judgment and ethical decision making.
19. Be familiar with the development of disease ontology.

#### M04 524H MAJOR RELIGIOUS TRADITIONS

Instructor: Chaplain Victor Trogon, PhD, BCC, 454-7116

This course will introduce the students to the tenets of mainline religions found in the United States and

how their beliefs and practices can best be considered in understanding the whole patient/family for treatment, planning and decision-making. Primary attention will be given to Christian, Jewish and Muslim traditions as well as others with particular considerations for health care. Special attention will be paid to end-of-life issues, decision-making and interpersonal dynamics. The students also will be introduced to a clinical model of understanding faith and spirituality within the context of health care. Students will be able to:

1. Be more comfortable considering patient/family religious/faith dynamics.
2. Understand the role of patient/family faith commitments in their healing, well-being and development.
3. Increase basic knowledge of tenets of mainline religions found in the United States and how their beliefs/practices can best be considered in understanding the whole patient/family for treatment planning and decision-making.

#### M04 588H MUSIC AND MEDICINE

Instructor: Steven Cheng, MD, 454-7719 and David Windus, MD, 362-7122

Music and medicine reflect one another in several fascinating ways. During this selective, we will examine how music depicts illness and disease, as well as how medicine addresses the specific benefits and occupational hazards of music. Ten students will participate in this highly interactive six-session course that will include lively discussions, listening sessions and demonstrations. Students will discuss how music evokes certain characteristics of disease, suffering and illness; discuss how illnesses in musicians/composers and rock stars influences their work; understand the role of music in the healing process; and recognize medical problems that arise in performing artists.

#### M04 598H A.R.T. ADVANCED INTERDISCIPLINARY BIOETHICS

Instructor: Stephen S. LeFrak, MD, 454-7116 and Rebecca Dresser, LID, 454-7116

The selective will focus on the complex ethical issues in human reproductive health including parenthood, reproductive rights, in vitro fertilization and embryo selection, insurance/national health care coverage, state regulation of reproductive rights, termination issues, etc. It is planned that it will be a predominantly case-based course. Justification for moral claims, and proposed action or policy, will be critically analyzed and discussed. This course has been developed to allow students to pursue a focused interest in one area of bioethics. This more-focused seminar should broaden the outlook of the attendees and sharpen their bioethical analytic skills. Students will be chosen from the law school, medical school and school of social work to help create an interdisciplinary environment. There are no other course prerequisites for enrollment. However, it is presumed that enrollees will have had or are concurrently involved in course work in introductory bioethics (either as undergraduates or currently at their respective graduate schools). There will be required attendance, readings and class participation. Class size will be limited to 15 students to maintain a discussion-based format. As a result, the number of students from each school will be quite limited.

Objectives of the class:

1. Encourage interdisciplinary (interschool) interactions and cooperation at an early stage of professional development
2. Enhance students' ability to critically analyze and discuss complex bioethical issues
3. Develop students' moral imagination as future professionals, both overall and in a specific area

4. Enhance students' abilities to negotiate with others when confronted with profound moral issues
5. Familiarize students with the ethics literature in the area of reproductive medicine.

#### M04 5875 ADVANCED OLIN GRAND ROUNDS

Instructor: Cynthia Wichelman, MD, FACEP, Associate Professor of Medicine, [wichelmc@wustl.edu](mailto:wichelmc@wustl.edu), and Bart Hamilton, PhD, Robert Brookings Distinguished Professor of Entrepreneurship

Grand Rounds at medical schools are forums for presenting new and challenging clinical problems and cases. The goal of Olin Grand Rounds is to focus on the challenges facing the business of medicine and consider possible solutions. The course provides a broad introduction to the current issues facing the health care sector, while integrating management tools and clinical knowledge. This fall semester course was first offered in 2006 and has become a popular course for premed and business undergraduates, as well as students in the MBA program. More medical students should take this class! The information is invaluable for any one pursuing a career in medicine or in the health care sector of business. In addition to several outstanding guest speakers, a number of business case study discussions are complemented with clinical patient presentations. Topics covered include clinical practice compensation distribution, concierge medicine, health care reform and health care system comparison, hospital management, analysis of walk-in clinics (i.e., Walgreens), organ transplantation, research and development and marketing of pharmaceuticals, sickle cell anemia and management of Medicaid and care to the underserved, the business of cosmetic surgery, and biotech startup methods used by local physician-entrepreneurs, to name a few. The course also includes a tour of Express Scripts.

#### M04 5013 INTRODUCTION TO EMERGENCY MEDICINE I

Instructor: Cynthia Wichelman, MD, FACEP, Associate Professor of Emergency Medicine, [wichelmc@wustl.edu](mailto:wichelmc@wustl.edu)

Over six sessions, we will review the physiology and clinical management of common emergencies: cardiovascular emergencies; trauma resuscitation and shock; environmental emergencies, such as high-altitude cerebral edema and snake bites; pediatric emergencies; gynecological and urological emergencies; and toxicological emergencies. Each session will include a lecture followed by case studies that highlight critical aspects of a patient's history, physical examination, laboratory and radiological studies, as well as procedural intervention and pharmacological treatment. Group participation is encouraged. This selective is intended to give students an exposure to emergency medicine. Students will become familiar with the methods used to evaluate and treat patients with medical emergencies in preparation for their clinical training.

#### M04 5016 INTRODUCTION TO EMERGENCY MEDICINE II

Instructor: Cynthia Wichelman, MD, FACEP, Associate Professor of Emergency Medicine, [wichelmc@wustl.edu](mailto:wichelmc@wustl.edu)

This class is a second session on emergency medicine (in response to student requests!) exploring topics not covered in the fall session. Although it would be beneficial to take the Introduction to Emergency Medicine I course offered in the fall, it is not a prerequisite for this class. Six sessions will review the physiology and clinical management of abdominal emergencies, ophthalmic emergencies, endocrine emergencies, environmental emergencies such as lightning and hypothermia, stroke, renal emergencies and obstetric emergencies. Each session will include a lecture followed by case studies that highlight critical aspects of a patient's history, physical examination, laboratory and radiological studies, as well as procedural intervention and pharmacological treatment. Group participation is encouraged. This selective is intended to give students further exposure to emergency medicine. Students will become familiar with the methods used to evaluate and treat patients with medical and surgical emergencies in preparation for their clinical training and board preparation.

#### M04 587L INTERNATIONAL HEALTH

Instructor: Cynthia Wichelman, MD, FACEP, Associate Professor of Emergency Medicine, wichelmc@wustl.edu

This course is an excellent opportunity to prepare for a summer abroad through FIHTM or for a fourth year away rotation. Speakers include WUSM faculty who have incorporated international healthcare in their practices -- from surgery (e.g., ophthalmology, neurosurgery, ENT, ob/gyn), and anesthesiology, to emergency medicine and pediatrics, as well as give students an opportunity to hear from the Global Health faculty heroes at WUSM. Each lecture is followed by an interview with the speaker. The course will help you explore different avenues for adding an international component to your career and to learn which specialties may more readily lend themselves to this. Other topics include how to protect your health while abroad and the ethics of research in a global setting, and organizations such as Doctors Without Borders and ORBIS. WUSM II and IV students will also share their experiences administering health care and doing research abroad. This course, which consists of six sessions, was first introduced in 2004 and is one of the fastest-growing selectives, filling up quickly.

#### M04 537 CARDIOVASCULAR CONTROL MECHANISMS

Instructor: David Murray, MD, 362-7394

The purpose of this selective is to demonstrate cardiovascular physiologic principles and control mechanisms using interactive patient simulators (computerized mannequins) to replicate common cardiovascular disease conditions and potential treatment modalities. Several clinical scenarios with case histories will be presented to small groups for interpretation and subsequent treatment, thereby providing the opportunity to explore endogenous baroreceptor-mediated reflex responses as well as prototypical pharmacologic interventions undertaken by clinicians. Scenarios may include hypovolemic shock, congestive heart failure, myocardial infarction, valvular diseases and some "unknowns." Variables monitored in the patient simulator include ECG, arterial, venous, ventricular and capillary wedge pressures, cardiac output, stroke volume, heart rate, systemic and pulmonary vascular resistance and ventilation. These labs will provide opportunities to consider baroreceptor and other regulatory principles operative in cardiovascular physiology/pharmacology in a simulated patient-care setting, how these systems are affected by a particular disorders/disease, and how the patient responds to various interventions and treatment options that students can implement. A class-wide discussion and systematic review will follow the individual small group workshops to allow synthesis of all the material.

#### M04 586H HEALTH AND HUMAN RIGHTS

Instructor: Kim Carmichael, MD, 454-7116

There is a strong belief among many physicians that our responsibilities extend beyond our individual patients to our communities, countries and even to our entire world. A humanities selective is an excellent forum for interested students to actively learn and discuss the impact of human rights violations on health. Topics discussed include torture, effects of land mines, prison health care, war crimes including sexual violence and public health effects of political conflicts (e.g. Afghanistan). Each meeting will consist of a brief presentation and a discussion on the topic. There will be a different presenter for each topic. Readings will be provided. Students will be able to:

1. Explore human rights issues that are relevant to the health professions from both local and worldwide perspectives.
2. Describe the boundaries and challenges involved in solving human rights issues.
3. Describe strategies for the implementation of programs that address human rights issues.

4. Provide students with examples of successful initiatives and interventions pertaining to health and human rights.

#### M04 587A PHYSICIAN AS HEALTH PROTECTOR AND PATIENT ADVOCATE

Instructor: Steven I. Plax, MD, 994-0109

Investigation into clinical topics again will be offered (please see report on Obesity and Hypertension by last year's students and Dr. Paine). Last year's students did an educational program teaching our population how to read the nutrition information on products they were purchasing. For further information, students may call Dr. Plax at (314) 994-0109. The Office of Medical Student Education has copies of our medical handbooks and their supplements. This course is a component of the Health Protection and Education Service, which meets on the third Saturday of each month except December and July. Sessions are held in the University City Library, 6701 Delmar from 9 a.m. to 11:30 a.m. Students share the goals of the HPES.

1. To do multiple screening testing ranging from height, weight, body mass index, blood pressure, urinalysis and stool exam, eye and vision evaluation, hearing tests by audiologist, skin and dental exam, blood sugar, hemoglobin, and cholesterol measurement, pulmonary function tests and EKGs.
2. Educate people in protecting their health -- a trained historian records each individual's medical history -- at conclusion of person's tests and recording of history, a one-on-one conference is held with a member of MD staff. Medical students participate in screenings and in history-taking and final conferences in telephone follow-up.

This is an opportunity for Washington University medical students to correlate the basic information gathered from first-year courses with their experience with our patients -- and in-the-trenches participation in preventive medicine. Students actively participate in the screening and in history-taking (with trained historian) and in individual conferences between patients and physicians. Students may take part in statistical analysis of data and join in the production of another supplement as in preceding years.

#### M04 580H THE HEALER'S ART

Instructor: Anna Lijowska, MD, 454-6148

The Healer's Art combines seed talks and experiential exercises in a large group setting along with small group experiential exercises. The course engages students in a discovery model of community of inquiry focusing on the meaning of physicianhood and the practice of medicine. Faculty participate in the discovery model process on an equal footing with students as well as facilitating the process of the small groups. The course is designed to encourage medical students to trust the power of listening and presence to heal; formulate a personal, comfortable and compassionate response to loss; experience the healing power of grief; recognize that who they are is as important to the healing relationship as what they know; recognize awe and mystery in the daily practice of medicine; explore the concept of calling; write a personal mission statement; and explore the personal meaning of physicianhood. The Healer's Art facilitates students in clarifying, strengthening and making a personal commitment to medicine as their life's work. Students also have the opportunity to explore their personal values and commit to developing and preserving their personal values, such as service, harmlessness, compassion, altruism, self-care, equality, justice, respect and nurturing wholeness.

Students will be able to:

1. Make an active commitment to strengthening and preserving their humanity
2. Experience the effects of listening and being listened to generously and compassionately
3. Experience healing relationships with other students

4. Experience tools of self-remembering
5. Identify effective and ineffective behavioral responses to loss and grief
6. Identify when they first became aware of wanting to serve others
7. Articulate and strengthen a personal commitment to medicine as their life's work
8. Experience practicing physicians sharing their experiences of loss, grief, mystery, and awe in practicing medicine
9. Witness the unity of commitment to service that lies beneath the diversity of expertise and experience

## Second Year

Teaching by the Department of Medicine is designed to: 1) prepare students for the transition from the preclinical sciences to the study of the sick patient at the bedside, 2) help them analyze the clinical manifestations of disease in terms of the responsible mechanisms and 3) introduce them to the techniques of examination that are used regularly on all clinical services. This instruction is undertaken jointly with members of other clinical departments and is coordinated with subject matter presented by the Department of Pathology and Immunology.

The major areas of clinical medicine are presented in detail to illustrate the application of biochemical, physiological and anatomical information to the understanding of pathological states. Cardiovascular, renal, neurological, gastrointestinal, pulmonary, hematological, metabolic, nutritional and developmental diseases are discussed. Emphasis is placed on the use of fundamental information in approaching clinical problems as a way of thinking that prepares the student for a lifetime of medicine, during which new information will constantly be acquired.

### M25 607 THE PRACTICE OF MEDICINE II

Instructor: Megan E. Wren, MD, 286-3480

Section Leaders: Alan Glass, MD, Dehra Glueck, MD, Jay F. Piccirillo, MD, Rebecca S. Dresser, JD, Stephen S. Lefrak, MD, Graham Colditz, MBBS, MPH, DrPH, Jean Wang, PhD

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 approaches to clinical thinking and decision-making. The sections of POM II include Advanced Physical Examination, Hospital Sessions, Case Development, Communication Skills, Ophthalmology, Radiology, Community and Public Health, Ethics and Health Policy, Perspectives on Illness, and Clinical Epidemiology and Evidence-Based Medicine. 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. 83 clock hours.

### M25 605A INFECTIOUS DISEASES AND MEDICAL MICROBIOLOGY

Instructor: Nigar Kirmani, MD, 454-8215

The infectious disease pathophysiology course emphasizes both organism-specific and organ-specific approaches to diseases caused by microbes. The course expands on material presented briefly in the first year concerning bacteria, viruses, fungi and parasites and their involvement in human disease. Mechanisms of disease production, clinical manifestations and therapy are discussed, along with public



health implications. In addition to lectures, small group case discussions enable students to apply the information they learn to clinical situations.

#### M25 606A RHEUMATOLOGY

Instructor: Richard D. Brasington, Jr., MD, 454-7255

The rheumatology pathophysiology course begins with an overview of the structure, function and physiology of the normal joint and the approach to the patient with arthritis and related disorders. Diagnoses covered include rheumatoid arthritis, systemic lupus erythematosus, vasculitis syndromes, osteoarthritis, infectious arthritis, and crystalline arthritis. Clinical features and treatment will be emphasized. In small group sessions, students interview and examine patients to gain a fuller understanding of the typical history and physical findings of these disorders. Students are strongly encouraged to attend the small group sessions with patients, who make a major contribution to teaching students about these conditions.

#### M25 611B CARDIOVASCULAR DISEASE

Instructor: Dana R. Abendschein, PhD, 362-8909

The purpose of this course is to consider the mechanisms and manifestations of acquired and congenital cardiovascular disorders as well as their pharmacologic treatment. Lectures and small group discussions that emphasize the major areas of cardiac pathophysiology and pharmacology are provided.

#### M25 612B PULMONARY DISEASE

Instructor: Michael B. Lippmann, MD, 289-6306, Adrian Shifren, MD, 362-5378

The objectives of the pulmonary pathophysiology course include review of normal pulmonary physiology as related to specific pulmonary disease states. The focus of the course will largely be upon presentations in lectures concerning pathophysiologic principles of abnormal lung structure and function. In addition, case study problems will be discussed.

#### M25 613B RENAL AND GENITOURINARY DISEASES

Instructors: Steven Cheng, MD, 362-7211

This course uses basic principles of renal physiology and ion homeostasis to understand commonly encountered fluid and electrolyte disorders (especially hyper-/hypo- natremias, acidoses/alkaloses) and the action of diuretic drugs. The pathophysiology of diabetic kidney disease, glomerular and tubulointerstitial diseases, hereditary kidney diseases, and the relationship between hypertension and the kidney are discussed. It also applies basic principles of urinary system anatomy and physiology to the understanding of kidney stones, disorders of the bladder and prostate, and of micturition. The course also introduces basic principles of dialysis and kidney transplant. Lectures, small group problem-solving and team-based learning sessions focus special attention on: 1) how a working knowledge of fundamentals, diagnostic testing and arithmetic manipulation can have important predictive value; and 2) how the courses of acute and chronic renal failure are both adaptive and maladaptive for the organism.

#### M25 614 DERMATOLOGY

Instructor: David M. Sheinbein, MD, 996-8005

The dermatology second-year course is designed to teach medical students 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.

#### M25 615A ENDOCRINOLOGY AND METABOLISM

Instructor: William E. Clutter, MD, 362-8094

This course aims to develop understanding of the pathophysiology, clinical manifestations and diagnosis of common endocrine disorders. History, physical examination and interpretation of diagnostic laboratory tests are emphasized. Principles of treatment of endocrine disorders and pharmacology of relevant drugs also are discussed. Students are expected to apply their knowledge in clinical case discussions.

#### M25 620A GASTROINTESTINAL AND LIVER DISEASES/NUTRITION

Instructor: Deborah C. Rubin, MD, 362-8935

This course discusses the pathophysiologic mechanisms related to the diseases of the gastrointestinal tract including esophagus, stomach, small and large intestines, liver, gallbladder and pancreas. The emphasis is on changes that occur in normal physiology, biochemistry, anatomy, immunology and cell biology that result in human gastroenterologic diseases. Included also are lectures on the pharmacology of gastrointestinal drugs and basics of human nutrition in clinical practice. Lectures are supplemented by group seminars that focus on clinical case presentations.

#### M25 625A HEMATOLOGY AND ONCOLOGY

Instructor: Scot G. Hickman, MD, 289-6308

The hematology and oncology pathophysiology course exposes students to common hematologic disorders and hematologic malignancies. The course uses lectures, clinical case discussions and practical sessions involving microscopy.

## Third Year

#### M25 710 MEDICINE CLERKSHIP

Instructor: Thomas M. De Fer, MD, 362-8050

The medicine clerkship provides supervised study of patients in both inpatient and ambulatory settings. The 12-week clerkship is divided into three four-week rotations: two inpatient and one outpatient. For the inpatient rotations, students are assigned as clinical clerks to patients admitted to the cardiology and general medical teaching services of Barnes-Jewish Hospital and the St. Louis VA Medical Center -- John Cochran Division. For the outpatient rotations, students are placed with community-based internal medicine or family practice physicians and will almost always require a car for transportation. Teaching is provided by the chief of service, attending physicians, house staff, consultants, chief residents, community-based preceptors and regularly scheduled conferences. Formal instruction is given regarding core internal medicine topics during the clerkship. Teaching activities include Chief Resident Rounds, Core Lecture Series, Physical Diagnosis Rounds, Radiology Rounds, Professor's Rounds and other departmentally based conferences.

#### Clinical Pathological Conference

The clinical course, laboratory and radiologic studies, and pathological findings of a patient are discussed using a problem-solving format at a weekly conference by members of the Departments of Medicine, Pathology and Immunology, and Radiology; Melvin Blanchard, MD, internal medicine; chief residents and medical staff; Louis P. Dehner, MD; and pathology staff.

#### M25 707 PRACTICE OF MEDICINE III

Coursemasters: Gregory M. Polites, MD, 747-5268

Clerkship Coordinators: Melody Damico, 362-3480

#### 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 students in their clinical stage of training are discussed. Each session begins with a short talk or panel discussion. As students exchange problematic scenarios and questions, the group develops potential solutions and management schemes.

Topics Include:

Session 1: Giving and Accepting Feedback - Defer

Session 2: Delivering Bad News - Lefrak, Dresser, Adkins, Garcia, Polites

Session 3: Coping with Stressors of a Medical Career - Glueck, Schlaggar, Spiegel, Glass

Session 4: Medical Errors and Disclosure

Session 5: Health Care Update on PPACA - Peck

Session 6: Health Economics - Peck

Session 7: Medical Malpractice - Peck

Session 8: Pharma and Professional Conflicts of Interest

Session 9: Domestic Violence - Glowinski

Date: The 3rd Tuesday of each month with the exception of June, November, and December.

Time: Session runs to 12:00 -1:15 pm.

Attendance at all sessions is required.

Students are excused from clinical activities to attend.

Location: Connor Auditorium, Farrell Learning and Teaching Center

#### M25 714 AMBULATORY: EMERGENCY MEDICINE

Instructors: Mark Levine, MD, 362-6743

The WUMS III Ambulatory Care Rotation takes place in the main emergency department of Barnes-Jewish Hospital. Three to six students at a time are assigned to this four-week rotation. Students will spend their first day in an orientation session that will include a brief survival in the ED introduction, a suture lab, an airway lab, and an ultrasound lab. Domestic violence is covered during this four-week rotation. A course "text" will be provided for the students on orientation day and is theirs to keep. On day two, after conference, students will begin primarily evaluating non-emergent patients in the emergency department (EM 2) and Urgent Care Area/EM3 area and report directly to an attending or senior resident. There are four hours of mandatory conferences per week: 8-10 a.m. on Tuesdays and 8-10 a.m. on Wednesdays. Students can expect to gain a wide range of skills in evaluating a variety of complicated and non-complicated patients. At the end of their rotation, students should be familiar with the approach to complex medical conditions like heart attacks, undifferentiated abdominal pain and complications of pregnancy as well as the "bread and butter" of complaints of ambulatory medicine such as lacerations, simple respiratory tract infections and minor trauma.

WUMS III will be graded on their ability to make a formal patient presentations during a shift, professionalism, their clinical skills and their conference attendance. There will be a written test on the last Friday of the rotation based entirely on the material provided to the students at the start of the rotation.

#### M26 713 AMBULATORY: FAMILY MEDICINE

Instructor: Amy Loudon, MD, 747-0279

The Family Medicine clerkship offered in the third and fourth years allows medical students to work one-on-one with board-certified family physicians in outlying areas of Missouri and Illinois and in other states.

Students may review preceptor profiles and comments that previous students made about preceptors. The clerkship makes every effort to accommodate student preferences for working with specific preceptors. Most students will work with a single preceptor for the duration of the four-week rotation. Students may work with small groups, potentially including family medicine residents. The student will work closely with preceptors on a daily basis in the physician's office. Students often accompany their preceptor on nursing home visits, hospital rounds, medical conferences and other educational activities. Housing will be provided to students working outside the immediate St. Louis vicinity. Weekend call schedules are arranged with the preceptor: students can often return to St. Louis on the weekends. Each student will receive a description of the goals and objectives for the four-week rotation. Students receive short e-mail assignments during this rotation. Grades are calculated primarily from preceptors' subjective evaluations.

#### M25 740 DERMATOLOGY CLERKSHIP

Instructor: Lynn Cornelius, MD, 454-8622

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.

The student will participate in outpatient care at the following hospitals and affiliated clinics: Barnes-Jewish Hospital, St. Louis Children's Hospital, Barnes-Jewish West County Hospital, the Veterans Administration Medical Center and Connectcare Hospitals. These hospital settings will provide the student with ample exposure to a diverse patient population. Students will attend all clinical teaching rounds and conferences in addition to the basic science and cutaneous histopathology conferences. Normal workday hours are 8 a.m. to 5 p.m. with no night or weekend on-call responsibilities. Each student is provided with copies of the two recommended textbooks, Principles of Dermatology by B. Looking and The Color Atlas and Synopsis of Clinical Dermatology by T.B. Fitzpatrick for use during the clerkship; the textbooks are returned to the clerkship coordinator at the end of the clerkship for use by other students rotating in the dermatology division.

The rotation attending physician and the resident physician will submit an evaluation based on the student's clinical skills, presentation, attitudes, overall performance and the end-of-rotation written exam score. Students are not eligible to take the fourth-year rotation if they complete this clerkship.

#### M25 750 GERIATRICS CLERKSHIP

Instructor: Ellen F. Binder, MD, 286-270, Coordinator: JoAnn Wilson, 286-2909

The primary goal of the four-week clerkship in Geriatrics 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, inpatient Geriatric consults, the Rehabilitation Institute of St. Louis (TRISL), the Acute Care for the Elderly (ACE) program at Missouri Baptist Hospital, and a local nursing home. Students will also have the opportunity to participate in hospice and home care visits, 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 ends by 5:30 p.m. There is no night or weekend call. Time is provided to read the detailed syllabus/bibliography. Students will be expected to give an oral presentation on a topic of their choice once during the rotation.

Location: Health key Building, 4488 Forest Park Ave., Third Floor, conference Room 318  
(Southeast corner of Forest park and Taylor)

Time: 8:00 a.m. the first day of the rotation

#### **M25 730 PHYSICAL MEDICINE AND REHABILITATION**

Coursemaster: Neringa Juknis, MD, 454-7757

Clerkship in PM&R for third-year medical students provides an opportunity to gain basic knowledge and clinical skills in evaluation and management of a wide range of neurological and musculoskeletal diseases and conditions that require specialized rehabilitative medical and therapeutic care. Students spend two weeks on the Spinal Cord Injury Unit (SCI) and two weeks on the Brain Injury (BI) and Stroke Unit at The Rehabilitation Institute of St. Louis. Students are expected to be a part of the rehabilitation team, follow three to five patients, participate in daily morning rounds, participate in performing consults and 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 with PM&R residents and fellows, and under direct guidance of the NeuroRehabilitation faculty. The usual duty hours are 7:30 a.m. to 5 p.m. weekdays and 8 a.m. to noon 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.

## **Fourth Year**

### **Electives**

#### **M25 801 HONORS MEDICINE - GENERAL MEDICINE**

Instructor(s): Thomas De Fer, MD, 362-8050

Location: Barnes-Jewish Hospital

Elective Contact: Amber Specter, 362-8050

Other Information: Students will receive e-mail communication regarding where to report on the first day prior to the beginning of the period.

Enrollment limit per period: Limit 8/period for Weeks 1, 5, 9; 4/period for Weeks 13, 17, 21, 25, 29, 33, 37, and 41

Valid start weeks for four-weeks blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The purpose of the "Honors Medicine" elective (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.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Primary Care 50%, Subspecialty Care 50%

Major teaching responsibility: Attending, chief resident, and resident

Patients seen/weekly: 8-12

On call/weekend responsibility: Yes

#### M25 805 RHEUMATOLOGY

Instructor(s): Richard Brasington, MD; Prabha Ranganathan, MD, John Atkinson, MD; Deborah Parks, MD, 454-7279

Location: Barnes-Jewish Hospital, 5C Center for Advanced Medicine

Elective Contact: Department secretary, 454-7279

Other Information: Students should contact the Rheumatology office, 454-7279 prior to first day for assignment.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will be involved in the diagnostic work-up and management of patients with rheumatic illnesses including systemic lupus erythematosus, rheumatoid arthritis, vasculitis (polyarteritis, Wegener's, temporal arteritis), spondyloarthropathies (ankylosing spondylitis, reactive arthritis), osteoarthritis, gout 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 Dr. Brasington.

Student time distribution: Inpatient 40%, Outpatient 50%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: ~25 per student

On call/weekend responsibility: None

#### M25 807 HONORS MEDICINE - VA MEDICAL CENTER

Instructor(s): Amy Joseph, MD, 289-6308

Location: St. Louis Veterans Affairs Medical Center

Elective Contact: Amy Joseph, MD, 289-6308

Other Information: Students will receive e-mail communication regarding where to report on the first day prior to the beginning of the period.

Enrollment limit per period: 3/period for weeks 1, 5, 9; 1/period for weeks 13, 17, 21, 25, 29, 33, 37, and 41.

Valid start weeks for four-weeks blocks are : Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The purpose of the Honors Medicine elective (subinternship) at the VA Medical Center is to develop practical experience and expertise in the care of hospitalized patients on an internal medicine ward. With appropriate supervision by the attending and resident physicians, subinterns will have similar responsibilities as interns. 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. While being supervised as listed above, subinterns assume

primary responsibility for the daily care of their patients, including evaluation on daily rounds, scheduling and obtaining results of diagnostic studies, calling consults, planning therapy, making arrangements for care after discharge. and communicating with patients and their families.

Student time distribution: Inpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attending, Chief Resident and Resident

Patients seen/weekly: 6-8 on average

On call/weekend responsibility: On-call every fourth day

#### M25 809 HYPERBARIC MEDICINE AND PROBLEM WOUND MANAGEMENT

Instructor(s): John D. Davidson, MD, and staff, 205-6818

Location: St. Luke's Hospital, Barnes- Jewish Hospital

Elective Contact: John D. Davidson, MD, 205-6818 or pager 424-2626

Other Information: Interested students should contact Dr. John D. Davidson to discuss in what way this elective can be tailored to their particular interests and goals. Mini-electives of one to two weeks duration can be arranged. (PLEASE contact Dr. Davidson at 205-6818 three weeks prior to the first date of elective to try to tailor the elective as much as possible to your primary interests.)

Enrollment limit per period: 1

Valid start weeks for two- and four-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, and 43. The specialty of hyperbaric medicine centers on the use of oxygen under increased atmospheric pressure as a drug for the treatment of many disparate diseases and clinical problems. This elective allows a student to have an acquaintance with this technology, which has a definite role in a wide range of differing specialties including emergency medicine, otolaryngology, plastic and reconstructive surgery, military medicine, rheumatology, dermatology, oral surgery, radiation oncology, internal medicine, neurology and psychiatry, to name a few.

Since students going into these specialties do not need to learn about hyperbaric medicine in depth, but nevertheless would benefit by some exposure to it, we can arrange a mini-elective of one to two weeks duration. This "exposure elective" can be tailored to a student's special field of interest just as we attempt to do in the usual four-week program. Please call Dr. John D. Davidson for more information.

Student time distribution: Inpatient 3%, Outpatient 92%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: John A. Davidson, MD, and Jane Kelly, RRT, CHT, Supervisor

Patients seen/weekly: 20

On call/weekend responsibility: Attending physician will call student regarding select cases

#### M25 810 GERIATRIC MEDICINE

Instructor(s): Ellen Binder, MD, 286-2700, press option 1

Location: WUSM Health Key Building, Third Floor, Room 374

Elective Contact: JoAnn Wilson, Program Coordinator: 286-2700, press option 1

Other Information: Meet at the Department of Geriatrics office, Health Key Building, 4488 Forest Park Ave., Third Floor Conference Room 318, 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 5, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will participate in patient care at the rehabilitation center, the skilled nursing facility Barnes-Jewish Extended Care in Clayton, the inpatient geriatric consultation service, the outpatient primary care and geriatric consultation center, and palliative care. Attendance at scheduled clinical conferences in geriatric medicine and hospice meetings is also required.

Student time distribution: Inpatient 20%, Outpatient 80%; Primary Care 20%, Subspecialty Care 80%

Major teaching responsibility: Attendings

Patients seen/weekly: 10-15  
On call/weekend responsibility: None

#### M25 811 CLINICAL INTERNAL MEDICINE - HOSPITALIST

Instructor(s): Caroline Kahle, MD, 362-1700

Location: Barnes Jewish Hospital, West Pavilion Corridor main level

Elective Contact: Mary Russell, 362-1707, [mrussell@wustl.edu](mailto:mrussell@wustl.edu)

Other Information: Students should contact Mary Russell one to two weeks prior to first day of elective for information on where to meet.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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.

Student time distribution: Inpatient 95%, Conferences/Lectures 5%; Primary Care 100%

Major teaching responsibility: Hospitalist attendings

Patients seen/weekly: 10

On call/weekend responsibility: None

#### M25 814 CLINICAL EMERGENCY MEDICINE, BARNES-JEWISH HOSPITAL

Instructor(s): Mark Levine, MD, 362-6743

Location: Barnard and/or Wohl Hospital

Elective Contact: Mary Hummert, 747-4156

Other Information: Contact Emergency Medicine Division office at 747-4156, for scheduling one week prior to the rotation. If a student is needing any time off, approval will be needed by the Course Coordinator before the start of the rotation. Students are required to work at least 12 to 14 shifts.

Enrollment limit per period: 6

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 to get an 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, in order to gain maximum exposure to all types of emergencies. A core content of lectures will be provided. Students will gain an understanding of prehospital care by doing a ridealong shift with the St. Louis Fire Department EMS. Students will also have a shift with the toxicology attendings and residents and will gain knowledge of the basics of ultrasound during their time in the department. 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 Dr. Michael Mullins, Director of Research, or any other EM attending should take this WUMS IV Emergency Medicine rotation. 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 Mary Hummert at least two weeks prior to the beginning of the rotation for scheduling purposes.



Student time distribution: Outpatient 80%, Conferences/Lectures 20%; Primary Care 40%, Subspecialty Care 60%

Major teaching responsibility: Attendings and senior residents (PGY 3 & 4)

Patients seen/weekly: ~5 per shift

On call/weekend responsibility: Evenings and weekends; no on call

#### M25 821 INPATIENT CARDIOLOGY

Instructor(s): Jose Madrazo, MD, 362-1291, pager 314-424-1733; Mohammad Kizilbash, MD, pager 314-538-8276

Location: Thirteenth Floor, Northwest Tower

Elective Contact: Anita Johnson, 314-747-3606

Other Information: Students meet on the Thirteenth Floor, Northwest Tower, 9:00 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 specialists 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.

Student time distribution: Inpatient 90%, Outpatient 0%, Conferences/ Lectures 10%; Primary Care 5%, Subspecialty Care 95%

Major teaching responsibility: Attending and fellow

Patients seen/weekly: 10-15

On call/weekend responsibility: None

#### M25 822 HONORS MEDICINE CARDIOLOGY

Instructor(s): Thomas De Fer, MD, 362-8050

Location: Barnes-Jewish Hospital

Elective Contact: Amber Specter, 362-8050

Other Information: Students will receive e-mail communication regarding when/where to report on the first day prior to the beginning of the period.

Enrollment limit per period: Limit 2/period

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The structure and functioning of the "Honors Medicine-Cardiology" elective (subinternship) is very similar to the general medicine subinternship (M25 801). 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.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Primary Care 25%, Subspecialty Care 75%

Major teaching responsibility: Attending, chief resident, and resident

Patients seen/weekly: 8-12

On call/weekend responsibility: Yes

#### M25 823 CLINICAL CARDIOLOGY - VA HOSPITAL

Instructor(s): Wade Martin, MD, 289-6329

Location: John Cochran VA Hospital

Elective Contact: Wade Martin, MD, 289-6329

Other Information: Students should meet in Room B206, Second Floor, VA Hospital.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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.

Student time distribution: Inpatient 45%, Outpatient 55%, Conferences/ Lectures 5-10%; Primary Care 25%, Subspecialty Care 75%

Major teaching responsibility: Attendings and fellows

Patients seen/weekly: 20

On call/weekend responsibility: Varies

#### M25 825 CARDIAC ARRHYTHMIAS AND ELECTROPHYSIOLOGY

Instructor(s): Timothy Smith, PhD, MD, 454-7877

Location: Barnes-Jewish Hospital

Elective Contact: Timothy Smith, PhD, MD, or Yvonne O'Connell, 454-7834

Other Information: Students meet in the Cardiology Division, Thirteenth Floor, Northwest Tower, 8:00 a.m. first day of elective or page the EP Fellow at 424-4680.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This elective provides the student with exposure and teaching in the diagnosis and treatment of complex cardiac rhythm disturbances. Specifically, the student is expected to evaluate patients referred for evaluation and treatment of complex or life-threatening rhythm disturbances, unexplained syncope or sudden cardiac death. Rounds are made daily on hospitalized patients, and students are welcome to observe electrophysiology studies or implantation of pacemakers and defibrillators. This elective also provides an intensive opportunity to learn clinical electrocardiography and the systematic use of anti-arrhythmic drugs. Finally, since patients with chronic, complex rhythm disturbances frequently have organic heart disease, a broad-based exposure to general cardiology is also part of this elective.

Student time distribution: Inpatient 80%, Outpatient 10% (optional), Conferences/Lectures 10%;

Subspecialty Care 100%

Major teaching responsibility: Attending physician

Patients seen/weekly: 2 new consults/day

On call/weekend responsibility: None

#### M25 827 HEART FAILURE/CARDIAC TRANSPLANTATION

Instructor(s): Gregory Ewald, MD, 454-7009

Location: Barnes-Jewish Hospital, North Campus, Suite 4455

Elective Contact: Gregory Ewald, MD, 454-7009

Other Information: Students should page the attending physician, 8:00 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This rotation is intended to provide trainees with a comprehensive experience managing patients with advanced heart failure. In addition to daily rounds, trainees are invited to attend both heart failure and transplant clinics. Further, the curriculum is supplemented by a comprehensive 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.

Student time distribution: Inpatient 70%, Outpatient 20%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: 30

On call/weekend responsibility: None

#### M25 830 DERMATOLOGY

Instructor(s): Dermatology staff, 454-8622

Location: 7705 Wohl Hospital

Elective Contact: Rosemarie Brannan, 454-8622

Other Information: First Monday of rotation students will attend both the 7:30 a.m. lecture in the Dermatology Library, 7706 Wohl Hospital and the 9:00 a.m. orientation, Room 7714 Wohl Hospital.

Enrollment limit per period: 4

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 29, 33, 37, and 41. THIS COURSE HAS A STRICT ATTENDANCE POLICY!

The aim of this elective is to provide a guide for the student so that s/he is 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 and affiliated clinics. Students will attend all clinical teaching rounds and conferences in addition to the basic science and cutaneous histopathology conferences. M25 830 is essentially the same as the 3rd Year Dermatology Clerkship. Students are limited to taking either one or the other - NOT BOTH.

Student time distribution: Inpatient 25%, Outpatient 50%, Conferences/ Lectures 25%; Specialty Care 100%

Major teaching responsibility: Course Master for rotation and senior resident

Patients seen/weekly: 25-50

On call/weekend responsibility: None

#### M25 834 CLINICAL MENTORING

Instructor(s): Brian Cohn, MD, 286-2546

Location: Office of Medical Student Education (OMSE), Fifth Floor Becker Medical Library

Elective Contact: Laurie Eisenhauer, 286-2546

Other Information: To be determined

Enrollment limit per period: 62

This elective is designed to develop the teaching and mentoring skills of our fourth year medical students through structured hospital sessions with first year medical students and supervised sessions with clinical faculty. The primary format of the elective is observation of the first year students during performance of aspects of the history and physical exam, followed by structured feedback from the fourth year mentor. It is hoped that the elective will improve the clinical mentoring experience for our first year medical students by increasing the quality and frequency of the student-patient interaction, the mentoring relationship with senior students, and supervisory sessions with clinical faculty.

Student time distribution: TBD

Major teaching responsibility: TBD (assigned)

Patients seen/weekly:

On call/weekend responsibility: None

#### M25 836 CLINICAL GASTROENTEROLOGY AND HEPATOLOGY

Instructor(s): Gregory S. Sayuk, MD, MPH, 454-8201

Location: Barnes-Jewish Hospital, East Pavilion

Elective Contact: Delli Beyers, 454-8201

Other Information: Students meet in the Digestive Disease Clinical Center, street level East Pavilion, Barnes-Jewish Hospital, 8:00 a.m. first day of elective.

Enrollment limit per period: 4

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The GI Hepatology elective is integrated into a very active inpatient/outpatient and endoscopy service at Barnes-Jewish Hospital. Students will participate in the evaluation of inpatients and outpatients with a spectrum of gut and liver disorders, will make patient rounds with the faculty and fellows, and have responsibility for patients on whom consultations have been requested. In addition, they will observe biopsy, endoscopic, and intubation techniques and participate in outpatient clinic and GI conferences.

Student time distribution: Inpatient 65%, Outpatient 25%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attending and fellows

Patients seen/weekly: 12 new

On call/weekend responsibility: None

#### M25 838 MEDICINE CONSULT SERVICE

Instructor(s): John Cras, MD, and Caroline Kahle, MD, 362-1700

Location: Barnes-Jewish Hospital, West Pavilion Corridor main level

Elective Contact: Mary Russell, 362-1707, [mrussell@wustl.edu](mailto:mrussell@wustl.edu)

Other Information: Students should contact Mary Russell, 362-1707, one to two weeks prior to first day of elective for information on where to meet.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41. Two week rotations are also available.

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.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Primary Care 100%

Major teaching responsibility: Consult Service attending (from the Division of Hospital Medicine)

Patients seen/weekly: 10-15

On call/weekend responsibility: None

#### M25 843 MEDICAL TOXICOLOGY

Instructor(s): Evan S. Schwarz, MD, 747-3690

Location: Emergency Medicine office, Eighth Floor of Barnard, Suite 8813

Elective Contact: Mary Hummert, 747-4156

Other Information: Students meet in Emergency Medicine Conference Room, 8th Floor, Barnard, 8:00 a.m. first day of elective

Enrollment limit per period: 5

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This rotation offers practical experience in the evaluation and management of the acutely ill poisoned patient. Students will function as subinterns and either report to the senior resident 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, 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 or call. 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 also exist during this rotation; those with this interest can ask for further information during their rotation. Students desiring a letter of recommendation from one of the toxicology attendings (who are also Emergency Medicine and Internal Medicine attendings) or 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 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 should be requested from Mary Hummert at least two weeks prior to the beginning of the rotation for scheduling purposes.

Student time distribution: Inpatient 70%, Outpatient 10%, Conferences/ Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Toxicology Faculty

Patients seen/weekly: 12

On call/weekend responsibility: None

#### M25 844 HEMATOLOGY AND HEMOSTASIS

Instructor(s): Morey Blinder, MD, and Evan Sadler, MD, 362-8857

Location: 8801 Clinical Sciences Research Building

Elective Contact: Morey Blinder, MD, 362-8814

Other Information: Students will meet in Barnes-Jewish Hospital South. Contact Kim French at 454-8532 for time and location.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Activities planned include work-up of patients at Barnes-Jewish Hospital under the supervision of the hematology fellow and his staff consultant; attendance at clinical rounds three to five hours weekly;

participation in out-patient clinics; experience in various procedures, especially blood and bone marrow morphology and in interpretation of coagulation tests. Daily student rounds with a senior staff person. Student time distribution: Inpatient 80%, Outpatient 10%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attending and fellow

Patients seen/weekly: 3-5

On call/weekend responsibility: None

#### M25 847 BONE AND MINERAL DISEASES

Instructor(s): Michael Whyte, MD; Kathryn Diemer, MD; Roberto Civitelli, MD; and Carolyn Jachna, MD

Location: Barnes-Jewish Hospital; Barnes-Jewish Hospital West County; Shriners Hospital for Children

Elective Contact: Michael Whyte, MD, 314-872-8305

Other Information: Please contact Dr. Whyte a week before elective for instruction and meeting location.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 17, 21, 25, 29, 33, 37, and 41.

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 be present interesting cases for discussion or the students can present a pertinent topic related to bone metabolism they have researched during their rotation.

Responsibilities: Shriners Hospital Wednesday a.m. (Dr. Whyte); CAM, second and third Monday (a.m.), and fourth Thursday (p.m.) of each month; Barnes-Jewish West County Prof. Building 2; Tuesdays or Wednesdays, p.m. Metabolic Bone Disease Case Conference, Friday 8 a.m. Room 2206, Kingshighway Bldg; Avioli Musculoskeletal Research Seminars, Friday 9 a.m. Brown Room, Steinberg Bldg.

Student time distribution: Outpatient 85%, Conferences/ Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: ~20

On call/weekend responsibility: None

#### M25 853 BONE AND JOINT INFECTIOUS DISEASE CONSULT

Instructor(s): Jonas Marschall, MD, 454-8214, [jmarscha@dom.wustl.edu](mailto:jmarscha@dom.wustl.edu)

Location: Fifteenth Floor, Northwest Tower

Elective Contact: Alicia Cicerelli, 454-8214

Other Information: Students should page the Bone and Joint attending at 510-3805 at 8:00 a.m. on the first day of the elective.

Enrollment limit per period: 8

Valid start weeks for two-week blocks are: Weeks 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, and 43.

Must be done in conjunction with two weeks of General Infectious Disease. 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 Infectious Disease are a prerequisite to this course.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%, Subspecialty Care 100%

Major teaching responsibility: Single Attendings

Patients seen/weekly: 20

On call/weekend responsibility: None

#### M25 854 TRANSPLANT INFECTIOUS DISEASE

Instructor(s): Steve Lawrence, MD, 454-8214, slawrenc@dom.wustl.edu

Location: Fifteenth Floor, Northwest Tower

Elective Contact: Alicia Cicerelli, 454-8214

Other Information: Students should page the Transplant fellow at 360-1129 at 8:00 a.m. on the first day of the elective.

Enrollment limit per period: 8

Valid start weeks for two-week blocks are: Weeks 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, and 43. Must be done in conjunction with 2 weeks of General Infectious Disease.

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.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%, Subspecialty Care 100%

Major teaching responsibility: Single Attending and Fellow

Patients seen/weekly: 6

On call/weekend responsibility: None

#### M25 856 INFECTIOUS DISEASE: CARE OF HIV-INFECTED PATIENTS

Instructor(s): Rachel Presti, MD, PhD, 454-8225

Location: St. Louis Children's Hospital, Barnes-Jewish Hospital, plus other ambulatory sites.

Elective Contact: Dawn-Michele Cannon, 454-8225

Other Information: Students should contact Dr. Presti one week prior to the start of rotation. Students report to the ID Clinic/ACTU, Storz Building, 4570 Children's Place, 9:00 a.m. first day of elective.

Enrollment limit per period: 4

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This elective is designed to introduce students to the care of HIV-infected individuals (adults, adolescents, and children) and of HIV-exposed infants. Care of the HIV-infected patient encompasses not only the medical aspects, but also the psychosocial aspects of care. The elective will involve rotation through

several clinics including the pediatric and adolescent HIV clinics, and several adult HIV clinics, along with exposure to the AIDS Clinical Trials unit. In addition, the student will spend part of his/her time rotating in the general ambulatory infectious diseases clinics (pediatric and adult ID).

Student time distribution: Outpatient 80%, Conferences/Lectures 15%, Other 5%; Subspecialty Care 100%

Major teaching responsibility: Attendings listed above as course instructors

Patients seen/weekly: 20

On call/weekend responsibility: None

#### M25 858 AMBULATORY INFECTIOUS DISEASE

Instructor(s): Nigar Kirmani, MD, 747-1214

Location: Fifteenth Floor Northwest Tower and Storz Building

Elective Contact: Lori Watkins, 747-1214

Other Information: Students should report to the ID Clinic in the Storz Building, 8:00 a.m. first day of elective.

Enrollment limit per period: 8

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41. 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. Students will participate in the care of HIV infected or otherwise immunosuppressed patients as well as general infectious disease and travel patients. The clinic is the primary provider for 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, sexually transmitted diseases and travel plans. Patients seen will have a wide range of acute and chronic infections with a heavy emphasis on HIV/AIDS, including indigent and insured patients, of both sexes and a wide range of ages. The students will play an important role in the management of these patients. They are expected to read the literature about their patients and participate in clinical conferences.

Student time distribution: Outpatient 90%, Conferences/Lectures 10%,

Primary Care 20%; Subspecialty Care 100%

Major teaching responsibility: Clinic Attendings

Patients seen/weekly: 15

On call/weekend responsibility: None

#### M25 859 GENERAL INPATIENT INFECTIOUS DISEASE

Instructor(s): Rachel Presti, MD, 454-8214, rpresti@dom.wustl.edu

Location: Fifteenth Floor, Northwest Tower

Elective Contact: Dawn-Michele Cannon or Alicia Cicerelli, 454-8214

Other Information: Students should page Infectious Disease Fellows at either 424-2718 or 424-2720 on the first morning of the elective.

Enrollment limit per period: 8

Valid start weeks for two- or four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41. Two week blocks must be done in conjunction with Transplant Infectious Disease or Bone and Joint Infectious Disease.

Study of patients with infectious diseases, including inpatient care of HIV infected patients and general infectious disease consults. The elective is designed to teach students the fundamentals of evaluating clinical problems in infection 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 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 and conferences and lectures in infectious diseases. They also learn appropriate use of antibiotics, antifungal and antiviral agents. A wide distribution of infectious diseases is covered including community acquired acute and chronic infections, opportunistic infections in HIV infected patients, hospital acquired infections, and basic infection control practices. This is a 4 week rotation. Two week rotations are allowed, but must be done in conjunction with 2 weeks of Transplant Infectious Disease or Bone and Joint Infectious Disease.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%. Students must be present at 75% of the elective to receive a passing grade.

Major teaching responsibility: Single attending and fellow

Patients seen/weekly: 7 new consults, 15 total

On call/weekend responsibility: None

#### M25 861 ONCOLOGY-INPATIENT

Instructor(s): Alex Denes, MD,362-4803

Location: Division 7900 Center for Advanced Medicine

Elective Contact: Janet Weier, 747-7509

Other Information: Students meet on the Seventh Floor CAM, POD B, Medical Oncology Outpatient Area, 8:00 a.m. first day of elective.

Enrollment limit per period: 6 students per block, on average one per attending

Valid start weeks for four-weeks blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 pharmacological basis for systemic cancer treatment. The ethical and medical challenges of caring for patients with advanced incurable malignancies will also be an important theme, as well as the conduct of clinical research in this patient population. Students will 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.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: All Medical Oncology Attendings

Patients seen/weekly: 50

On call/weekend responsibility: None

#### M25 862 INPATIENT INTERNAL MEDICINE/ONCOLOGY-FIRM

Instructor(s): Anna Roshal, MD, and Alex Denes, MD, 747-7509

Location: North Campus, 7900 Inpatient Floor

Elective Contact: Janet Weier, 747-7509

Other Information: Students meet in North Campus, 7900 Inpatient Floor, 7:30 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will function as sub-interns on the resident and intern team, supervised by attending Medical Oncologist. They will see patients who have a cancer diagnosis and are admitted for either treatment, or complications of their disease, including complicated symptom control issues. Most common cancers that

are seen are lymphoma, lung cancer, GI malignancies, sarcomas, and breast cancer. Students will also be exposed to complex psychosocial issues surrounding end-of-life discussions with patients and their families, and learn about managing complex symptomatology frequently encountered in this population. There are scheduled twice weekly formal teaching lectures on oncologic emergencies, and other topics such as neutropenic fever, pain management and management of specific cancer types.

Major learning goals:

- (1) Become familiar with frequent complications of cancer treatment such as neutropenic fever, nausea/vomiting, diarrhea, infectious complications and their management.
- (2) Become familiar with oncologic emergencies (spinal cord compression, hypercalcemia, neutropenic sepsis) and their management.
- (3) Become more comfortable handling patients and families requiring difficult psychosocial and end-of-life discussions.

Student time distribution: Inpatient 100%; Subspecialty Care 100%

Major teaching responsibility: Dr. Denes and Dr. Roshal

Patients seen/weekly: 50

On call/weekend responsibility: One-in-four call

#### M25 863 EMERGENCY ULTRASOUND

Instructor(s): Deborah Kane, MD, and staff, 747-4156

Location: Barnes-Jewish Hospital, North Campus

Elective Contact: Mary Hummert, 747-4156

Other Information: Students meet at the Emergency Department at Barnes Jewish Hospital at 10 a.m. on the first day of the elective.

Enrollment limit per period: 1 unless otherwise approved by coursemaster

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This rotation will focus on ultrasound and all of its many applications and uses in the Emergency Department. 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, gallbladder, and DVT. In general, the student will be in the Emergency Department during weekdays to perform these exams. Students will not be involved in direct patient care during this rotation. Students will have access to a lecture bank of the common applications. In addition, the student will meet with the Ultrasound Director 1-2 times/week to review images and have direct hands-on instruction. At the end of the rotation the student should have gained the knowledge of basic Emergency Ultrasound including its indications and applications; as well as becoming more adept at the performance of ultrasound.

Student time distribution: Outpatient 80%, Conferences/Lectures 20%; Primary Care 40%, Subspecialty Care 60%

Major teaching responsibility: Attendings

Patients seen/weekly: 25

On call/weekend responsibility: None

#### M25 865 INTENSIVE CARE MEDICINE - BARNES-JEWISH NORTH

Instructor(s): Warren Isakow, MD, and staff, 454-8762

Location: Barnes-Jewish Hospital, North Campus

Elective Contact: Lisa Wetzel, 454-8762

Other Information: Students meet at the MICU (Eighth Floor Barnes-Jewish Hospital, North Campus), 8:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This elective in intensive care is offered in the Intensive Care Unit at Barnes-Jewish Hospital, North Campus. This unit has 10 intensive care beds providing intensive nursing care and life-support technology. The patients represent a mixture of patients with primarily medical problems. Patient care responsibility includes night call. In addition to patient responsibility, there are regularly scheduled conferences and attending rounds.

Student time distribution: Inpatient 100%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 8

On call/weekend responsibility: Every third night

#### M25 867 MEDICAL INTENSIVE CARE

Instructor(s): Warren Isakow, MD, 454-8762

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Lisa Wetzel, 454-8762

Other Information: Students report to the Medical Intensive Care Unit, 8300 Barnes-Jewish Hospital, South Campus, 7:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This elective is offered as an opportunity to gain additional experience in acute, primary care medicine. The elective is an advanced course in patient care involving complex medical problems. Responsibilities involve working up new patients with the MICU team, case presentations and attendance at conferences. Conferences consist of attending rounds Monday through Saturday, radiology rounds Monday through Saturday, pulmonary conference and medical grand rounds on Thursday, and critical care conference once each month. Call schedule is every third night.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 3

On call/weekend responsibility: Yes

#### M25 869 PALLIATIVE MEDICINE

Instructor(s): Maria Dans, MD, Coursemaster, 362-5800, mdans@dom.wustl.edu, BJH Palliative Care Service members

Location: 3320 Suite, Kingshighway Building, North Campus

Elective Contact: Nicole Williams, 747-5361, nsw2227@bjc.org

Other Information: Please email the Coursemaster and Elective Contact at least one week before start of elective. Reporting time is 8:45 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 Palliative Care Service.

Students will learn to assess and treat refractory symptoms, participate in complicated advanced care planning, and gain an understanding of rational polypharmacy through consultation on end-of-life issues and symptom management. 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 participate in conversations with patients regarding goals of care, delivering bad news, and withholding/withdrawing care. Students will attend

interdisciplinary team meetings. They may also make home visits with hospice care providers, if desired. Emphasis will also be placed on observing and understanding the psychosocial and spiritual needs of the patients, as well as the impact of the burden on caregivers.

Student time distribution: Inpatient 85%, Conferences/Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: BJH Palliative Care Attendings (Maria Dans, MD, and Kathleen Garcia, MD); BJH Palliative Care Team Members; BJC Hospice Medical Director (Bernard Shore, MD); SLCH Palliative Care Service Medical Director (Joan Rosenbaum, MD)

Patients seen/weekly: 10

On call/weekend responsibility: None

#### M25 870 ENDOCRINOLOGY, DIABETES AND METABOLISM

Instructor(s): Clay F. Semenkovich, MD, and staff, 362-7617

Location: Eighth Floor Southwest Tower, Barnes-Jewish South Campus

Elective Contact: Karen Muehlhauser, 362-7617

Other Information: Students meet on Eighth Floor Southwest Tower, Barnes-Jewish South Campus, 8:15 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

In general, the 4-week rotation will be divided into 2 weeks general endocrinology and 2 weeks diabetes.

Students taking this elective see patients with endocrine and metabolic diseases in the Outpatient

Consultation offices and inpatients at Barnes-Jewish Hospital. They will present these cases at formal

rounds. They will also participate in informal rounds with the division and at divisional seminars. 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.

Student time distribution: Inpatient 60%, Outpatient 30%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Faculty consultant for inpatients, individual faculty one-on-one for outpatients and division chief for both

Patients seen/weekly: 8-10

On call/weekend responsibility: Elective for students

#### M25 871 ONCOLOGY-OUTPATIENT

Instructor(s): Steven Sorscher, MD, 362-9319

Location: Siteman Cancer Center, CAM Building

Elective Contact: Joanna Duke, 747-8475

Other Information: Students meet on the Seventh Floor, Siteman Cancer Center, CAM Building, 4921 Parkview Place, 8:30 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 have in

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 (eg 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.

Student time distribution: Outpatient 85%, Conferences/Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: Oncology attendings and occasionally fellows

Patients seen/weekly: 30-50

On call/weekend responsibility: None

#### M25 877 INTENSIVE ECG INTERPRETATION

Instructor(s): Robert E. Kleiger, MD; 454-8146

Location: Thirteenth Floor, Northwest Tower

Elective Contact: Marge Leaders; 454-8146; mleaders@dom.wustl.edu

Other Information: Contact Marge Leaders, Thirteenth Floor, Northwest Tower, on the first day of elective at 9:30 a.m.

Enrollment limit per period: 2

Valid start weeks for two-week blocks are: Weeks 1, 3, 5, 11, 13, 15, 17, 19, 27, 29, 31, 33, 35, 37, 39, 41, and 43.

The student, during the two-week elective, will read 20-25 ECGs obtained from the Barnes-Jewish Heart Station and then over read by an experienced electrocardiographer. There will also be didactic sessions covering infarction, ventricular hypertrophy, heart block, arrhythmias, and aberrant conduction.

Student time distribution: Inpatient 0%, Outpatient 0%, Conferences/ Lectures 100%; Subspecialty Care 100%

Major teaching responsibility: Attending

Patients seen/weekly: n/a

On call/weekend responsibility: None

#### M25 878 PALLIATIVE CARE FOR THE NEW PHYSICIAN

Instructor(s): Gary A. Ratkin, MD, 314-996-5425

Location: Missouri Baptist Medical Center, 3015 N. Ballas Rd., St. Louis, MO 63131

Elective Contact: Gary A. Ratkin, MD, 314-996-5425, gar0347@bjc.org

Other Information: Contact Dr Ratkin at least two weeks in advance of first day of rotation.

Enrollment limit per period: 1

Valid start weeks for four4-week blocks are: Weeks 9, 13, 17, 33.

The Palliative Care program at Missouri Baptist Medical Center utilizes a model that encourages primary care physicians and hospitalists to direct and provide palliative care to their patients with a wide range of chronic illness. We stress training and practice of of empathetic communication and facilitated decision-making for patients and their family members, who are inpatients often facing end-of-life circumstances. Our intention is to expose the student to a range of patient scenarios both on an inpatient and outpatient basis, with time spent in the critical care environment, inpatient medical-surgical services, our palliative care service rooms, outpatient palliative care offices, home visits and time with the BJC Hospice program. The student will have the opportunity to interact with patients and family members, where possible, participate in decision-making regarding goal setting, symptom management and discharge planning. Cases that are seen by the student will be presented at case conferences. The "new physician" will have the opportunity to lead topic oriented discussions and participate in clinical investigations that are currently underway.

Student time distribution: Inpatient 75%, Outpatient 25%, Conferences/ Lectures 10%; Primary Care 100%

Major teaching responsibility: Gary A. Ratkin, MD  
Patients seen/weekly: Estimated 5/week  
On call/weekend responsibility: None

#### M25 880 PULMONARY MEDICINE - BARNES-JEWISH HOSPITAL

Instructor(s): Daniel Rosenbluth, MD, and staff, 454-8762

Location: Fifteenth Floor, Northwest Tower

Elective Contact: Lisa Wetzel, 454-8762

Other Information: Students should page Pulmonary Consult Fellow, 7:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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.

Student time distribution: Inpatient 60%, Outpatient 20%, Conferences/ Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Multiple attendings, fellows and residents

Patients seen/weekly: 20

On call/weekend responsibility: None

#### M25 882 PULMONARY MEDICINE - VA HOSPITAL

Instructor(s): Michael Lippmann, MD, 289-6306

Location: John Cochran VA Hospital

Elective Contact: Michael Lippmann, MD, 289-6306

Other Information: Students meet in 6C-MICU John Cochran VA Hospital, 7:30 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will participate in several ambulatory care activities of the Pulmonary Section, including outpatient consultations of common respiratory disorders such as COPD, obstructive sleep apnea, lung cancer and tuberculosis, and follow-up of primary care patients with pulmonary disease. In addition, students will round in medical intensive care units, interpret pulmonary function tests, participate in bronchoscopy and attend scheduled teaching conferences of the Pulmonary Division.

Student time distribution: Inpatient 30%, Outpatient 50%, Conferences/ Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Several attendings

Patients seen/weekly: 6-10 (by student)

On call/weekend responsibility: None

#### M25 884 BONE MARROW TRANSPLANTATION AND STEM CELL BIOLOGY

Instructor(s): John F. DiPersio, MD, PhD, 362-9339

Location: Bone Marrow Transplant Unit 13-100

Elective Contact: John F. DiPersio, MD, PhD, or Kimberly Kuehler, 454-8306

Other Information: Students meet in the Bone Marrow Transplant Unit, 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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, and stem cell biology. 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.

Student time distribution: Inpatient 60%, Outpatient 20%, Conferences/ Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attending on service as well as all BMT physicians

Patients seen/weekly: 10-20

On call/weekend responsibility: None

#### M25 885 OCCUPATIONAL/ENVIRONMENTAL MEDICINE

Instructor(s): Bradley Evanoff, MD, MPH, 454-8638

Location: First Floor, Wohl Hospital

Elective Contact: Bradley Evanoff, MD, MPH, 454-8638

Other Information: Students should meet at First Floor, Wohl Hospital, 9:00 a.m. first day of elective.

Enrollment limit per period: 1 (2, by special arrangement)

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41. (Students may take this elective for up to 12 weeks.)

This elective is designed to introduce students to research and practice in the prevention of work-related injuries and illnesses, and prevention of health effects related to environmental exposures. Preventive activities will include work site visits and intervention projects, as well as involvement with work site health promotion and policy making. Research projects involve epidemiology and intervention projects in work-related injury and musculoskeletal disorders. Specific activities are flexible depending on the students' interests.

Students may elect to participate in the Interdisciplinary Environmental Clinic at Washington University. Based in the law school, the clinic involves interdisciplinary teams of students (law, engineering, environmental science) taking principal responsibility, under faculty supervision, for cases and projects on behalf of environmental and community organizations. The medical student(s) assist clinic students by evaluating the human health impacts involved in one or more of the clinic's cases, and presenting such information to the client organization(s) and others. Among the cases on which medical students might participate are: (1) air pollution associated with factories in the St Louis metropolitan area; (2) lead poisoning of children and adults in St. Louis and surrounding towns; (3) air and water pollution caused by concentrated animal feeding operations (factory farms) in Missouri. Students choosing this option will work with the Environmental Clinic staff and with Dr. Evanoff to evaluate and present evaluations of human health impacts of environmental exposures.

Student time distribution: Conferences/Lectures 10%, Policy activities/Research 90%; Subspecialty Care 100%

Major teaching responsibility: Attending

Patients seen/weekly: 10

On call/weekend responsibility: None

#### M25 887 CLINICAL CARDIOVASCULAR MEDICINE

Instructor(s): Thomas F. Martin, MD, FACC; and Timothy J. Martin, MD, FACC, CCDS, 573-308-1301

Location: Phelps County Regional Medical Center, Rolla, MO

Elective Contact: Annette Wells, 573-308-1301, awells@dom.wustl.edu

Other Information: Students should arrive at Washington University Heart Care Institute in Rolla, 1050 W. 10th Street, Suite 500 at 8:00 a.m. the first day of elective, and will be escorted to the unit where Dr. Martin is rounding.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 25, 29, 33, and 37.

Clinical cardiology with some internal medicine in a rural setting. In-patient and Out-patient care. Diagnostic Testing. Device Implants and follow up care. Cardiac Catheterization. Peripheral Vascular angiography and intervention. Room and board provided.

Student time distribution: Inpatient 50%, Outpatient 50%; Subspecialty Care 100%

Major teaching responsibility: Attending

Patients seen/weekly: 100

On call/weekend responsibility: None

#### M25 890 CLINICAL NEPHROLOGY

Instructor(s): Steven Cheng, MD, 362-3204

Location: Chromalloy American Kidney Center, Barnes-Jewish Hospital

Elective Contact: Ene Stubenrouch, 362-7211

Other Information: Students meet in the Acute Dialysis Center, Division 14300, Barnes-Jewish Hospital, 8:00 a.m. first day of elective. Ask for the Renal Fellow on the Consult Service.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students assist in both the inpatient and outpatient areas to diagnose patients with acute and chronic renal failure, glomerulonephritis, and electrolyte disorders. The student is a full member of the inpatient renal consult service, diagnosing and treating patients with acute and chronic renal disease and electrolyte disorders. Students will learn electrolyte management, drug dosing, dialysis procedures and complications, kidney biopsy reading, and the management of acute and chronic renal failure. Students are also encouraged to spend two or three half-days in the outpatient center rotating to the General Renal Clinics and the Transplant Clinic. Throughout the rotation, students work closely with an attending and a renal fellow.

Student time distribution: Inpatient 80%, Outpatient 10%, Conferences/Lectures 10%; Primary Care 20%, Subspecialty Care 80%

Major teaching responsibility: Three attendings and three renal fellows

Patients seen/weekly: Four consults per week

On call/weekend responsibility: Saturday a.m. rounds desirable but not required

#### M25 893 ADULT ALLERGY AND CLINICAL IMMUNOLOGY

Instructor(s): H. James Wedner, MD, 454-7376

Location: Fifteenth Floor, Northwest Tower

Elective Contact: Jill Munoz, 454-7376

Other Information: Students meet Kristy Smith in the Allergy and Immunology division office, Fifteenth Floor, Northwest Tower, 8:00 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will participate in the allergy consult service at Barnes-Jewish Hospital, North and South Campus. The student will serve as the primary allergy consult for inpatient and Emergency Room consultation and present each patient to the allergy fellows on call and the attending physician. Students will attend The Adult Allergy Clinic, Pediatric Allergy Clinic, and the outpatient clinics at The Asthma & Allergy Center at Barnes-Jewish West County Hospital. Conferences on selected topics in allergy and clinical immunology will be held with the attending staff two to three afternoons a week.

Student time distribution: Inpatient 10%, Outpatient 75%, Conferences/ Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: Attending and staff

Patients seen/weekly: 12

On call/weekend responsibility: Optional



# Research

(M25 900)

**Dana R. Abendschein, PhD**, 9924 Clinical Sciences Research Building, 362-8925. Research in this translational physiology laboratory is focused on development of novel antithrombotic approaches for use during acute myocardial infarction, stroke, and surgery where 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.

**John P. Atkinson, MD**, Tenth Floor Clinical Sciences Research Building, 362-8391. A clinical research elective is offered in evaluation of patients with complement deficiency states and undiagnosed rheumatic disease syndromes.

**Roberto Civitelli, MD**, BJCIH Eleventh Floor, Musculoskeletal Research Center, 454-8408. The 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.

**Philip E. Cryer, MD**, 6609 Wohl Clinic, 362-7635. Studies of the physiology of glucose counterregulation and its pathophysiology, and relation to clinical hypoglycemia, in people with diabetes.

**Nicholas O. Davidson, MD**, 910 CSRB North Tower, 362-2027. Genetic pathways for 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 US, 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.

**Thomas M. DeFer, MD**, [tdefer@dom.wustl.edu](mailto:tdefer@dom.wustl.edu), 6604 Wohl Hospital, 362-8050, Special Projects in Medical Education. Through special arrangement with and approval by the Course Master, fourth year students will participate in special projects in medical education. Typical projects will require approximately four weeks to complete. These four weeks can occur consecutively (preferred) or be spread out somewhat as needed. Medical education projects should be aimed at improving the curriculum, student experience, and/or administration of the Internal Medicine Clerkship or the Subinternship. Interested students should contact the Course Master via phone or e-mail to discuss the proposed project. Those who are interested but would like guidance in designing a project should also contact the Course Master. This is open only to Washington University School of Medicine students.

**Matthew Ellis, MB, BChir, PhD**, Room 724, Southwest Tower, 747-3613. Genomics of Breast Cancer. The demonstration that the HER2 gene was amplified in breast cancer heralded the "genomic era" for this disease which ultimately led to major clinical advances for HER2-positive disease. The HER2 discovery was based on a search for cancer specific anomalies in the cellular homologs of the acutely transforming retroviral oncogenes described in birds and mammals. However HER2 gene amplification is now recognized to be only one of a large number of somatic mutations that occur in breast cancer. In the last ten years, my clinical and laboratory efforts have focused on the development of a luminal (hormone receptor positive) breast cancer genome atlas to elucidate the complexity of the somatic changes in the breast cancer genome responsible for tumors resistant to current therapies. During these efforts we established a body of work on the practice of treating postmenopausal women with large palpable hormone receptor rich tumors with four months of an aromatase inhibitor. The ultimate scientific goal of these efforts is to create specimen banks and biomarker data from thousands of patients to create sufficient statistical power to robustly link genomic screens to clinical outcomes so we can eventually focus our basic science efforts on the most lethal genetic events.

Over the last year, we have undertaken a comprehensive analysis of the tumor samples accrued, including "whole genome" gene expression chips, high resolution array comparative hybridization analysis and candidate gene sequencing. The gene lists we are currently generating, particularly those from the marriage of expression profiling and array comparative hybridization, suggest a host of new therapeutic targets are ready to be exploited. Functional characterization of these genes has begun, and this effort is a major focus in the laboratory. Elective students will focus on projects that relate to individual oncogene candidates. The scope of the project will be commensurate with elective time commitment but participation may include interpretation of genomic data, confirmatory studies on gene over-expression in cell lines and tissues and functional studies using gene transfer, gene knock-down and pharmacological targeting to verify the identity of bone fide therapeutic targets for further investigation. Attendance at weekly lab meetings is expected.

**Bradley Evanoff, MD, MPH**, 454-8638. Occupational medicine epidemiology research. My research involves the use of epidemiology methods to characterize associations between diseases and work-related exposures. I am also doing studies that evaluate the detection and treatment of work-related musculoskeletal diseases. 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 work site visits and intervention projects, as well as involvement with work site health promotion and policy making. Elective length is variable depending on individual circumstances. Please contact Dr. Evanoff to discuss this research.

**Gregory I. Goldberg, PhD**, 7740 Barnard, 362-8172. Role of secreted extracellular matrix metalloproteases in tissue remodeling. Structure and function of the metalloproteases.

**Richard W. Gross, MD, PhD**, 4525 Scott Avenue, East Building, 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.

**Marc R. Hammerman, MD**, 7704 Wohl Clinic, 362-8233. Studies characterizing the transplantation of kidney and pancreatic anlage as a means to "grow new organs" in the settings of end-stage chronic renal failure and diabetes mellitus.

**Keith A. Hruska, MD**, Fifth Floor McDonnell Pediatric Research Building, 286-2772. Our laboratory's focus is on two aspects of kidney diseases: the progression of chronic kidney disease (CKD), and the syndrome of the CKD-mineral bone disorder (CKD-MBD). The latter is an important cause of mortality associated with CKD. We have discovered the pathogenesis of the CKD-MBD in early stage 2 CKD. We have ongoing studies of CKD stimulated vascular calcification in which we have discovered the mechanism of atherosclerotic plaque calcification stimulated by phosphorus. We are analyzing phosphorus as a cardiovascular risk factor, and new therapies for chronic kidney disease, the CKD-MBD, and vascular calcification.

**Stuart A. Kornfeld, MD**, Eighth Floor Clinical Sciences Research Building, 362-8803. Synthesis, processing and sorting of glycoproteins, including lysosomal enzymes. Intracellular protein trafficking.

**Sandor J. Kovacs, PhD, MD**, 9965 Clinical Sciences Research Building, 362-8901. For students with math, physics and engineering background. Cardiovascular biophysics research elective concentrates on physiologic modeling and comparison of model predictions to in vivo human data. Minimum of eight weeks of elective time.

**Jack Ladenson, PhD**, 454-8436. Development of monoclonal and single-chain antibodies for use in research and in diagnostic testing.

**Marc S. Levin, MD, and Deborah C. Rubin, MD**, 922/924 Clinical Sciences Research Building, 362-8933, 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 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 role of retinoids and nuclear receptor signaling and the function of an immediate early gene *Tis7* on gut adaptation following 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 it relates 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 production of transgenic and knockout mouse models, in situ hybridization and immunohistochemistry.

**Philip W. Majerus, MD**, Eighth Floor Clinical Sciences Research Building, 362-8801. Biochemistry of platelets, regulation of lipid metabolism in tissue culture; mechanism of platelet thrombus formation.

**Jeffrey D. Milbrandt, MD, PhD**, 101 Biotechnology Center, 362-4650. We have several ongoing projects in our laboratory. (1) The biological function of the GFL family of neurotrophic factors (GDNF, neurturin, persephin and artemin) that signal through a receptor complex containing the Ret tyrosine kinase. These factors promote survival of multiple neuronal populations including dopaminergic neurons, which degenerate in Parkinson's disease, motor neurons, which are affected in Lou Gehrig's disease and most neurons of the peripheral nervous system. (2) The biological roles of *Egr2/Nab2* in regulating the

Schwann cell myelination program and how abnormal function of these transcription factors result in peripheral neuropathies. (3) The development of prostate cancer, especially the role of Egr1 in regulating the PIN to invasive carcinoma transition and the role of the Nkx3.1 homeodomain protein in tumor initiation.

**Jason C. Mills, MD, PhD**, Room 1030 CSRB North Tower, 362-4213. We investigate the differentiation of epithelial stem cells in the upper GI 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: (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) comparing and contrasting the roles of Xbp1 and Mist1 in development of plasma cells (where both genes are also expressed) and in gastrointestinal secretory cells.

**Stanley Misler, MD, PhD**, 815 Yalem Building, Barnes-Jewish Hospital, 454-7719. Stimulus-secretion coupling in endocrine cells (B-islet cells and adrenal chromaffin cells) examined using single-cell assays of secretion (capacitance measurements, amperometry).

**Michael Mullins, MD, and Lawrence M. Lewis, MD**, [mullinsm@wusm.wustl.edu](mailto:mullinsm@wusm.wustl.edu), 747-5585 or Lisa Hayes, [hayesli@wusm.wustl.edu](mailto:hayesli@wusm.wustl.edu), 362-4362. Emergency Medicine Clinical Research. Emergency medicine clinical research involves the gamut of research designs ranging 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 healthcare systems and Emergency Department processes (A Comparison of the Canadian Triage Acuity Scale to the Emergency Severity Index to Detect Serious Time-sensitive Medical Conditions), to analyzing 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 minimal risk. Students will be taught important rules regarding data acquisition and entry, particularly as it relates to standards that have been set for 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 ability for time commitment. Students will meet weekly with one of the course masters 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.

**Ginger E. Nicol, MD**, 4412 Renard Building, 362-5939. Clinical research concerning substrate (glucose and lipid) metabolism and the regulation of weight and body composition in persons with mental illness, particularly concerning the effect of psychotropic medications. 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.

**Richard E. Ostlund, MD**, 8804 Wohl Hospital, 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.

**Katherine Ponder, MD**, 8818 Cancer Science Research Building, 362-5188. KPONDER@WUSTL.EDU. Gene Therapy for Lysosomal Storage Diseases. Our laboratory is interested in using gene therapy to treat 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 results in expression that is sufficient to reduce many of the clinical manifestations of these genetic diseases. Current studies focus upon assessing the therapeutic effect of gene therapy on sites that are affected in MPS such as the heart, aorta, bones, and joints, and 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**, Eighth Floor, Southwest Tower, 362-4454. Fatty acid metabolism and its role in atherosclerosis, diabetes, hypertension, and obesity. The modulation of respiratory uncoupling for the treatment of aging, obesity, and vascular disease.

**Phyllis K. Stein, PhD**, Room 13116 Northwest Tower, 286-1350. Clinical Significance of Heart Rate Variability and ECG-Derived Waveform Parameters Obtained from Continuous Ambulatory Monitoring. This elective affords 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 involving de novo data collection in a clinical or animal population. Also, many possible directions for this research are available from applying traditional and non-linear HRV to different populations, developing methods to quantify ultradian heart rate variability patterns, to developing novel ECG analysis techniques, etc. 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 >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 is also a subsets of the CHS and of 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 are also analyzing 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 on the relationship of heart rate variability and changes in heart rate variability over time and a huge number of clinical and demographic factors among the elderly. Currently we are studying the relationship of Holter-based HRV and sleep apnea patterns to the development of atrial fibrillation post-cardiac surgery and collaborating in a study of treatment of depression in treatment-resistant depressed post-MI patients, a study of sickle cell patients and one of heart rate variability and echo parameters in elderly African Americans.

**Dwight A. Towler, MD, PhD**, 514 Yalem Research Building, Barnes-Jewish Hospital, North Campus, 454-7434. Tremendous unmet needs exist in musculoskeletal medicine. Osteoporosis and osteoarthritis are recognized as common and clinically important, but other serious skeletal disorders also afflict our

society. In the setting of type 2 diabetes mellitus (T2DM), lower-extremity musculoskeletal disease is prevalent, costly, and exceedingly difficult to manage, with fracture, arthropathy, ischemia, ulcer, infection, and amputation commonly confronting patients and clinicians. Aortofemoral medial artery calcification is a strong predictor of risk for lower extremity amputation in patients with T2DM. While not occluding the lumen, mural elastinolysis and medial calcification compromise arterial elasticity -- a material property necessary for Windkessel physiology that ensures normal tissue perfusion throughout the cardiac cycle. Peripheral arterial disease is also associated with higher rates of hip bone loss and increased fracture risk in the elderly diabetic patient. During diabetic arterial calcification, the Msx2-Wnt signaling cascade that controls orthotopic craniofacial bone formation is activated ectopically in the aortic valve and vessel wall. Diabetes and reactive oxygen species induce expression of Msx2 in arterial myofibroblasts, upregulate aortic Wnt gene expression, and activate pro-calcific and pro-fibrotic canonical Wnt signaling in the valve and tunica media. By studying Msx2 actions, we have identified that paracrine Wnt/Dkk signals control arteriosclerosis T2DM by regulating myogenic and osteogenic lineage allocation of vascular mesenchymal progenitors. Inflammatory redox cues initiated by TNF-alpha and osteopontin (OPN) modulate the activation of this arterial injury response, which appears to be sustained by myofibroblast mitochondrial dysfunction. We now study how strategies that target vascular Wnt and OPN signaling regulate diabetic arteriosclerosis, arterial compliance (ex vivo video microplethysmography), and lower extremity perfusion (laser Doppler perfusion imaging) in diabetic vascular disease.

**John Turk, MD, PhD**, Eighth Floor South West Tower, 362-8190. Phospholipid signaling mechanisms in pancreatic islets. Experience in mass spectrometric analysis of complex lipids is available.

**H. J. Wedner, MD**, 5002 Steinberg Pavilion, Barnes-Jewish Hospital, North Campus, 454-7937 or 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.

**H.J. Wedner, MD**, 5002 Steinberg Pavilion, Barnes-Jewish Hospital, North Campus, 454-7937 or 454-7377. 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*, *Epicoccum nigrum* and several pollens including those from white oak and *Parthenium hysterophoros*, a newly recognized allergen.

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Christine T Pham, MD

Associate Professor of Medicine

William J Phillips, MD

Assistant Professor of Clinical Medicine

Jay Francis Piccirillo, MD

Professor of Medicine

Joel Picus, MD

Professor of Medicine

Stephen J Pieper, MD

Instructor in Clinical Medicine

Amelia Kahler Pinto, PHD

Research Instructor in Medicine

Bryan Douglas Piotrowski, MD

Instructor in Clinical Medicine

Doug Pogue, MD

Instructor in Clinical Medicine

Robert Francis Poirier Jr, MD

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Donovan Polack, MD

Assistant Professor of Clinical Medicine

Gregory Polites, MD

Associate Professor of Emergency Medicine in Medicine

Kenneth S Polonsky, MBBCH

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Katherine P Ponder, MD

Professor of Medicine

Makhawadee Pongruangporn, MD

Instructor in Clinical Medicine

Harish Ponnuru, MD

Instructor in Clinical Medicine

Lee S Portnoff, MA, MD

Assistant Professor of Clinical Medicine (Dermatology)

Daniel E Potts, MD

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William G Powderly, MD

J. William Campbell Professor of Medicine

John A Powell, MD

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Lawrence Prablek, MD

Instructor in Clinical Medicine

Diana A Prablek, MD

Instructor in Clinical Medicine

Simeon Prager, MD

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David J Prelutsky, MD

Associate Professor of Clinical Medicine

Rachel M. Presti, MD, PHD

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Joseph M Primrose, MD

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Robert Allen Pufahl Jr, PHD

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Edward Puro, MS, PHD, MD

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Iskra Pusic, MD

Assistant Professor of Medicine

Michelle Anne Hurchla Pyles, PHD

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Usman Qayyum

Instructor in Clinical Medicine

Patricia M Quinley, MD

Instructor in Clinical Medicine

Abdul H Qureshi, MS

Instructor in Clinical Medicine

Susan B. Racette, PHD

Research Associate Professor of Medicine

Gwendalyn Jan Randolph, PHD

Professor of Medicine

Prabha Ranganathan, MBBS

Associate Professor of Medicine

U. Ramakrishna Rao, MS, PHD

Research Associate Professor of Medicine

Ravi Rasalingam, MD

Assistant Professor of Medicine

Antonella Luisa Rastelli, MD

Associate Professor of Medicine

Gary A Ratkin, MD

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Lee Ratner, MA, MD, PHD

Professor of Medicine

Alan A and Edith L Wolff Professor of Oncology

Daniel Rauch, PHD

Research Assistant Professor of Medicine

Saadia Taufiq Raza, MD

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Babak Razani, MD, PHD

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Timothy Patrick Rearden, MS, MD

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Katherine Marie Reeder, PHD

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Dominic N Reeds, MD

Assistant Professor of Medicine

Susan Robinson Reeds, MD

Instructor in Clinical Medicine

Lester T Reese, MD

Professor of Clinical Medicine (Dermatology)

Thomas Yvan Regenbogen, MD

Instructor in Medicine

Margaret Reiker, PHD, MD

Instructor in Clinical Medicine

Jacqueline Levy Reiss, MD

Instructor in Clinical Medicine

Hilary Elizabeth Lee Reno, MS, PHD, MD

Instructor in Medicine

Stacey L. Rentschler, MS, PHD, MD

Assistant Professor of Medicine

Nicholas R Renz, MD

Instructor in Emergency Medicine in Medicine

Michael P Rettig, PHD

Research Assistant Professor of Medicine

Michael W Rich, MD

Professor of Medicine

Lois F. Richard, PHD, MD

Assistant Professor of Medicine

Terrence E Riehl, MS, PHD

Research Assistant Professor of Medicine

Amy Elizabeth Riek, MD

Instructor in Medicine

Robert D Rifkin, MD

Professor of Medicine

Caron E Rigden, BFA, MD

Assistant Professor of Medicine

Joan K. Riley, PHD

Instructor in Medicine

Lisa B Ring, MD

Instructor in Clinical Medicine (Dermatology)

Tracy Marie Riordan, MD

Instructor in Clinical Medicine

Elisha D.O. Roberson, PHD

Instructor in Medicine

Clifton A Robinson, MD



Instructor in Emergency Medicine in Medicine

Paul Arthur Robiolio, M PHIL, MD

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M. Reza Rofougaran, MD

Instructor in Clinical Medicine

Sharon Alicia Rogers, MS

Research Instructor in Medicine

H. Bryan Rogers, MD

Instructor in Clinical Medicine

Felice A Rolnick, MD

Instructor in Clinical Medicine

Rizwan Romee, MD

Instructor in Medicine

Arthur G. Romero, PHD

Research Associate Professor of Medicine

Daniel B Rosenbluth, MD

Professor of Medicine

Anna Roshal, MD

Assistant Professor of Medicine

Ilana Shaina Rosman, MD

Assistant Professor of Medicine (Pending Executive Faculty Approval)

Willie Ray Ross, MD, M PH

Associate Professor of Medicine

Bruce J Roth, MD

Professor of Medicine

Marcos Rothstein, MD

Professor of Medicine

Ernest Tuttle Rouse III, MD

Instructor in Clinical Medicine

Jeremy Rower, MD

Instructor in Clinical Medicine

Deborah C Rubin, MD

Professor of Medicine

Myra L. Rubio, MD

Assistant Professor of Medicine

Brent E Ruoff, MD

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Tonya D Russell, MD

Associate Professor of Medicine

Joseph F Ruwitch Jr, MD

Professor of Clinical Medicine

Kenneth J Rybicki, MS, PHD, MD

Instructor in Clinical Medicine

Roshan I Sabar

Instructor in Clinical Medicine

J. Evan Sadler, PHD, MD

Professor of Medicine

Mehrdad Saeed-Vafa, MD

Instructor in Clinical Medicine

Shabbir H Safdar

Professor of Clinical Medicine

Sonny Satnam Saggar

Instructor in Clinical Medicine

Kaori A. Sakurai

Instructor in Clinical Medicine

Christine Joan Salter, DC, MD

Instructor in Clinical Medicine

Robert J Saltman, MD

Associate Professor of Clinical Medicine

John Mark Samet, MD

Instructor in Clinical Medicine

Lawrence E Samuels, MD

Instructor in Clinical Medicine (Dermatology)

Guadalupe Sanchez, MD

Instructor in Clinical Medicine (Dermatology)

Mark Steven Sands, PHD

Professor of Medicine

Kristen Marie Sanfilippo, MD, MHS

Instructor in Medicine (Pending Dean's Approval)

Daniel Jose Santa Cruz, MD

Instructor in Clinical Medicine (Dermatology)

Richard Albert Santos, MD, PHD

Assistant Professor of Medicine

Carlos Alfonso Quilala Santos, MD

Assistant Professor of Medicine

Anita Annie Sarathi, MD

Instructor in Clinical Medicine

Evelio E. Sardina, MS, PHD, MD

Instructor in Clinical Medicine

Gregory Stephen Sayuk, MD

Assistant Professor of Medicine

Lawrence R Schacht, MD

Instructor in Clinical Medicine

Jean E. Schaffer, MD

Virginia Minnich Distinguished Professor of Medicine

Andras Schaffer, MD, PHD

Assistant Professor of Medicine (Dermatology)

Richard O. Schamp, MD

Instructor in Clinical Medicine

Kenneth B Schechtman, MS, PHD, MA

Research Associate Professor of Medicine

Mark Scheperle, MD

Instructor in Clinical Medicine

Alvin K Schergen, MD

Instructor in Clinical Medicine

Joel D. Schilling, PHD, MD

Assistant Professor of Medicine

Tania L Schmid, MD

Instructor in Clinical Medicine

Robert Jay Schneider, MD

Assistant Professor of Clinical Medicine

Erin R. Schockett, MD

Instructor in Clinical Medicine

Mark Andrew Schroeder, MD

Assistant Professor of Medicine

Alexander E Schuetz, MD

Instructor in Clinical Medicine

Paul Schultz, MD

Instructor in Clinical Medicine

Stephen Schuman, MD

Instructor in Clinical Medicine

Benjamin D Schwartz, PHD, MD

Professor of Clinical Medicine

Adjunct Professor of Medicine

David B Schwartz, PHD, MD, MA

Associate Professor of Medicine

Evan Stuart Schwarz, MD

Assistant Professor of Emergency Medicine in Medicine (Pending Executive Faculty Approval)

Mitchell G Scott, MS, PHD

Clinical Research Assistant Professor of Medicine

Lynne M Seacord, MD

Assistant Professor of Medicine

Jay R Seltzer, MD

Assistant Professor of Clinical Medicine

David Seltzer, MD

Assistant Professor of Emergency Medicine in Medicine

Clay F Semenkovich, MD

Professor of Medicine

Herbert S Gasser Professor

Deepali Prabir Sen, MBBS, MD

Assistant Professor of Medicine

Robert M Senior, MD, MLA

Dorothy R and Hubert C Moog Professor of Pulmonary Diseases in Medicine

Joseph Michael Seria, MD

Instructor in Clinical Medicine

Harvey Serota, MD

Instructor in Clinical Medicine

James F Sertl, MD

Instructor in Clinical Medicine

Jeffery Scott Shafer, MD

Adjunct Instructor in Emergency Medicine in Medicine

**Atul S Shah**

Instructor in Clinical Medicine

**William D Shannon, MS, PHD**

Professor of Biostatistics in Medicine

**Jieya Shao, PHD**

Research Assistant Professor of Medicine (Pending Executive Faculty Approval)

**Noura Mohamed Sharabash, MD**

Instructor in Medicine

**Gerald Stephen Shatz, MD**

Assistant Professor of Clinical Medicine

**Nidal Shawahin, MD**

Instructor in Clinical Medicine

**Vidal T. Sheen, MD**

Instructor in Clinical Medicine

**David M. Sheinbein, MD**

Associate Professor of Medicine (Dermatology)

**Amy Lynn Sheldahl, MD**

Assistant Professor of Medicine

**Mounir M Shenouda**

Instructor in Clinical Medicine

**Adrian Shifren, MBBCH, MS**

Assistant Professor of Medicine

**Bernard L Shore, MD**

Professor of Clinical Medicine

**Sherry E Shuman, MD**

Associate Professor of Clinical Medicine

**Robert B Shuman, MD**

Associate Professor of Clinical Medicine

Barry Alan Siegel, MD

Professor of Medicine

Christine A Sigman, MD

Instructor in Clinical Medicine

Randy B Silverstein, MD

Instructor in Clinical Medicine

Julie Martha Silverstein, MD

Assistant Professor of Medicine

David R Sinacore, MHS, PHD

Professor of Medicine

Robert W Sindel, MD

Instructor in Clinical Medicine

Sanford S Sineff, MD

Assistant Professor of Emergency Medicine in Medicine

Gary Singer, MD

Assistant Professor of Clinical Medicine

Jasvinder Singh, MD

Associate Professor of Medicine

Gurcharan J Singh, MD

Instructor in Clinical Medicine

Donald A Skor, MD

Professor of Clinical Medicine

Eduardo Slatopolsky, MD

Joseph Friedman Professor of Renal Diseases in Medicine

Timothy W. Smith, PHD, MD

Associate Professor of Medicine

Raymond P Smith, MD

Instructor in Clinical Medicine

Gordon Ian Smith, MS, PHD

Research Assistant Professor of Medicine

Timothy Robert Smith, MD

Instructor in Clinical Medicine

Allen D Soffer, MD

Instructor in Clinical Medicine

Stephanie Rose Solomon, PHD

Adjunct Assistant Professor of Medicine

Rand Washburn Sommer, MD

Associate Professor of Clinical Medicine

Haowei Song, PHD

Research Instructor in Medicine

Steven M. Sorscher, MD

Associate Professor of Medicine

Hani Charles Soudah, MD, PHD

Associate Professor of Clinical Medicine

William F Southworth, MD

Assistant Professor of Clinical Medicine

James Joseph Spadaro Jr, MD

Assistant Professor of Clinical Medicine

Michael L Spearman, MD

Instructor in Clinical Medicine

John Spertus

Adjunct Professor of Medicine

Erik Christian Stabell, MD

Instructor in Clinical Medicine

Phyllis K Stein, M ED, PHD



Research Associate Professor of Medicine

Paul M Stein, MD

Professor of Clinical Medicine

Richard Ian Stein, PHD

Research Assistant Professor of Medicine

William F Stenson, MD

Dr Nicholas V Costrini Professor of Medicine

Barbara B Sterkel

Adjunct Associate Professor of Medicine

Sheila Stewart-Wigglesworth, PHD

Associate Professor of Medicine

Nathan O. Stitzel, MD, PHD

Instructor in Medicine

Keith Evan Stockerl-Goldstein, MD

Associate Professor of Medicine

James Andrew Stokes, MD

Instructor in Clinical Medicine

Gregory A Storch, MD

Professor of Medicine

Cristina Strong, PHD

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Xiong Su, PHD

Assistant Professor of Medicine

Hamsa Subramanian

Instructor in Clinical Medicine

Shelby A Sullivan, MD

Assistant Professor of Medicine

Melissa Sum, MD

Instructor in Medicine (Pending Dean's Approval)

**Kaharu Sumino, MD, PHD, M PA**

Assistant Professor of Medicine

**William Craig Summers, MD**

Instructor in Clinical Medicine

**Walton Sumner II, MD**

Associate Professor of Medicine

**Rama Suresh, MBBS**

Assistant Professor of Medicine

**Rudee Suwannasri, MD**

Instructor in Clinical Medicine

**Bridgette B Svancarek, MD**

Instructor in Emergency Medicine in Medicine

**Elzbieta Anna Swietlicki, MS, PHD**

Research Instructor in Medicine

**Adel Tabchy, MD, MS**

Assistant Professor of Medicine

**Steven D Taff, MS, PHD**

Instructor in Medicine

**Mohammad Tahir, MD**

Instructor in Clinical Medicine

**Benjamin R Tan, MD**

Associate Professor of Medicine

**David Tan, MD**

Assistant Professor of Emergency Medicine in Medicine

**Michael J. Tang, MD**

Instructor in Medicine

**Kongsak Tanphaichitr, MD**

Professor of Clinical Medicine

Richard S Tao, MD, MIM

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Steven L Teitelbaum, MD

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Arnold S Tepper, MD

Instructor in Clinical Medicine

Wanda T Terrell, MD

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Larissa Bryka Thackray, PHD

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George K. Thampy, MD

Instructor in Clinical Medicine

Daniel Leonidas Theodoro, MD

Assistant Professor of Emergency Medicine in Medicine

J. Allen Thiel, MD

Associate Professor of Clinical Medicine

Mark S Thoenke, PHD, MD

Associate Professor of Medicine

Erik P Thyssen, MD

Assistant Professor of Clinical Medicine

Lawrence S Tierney, MD

Associate Professor of Clinical Medicine

Jeffrey P Tillinghast, MD

Associate Professor of Clinical Medicine

Garry S Tobin, MD

Associate Professor of Medicine

Douglas M Tollefsen, PHD, MD

Professor of Medicine

Michael H. Tomasson, MD

Associate Professor of Medicine

Waseem Touma, MD

Instructor in Clinical Medicine

Robert R Townsend, MS, MD, PHD

Professor of Medicine

Elizabeth A Tracy, MD

Instructor in Clinical Medicine

David D Tran, MD, PHD

Assistant Professor of Medicine

Sandeep Kumar Tripathy, PHD, MD

Assistant Professor of Medicine

Elbert P Trulock III, MD

Rosemary and I Jerome Flance Professor of Pulmonary Medicine in Medicine

Thomas F Tse, MD

Instructor in Clinical Medicine

Dolores R Tucker, MD

Assistant Professor of Clinical Medicine (Dermatology)

David J Tucker, MD

Assistant Professor of Clinical Medicine

Stacey S Tull, MD, M PH

Assistant Professor of Clinical Medicine (Dermatology)

John W Turk, MD, PHD

Professor of Medicine

Peter G Tuteur, MD

Associate Professor of Medicine

Robert C. Uchiyama, MD

Instructor in Clinical Medicine

John H Uhlemann, MD

Assistant Professor of Clinical Medicine (Dermatology)

Fumihiko Urano, MD, PHD

Samuel E Schechter Associate Professor of Medicine

Geoffrey L Uy, MD, MA

Assistant Professor of Medicine

Brij R Vaid, MD

Instructor in Clinical Medicine

Albert Lee Van Amburg lil, MD

Assistant Professor of Clinical Medicine

Brian Andrew Van Tine, PHD, MD

Assistant Professor of Medicine

Gil M Vardi, MD

Assistant Professor of Clinical Medicine

Emmanuel A Venkatesan

Associate Professor of Clinical Medicine

Ravi Vij, MBBS

Associate Professor of Medicine

Kiran Raj Vij, MD

Assistant Professor of Medicine

Anitha Vijayan, MD

Professor of Medicine

Dennis T Villareal, MD

Adjunct Associate Professor of Medicine

Herbert W Virgin IV, PHD, MD

Professor of Medicine

Oksana Volshteyn, MD

Professor of Medicine

**Benjamin Allen Voss, MD**

Instructor in Clinical Medicine

**Stanley G Vriezelaar, MD**

Instructor in Clinical Medicine

**Harry Lee Wadsworth, MD**

Instructor in Clinical Medicine

**Jason Cass Wagner, MD**

Assistant Professor of Emergency Medicine in Medicine

**Nina Delaney Wagner-Johnston, MD**

Assistant Professor of Medicine

**Stanley M Wald, MD**

Associate Professor of Clinical Medicine

**David Wallace, MD**

Instructor in Clinical Medicine

**David A Walls, MD**

Instructor in Clinical Medicine

**Sarah N. Walsh**

Instructor in Clinical Medicine (Dermatology)

**Matthew John Walter, MD**

Associate Professor of Medicine

**Richard Coburn Walters, MD**

Instructor in Clinical Medicine (Dermatology)

**Lawrence L. Wang, PHD, MD**

Instructor in Clinical Medicine (Dermatology)

**Jean S Wang, MD, PHD**

Associate Professor of Medicine

**Andrea Wang-Gillam, MD**

Assistant Professor of Medicine

Saiama Naheed Waqar, MD

Instructor in Medicine

David K. Warren, MD, MPH

Associate Professor of Medicine

Corinna Hendrell Warren, MD

Instructor in Clinical Medicine

Lukas Delbert Wartman, MD

Assistant Professor of Medicine

Andrzej J. Wasiak, MD, PHD

Assistant Professor of Clinical Medicine

Scott P Wasserstrom, MA, MD

Instructor in Clinical Medicine

Jason Dean Weber, PHD

Associate Professor of Medicine

H. James Wedner, MD

Phillip & Arleen Korenblat Professor of Allergy and Immunology in Medicine

Xiaochao Wei, PHD

Research Instructor in Medicine

Kevin D Weikart, MD

Instructor in Clinical Medicine

Gary J Weil, MD

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Katherine N Weilbaecher, MD

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Carla Joy Weinheimer, MS

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Leonard B Weinstock, MD

Associate Professor of Clinical Medicine

Steven Jay Weintraub, MS, MD

Assistant Professor of Medicine

Edmond Weisbart

Assistant Professor of Clinical Medicine

Alan N Weiss, MD

Professor of Medicine

Peter Douglas Weiss, MD

Instructor in Clinical Medicine

Edward P Weiss, MS, PHD

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John Sutton Welch, PHD, MD

Assistant Professor of Medicine

Jennifer Welch, MD

Instructor in Medicine (Pending Dean's Approval)

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Alvin S Wenneker, MD

Professor of Clinical Medicine

Brian T Wessman, MD

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Peter Westervelt, MD, PHD

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Alison J Whelan, MD

Professor of Medicine

Neil Harris White, MD

Professor of Medicine

Brian Stephen White, PHD



Research Assistant Professor of Medicine

Michael Peter Whyte, MD

Professor of Medicine

Burton M Wice, PHD

Research Associate Professor of Medicine

Cynthia A Wichelman, MD

Associate Professor of Emergency Medicine in Medicine

Samuel A Wickline, MD

Professor of Medicine

James R Hornsby Family Professor of Medicine

John F Wiedner, MD

Instructor in Clinical Medicine

Christopher William Wieland, MD

Instructor in Medicine

Deborah A Wienski, MD

Instructor in Clinical Medicine

Tanya M Wildes, MD

Assistant Professor of Medicine

Denise Wilfley, PHD

Professor of Medicine

Nancy J Williams, MD

Instructor in Clinical Medicine

George A Williams III, MA, MD

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R. Jerome Williams Jr, MD

Associate Professor of Clinical Medicine

Monita Elaine Wilson, MS, PHD

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Patrick H Win

Instructor in Clinical Medicine

David William Windus, MD

Professor of Medicine

Karen Winters, MD

Associate Professor of Medicine

Chad Alan Witt, MD

Assistant Professor of Medicine

Keith Frederic Woeltje, PHD, MD

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Nathan E Wolins, PHD

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John A Wood, MD

Associate Professor of Clinical Medicine

Michele C Woodley, MD

Assistant Professor of Clinical Medicine

Megan Elizabeth Wren, MD

Associate Professor of Medicine

Jeffrey M Wright, MD

Assistant Professor of Clinical Medicine

Xiaobo Wu, MD

Research Assistant Professor of Medicine

Yan Xie, MD, MS

Research Instructor in Medicine

Mai Xu, MD, MS, PHD

Research Instructor in Medicine (Pending Dean's Approval)

Weining David Xu, MD

Instructor in Medicine

Naga M Yalla, MD

Instructor in Medicine

Kathryn Ayako Yamada, PHD

Research Professor of Medicine

Kui Yang, ME, PHD

Research Instructor in Medicine

Kevin E Yarasheski, MA, PHD

Professor of Medicine

Timothy Teng-Kay Yau, MD

Assistant Professor of Medicine

Wayne M Yokoyama, MD

Sam and Audrey Loew Levin Professor of Medicine (Rheumatology)

Howard Hughes Medical Institute Investigator in Medicine

Jun Yoshino, MD, PHD

Research Assistant Professor of Medicine

Zhongsheng You, MS, PHD

Assistant Professor of Medicine

Simon Yu, MD

Instructor in Clinical Medicine

Roger D. Yusen, MD, MPH

Associate Professor of Medicine

Alan Zajarias, MD

Assistant Professor of Medicine

John F. Zalewski, MD

Instructor in Clinical Medicine

Joel Zeffren

Instructor in Clinical Medicine

Yong Zhang, MD, MS, PHD

Research Instructor in Medicine

Robert E Ziegler, MD, PHD

Assistant Professor of Clinical Medicine (Dermatology)

## 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 **DBBS** program in **Molecular Microbiology and Microbial Pathogenesis**, the department also offers a number of advanced courses, primarily designed for graduate students, but open to medical students. Advanced elective research activities are offered by faculty in the department.

## MD Courses

### First Year

M30 526 MICROBES AND PATHOGENESIS

Instructors: Henry V. Huang, PhD, 362-2755; Scott Hultgren, PhD, 362-6772

The challenge of this course is to emphasize the importance of understanding molecular and cellular paradigms of how pathogenic microbes interact with their hosts and cause disease. Selected pathogenic microbes, including bacteria, viruses, parasites and fungi, will be utilized as models to explain general principles of host-pathogen interactions and their consequences. Mechanisms by which microbes evade host defenses to cause acute and chronic infections will be highlighted. Problems facing the medical community in the 21st century such as rising antibiotic resistance and tropical diseases will be addressed. The main objective of this course is to teach students how to think about microbial pathogenesis in a way that will provide them a conceptual framework that relates mechanisms of pathogenesis to symptomology and pathophysiology.

### Fourth Year

#### Electives

At present, the primary enrollees in the following courses are students working for a PhD degree in one of the basic sciences. However, these courses are recommended for interested medical students, especially those who may be considering a career in medical research, such as MSTP students. MSTP students can

take Bio 5392 in place of the Medical Microbiology course (M30 526). Emphasis is placed on the organization and function of living systems at the molecular level. The courses combine formal lectures with student-directed seminars. Course descriptions are presented under Division of Biology and Biomedical Sciences.

L41 (Bio) 5217 SPECIAL TOPICS IN MICROBIAL PATHOGENESIS

L41 (Bio) 5392 MOLECULAR MICROBIOLOGY AND PATHOGENESIS

Note — The number preceding the course title indicates that the course carries credit in the Graduate School of Arts & Sciences.

## Research

(M30 900)

Cross-listed with L41 (Bio) 590

**John P. Atkinson, MD**, Tenth Floor Clinical Sciences Research Building, 362-8391. Basic and clinical investigations of complement receptors and regulatory proteins including their roles in protecting self-tissue from damage, serving as a receptor for pathogens and inducing T regulatory cells. Poxviruses and flaviviruses that produce virulence factors which mimic the host's complement regulators are a recent focus.

**Douglas E. Berg, PhD**, Eighth Floor McDonnell Pediatric Research Building, 362-2772. *Helicobacter pylori*: mechanisms of gastric colonization and disease; drug resistance; molecular epidemiology and evolution.

**Stephen M. Beverley, PhD**, Ninth Floor McDonnell Pediatric Research Building, 747-2630. Molecular genetics of protozoan parasites and tropical diseases; biosynthesis of the parasite surface, genomics, virulence and drug action or resistance.

**Michael Caparon, PhD**, Tenth Floor McDonnell Pediatric Research Building, 362-1485. Molecular genetics and pathogenicity of the streptococci and other pathogenic gram positive bacteria.

**Michael S. Diamond, MD, PhD**, Seventh Floor McDonnell Pediatric Research Building, 362-2842. The research in our laboratory focuses on the interface between viral pathogenesis and the host immune response. Four globally important positive strand RNA viruses are studied, including West Nile, Dengue, Chikungunya, and hepatitis C virus. Studies are focused on identifying the host and viral factors that modulate the severity of an infection, the structural and molecular basis of antibody mediated protection, and mechanisms of viral immune evasion. Our laboratory utilizes an array of approaches including those used in molecular virology, cell biology, structural biology, systems biology, cellular immunology, and in vivo models of pathogenesis.

**Tamara L. Doering, MD, PhD**, Tenth Floor McDonnell Pediatric Research Building, 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 investigation of 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**, Ninth Floor McDonnell Pediatric Research Building, 362-1514. Biochemistry of malaria.

**David B. Haslam, MD**, Sixth Floor McDonnell Pediatric Research Building, 286-2888. Our laboratory is investigating the trafficking of shiga toxin within human cells. In particular, we are searching for small molecules that inhibit toxin trafficking. These will be used as tools to study the pathway, and some might be developed as potential therapeutic agents.

**Jeffrey P. Henderson, MD, PhD**, Tenth Floor, BJH Institute of Health Building, 747-0240. Basic and translational investigation of Gram negative bacterial pathophysiology. We make extensive use of mass spectrometry to understand how bacteria use small molecules and proteins for nutrient theft and defense from the host immune system. Where possible, we use these methods to better understand the host-pathogen interface in patients. We have used this information to identify and design agents that specifically target pathogenic strains.

**Henry Huang, PhD**, Eighth Floor McDonnell Pediatric Research Building, 362-2755. RNA virus evolution. Molecular biology of alphaviruses. Alphavirus gene expression vectors. Antiviral drug design.

**Scott J. Hultgren, PhD**, Tenth Floor McDonnell Pediatric Research Building, 362-6772. 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 assembly and extrusion of pili across the outer membrane. We revealed how UPEC 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, re-shaping models of bacterial infections in general and spawning new technologies to design novel vaccines and anti-microbial therapeutics to diagnose, treat and/or prevent UTIs and their sequelae.

**David A. Hunstad, MD**, Room 6106 McDonnell Pediatric Research Building, 286-2710. The laboratory studies the molecular mechanisms by which conserved, general periplasmic chaperones, such as SurA, contribute to the assembly and presentation of surface virulence factors by Gram-negative pathogens. In addition, we are evaluating the utility of novel silver-based antimicrobial compounds in special populations with UTI. Our goals are to discover novel targets for interventions that will prevent and treat Gram-negative infections of the urinary tract, gastrointestinal tract, and central nervous system.

**Amanda Lewis, PhD**, Tenth Floor, BJC-IH, 286-0016. 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 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 identify patient groups most at risk for adverse events. Another active area of study in the lab involves polymicrobial urinary tract infection (UTI). We have developed a mouse model of polymicrobial UTI and are currently defining novel processes, bacterial factors and the impact of host that contribute to susceptibility.

**Lee Ratner, MD, PhD**, 562 McDonnell Science Building, 362-8836. Human Retrovirus Research. Studies of human retrovirus replication and pathogenesis. These include studies of the 1) human T-cell leukemia virus receptor, regulation by interferon, and transformation of T-cells, 2) HIV interaction with co-receptors and pre-integration complex transport to the nucleus, and 3) xenotropic-murine related retrovirus in prostate cancer.

**Robert Schreiber, PhD**, Room 7749, Seventh Floor Clinical Sciences Research Building, 362-8747. Tumor immunology focusing on mouse models of cancer and cancer immunoediting. Biochemistry and biology of cytokines, their receptors and cytokine receptor signaling with particular emphasis on IFN $\alpha$ / $\beta$  and IFN $\gamma$ .

**L. David Sibley, PhD**, Ninth Floor McDonnell Pediatric Research Building, 362-8873. 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 development of animal models for studying pathogenesis and resistance.

**Christina L. Stallings, PhD**, Tenth Floor, McDonnell Pediatrics Research Building, 286-0276. 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 yield therapeutic strategies for treatment of mycobacterial infections.

**Gregory Storch, MD**, 2N52 St. Louis Children's Hospital, 454-6079. In this elective, the student will participate in a research project involving the application of techniques of molecular biology, especially the polymerase chain reaction and nucleotide sequencing, to the diagnosis of the infectious diseases. Infectious agents currently under investigation include human cytomegalovirus, Epstein-Barr virus, BK polyoma virus, Ehrlichia, and respiratory viruses. Studies are also directed at molecular detection and analysis of resistance to antimicrobial agents.

**Patrick M. Stuart, PhD**, 1217B McMillan, 362-9336. Virology. Investigate the role viral-induced immune responses play in corneal pathology seen in both primary and recurrent herpes infections of the eye. Characterize the role that apoptotic pathways play in herpetic diseases of the eye. To develop and characterize anti-herpetic vaccines as well as immunologically-based tolerance procedures that are effective in preventing recurrent herpetic keratitis.

**Phillip I. Tarr, MD**, Sixth Floor, McDonnell Pediatric Research Building, 286-2848. Opportunities in Enteric Human Microbiology. We have a variety of relevant research opportunities available to us in our laboratory. Most efforts center around the intense genetic studies of already isolated bacteria, including

pathogens and commensal organisms. The specimen archive is obtained from children with diagnosed enteric infections or other inflammatory disorders of the gut, including inflammatory bowel disease as well as ulcerative colitis and necrotizing enterocolitis. Additionally, we have a very large biomass archive, consisting of stool from patients during or before events, most particularly necrotizing enterocolitis. In our efforts, we study the bioactivity and genetics of the microbial populations, and we also interrogate the human enteric response to these populations. We use a variety of techniques, including classic monoclonal sequencing and sequence and phylogenetic analyses, polymicrobial censusing (usually 16 rRNA analysis) and shotgun DNA sequencing (using massively parallel technology), transcriptional sequencing, and proteomics. All projects attempt to amalgamate data from the fields of microbial evolution, microbial pathogenesis, microbial ecology, and host response, to dissect the relation between the enteric biomass and human health and disease. Rotating (elective) students will be assigned a feasible project that attempts to answer a well-circumscribed question, or develop a broadly useful reagent or technique, within the constraints of a time-limited rotation.

**Niraj H. Tolia, PhD**, Eighth Floor, McDonnell Pediatric Research Building, 286-0134. 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.

**Herbert Virgin, MD, PhD**, 1754 West Building, 362-9223. We work on issues at the interface of virology and immunology by analyzing aspects of immunity that control infection and aspects of viral structure/genetics that contribute to virulence, disease and oncogenesis. We study the pathogenesis and latency of the dsDNA enveloped murine gammaherpesvirus 68 as well as RNA viruses MNV-1 and Sindbis virus.

**Joseph P. Vogel, PhD**, Tenth Floor McDonnell Pediatric Research Building, 747-1029. Legionella pneumophila, the causative agent of Legionnaires pneumonia, replicates inside alveolar macrophages by preventing phagosome-lysosome fusion.

**David Wang, PhD**, Eighth Floor McDonnell Pediatric Research Building, 286-1123. 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 and molecular/cellular strategies to define the relevance of newly identified viruses to human disease. A range of new viruses, including polyomaviruses, astroviruses and picornaviruses are under investigation.

**Dong Yu, PhD**, 9220D McDonnell Pediatric Research Building, 362-7367. Human cytomegalovirus (HCMV) is an important human pathogen that causes severe and life-threatening disease in people with a compromised immunity, is the most common infectious cause of birth defects in newborns, and has been associated with various vascular diseases. In my laboratory, students have opportunities to use genetic, biochemical, genomic, and cell biology approaches to study key viral and cellular processes that are pivotal to HCMV biology and pathogenesis. In particular, they will investigate the role of viral genes in HCMV infection, decipher the unique molecular biology of HCMV clinical isolates, and use mouse model of mouse CMV infection as a surrogate model for dissecting the mechanism of HCMV infection and pathogenesis in vivo.

## Department of Molecular Microbiology Faculty

Stephen M Beverley, PHD



Marvin A Brennecke Professor of Molecular Microbiology

Head of the Department of Molecular Microbiology

**Shabaana Abdul Khader, PHD**

Associate Professor of Molecular Microbiology

**John Patterson Atkinson, MD**

Professor of Molecular Microbiology

**Wandy L. Beatty, PHD**

Research Assistant Professor of Molecular Microbiology

**Adrianus C Boon, MS, PHD**

Assistant Professor of Molecular Microbiology

**Tamara L. Brent, PHD, MD**

Professor of Molecular Microbiology

Alumni Endowed Professor of Molecular Microbiology

**Michael G Caparon Jr., PHD**

Professor of Molecular Microbiology

**Susan E Cullen, PHD**

Adjunct Professor of Molecular Microbiology

**Michael Diamond, PHD, MD**

Professor of Molecular Microbiology

**Deborah E Dobson, PHD**

Research Associate Professor of Molecular Microbiology

**Karen W Dodson, PHD**

Research Instructor in Molecular Microbiology

**Daniel E Goldberg, PHD, MD**

Professor of Molecular Microbiology

**Dennis E Hallahan, MD**

Professor of Molecular Microbiology

Jeffrey P. Henderson, MD, PHD

Assistant Professor of Molecular Microbiology

Henry V Huang, PHD

Associate Professor of Molecular Microbiology

Scott James Hultgren, PHD

Helen L Stoeber Professor of Molecular Microbiology

David A Hunstad, MD

Associate Professor of Molecular Microbiology

Anthony Kulczycki Jr, MD

Associate Professor of Molecular Microbiology

Amanda Lark Lewis, PHD

Assistant Professor of Molecular Microbiology

Jennifer K Lodge, PHD

Professor of Molecular Microbiology

Elaine Rene Mardis, PHD

Professor of Molecular Microbiology

Audrey R Odom, PHD, MD

Assistant Professor of Molecular Microbiology

Paul D Olivo, MD, PHD

Adjunct Assistant Professor of Molecular Microbiology

Edward J Pearce, PHD

Professor of Molecular Microbiology

Lee Ratner, MA, MD, PHD

Professor of Molecular Microbiology

Charles M Rice III, PHD

Adjunct Professor of Molecular Microbiology

Robert D Schreiber, PHD

Professor of Molecular Microbiology

Jahangheer S. Shaik, MS, MS1, PHD

Research Instructor in Molecular Microbiology

Laurence David Sibley, PHD

Professor of Molecular Microbiology

Alan A and Edith L Wolff Distinguished Professor

Christina Leigh Stallings, MA, MS, PHD

Assistant Professor of Molecular Microbiology

Gregory A Storch, MD

Professor of Molecular Microbiology

Phillip Irwin Tarr, MD

Professor of Molecular Microbiology

Niraj Harish Tolia, PHD

Assistant Professor of Molecular Microbiology

Herbert W Virgin IV, PHD, MD

Professor of Molecular Microbiology

Joseph Paul Vogel, PHD

Associate Professor of Molecular Microbiology

David Wang, PHD

Associate Professor of Molecular Microbiology

Gary J Weil, MD

Professor of Molecular Microbiology

George Matthew Weinstock, PHD

Professor of Molecular Microbiology

Richard K Wilson, PHD

Professor of Molecular Microbiology

# Department of Neurological Surgery

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 Anatomy and Neurobiology** with participation of the neurosurgery faculty. In the second year, the **Department of Neurological Surgery** presents the course in Diseases of the Nervous System in conjunction with the Departments of Neurology, Pathology, Molecular Biology and Pharmacology, Medicine and Pediatrics. The course emphasizes how knowledge derived from basic or clinical investigations leads to improvements in clinical care. In the third year, students may elect to participate in a two- or four-week Neurosurgery clerkship which introduces them to the clinical care of patients with diseases of the nervous system. Neurosurgical faculty members work with the neurologists in providing lectures, demonstrations and teaching exercises in 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. In the fourth year, students may choose from several advanced electives including clinical externships in neurosurgery and experiences in basic or clinical/translational research.

## Neurological Surgery Divisions

### **Division of Pediatric Neurosurgery**

Jeffrey R. Leonard, MD; Matthew D. Smyth, MD; Tae Sung Park, MD; David D. Limbrick Jr., MD, PhD.

Based in St. Louis Children's Hospital, the Division of Pediatric Neurosurgery of the Department of Neurosurgery provides neurosurgical care for the many disorders that are unique to the developing nervous system, from the premature infant to the young adult. Subspecialty areas include pediatric neuro-oncology, spastic cerebral palsy, craniofacial disorders, obstetrical brachial plexus injuries and epilepsy surgery. Active areas of clinical and basic research include pediatric head trauma, brain tumors, epilepsy and neonatal brain injury and hydrocephalus.

## Center for Innovation in Neuroscience and Technology

Eric C. Leuthardt, MD (director)

The multidisciplinary center is based in the Department of Neurosurgery with participation from multiple departments in the medical school and across the University campus. Current active participants include neurosurgery faculty members Ralph G. Dacey Jr., MD, chairman; Colin Derdeyn, MD, with the Division of Neuroradiology; Steve Peterson, MD, with the Department of Neurology/Neurobiology; Frank C-P Yin, PhD, chairman and Daniel Moran, PhD, with the Department of Biomedical Engineering; Philip Bayly, PhD, and Guy Genin, PhD, with the Department of Mechanical Engineering; Bill Smart, PhD, with the Department of Computer Science; F. Scott Kieff, JD, with the School of Law and adjunct professor in the Department of Neurosurgery; and Michael Marrah with the Office of Technology Management.

## James L. O'Leary Division of Experimental Neurology and Neurological Surgery

Thomas A. Woolsey, MD (director)

The O'Leary Division was created in 1980 to formalize a long-standing tradition of providing unique opportunities for residents, fellows and others to engage in basic research as part of this academic training program. The division pioneered techniques to study brain structure and activity, with a focus on developmental and adult nervous system plasticity. Trainees have published fundamental work on mechanisms of activity-based changes to cerebral blood flow, a novel stroke model, new understanding of impacts of glioblastoma growth on cortical structure and function, and novel approaches to visualizing and analyzing dynamic changes in structure and function. The division currently collaborates widely on projects conducted in and outside WUSM including: faculty in this Department and the departments of Neurology, Anatomy and Neurobiology, Biomedical Engineering, Earth and Planetary Sciences, Electrical and Systems Engineering, Pediatrics, Otolaryngology and Radiology.

## Areas of neurosurgical specialization

### **Cerebrovascular Surgery**

Michael R. Chicoine, MD; Ralph G. Dacey Jr., MD; Robert L. Grubb Jr., MD; Keith M. Rich, MD; Gregory J. Zipfel, MD

### **Cranial Base Surgery**

Michael R. Chicoine, MD; Robert L. Grubb Jr., MD; Gregory J. Zipfel, MD

### **Epilepsy Surgery**

Joshua L. Dowling, MD; Eric C. Leuthardt, MD

### **Neuro-Oncology**

Michael R. Chicoine, MD; Ralph G. Dacey Jr., MD; Albert Kim, MD; Keith M. Rich, MD; Eric C. Leuthardt, MD

### **Pediatric Neurosurgery**

Jeffrey R. Leonard, MD; Matthew D. Smyth, MD; Tae Sung Park, MD; David D. Limbrick Jr., MD, PhD

### **Peripheral Nerve Surgery**

Wilson Z. Ray, MD

### **Pituitary Surgery**

Michael R. Chicoine, MD; Ralph G. Dacey Jr., MD; Gregory J. Zipfel, MD

### **Spinal Neurosurgery**

Wilson Z. Ray, MD; Paul Santiago, MD; Todd J. Stewart, MD; Neill M. Wright, MD; Eric C. Leuthardt, MD

### **Stereotactic Radiosurgery**

Michael R. Chicoine, MD; Ralph G. Dacey Jr., MD; Joshua L. Dowling, MD; Keith M. Rich, MD; Matthew D. Smyth, MD; Eric C. Leuthardt, MD

### **Surgical Management of Pain**

Joshua L. Dowling, MD

## MD Courses

## First Year

### Selectives

#### MO4 5878 INTRODUCTION TO CLINICAL NEUROSURGERY

Instructor: Jeffrey Leonard, MD, 454-4630

The objective for this selective course is to expose students to the various fields of neurosurgery. Students attend X-Ray/Case Management conferences and Grand Rounds. There are nine sessions for the semester: two case management conferences, two Grand Rounds and five discussions. Students (discussion leaders) are assigned to relevant literature to present. Discussion dates and discussion leaders are chosen at the introductory meeting. The course also exposes students to tools they can use in critical reading of medical literature. During the semester, as opportunities allow, patients with the disease processes being discussed are brought to class, and students are lead on rounds to discuss the various patients in the hospital at that time. In addition, there will be cadaver lab which provides students with hands-on experience with neurosurgical procedures, guided by faculty and residents.

## Third Year

### Third-Year 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.

## Fourth Year

### Elective

#### M40 805 NEUROSURGERY

Instructor(s): David Limbrick, MD, PhD, 454-2810

Location: Department of Pediatric Neurosurgery, St. Louis Children's Hospital, 4 South 20, 8:00 a.m. first day of elective.

Elective Contact: David Limbrick, MD, PhD, 454-2810

Other Information: Students should contact Dr. Limbrick prior to the first day of the elective.

Enrollment limit per period: 4

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The goal 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 also strongly encouraged as a component of this fourth year elective.

Student time distribution: Inpatient 80%; Outpatient 20%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: N/A  
Patients seen/weekly: 125  
On call/weekend responsibility: None

## Research

(M40 900)

**Michael R. Chicoine, MD**, Fifth Floor McMillan, 362-4313. Outcomes analysis for adult patients with brain tumors. Current clinical studies focus on outcomes of patients with benign and malignant brain tumors utilizing a prospective brain tumor database. Particular emphasis includes the impact of intraoperative MRI upon outcomes for patients with brain tumors and other diseases.

**Ralph G. Dacey, Jr., MD**, Fifth Floor McMillan, 362-3571. Research on the cerebral microcirculation and ischemia/reperfusion: Our studies focus on 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.

**Hans H. Dietrich, PhD**, Fifth Floor McMillan, 362-3656. Pathophysiology of the cerebral microcirculation in Alzheimer's disease and diabetes: Alzheimer's disease and diabetes impair the vascular function of the cerebral microcirculation. We use in vitro techniques for studying isolated perfused microvessels from genetic models of the respective diseases to examine the impairment of molecular mechanisms involved in endothelial and smooth muscle integration of cerebral blood flow regulation. Based on our studies, we devise and test treatments to alleviate the observed microvascular dysfunction.

**Jeffrey M. Gidday, PhD**, 286-2795. Research in our lab is aimed at elucidating the innate mechanisms responsible for the promotion of robust neuronal and vascular protection against ischemic and other neurodegenerative injuries in CNS tissues (a phenotype called "tolerance") that results from a sublethal "conditioning" stress. The current focus in brain is on defining endogenous, vascular-based, anti-inflammatory mechanisms of long-lasting stroke tolerance in response to repetitive hypoxic preconditioning. In the retina, we've found that this novel form of protracted plasticity in the CNS also protects against the slow, progressive degeneration of retinal ganglion cells that defines glaucoma. Identifying these epigenetic mechanisms, and how they are amenable to physiologic or pharmacologic activation, will provide novel therapeutic targets for cytoprotection in the setting of both acute, and chronic, neurodegenerative disease.

**David D. Limbrick, MD, PhD**, Suite 4S20, St. Louis Children's Hospital, 454-2810. Clinical and translational research into newborn brain injuries, including post-hemorrhagic hydrocephalus. Main research areas include cerebrospinal fluid protein markers of disease, MRI diffusion tensor imaging, and prospective clinical trials. Also, multi-institutional clinical research opportunities exist for syringomyelia associated with Chiari I malformation.

**T. S. Park, MD**, 1S46 St. Louis Children's Hospital, 454-2810. Outcome studies of selective dorsal rhizotomies for treatment of spastic cerebral palsy in children, and brachial plexus repair for birth injury are ongoing projects.

**Keith M. Rich, MD**, Fifth Floor McMillan, 362-3566. 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.

**Neill M. Wright, MD**, Fifth Floor McMillan, 362-3630. Clinical outcomes studies focusing on the treatment and results of cervical spine surgery. Several active research opportunities include the evaluation of novel surgical techniques for treatment of the atlantoaxial (C1-2) segment, the use of synthetic bone in cervical spine surgery, the relationship between cervical spondylosis and dizziness, and the critical evaluation of certain intra-operative techniques and surgical practices.

**Gregory J. Zipfel, MD**, Fifth Floor McMillan, 747-8871. Our cerebrovascular research laboratory has two main interests: (1) Examining the pathophysiologic effects of amyloid- $\beta$  peptide on cerebral arteriolar function, and determining the manner and extent to which such effects contribute to diseases such as ischemic brain injury, cerebral amyloid angiopathy, and Alzheimer's Disease; and (2) Exploring the molecular basis and therapeutic intervention for vasospasm and cognitive deficits following experimental aneurysmal subarachnoid hemorrhage.

## Department of Neurological Surgery Faculty

**Ralph G Dacey Jr, MD**

Henry G and Edith R Schwartz Professor of Neurological Surgery

Head of the Department of Neurological Surgery

**Tammie Lee Smith Benzinger, PHD, MD**

Assistant Professor of Neurological Surgery

**Keith Happ Bridwell, MD**

Professor of Neurological Surgery

**Jacob M Buchowski, MS, MD**

Associate Professor of Neurological Surgery

**Andreas H Burkhalter, MS, PHD**

Associate Professor of Neurobiology in Neurological Surgery

**Michael R Chicoine, MD**

Associate Professor of Neurological Surgery

August A. Busch, Jr. Distinguished Professor

**Dewitte T Cross III, MD**

Professor of Neurological Surgery



Colin Pieter Derdeyn, MD

Professor of Neurological Surgery

Hans H Dietrich, MS, PHD

Assistant Professor of Neurological Surgery

Michael N Diringer, MA, MD

Professor of Neurological Surgery

Ian G Dorward, MD

Assistant Professor of Neurological Surgery (Pending Executive Faculty Approval)

Joshua L Dowling, MD

Associate Professor of Neurological Surgery

Robert E Drzymala, PHD

Professor of Neurological Surgery

Jack R. Engsborg, MS, MS1, PHD

Professor of Neurological Surgery

Jeffrey M. Gidday, PHD

Associate Professor of Neurological Surgery

Robert L Grubb Jr, MD

Professor of Neurological Surgery

David H Gutmann, MS, PHD, MD

Professor of Neurological Surgery

Byung Hee Han, PHD

Assistant Professor of Neurological Surgery

Matthew A Howard

Adjunct Assistant Professor of Neurological Surgery

William Edward Janes, OTD, MS

Instructor in Neurological Surgery

Sarah C. Jost

Adjunct Assistant Professor of Neurological Surgery

Michael Patrick Kelly, MD

Assistant Professor of Neurological Surgery

Salah G. Keyrouz, MD

Associate Professor of Neurological Surgery

Albert H Kim, MA, PHD, MD

Assistant Professor of Neurological Surgery

Lawrence G Lenke, MD

Professor of Neurological Surgery

Jeffrey R. Leonard, MD

Associate Professor of Neurological Surgery

Eric Claude Leuthardt, MD

Associate Professor of Neurological Surgery

David D Limbrick Jr, MD, PHD

Assistant Professor of Neurological Surgery

Gerald P Linette, MD, PHD

Associate Professor of Neurological Surgery

Christopher J Moran, MD

Professor of Neurological Surgery

Tae Sung Park, MD

Shi Hui Huang Professor of Neurological Surgery

Steven E Petersen, PHD

Associate Professor of Neurological Surgery (Neuropsychology)

Wilson Z Ray, MD

Assistant Professor of Neurological Surgery

Keith M Rich, MD

Professor of Neurological Surgery

K. Daniel Riew, MD

Professor of Neurological Surgery

Paul Santiago, MD

Associate Professor of Neurological Surgery

Gerwin Schalk

Adjunct Assistant Professor of Neurological Surgery

Timothy L Shurtleff, MS

Instructor in Neurosurgery

Julie Martha Silverstein, MD

Assistant Professor of Neurological Surgery

Matthew D Smyth, MD

Associate Professor of Neurological Surgery

Rene Tempelhoff, MD

Professor of Neurological Surgery

Thomas A Woolsey, MD

Professor of Experimental Neurological Surgery

George H and Ethel R Bishop Scholar in Neuroscience in Neurological Surgery

Neill Marshall Wright, MD

Herbert Lourie Professor of Neurological Surgery

Hiroko Yano, MS, PHD

Assistant Professor of Neurological Surgery

Liya Yuan, MS, PHD

Research Instructor in Neurological Surgery

Lukas P Zebala, MD

Assistant Professor of Neurological Surgery

Yanli Zhu, MD, MS

Research Instructor in Neurological Surgery

Gregory Joseph Zipfel, MD

Associate Professor of Neurological Surgery

## Department of Neurology

Neurology concerns itself with the diseases of 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 the [Department of Anatomy and Neurobiology](#), with participation of faculty from the [Department of Neurology](#). A first-year selective titled [Clinical Correlations in Neuroscience](#) is available, which is an opportunity for interested students to shadow physicians in neuro-related fields and attend basic science or clinical conferences. Another first-year selective titled [Alzheimer's Disease \(AD\) in the Clinic and the Lab](#) is also available, which is an opportunity for interested students to get an overview of the most exciting areas of AD clinical and science research. In the second year, the Department of Neurology presents the course [Diseases of the Nervous System](#) in conjunction with the Departments of [Pathology and Immunology](#), [Neurological Surgery](#) and [Ophthalmology](#). 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.

In the third year, a four-week clerkship in Neurology introduces students to the clinical care of patients with diseases of the nervous system. Questions pertaining to neurosurgical treatment, neurorehabilitation and ethical issues in management also are addressed. In the fourth year, opportunities exist for many varieties of advanced clinical or research experience. A four-year residency program prepares medical graduates for specialization in neurology. Subspecialty fellowship programs routinely provide additional training in dementia, epilepsy, electrophysiology, electromyography, sleep medicine, cerebrovascular disease and stroke, neuroimmunology, neurological critical care, neuromuscular disease, neuropsychology and movement disorders.

Thirteen divisions and sections are in the department including the Division of Adult Neurology, the Division of Pediatric and Developmental Neurology and the Division of Neurorehabilitation. See [www.neuro.wustl.edu](http://www.neuro.wustl.edu) for details.

**Division of Neuropsychology:** Steven Petersen, PhD (division director); Francis Miezin, BS, MS; Bradley Schlaggar, MD, PhD; Gordon Shulman, PhD

**Division of Neurorehabilitation:** Maurizio Corbetta, MD (division director); David Brody, MD, PhD; Alex Carter, MD, PhD; Robert Fucetola, PhD; Thy Huskey, MD; Sindhu Jacob, MD; Neringa Juknis, MD; Rimma Ruvinskaya, MD; Nicole Werner, PhD; Oksana Volshteyn, MD; Martin Wice, MD

**Division of Pediatric and Developmental Neurology:** Michael Noetzel, MD (division director); Mary Bertrand, MD; Janice Brunstrom, MD; Anne Connolly, MD; Edwin Dodson, MD; Rafael Galindo, MD, PhD; Paul Golumbek, MD, PhD; Christina Gurnett, MD, PhD; David Gutmann, MD; Douglas Larsen, MD; Amy Licis, MD; Soe Mar, MD; Jeffrey Neil, MD, PhD; Arthur Prenskey, MD; Robin Ryther, MD, PhD; Bradley Schlaggar, MD (division associate director); PhD, Christopher Smyser, MD; Liu Lin Thio, MD, PhD; Jean Thurston, MD; Amy Viehoever, MD, PhD; Judy Weisenberg, MD; Michael Wong, MD, PhD; Kelvin

Yamada, MD; John Zempel, MD, PhD; Craig Zaidman, MD

**Aging and Dementia Section:** John Morris, MD (section head); Randall Bateman, MD; Virginia Buckles, PhD; Nigel J. Cairns, PhD, FRC Path; David Carr, MD; John Cirrito, PhD; Mary Coats, MSN; Anne Fagan, PhD; Nupur Ghoshal, MD, PhD; Jason Hassenstab, PhD; David Holtzman, MD (department chair); Terri Hosto, MSW; Eugene Johnson, Jr., PhD; Pamela Millsap, MSN; Erik Musiek, MD, PhD; Krista Moulder, PhD; Erik Musiek, MD, PhD; Catherine Roe, PhD; B. Joy Snider, MD, PhD

**Hope Center for Neurological Disorders (specifically those faculty in the Department of Neurology):** Alison Goate, D.Phil (director); Beau Ances, MD, PhD; Randall Bateman, MD; David Brody, MD, PhD; Janice Brunstrom, MD; Nigel Cairns, PhD; FRCPath, John Cirrito, PhD; Anne Cross, M; Marc Diamond, MD; Anne Fagan Niven, PhD; Christina Gurnett, MD, PhD; Matthew Harms, MD; David Holtzman, MD (department chairman); Mark Jacquin, PhD; Eugene Johnson Jr., PhD; Paul Kotzbauer, MD, PhD; Terrance Kummer, MD, PhD; Jin-Moo Lee, MD, PhD; Mingjie Li, PhD; Timothy Miller, MD, PhD; John Morris, MD; Joel Perlmutter, MD; Alan Pestronk, MD; Steve Petersen, PhD; Laura Piccio, MD, PhD; Anneliese Schaefer, PhD (executive director); Bradley Schlaggar, MD; B. Joy Snider, MD, PhD; Liu-Lin Thio, MD, PhD; Conrad Chris Weihl, MD, PhD; Michael Wong, MD, PhD; Gregory Wu, MD, PhD; Kelvin Yamada, MD

**Cerebrovascular Disease Section:** Jin-Moo Lee, MD, PhD (section head); David Carpenter, MD; Amar Dhand, MD; Andria Ford, MD; Salah Keyrouz, MD; Renee Van Stavern, MD; Allyson Zazulia, MD

**Clinical Neurophysiology Section:** Muhammad Al-Lozi, MD, Edward Hogan, MD (section heads); Mary Bertrand, MD; Anne Connolly, MD; Keith Day, MD, PhD; Stephen Duntley, MD; Lawrence Eisenman, MD, PhD; Christina Gurnett, MD, PhD; Amy Licis, MD; Glenn Lopate, MD; Luigi Maccotta, MD, PhD; Samiya Rashid, DO; Liu Lin Thio, MD, PhD; Judy Weisenberg, MD; Michael Wong, MD, PhD; Kelvin Yamada, MD; John Zempel, MD, PhD

**Pediatric Epilepsy and Sleep Section:** Stephen Duntley, MD (section co-head); Liu Lin Thio, MD, PhD (section co-head); Mary Bertrand, MD; Edwin Dodson, MD; Lawrence Eisenman, MD, PhD; Christina Gurnett, MD, PhD; Jean Holowach-Thurston, MD; Amy Licis, MD; Jay Piccirillo, MD; Simya Rashid, DO; Robin Ryther, MD, PhD; Judy Weisenberg, MD; Michael Wong, MD, PhD; Kelvin Yamada, MD; John Zempel, MD, PhD

**Adult Epilepsy Section:** Edward Hogan, MD; Laurence Eisenman, MD, PhD; Keith Day, MD, PhD; Luigi Maccotta, MD, PhD

**Neuroimaging Section:** Beau Ances, MD; Kevin Black, MD; Maurizio Corbetta, MD; Colin Derdeyn, MD; Francis Miezin, MS; Jeffrey Neil, MD, PhD; Joel Perlmutter, MD; Steven Petersen, PhD; Bradley Schlaggar, MD, PhD; Gordon Shulman, PhD; Tom Videen, PhD; Allyson Zazulia, MD

**Neuroinfectious Disease Section:** David Clifford, MD (section head); Beau Ances, MD

Neurofibromatosis and Neuro-Oncology: David Gutmann, MD, PhD

**Movement Disorders Section:** Joel Perlmutter, MD (section head); Kevin Black, MD; Meghan Campbell, PhD; Susan Criswell, MD; Marc Diamond, MD; Gammon Earhart, PhD; Erin Foster, OTD; Johanna Hartlein, APRN; Tamara Hershey, PhD; Morvarid Karimi, MD; Paul Kotzbauer, MD, PhD; Scott Norris, MD; Brad Racette, MD; Bradley Schlaggar, MD, PhD; Mwiza Ushe, MD; Amy Viehovever, MD, PhD; Allison Willis, MD

**Neuroimmunology Section:** Anne Cross, MD (section head); Becky Parks, MD; Robert Naismith, MD; Laura Piccio, MD, PhD; Gregory Wu, MD

**Neurological Critical Care Section:** Michael Diringer, MD (section head-NNICU); Salah Keyrouz, MD (Medical Director, NNICU); Rajat Dhar, MD; Terrance Kummer, MD; Michael Rubin, MD

**Neuromuscular Diseases Section:** Alan Pestronk, MD (section head); Muhammad Al-Lozi, MD; Robert Bucelli, MD, PhD; Anne Connolly, MD; Julaine Florence, PT, DPT; Paul Golumbek, MD, PhD; Matthew Harms, MD, Glenn Lopate, MD; Timothy Miller, MD, PhD; Brian Sommerville, MD; Arun Varadhachary, MD, PhD; Chris Wehl, MD, PhD; Craig Zaidman, MD

**Sleep Section:** Stephen Duntley, MD (section head); Gabriela de Bruin, MD; Yo-El Ju, MD; Amy Licis, MD; Rachel Darken, MD, PhD; Brendan Lucey, MD; Terri Riutcel, MD; Kelvin Yamada, MD

**General Neurology Section:** General Neurology Section: Sylvia Awadalla, MD (section head); William Landau, MD(Emeritus); Robert Bucelli, MD, PhD; Rachel Darken, MD, PhD; Gabriela de Bruin, MD; Arun Varadhachary, MD, PhD

## MD Courses

First Year

Selectives

### M04 5017 01 CLINICAL CORRELATIONS IN NEUROSCIENCE

Instructor: Allyson Zazulia, MD, 362-2560

Clinical faculty for this selective are members of the following departments or divisions: Neurology, Pediatric Neurology, Neurological Surgery, Neuro ICU, Radiology, Pathology and Immunology, and Psychiatry. Students will shadow physicians, attend rounds and meet for seminars and demonstrations to discuss particular patient cases and research studies. Teaching Objective: to gain exposure to medical career options involving neuroscience.

### M04 582 01 ALZHEIMER'S DISEASE IN THE CLINIC AND THE LAB

Instructors: John C. Morris, MD, and other faculty affiliated with the Knight Alzheimer's Disease Research Center, Department of Neurology. For information, contact Jennifer Phillips at 286-2882 or [phillipsj@abraxas.wustl.edu](mailto:phillipsj@abraxas.wustl.edu)

Alzheimer's disease (AD) affects more than 5 million Americans, and will increase substantially as our population ages. Of the top 10 causes of death in the United States, AD is the only disease without any way to prevent, cure or slow the progression. The cost of caring for AD patients has been estimated at over \$172 billion annually, and the human toll on patients and family members can be devastating. Patients and families turn to primary care and specialist physicians (e.g., neurologists, psychiatrists, geriatricians) for answers to their plight. The good news for physicians is that research on AD is moving at a rapid pace. Exciting advances in our understanding of AD etiology, early diagnosis and treatment are changing the landscape of dementia care.

Students in this course are offered a dynamic and interactive overview of the most exciting areas of AD clinical and science research from one of the top Alzheimer's disease research centers in the world. Find out how amyloid plaques and other AD-related abnormalities form in the brain and new discoveries about

their possible reversal! The course includes lecture and student presentation components, plus opportunities to observe patients and families in an active neurology memory disorder clinic, participate in neuropathology evaluations of demented individuals, experience and administer psychometric evaluation tools and interact with investigators from the fields of molecular genetics, cell biology and neuropathology.

## Second Year

### M35 632 DISEASES OF THE NERVOUS SYSTEM

Instructor: Allyson Zazulia, MD, 362-2560

The goal of this course is to provide an introduction to diseases of the central and peripheral nervous systems, including their clinical manifestations, pathology, pathophysiology and pharmacotherapy. The course includes reading assignments, lectures, laboratories, conferences and clinical presentations.

## Third Year

### M35 720 NEUROLOGY CLERKSHIP

Instructor: Robert Naismith, MD, 362-3998

A full-time, four-week clerkship is provided on the inpatient neurology services at Barnes-Jewish Hospital south. Patients are assigned to students, who evaluate and follow them with the resident staff and discuss them regularly in conferences with the senior neurological staff. Students also work in the neurology clinic under staff supervision and attend a series of lectures on neurosurgical problems. The goal of this rotation is to gain expertise in the evaluation and treatment of patients with neurologic diseases.

Up to two students may elect to obtain their clerkship experience on the neurosurgery service. Up to two students may elect a two-week experience in either inpatient or outpatient pediatric neurology. Students participate in the neurology specialty clinics at St. Louis Children's Hospital, working under the supervision of pediatric neurology fellows and senior staff.

### M25 730 PHYSICAL MEDICINE AND REHABILITATION CLERKSHIP

Instructor: Oksana Volshteyn, MD, 454-7757

The clerkship in PM&R for third-year medical students provides an opportunity to gain basic knowledge and clinical skills in evaluation and management of a wide range of neurological and musculoskeletal diseases and conditions that require specialized rehabilitative medical and therapeutic care. Students spend two weeks on the Spinal Cord Injury Unit (SCI) and two weeks on the Brain Injury (BI) and Stroke Unit at The Rehabilitation Institute of St. Louis. Students are expected to be a part of the rehabilitation team, follow two to three patients, participate in daily morning rounds, participate in performing consults and 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 7-7:30 a.m. to 5 p.m. on weekdays and 8 a.m. to noon 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 the rotation experience.

## Fourth Year

## Electives

### M35 815 CONSULT NEUROLOGY

Instructor(s): Robert Naismith, MD, 362-3998

Location: Barnes-Jewish Hospital including Medical Floors, Surgery Floors, Neuro ICU, and the Emergency Department

Elective Contact: Lorraine Edrington, 362-3998

Other Information: Visiting students will attend Orientation on the on the first day of the elective. Fourth-year Washington University medical students may begin with their team if they are comfortable with the rotation and already went through the course.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The student will evaluate patients with neurological manifestations of medical, surgical, and psychiatric diseases. The student will participate in caring for patients under the supervision of the consult resident and attending physician. The student also will attend weekly clinical conferences, including Neurology Grand Rounds.

Student time distribution: Inpatient 90%, Outpatient 5%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Single attending and resident

Patients seen/weekly: 10-15

On call/weekend responsibility: No call/weekends until noon Saturday

### M35 816 INPATIENT NEUROLOGY SUBINTERNSHIP

Instructor(s): Robert Naismith, MD, 362-3998

Location: 11400 and 11500 Barnes-Jewish Hospital

Elective Contact: Lorraine Edrington, 362-3998

Other Information: Visiting students will attend Orientation on the on the first day of the elective. Fourth-year Washington University medical students may begin with their team if they are comfortable with the rotation and already went through the course.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will function as a subintern on the inpatient neurology service under the supervision of the junior resident, the chief resident, and the attending physicians. The student will also attend weekly clinical conferences. This elective would be a good option for Wash U students who are interested in a career in Neurology, or would like additional Neurology experience before their residency. It would also be good for visiting students interested in Neurology who would like a closer look at our program.

Student time distribution: Inpatient 100%

Major teaching responsibility: Attending physicians, chief residents, junior resident

Patients seen/weekly: 6

On call/weekend responsibility: Every sixth night

### M35 830 NEURO-ONCOLOGY

Instructor(s): David H. Gutmann, MD, PhD, 362-7379

Location: Suite C, Sixth Floor Center for Advanced Medicine

Elective Contact: David H. Gutmann, MD, PhD, 362-7379, [gutmann@neuro.wustl.edu](mailto:gutmann@neuro.wustl.edu)

Other Information: Students should email Dr. Gutmann at least one week prior to the start date of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Provide an outpatient-oriented combined pediatric and adult neuro-oncology experience for fourth year



medical students. (1) Attend multidisciplinary adult and pediatric neuro-oncology clinics and case conferences (tumor boards); (2) Attend adult and pediatric radiation oncology clinics; (3) Attend neuropathology brain tumor review; (4) Participate in subspecialty brain tumor clinics; (5) Attend monthly brain tumor research conferences.

Student time distribution: Outpatient 90%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Team teaching in clinic

Patients seen/weekly: 50 patients

On call/weekend responsibility: None

### M35 851 CLINICAL ASPECTS OF AGING AND DEMENTIA

Instructor(s): John C. Morris, MD, and Joy Snider, MD, PhD, Jennifer Phillips, MPA (coordinator), 286-2882

Location: Knight Alzheimer's Disease Research Center (ADRC) 4488 Forest Park Ave. (two-story brick building at intersection with Taylor)

Elective Contact: Jennifer Phillips, MPA (coordinator), 286-2882, [phillipsj@wustl.edu](mailto:phillipsj@wustl.edu)

Other Information: Jennifer Phillips at least one week prior to first day of elective to set up orientation.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 33, 37 and 41.

This elective focuses on the characterization of the clinical and cognitive features of healthy brain aging and the distinction of dementia from healthy aging. Experienced clinicians will review the differential diagnosis of dementia with the students, including Alzheimer's disease, dementia with Lewy bodies, frontotemporal dementias, cerebrovascular disorders and affective disorders. The student will gain proficiency in interviewing techniques and in the neurologic examination of the geriatric patient, be introduced to neuropsychology, neuropathology, biomarkers, neuroimaging, genetics and other biomedical procedures important in the diagnostic evaluation of older adults. Experience in community assessment and long-term care is provided. Demonstration of clinical trials of experimental agents used in memory disorders and practical aspects of the management of the demented patient and his or her family is provided. An interdisciplinary approach is emphasized and students will have opportunity to interact with physicians, nurse clinicians, psychologists and social workers. Students have the option of becoming certified in the Clinical Dementia Rating, the gold standard in dementia staging.

Student time distribution: Research and Clinical Patient Evaluation 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attending neurologists, psychiatrists and geriatricians involved in the evaluation of memory and aging

Patients seen/weekly: 6-12

On call/weekend responsibility: None

### M35 860 PEDIATRIC NEUROLOGY

Instructor(s): Douglas Larsen, MD, MEd, 454-6042

Location: Twelfth Floor, Suite 1260 Northwest Tower

Elective Contact: Lori Nichols, [nicholsl@neuro.wustl.edu](mailto:nicholsl@neuro.wustl.edu)

Other Information: Students report to Dr. Larsen on the Twelfth Floor, Suite 1260 Northwest Tower, 8:00 a.m. first day of elective for orientation.

Enrollment limit per period: 1 (Inpatient); 1 (Consultation Office Service)

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The senior elective experience in child neurology is designed to adapt to the individual goals and objectives of students. The elective takes place in two two-week blocks that occur among five possible venues as chosen by the student: (1) Outpatient clinics, (2) In-patient ward service, (3) In-patient 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 coursemaster 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. All students choosing a pediatric neurology elective will arrange their specific schedule with the coursemaster beforehand.

Student time distribution: Inpatient rotation 80%, Outpatient rotation 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Inpatient: Single attending and senior resident, Outpatient: Multiple attendings

Patients seen/weekly: Inpatient: 5-9, Outpatient: 20-25

On call/weekend responsibility: None

#### M35 861 NEUROLOGY/NEUROSURGERY ICU

Instructor(s): Michael Diringer, MD, 362-2999

Location: 10400B Barnes-Jewish Hospital

Elective Contact: Liz Vansickle, 362-2999

Other Information: Students report to 10400 ICU, 7:30 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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, and stroke. The student will follow patients, participate in rounds and perform some procedures under supervision. Didactic sessions will be provided as conferences or lectures from the ICU attending.

Student time distribution: Inpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Fellows and residents

Patients seen/weekly: 25

On call/weekend responsibility: Variable

#### M35 865 ADULT AND PEDIATRIC EPILEPSY

Instructor(s): Edward Hogan, MD, 362-3944

Location: 11400 EMU Barnes Jewish Hospital

Elective Contact: Donna Theiss, 362-7845, [theissd@neuro.wustl.edu](mailto:theissd@neuro.wustl.edu)

Other Information: Students should meet on 11400 EMU 9:00 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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.

Student time distribution: Inpatient 70%, Outpatient 10%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attending faculty, fellows

Patients seen/weekly: 40

On call/weekend responsibility: None

### M35 871 CLINICAL NEUROIMMUNOLOGY & MULTIPLE SCLEROSIS

Instructor(s): Becky Parks, MD, [parksb@neuro.wustl.edu](mailto:parksb@neuro.wustl.edu)

Location: Various clinic locations

Elective Contact: Nanette Bladdick, 362-3307

Other Information: Contact Dr. Parks by email to arrange time and location to report on first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 5, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will have the opportunity to interview and examine patients with multiple sclerosis or related neuroimmunological disorders. They will become familiar with the differential diagnosis of MS, appropriate laboratory evaluation and common MRI findings in MS. This elective will also familiarize students with the disease-modifying therapies used to treat MS. They will gain practical knowledge about evaluation and treatment of spasticity, neurogenic bladder, fatigue and other common symptoms.

Third year medical students rotating as part of a core rotation will attend the required conferences for third year students. Students choosing this elective to gain additional experience in the field of Neurology will attend Neurology Grand Rounds on Friday morning. Students may also attend our MS Journal Club and the MS Patient Care conference held on the first and third Thursdays of every month, respectively.

Student time distribution: Inpatient 0%, Outpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Becky Parks, MD

Patients seen/weekly: 30+

On call/weekend responsibility: None

### M35 872 MS CENTER/OUTPATIENT - MISSOURI BAPTIST

Instructor(s): Barry Singer, MD, 314-996-7966

Location: Missouri Baptist Medical Center, 3009 N. Ballas Rd, Building B, Suite 207B, St. Louis, MO 63131

Elective Contact: Barry Singer, MD, 314-996-7966

Other Information: Students meet at 8:00 a.m., Missouri Baptist Medical Center, 3009 N. Ballas Rd, Building B, Suite 207B, St. Louis, MO 63131, first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 5 and 9.

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 two weeks at The MS Center for Innovations in Care at Missouri Baptist Medical Center with Dr. Barry Singer and Dr. Mark Tullman and two weeks at the West Count MS Center

affiliated with Mercy with Dr. Barbara Green and Dr. Amy Rauchway. An additional goal for students will be to understand process of clinical research and translation into approved therapies. Both centers have developed medications that have or will be soon FDA-approved as new therapies for multiple sclerosis.

Student time distribution: Outpatient 100%; Subspecialty Care 100%

Major teaching responsibility: Barry Singer, MD, Barbara Green, MD

Patients seen/weekly: 20

On call/weekend responsibility: None

#### M80 807 PHYSICAL MEDICINE AND REHABILITATION

Instructor(s): Neringa Juknis, MD, 454-7757, [juknisn@neuro.wustl.edu](mailto:juknisn@neuro.wustl.edu)

Location: Suite 2304, Rehabilitation Division, Neurology Department, 4444 Forest Park Avenue

Elective Contact: Donna Barbier, 454-7757, [barbierd@neuro.wustl.edu](mailto:barbierd@neuro.wustl.edu)

Other Information: Students report to Suite 2304, Rehabilitation Division, Neurology Department, 4444 Forest Park Avenue, 9:00 a.m. first day of elective.

Rotation location - The Rehabilitation Institute of St. Louis, 4455 Duncan Ave.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 psychiatry 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.

Student time distribution: Inpatient 80%, Outpatient 10%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attending faculty and residents

Patients seen/weekly: 20

On call/weekend responsibility: None

# Research

(M35 900)

**Beau Ances, MD**, Second Floor Storz, 747-8423. Neuroimaging of Neurodegenerative Disorders. Students can work in a neuroimaging laboratory that is focused on translational discovery of neuroimaging biomarkers for neurodegenerative diseases. The laboratory focuses on the pathogenesis of HIV dementia and Alzheimer's disease. We are investigating the effects of neurodegenerative diseases on brain networks using blood oxygen level dependent imaging and arterial spin labeling. Multiple projects that involve bioengineering, neuroimaging, and infectious disease are available depending on the interest of the student.

**Randall Bateman, MD**, 304 Biotechnology Center, 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. The student will participate in multiple areas of the research including participant consent, enrollment, and admission to a research hospital unit. Lumbar catheter placement and CSF sample collection will be demonstrated. The student will participate in sample analysis including processing for mass spectrometry quantitation, ELISA, and western gel methods. Quantitation, analysis and modeling of the data will be taught in the context of data interpretation and study design.

**Maurizio Corbetta, MD**, 4525 East Building, 362-7620. The elective will provide hands-on experience in using functional neuroimaging (PET and fMRI) to map regions of the human brain responsible for vision and attention, and to study recovery of function in patients with cognitive deficits (aphasia, neglect) and brain injury.

**Anne H. Cross, MD**, Third Floor McMillan, 362-3293. 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 leading to lesions of multiple sclerosis. Depending upon the time commitment of the student, they will either assist with ongoing projects, or be given a laboratory project on which to work, which may involve animal models, cell culture or studies of human samples (CSF, blood, autopsied specimens), depending upon the individual interests. Interested students should contact Dr. Cross in advance before signing up for this research.

**Marc Diamond, MD**, 305 Biotechnology Building, 286-2165. Molecular Mechanisms and Therapeutics for Neurodegenerative Diseases. Students will have the opportunity to work in a basic science laboratory that is focused on translational discovery: identifying therapeutic mechanisms and developing drugs and drug targets for neurodegenerative diseases. The laboratory is focused on pathogenesis of the tauopathies, and of Huntington disease. In the tauopathies, we are testing the hypothesis that propagation of protein misfolding occurs by transfer of protein aggregates between cells in a manner similar to prions. In Huntington disease, we are using advanced biophysical techniques to identify and characterize proteins that interact with and regulate the misfolding of mutant huntingtin. Multiple projects are available that involve biophysics, biochemistry, cell biology, and animal studies, depending on the interest of the student.

**Robert T. Naismith, MD**, 310B McMillan, 747-0432. Clinical Imaging Research in Multiple Sclerosis (eight weeks). The student will learn about neuroimaging, imaging analyses, data collection, data management, and clinical study endpoints in multiple sclerosis (MS). They will observe patient participants undergoing a detailed evaluation of disability measures, such as ambulation, symptom

scales, cognition, vision, upper extremity function, etc. They will witness the entire process of image acquisition, processing, analyses, 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 MS, 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, determine their effects on clinical function, 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.

**Steven E. Petersen, PhD**, 2108 East Building, 362-3319. This lab is interested in the functional localization of higher brain processes, particularly those processes related to language, memory and visual attention. Our main approach to these issues is the use of PET and fMRI activation, but we also study task performance in normal and selected patient populations.

**Joel S. Perlmutter, MD**, Second Floor East Building, 362-6026. Pathophysiology of Movement Disorders. The lab is primarily interested in etiology, pathophysiology and treatment of basal ganglia disorders. We have several studies of PD. We investigate mechanisms of action of deep brain stimulation, 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 quantify motor behavior. We also have an active program developing and validation neuroimaging biomarkers for PD and integrity of the nigrostriatal pathway that includes studies in people and animal models of PD. We have an active program combining a variety of approaches to develop biomarkers and investigate 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 parse out the effects of selective dopaminergic agonists. We also are working to develop MR-based methods including DTI and resting state functional connectivity to investigate brain mechanisms underlying PD and dystonia.

**Brad A. Racette, MD**, Fourth Floor McMillan, 747-0531. Our lab is primarily interested in environmental risk factors associated with Parkinson disease. We use a variety of techniques to study these risk factors, including traditional field epidemiology in which we evaluate workers exposed to metals, neuroimaging where we study the pathophysiology of toxin mediated parkinsonism, geographic information systems research where we associate passive environmental toxin exposures with incident and prevalent Parkinson disease, and neuropathologic studies in manganese exposed workers from South Africa. There are numerous opportunities available for students to be involved with any of these projects. Students will have some clinical exposure as well to familiarize them pertinent clinical syndrome.

**Marcus E. Raichle, MD**, Neuro Imaging Laboratory, Second Floor East Building, 362-6907. In vivo brain hemodynamic, metabolic and functional studies of human cognition and emotion using cyclotron-produced isotopes and emission tomography (PET) as well as functional magnetic resonance imaging (fMRI) in humans. See also Steven E. Petersen, PhD

**B. Joy Snider, MD, PhD**, Biotechnology Building Room 225, 747-2107. Protein degradation and calcium homeostasis in cellular models of neurodegenerative disorders. We study regulation and dysfunction of the ubiquitin-proteasome system in cultured cells, including primary neuronal cultures. A second set of

projects is aimed at elucidating the role of intracellular calcium homeostasis in neuronal dysfunction and death.

**Gregory Wu, MD, PhD**, Third Floor McMillan, 362-3293. Understanding how immune responses are generated that target the central nervous system. Specifically, studies on antigen presentation 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.

**Kel Yamada, MD**, 204 Biotechnology Center, 362-3533, 454-6120. Research on mechanisms modulating synaptic transmission in the central nervous system using electrophysiological techniques in neuronal cell cultures, in brain slices, and in live rodents. Studies are relevant to epilepsy, neonatal brain injury, and stroke.

## Department of Neurology Faculty

**David Michael Holtzman, MD**

Andrew B. and Gretchen P. Jones Professor of Neurology

Head of the Department of Neurology

**Aninda Bhat Acharya, MD**

Instructor in Clinical Neurology

**Muhammad Taher Al-Lozi, MD, MS**

Professor of Neurology

**Denis Ian Altman, MBBCH**

Associate Professor of Clinical Neurology

**Lizette Alvarez-Montero, MD**

Instructor in Clinical Neurology

**Beau Mark Ances, MS, PHD, MD**

Associate Professor of Neurology

**Sylvia Awadalla, MD**

Professor of Neurology

**Robert H Baloh, MD, PHD**

Adjunct Assistant Professor of Neurology

**Randall John Bateman, MD**

Associate Professor of Neurology

Charles F and Joanne Knight Distinguished Professor of Neurology

**M. Carolyn Baum, MA, PHD**

Professor of Neurology (Occupational Therapy)

**Max Prely Benzaquen**

Instructor in Clinical Neurology

**Christine R. Berg, BSOT, MS, PHD**

Assistant Professor of Neurology

**Mary Ellen Bertrand, MD**

Associate Professor of Neurology

**Rebecca L Birkenmeier, MS**

Research Assistant Professor of Neurology

**Alan J Birtwistle**

Assistant Professor of Clinical Neurology

**Joseph T Black, MD**

Professor of Clinical Neurology

**Lynn Bennett Blackburn, MA, PHD**

Assistant Professor of Clinical Neurology

**Marghuretta Dakota Bland, MS, DPT**

Assistant Professor of Neurology

**James Scott Bonner, MD**

Instructor in Clinical Neurology

**David L Brody, MD, PHD**

Associate Professor of Neurology

**Janice E Brunstrom-Hernandez, MD**

Associate Professor of Neurology

**Robert Charles Bucelli, MD, PHD**



Assistant Professor of Neurology

Virginia D Buckles, MS, PHD

Research Professor of Neurology

Michelle A. Burack, PHD, MD

Adjunct Instructor in Neurology

Garrett C Burris, MD

Associate Professor of Clinical Neurology

Nigel John Cairns, PHD

Research Professor of Neurology

David J Callahan, MD

Assistant Professor of Clinical Neurology

Meghan Clark Campbell, PHD

Research Assistant Professor of Neurology

Russell C. Cantrell, MD

Instructor in Clinical Neurology

David A Carpenter, MD

Associate Professor of Neurology

Alexandre Carter, MD, PHD

Assistant Professor of Neurology

John R. Cirrito, PHD

Assistant Professor of Neurology

Billie Ruth Clark, PHD

Associate Professor of Neurology

David B Clifford, MD

Melba and Forest Seay Professor of Clinical Neuropharmacology in Neurology

Anne Maureen Connolly, MD

Professor of Neurology

Lisa Tabor Connor, MA, PHD

Assistant Professor of Neurology

Maurizio Corbetta, MD

Norman J. Stupp Professor of Neurology

Susan R Criswell, MD

Assistant Professor of Neurology

Dorothy Anne Cross, MD

Professor of Neurology

Beth Elaine Crowner, BS PT, MS, M PP, DPT

Associate Professor of Neurology

Nicole Cruz

Instructor in Clinical Neurology

Jeanenne M Dallas, MA

Instructor in Neurology

Rachel S Darken, PHD, MD

Assistant Professor of Neurology

Brian Keith Day, PHD, MD

Instructor in Neurology

Gabriela De Bruin, MD

Assistant Professor of Neurology

Colin Pieter Derdeyn, MD

Professor of Neurology

Susan S. Deusinger, MA, PHD

Professor of Neurology

Amar Dhand, PHD, MD

Assistant Professor of Neurology

Rajat Dhar, MD

Assistant Professor of Neurology

Marc I Diamond, MD

David Clayson Professor of Neurology

Michael N Diringier, MA, MD

Professor of Neurology

Joseph M Dooley Jr, MD

Associate Professor of Clinical Neurology

Nico U. Dosenbach, MD, PHD

Instructor in Neurology

Alexander W Dromerick, MD

Adjunct Associate Professor of Neurology

Ryan Patrick Duncan, MS, DPT

Instructor in Neurology

Gammon Marie Earhart, MS, PHD

Associate Professor of Neurology

Dorothy F Edwards, PHD

Adjunct Associate Professor of Neurology

Lawrence N Eisenman, MD, PHD

Associate Professor of Neurology

Juan Escandon, MD

Assistant Professor of Clinical Neurology

Eugene Evra, MD

Instructor in Clinical Neurology

Yuan Fan, MD, MS, PHD

Assistant Professor of Neurology

Julaine Marie Florence, MS, DPT

Research Professor of Neurology

Andria L Ford, MD

Assistant Professor of Neurology

Bennett David Frank, PHD, MD

Instructor in Clinical Neurology

Robert P. Fucetola, MA, PHD

Associate Professor of Neurology

Rafael Galindo, PHD, MD

Instructor in Neurology

Judith Rebecca Gelber, DPT

Assistant Professor of Neurology

Nupur Ghoshal, PHD, MD

Assistant Professor of Neurology

Alison Goate, PHD

Professor of Neurology

James M Goldring, PHD, MD

Instructor in Clinical Neurology

Paul T Golumbek, MS, PHD, MD

Assistant Professor of Neurology

David B Gray, MS, PHD

Professor of Neurology

Royal Gene Grueneich, PHD

Assistant Professor of Clinical Neurology

Christina A. Gurnett, PHD, MD

Associate Professor of Neurology

David H Gutmann, MS, PHD, MD

Donald O. Schnuck Family Professor of Neurology

Joseph Hanaway, MD

Assistant Professor of Clinical Neurology

**Matthew B Harms, MD**

Assistant Professor of Neurology

**Jason J Hassenstab, B MUS, MS PSYC, PHD**

Assistant Professor of Neurology

**J Michael Hatlelid, MD**

Associate Professor of Clinical Neurology

**Tamara G Hershey, PHD**

Professor of Neurology

**Robert Edward Hogan III, MD**

Associate Professor of Neurology

**Terri L Hosto, BSW, MSW**

Research Instructor in Neurology

**Chung Hsu, MD, PHD**

Adjunct Professor of Neurology

**Theresa Human**

Instructor in Clinical Neurology

**Linda Ann Hunt**

Adjunct Associate Professor of Neurology

**Devyani M. Hunt, MD**

Associate Professor of Neurology

**Thy N Huskey, MD**

Associate Professor of Neurology

**Krzysztof L Hyrc, MS, PHD**

Research Assistant Professor of Neurology

**Jill Christine Isenberg, MS PSYC, PHD**

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Sindhu Saji Jacob, MD

Assistant Professor of Neurology

Mark F Jacquin, PHD

Professor of Neurology

Eugene Malcolm Johnson Jr, PHD

Professor of Neurology

Yo-Ei S Ju, MD

Assistant Professor of Neurology

Neringa Juknis, MD

Assistant Professor of Neurology

Morvarid Karimi, MD

Assistant Professor of Neurology

Richard T. Katz, MA, MD

Professor of Clinical Neurology

Salah G. Keyrouz, MD

Associate Professor of Neurology

Syed Ahmed Khader, MD

Instructor in Clinical Neurology

Albert H Kim, MA, PHD, MD

Assistant Professor of Neurology

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Ashok Kumar, MD

Assistant Professor of Clinical Neurology

Terrance T. Kummer, MD, PHD

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Catherine Eckels Lang, MS, PHD

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Associate Professor of Neurology

Brendan Patrick Lucey, MD

Instructor in Neurology

Luigi Maccotta, MD, PHD

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John F Mantovani, MD

Associate Professor of Clinical Neurology

Soe S Mar, MD

Associate Professor of Neurology

Robert P Margolis, MD

Assistant Professor of Clinical Neurology

John P Metzler, MD

Associate Professor of Neurology

Francis M Miezín, MS

Research Associate Professor of Neurology

Jeffrey D Milbrandt, MD, PHD

Professor of Neurology

Timothy M Miller, MD, PHD

Assistant Professor of Neurology

Pamela F Millsap, BN, MSN

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Kerri A Morgan, MS

Instructor in Neurology

John Carl Morris, MD

Harvey A and Dorismae Hacker Friedman Professor of Neurology

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Assistant Professor of Neurology

Robert T Naismith II, MD

Assistant Professor of Neurology

Anne Fagan Niven, PHD



Research Professor of Neurology

Michael Justin Noetzel, MD

Professor of Neurology

Barbara Jean Norton, MHS, PHD

Professor of Neurology

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Professor of Neurology

Alan Pestronk, MD

Professor of Neurology

Steven E Petersen, PHD

James S McDonnell Professor of Cognitive Neuroscience in Neurology

Daniel Phillips, MD, BE

Assistant Professor of Clinical Neurology

Laura Piccio, MD

Research Assistant Professor of Neurology

Jose A Pineda Soto, MD

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William John Powers, MD

Adjunct Professor of Neurology

Heidi Prather, DOST

Professor of Neurology

Brad Alan Racette, MD

Professor of Neurology

Marcus E Raichle, MD

Professor of Neurology

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Rimma Ruvinskaya, MD

Assistant Professor of Neurology

Robin C Ryther, PHD, MD

Assistant Professor of Neurology

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Bradley L Schlaggar, PHD, MD

A Ernest and Jane G Stein Professor of Neurology

**Earl R Schultz, MD**

Professor of Clinical Neurology

**Jieya Shao, PHD**

Research Instructor in Neurology

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**Gordon L Shulman, MS, PHD**

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**Eli R Shuter, MD**

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**Todd B Silverman**

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**Barry A. Singer**

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**Christopher D Smyser, MD**

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**Barbara Joy Snider, MD, PHD**

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**Abraham Z Snyder, PHD, MD**

Research Associate Professor of Neurology

**Richard Brian Sommerville, MD**

Assistant Professor of Neurology

**Tara V. Spevack, MS, PHD**

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LinLin Tian, PHD

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Norman Edwin Trevathan III, MD, MS

Adjunct Professor of Neurology

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Instructor in Neurology

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Associate Professor of Neurology

Renee Bailey Van Stavern, MD

Associate Professor of Neurology

Arun S. Varadhachary, PHD, MD

Assistant Professor of Neurology

Erin Foster Voegtli, OTD

Assistant Professor of Neurology

Oksana Volshteyn, MD

Professor of Neurology

Andrew M. Wayne, MD

Instructor in Clinical Neurology

Ling Wei, MD

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Michael Wong, MD, PHD

Associate Professor of Neurology

Thomas A Woolsey, MD

Professor of Experimental Neurology

George H and Ethel R Bishop Scholar in Neuroscience in Neurology

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Assistant Professor of Neurology

Chengjie Xiong, MS, PHD

Professor of Neurology

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Professor of Neurology

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John M Zempel, PHD, MD

Associate Professor of Neurology

Lirong Zhu, MD, PHD

Instructor in Clinical Neurology

## Department of Obstetrics and Gynecology

The [Department of Obstetrics and Gynecology](#) has clinical teaching services located at Barnes-Jewish Hospital and Missouri Baptist Medical Center under the following director:

**George A. Macones, MD, MSCE, 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

David G. Mutch, MD

### **Maternal-Fetal Medicine**

George A. Macones, MD, MSCE

### **Reproductive Endocrinology and Infertility**

Randall R. Odem, MD

### **General Obstetrics and Gynecology**

Eric Strand, MD

### **Uro-Gynecology**

L. Lewis Wall, MD, PhD

### **Research**

Kelle H. Moley, MD (Basic Research), Jeffrey F. Peipert, MD, PhD (Clinical Research)

## **Ob/Gyn Residency Program Director**

Jeffrey F. Peipert, MD, PhD

Instruction in obstetrics and gynecology is provided during all four years of the medical curriculum, beginning with an introductory course in the first year as a component of Clinical Medicine. Teaching in the second year is designed to correlate basic science with the physiologic basis of normal pregnancy and parturition, reproductive biology, infertility and reproductive endocrinology and gynecologic malignancies. 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. In the fourth year, students may elect a subinternship in the listed clinical subspecialties or a research elective.

## MD Courses

### First Year

As a component of the course in Clinical Medicine offered by the Department of Medicine, the student is introduced to the essentials in the medical history and examination for the gynecological evaluation of the adult woman patient.

### Second Year

Second-year students are introduced to obstetrics and gynecology with lectures in reproductive biology that apply and expand upon pelvic anatomy and gynecologic and obstetric physiologic principles taught in the first year.

#### M45 635B OBSTETRICS AND GYNECOLOGY

Instructor: D. Michael Nelson, MD, PhD, 362-1016

The obstetrical component of this course emphasizes the physiologic basis of normal pregnancy, parturition, labor and delivery, and adaptations of other organ systems to pregnancy. Pathophysiology of pregnancy, pregnancy complications and deviations from normal labor will also be introduced. The gynecologic component of the course reviews embryology and genetics of practical use for clinicians. This provides a foundation to overview adolescent gynecology, amenorrhea, abnormal uterine bleeding, reproductive endocrinology, infertility, menopause, surgical anatomy, and diagnosis and treatment of gynecologic neoplasm.

### Third Year

#### M45 730 OB/GYN CLERKSHIP

Clerkship Director: Tammy Sonn, MD

Clerkship Coordinator: Trish Werner, 362-3126

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 in the ED or off-service floors seeing consults. Faculty, fellows, residents, and nurse practitioners provide teaching for this

rotation. Student-directed didactics include the faculty and chief resident lecture series, surgical skills session and faculty-assigned preceptor groups that meet throughout their six-week rotation.

## Fourth Year

Fourth-year students wishing to take an externship or research elective can choose from a variety of courses.

### Electives

#### M45 804 OB/GYN OUTPATIENT CARE SUBINTERNSHIP

Instructor(s): Laura A. Parks, MD, [parksla@wudosis.wustl.edu](mailto:parksla@wudosis.wustl.edu), 362-1016

Location: Room 308, Maternity Hospital, Barnes-Jewish Hospital, South Campus

Elective Contact: Patti Sasse, 362-1016

Other Information: Students should contact Patti Sasse one to two weeks before rotation for instructions of start time/location for first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 sub-intern will spend one to three half days weekly participating in outpatient surgery under the supervision of attendings and house staff, and five to six additional half days in clinic and private offices. Overnight OB call will be selected over a weekend to acquaint the student with the house staff and hospital, providing opportunity to participate in deliveries. A 30-45 minute presentation to attendings and house staff will culminate the rotation on a selected OB/GYN topic.

Student time distribution: Outpatient 100%; Primary Care 100%

Major teaching responsibility: Attending staff

Patients seen/weekly: 5-20/day

On call/weekend responsibility: See above description

#### M45 810 OB/GYN ENDOCRINOLOGY-INFERTILITY SUBINTERNSHIP

Instructor(s): Randall Odem, MD; Amber Cooper, MD; Emily Jungheim, MD; Sarah Keller, MD; Kelle Moley, MD; and Valerie Ratts, MD, 314-286-2421

Location: 4444 Forest Park Ave., Suite 3100

Elective Contact: Randall Odem, MD, [odemr@wustl.edu](mailto:odemr@wustl.edu)

Other Information: Students report to Dr. Odem first day of elective. Please email Dr. Odem the prior week.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The subintern will participate (in the office and hospital) in the study and treatment of women with reproductive endocrine disorders and infertility. S/he 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.

Student time distribution: Inpatient 10%, Outpatient 75%, Conferences/ Lectures 15%; Primary Care 10%, Subspecialty Care 90%

Major teaching responsibility: Attendings, fellows, and resident

Patients seen/weekly: 75

On call/weekend responsibility: None



#### M45 830 GYN ONCOLOGY SUBINTERNSHIP

Instructor(s): David Mutch, MD, 362-3181

Location: Maternity Hospital, Barnes- Jewish Hospital, South Campus

Elective Contact: David Mutch, MD, 362-3181

Other Information: Students report to Dr. Mutch, Fourth Floor Maternity Hospital, 9 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

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. S/he 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 project in gynecologic malignancy are also available.

Student time distribution: Inpatient 70%, Outpatient 20%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings, fellows, and residents

Patients seen/weekly: 40

On call/weekend responsibility: Weekend rounds

#### M45 840 MATERNAL-FETAL MEDICINE SUBINTERNSHIP

Instructor(s): David Stamilio, MD, 747-0739

Location: Maternity Hospital, Barnes-Jewish Hospital, South Campus

Elective Contact: Nicole Doumbe and David Stamilio, MD, 747-0739

Other Information: Students report to Antepartum Service (ward 5300), 7:30 a.m. first Monday of elective. If the first day is a holiday, call ahead to Dr. Stamilio for instructions.

Enrollment limit per period: 1, unless cleared by course master.

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Sub-interns will participate in the antepartum and intrapartum management of high-risk hospitalized patients. There is limited interaction with outpatients through the High-Risk Obstetrics Clinics and the Center for Diabetes in Pregnancy. Examples include diabetes, hypertension, renal disease, hematologic abnormalities, preterm labor, and others. Antepartum evaluation and monitoring of the pregnant woman and her fetus are emphasized. Supervision is by the antepartum chief resident and a maternal-fetal medicine faculty member and fellow. An opportunity for intense labor and delivery experience with the Night Team is also encouraged. Students will spend time observing diagnostic obstetric ultrasound examinations. The student will prepare a brief talk on a topic of his/her interest during the course of the rotation.

Student time distribution: Inpatient 80%, Outpatient 15%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: Inpatient: 20; Outpatient: 5

On call/weekend responsibility: Overnight/weekend call optional, student self-scheduled

#### M45 843 MATERNAL-FETAL MED OUTPATIENT CARE SUB-I

Instructor(s): David Stamilio, MD, 747-0739

Location: Fifth Floor, Center for Advanced Medicine, OB/GYN office

Elective Contact: Nicole Doumbe and David Stamilio, MD, 747-0739

Other Information: Students report to the Fifth Floor, Center for Advanced Medicine, OB/GYN office, 8:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41

Students will see a variety of high risk obstetrical patients in the out patient setting. 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. Students will spend some time with geneticists, and experience counseling of a variety of genetic conditions. In addition they will spend time on the ultrasound unit observing numerous high resolution scans. The student will be responsible for one presentation to be given to the OB teams at the end of the rotation. Students are provided independent study time to put together the presentation which should be in power point and on a topic of their choice, inspired by a patient-related clinical conditioned that peaked 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 in-patient obstetrics. This is voluntary and not a requisite.

Student time distribution: Inpatient 5%, Outpatient 85%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Maternal-Fetal Medicine Attendings and fellows

Patients seen/weekly: 40

On call/weekend responsibility: Not required, overnight call available to enhance experience

#### M45 856 OB/GYN ULTRASOUND - GENETICS

Instructor(s): Jeffrey Dicke, MD, 454-8135

Location: The Women's Health Center, Fifth Floor, Center for Advanced Medicine and The Center for Women's Wellness, Fourth Floor, Building D, Missouri Baptist Medical Center

Elective Contact: Jeffrey Dicke, MD, 454-8135

Other Information: Students should contact Dr. Dicke one week prior to first day of elective.

Enrollment limit per period: 1

Valid start weeks for two-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, and 43.

Working with the attending physicians in the Ultrasound Units at the Center for Advanced Medicine 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.

Student time distribution: Outpatient 90%, Conferences/Lectures 10%; Primary Care 30%, Subspecialty Care 70%

Major teaching responsibility: The attendings of the ultrasound section

Patients seen/weekly: 40

On call/weekend responsibility: None

#### M65 833 SPECIAL TOPICS IN REPRODUCTIVE HEALTH

Instructor(s): Tessa Madden, MD, 747-6495

Location: Division of Clinical Research, 4533 Clayton Ave., Second Floor

Elective Contact: Tessa Madden, MD, 747-6495

Other Information: Students should contact Dr. Madden a week prior to the beginning of the rotation, email [maddent@wustl.edu](mailto:maddent@wustl.edu)

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 17, 21, 29, 33, 37, and 41

Students will attend a variety of outpatient clinics to interact with patients seeking different reproductive health services. These clinics include family planning and abortion services at Planned Parenthood, the County STD clinic, Adolescent and Pediatric Gynecology, Child Sexual Abuse, Teen OB clinic, the Contraceptive CHOICE Clinic, and outpatient gynecology clinics at the Center for Advanced Medicine. Clinical experiences will be ambulatory. Conferences include weekly Obstetrics and Gynecology Grand Rounds, weekly Family Planning Meeting and monthly Family Planning Journal Club. Reading will include relevant articles and chapters. Students will be responsible for a brief presentation on a reproductive health topic at the conclusion of the course. Opportunities for clinical research in contraception are also available.

Student time distribution: Outpatient 100%; Primary Care 30%, Subspecialty Care 70%

Major teaching responsibility: Attendings

Patients seen/weekly: Varies

On call/weekend responsibility: None

### M10 823 OBSTETRICAL ANESTHESIA

Instructor(s): Swarup Varaday, MD, 362-6252

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Swarup Varaday, MD, 362-6252 or 362-2628

Other Information: Students should report to 5400 Labor and Delivery, 7:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for two- or four-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, and 43.

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).

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attending, Senior Resident

Patients seen/weekly: 20

On call/weekend responsibility: None (optional)

## Research

(M45 900)

**Jenifer E. Allsworth, PhD, Jeffrey F. Peipert, MD, PhD, Gina M. Secura, PhD**, 4533 Clayton Ave., 747-6434. Reproductive Epidemiology. In this four-week elective, students will have the opportunity to immerse themselves in an epidemiologic study examining an obstetric or gynecologic outcome. Dr. Allsworth's research focuses on risk factors for the acquisition of sexually transmitted infections and how social factors, including race/ethnicity, poverty, discrimination and violence impact women's reproductive health. Dr. Peipert's research focuses on family planning, long-acting reversible contraception, sexually transmitted infections and the promotion of dual contraceptive use. Dr. Secura's research focuses on HIV and STD risk among young men and women and contraception among women. The Division has many

ongoing clinical research studies for potential collaboration, include the Contraceptive CHOICE Project. The CHOICE Project is a prospective cohort study of 10,000 women in the St. Louis region that is seeking to reduce unintended pregnancy rates in the region through the promotion of long-acting reversible contraception as well as describe method related satisfaction, compliance and continuation rates for long and short acting methods. This rotation is designed for the student planning a career in academic medicine as a physician scientist and one who is interested in considering pursuing clinical research. Prior to signing up for this course, the student must contact Dr. Allsworth to discuss the schedule and expectations of the rotation.

**Kelle H. Moley, MD, Sarah England, PhD, Indira Mysorekar, PhD, and Joan Riley, PhD**, Tenth Floor BJCIH building, 287-1775. In this six-week elective, students will have the opportunity to immerse themselves in bench research in reproductive science. The four PI's willing to take students are Drs. Kelle Moley, Joan Riley, Sarah England and Indira Mysorekar. Dr. Moley's research focuses on mammalian gametes, fertilization, preimplantation development and implantation. Dr. Riley's research centers around the immunoregulatory processes of mammalian fetomaternal interaction and ovarian biology. 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 pathogenesis of a common infectious disease in women, namely recurrent urinary tract infections (UTIs) and investigation of potential infectious etiology for preterm birth in pregnant women. 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 planning a career in academic medicine as a physician scientist and one who is interested in considering reproductive science as a field. Prior to signing up for this course, the student must contact Dr. Moley to discuss the schedule and expectations of the rotation.

## Department of Obstetrics and Gynecology Faculty

**George Andrew Macones, MD, MS**

Mitchell and Elaine Yanow Professor of Obstetrics and Gynecology

Head of the Department of Obstetrics and Gynecology

**John K Appelbaum, MD**

Assistant Professor of Clinical Obstetrics and Gynecology

**Tomas Ismael Aquino**

Assistant Professor of Clinical Obstetrics and Gynecology

**Sangeeta Kaur Babar, MD**

Instructor in Clinical Obstetrics and Gynecology

Margaret Elizabeth Baum, MD

Instructor in Clinical Obstetrics and Gynecology

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Assistant Professor of Obstetrics and Gynecology

Jeffrey D Bloss

Adjunct Associate Professor of Obstetrics and Gynecology

Irving Boime, MS, PHD

Professor of Reproductive Biology in Obstetrics and Gynecology

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Instructor in Clinical Obstetrics and Gynecology

Lawrence V Boveri, MD

Instructor in Clinical Obstetrics and Gynecology

Jessica Naomi Bowers

Instructor in Clinical Obstetrics and Gynecology

Igor Brondz, MD

Instructor in Clinical Obstetrics and Gynecology

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Assistant Professor of Obstetrics and Gynecology

**Arthur L Casey, MD**

Instructor in Clinical Obstetrics and Gynecology

**Michael B Chen**

Assistant Professor of Clinical Obstetrics and Gynecology

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**Vicente M Colon-Alcaraz, MD**

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**Amber Russell Cooper, MD**

Assistant Professor of Obstetrics and Gynecology

**James P Crane, MD**

Professor of Obstetrics and Gynecology

**Robert D Crist**

Instructor in Clinical Obstetrics and Gynecology

**Veronica Lynn Cross**

Instructor in Clinical Obstetrics and Gynecology

**David T Curiel, MD, PHD**

Professor of Obstetrics and Gynecology

**Michelle R Devera, MD**

Instructor in Clinical Obstetrics and Gynecology

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Darryl Thomas Zinck

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## Department of Ophthalmology and Visual Sciences

Instruction begins in the first year with examination of the eye and a lecture on various aspects of ocular disease. During the second year, all students receive (via email) the “Ophthalmology Case Studies,” and these cases are reviewed in a “lecture/feedback” session. During the third year, students are given the opportunity during the surgery block to spend four weeks on the ophthalmology services. In addition, during the third year there are lectures given to students during the Internal Medicine rotations. All students work on Washington University’s “Case Studies for Medical Students.” The emphasis is on ocular manifestations of common systemic diseases, ocular trauma and common eye diseases such as cataract and glaucoma. In the fourth year, a four-week clinical rotation is tailored to students interested in pursuing ophthalmology as a career. Also, research electives are available under the guidance of numerous different ophthalmology faculty members for fourth year students.

## MD Courses

### First Year

Introduction to clinical ophthalmology begins in the first year with a lecture and practicum (peer exam) on taking an ocular history and performing an ocular exam. Emphasis is on ophthalmoscopy. Lectures and practicum session will be led by Dr. Collin McClelland and Dr. Morton Smith.

## Second Year

During the second year, all students receive (via e-mail) the “Ophthalmology Case Studies.” All students must review each case in preparation for the “lecture/feedback” session with Dr. Morton Smith and/or Dr. Collin McClelland in a large-group format. Students will be called on (at random) for their answers to each case.

## Third Year

### Third-Year Clerkship Opportunities

In 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 student rotators include the use of the slit lamp and indirect ophthalmoscopy. All third-year students must complete the “Case Studies in Ophthalmology for Medical Students” and attend the periodic “feedback/oral exam” session with Dr. Morton Smith and/or Dr. Collin McClelland.

### Third Year/Fourth Year

Ophthalmology Sub-Internship Rotation. During the month of June prior to fourth year, students interested in pursuing a career in ophthalmology are encouraged to rotate on this intensive four week rotation. Students will have personal indirect ophthalmoscopy lenses available for use on the rotation. Formal didactics and workshops will be used to teach students how to perform a detailed ophthalmic history and exam including mastery of advanced slit lamp techniques and indirect funduscopy. 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. By the end of the rotation, students will be expected to function at the level of a first year ophthalmology resident.

## Fourth Year

### Electives

M50 801 OPHTHALMOLOGY

Instructor(s): Collin M. McClelland, MD, [mcclellandc@vision.wustl.edu](mailto:mcclellandc@vision.wustl.edu)

Morton E. Smith, MD, 747-5559 or 362-5722

Location: McMillan Hospital, Room 114, Barnes-Jewish Hospital, South Campus

Elective Contact: Mary Hitt, 362-5722

Other Information: All students interested in this senior elective must meet with Dr. Collin McClelland or Dr. Morton Smith in March of year WUMS III.

Enrollment limit per period: 8

Valid start weeks are: June 3, 2013 through June 28, 2013

This elective is for senior students who plan to apply for a residency in ophthalmology. The student rotates through the general 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. pediatric ophthalmology clinic at St. Louis Children's Hospital, neuro-ophthalmology service, cornea/external disease service, etc.) The student's responsibilities progress from observation (including observing surgery) to complete eye exam with presentation of patients to the director of that particular service.

Several cases must be presented to Dr. Collin McClelland or Dr. Morton Smith. The student must also work on the "Case Studies in Ophthalmology for Medical Students" and present the answers to these cases in the form of an oral exam administered by Dr. Collin McClelland or Dr. Morton Smith. The students must attend all conferences as well as Grand Rounds, Wednesday Night Seminar for residents, and spend one night a week (until 11 p.m.) with the ophthalmology resident on call for emergencies. 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 Dr. Collin McClelland or Dr. Morton Smith in March of year WUMS III. The final grade of the student is determined by the narrative input from the director of the particular service(s) through which the student rotated, plus the case presentations, plus the oral quiz on the "Case Studies" book. The grades at Washington University are Honors, High Pass, Pass, Fail.

Student time distribution: Inpatient 5%, Outpatient 80%, Conferences/ Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: Attendings, fellows and residents

Patients seen/weekly: At least 25, usually more

On call/weekend responsibility: One night per week (until 11:00 p.m.)

## Research

(M50 900)

**Usha P. Andley, PhD**, 1114-C McMillan, 362-7167. Crystallins and lens cell biology. Crystallins play an essential refractive role and maintain lens transparency. However, the role of the molecular chaperone alpha-crystallin in normal lens function and cataract formation remains enigmatic. Recently, Dr. Andley's laboratory has shown that aA or aB-crystallin expression protects cells from death in vivo and in vitro. Mutations in these proteins are the basis of several inherited cataracts. Using genetic approaches, the laboratory is now focusing on understanding how mutations in aA and aB crystallin alter lens cell function in vivo. Biochemical and cell biological approaches including confocal microscopy, immunoprecipitation, and immunofluorescence analysis are being used to study substrates that interact with alpha-crystallin in vivo leading to cataract.

**Steven Bassnett, PhD**, 1114 McMillan, 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.

**David C. Beebe, PhD**, 101C McMillan, 362-1621. My laboratory works with Drs. Holekamp, Siegfried, Huang and Arthur to identify mechanisms responsible for age-related cataracts, open angle glaucoma and corneal decompensation. Our data implicates oxygen toxicity as the major cause of the most common type of age-related cataracts and suggest that age-related degeneration of the vitreous body exposes the lens to higher levels of oxygen. We also found that oxygen levels in the anterior chamber angle are associated with three major risk factors for developing open angle glaucoma: African heritage, corneal thickness and previous vitrectomy. Our recent studies suggest that corneal oxygen consumption is decreased in patients with corneal decompensation (keratopathy). One or two projects are available to confirm and extend these observations.

**Anjali Bhorade, MD**, 362-5343. Differences in Intraocular Pressure Measured in the Clinic and Home in

**Glaucoma Patients:** Intraocular pressure (IOP) measurements obtained in the clinic are a key element in assessing and managing glaucoma. It is plausible that IOP measured in the clinic may not accurately reflect IOP measured in the homes of glaucoma patients. Objectives: (1) To compare IOP measured in the clinic and home in patients with glaucoma. (2) To identify factors associated with differences in IOP measured in the clinic and home.

**Visual Function in Glaucoma Patients:** There is relatively little known on how visual impairment at different stages of glaucoma affects visual function and quality of life of glaucoma patients. This NIH-funded pilot study uses a comprehensive assessment of clinical, functional, and self-reported questionnaires in the clinic and home to characterize the impact of glaucoma on a person's visual function and quality of life. Objectives (1) To better understand how glaucoma affects visual function and daily life in older adults. (2) To determine the stage of glaucoma, if predictable, at which visual impairment begins.

**Shiming Chen, PhD**, 618 McMillan, 747-4350. Molecular basis of retinal specific gene expression and hereditary retinal degeneration. This elective is for students who are interested in gaining research experience in molecular vision and retinal diseases. The research will mainly focus on transcription factors that are expressed in the retinal photoreceptor cells and required for the normal development of photoreceptor function and/or linked to photoreceptor degenerative diseases. Students will learn basic molecular and biochemical approaches commonly used for: (1) studying interactions between photoreceptor transcription factors and their target genes, (2) functional analysis of mutated factors carrying genetically identified mutations as a tool to find phenotype and genotype correlations, and (3) how to apply the above knowledge to develop early diagnosis and therapeutic interventions for the photoreceptor diseases. Both hands-on experience and experimental design skills will be covered during the course. A small project will be assigned to each student. By the end of the course, each student will give an oral presentation on the progress of the project in a lab meeting and/or a departmental seminar setting.

**Susan M. Culican, MD, PhD**, 1104 McMillan, 362-9278. Projects focus mainly on two areas: regulation of appropriate connections between retinal ganglion cells in the eye and their target nuclei in the brain during development and the role of E3 ubiquitin ligases in retinal ganglion cell neuroprotection. (1) Developmental Neurobiology. (2) Synaptic plasticity. (3) Neuroprotection.

**Thomas A. Ferguson, PhD**, 1207 McMillan, 362-3745. Cellular and molecular regulation of the ocular immune response. Immunological basis of age-related macular degeneration (AMD).

**Mae Gordon, PhD**, 1125 Old Shriners, 362-3716. (1) Multicenter randomized clinical trial to determine if medical treatment of ocular hypertension prevents or delays glaucomatous optic nerve damage. (2) Quality-of-life assessment. (3) Multicenter epidemiological study of keratoconus.

**Didier Hodzic, PhD**, 620 McMillan, 362-7037. Linker of the Nucleoskeleton to the Cytoskeleton (LINC complexes) are macromolecular assemblies that span the nuclear envelope of mammalian cells and physically connect the nuclear lamina to different cytoskeletal elements such as actin and plectin. LINC complexes assemble through the interaction between evolutionary-conserved domains of Sun proteins and Nesprins, two families of inner and outer nuclear membrane proteins, respectively. In lower organisms, the expression of these proteins is essential for nuclear migration and anchorage. Using in vitro and in vivo models where LINC complexes are disrupted, we are studying the mechanisms of nuclear migration and anchorage in single cell assays as well as their relevance to retinogenesis, CNS development and skeletal muscle biology.

**Andrew Huang, MD, MPH**, 106 McMillan Building, 362-0403. Clinical research elective: corneal

dystrophies, lamellar keratoplasty and ocular surface squamous neoplasia.

**Vladimir Kefalov, PhD**, 625 McMillan, 362-4376. Our lab is interested in the mechanisms that determine the functional properties of mammalian rod and cone photoreceptors. We use a battery of tools, from single-cell and isolated retina recordings, to live electroretinogram and behavior experiments with wild type and genetically modified mice. While the emphasis of our studies is on our daytime photoreceptors, the cones, we are also investigating some aspects of rod phototransduction. Some of the ongoing projects in the lab are: (1) Mechanisms that allow cones to restore their visual pigment rapidly after exposure to light. This research is funded by an RO1 grant from the National Eye Institute; (2) Mechanisms that allow cones to adapt and remain functional in a wide range of light intensities This research is funded by an R21 grant from the National Eye Institute; (3) Pharmacological treatment of retinal disease. This multi-PI project is funded by an R24 grant from the National Eye Institute. In addition to the studies listed above, we are also involved in a number of collaborative projects investigating various aspects of rod and cone phototransduction.

Peter Lukasiewicz, PhD, 1003C McMillan, 362-4284. Neurobiology of the healthy and diseased vertebrate retina.

**John R. Pruett, Jr., MD, PhD**, 1153K East Building, 747-6769. Visual Systems and Cognitive Neuroscience Studies of Autism. Two active areas of research in my lab include: (1) behavioral and imaging studies of visual attention to and processing of eyes and faces in autistic and non-autistic subjects, and (2) developmental studies of large-scale brain networks in autistic and non-autistic subjects using functional connectivity magnetic resonance imaging (fcMRI). Example research rotation projects might include: pilot visual psychophysical studies of intermediate visual processes supporting face perception, or - for trainees with computational and/or imaging skills and interests - graph theory-based analyses of visual system sub-network structure across various groups in fcMRI data we have acquired from on-going projects.

**Alan Shiels, PhD**, 1128 McMillan, 362-1637, shiels@vision.wustl.edu. Molecular genetics of cataract and associated eye disorders: genome-wide mapping, targeted sequencing, functional expression studies in mouse models.

**Larry Tychsen, MD**, 2S89 Eye Clinic, St. Louis Children's Hospital, 454-6026. Pediatric Ophthalmology. My clinical work focuses on three topics: (1) Surgical repair of vision in children with ocular and brain damage, including prematurity, cerebral palsy, Down syndrome and autism (2) Refractive surgery (excimer laser and intraocular implants) for children who have major difficulties wearing eyeglasses or contact lenses (3) Eye muscle surgery for children and adults who have crossed eyes (strabismus) and eye movement abnormalities (e.g. nystagmus). I am principal investigator on NIH-funded studies of visual brain maldevelopment and repair in infant primates, as well as clinical studies of visuomotor abnormalities in cerebral palsy and pediatric refractive surgery.

**David E. Vollman, MD, MBA**, 294-2102. Age-related Macular Degeneration is associated with significant personal and monetary costs. In conjunction with Susan Culican, we have developed a cheap, easily accessible, computer-based vision task that can distinguish patients with and without macular disease based on performance. The goal of this study is to establish to what degree our task can detect macular disease in older adults to determine whether it will be useful as a vision screening tool in a community-based geriatric population to identify patients who would benefit from referral to an ophthalmologist for diagnosis and treatment.

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Kurt W Finklang, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Frank Donald Fontana, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Bruce S Frank, MD

Assistant Professor of Clinical Ophthalmology and Visual Sciences

Carrie S Gaines, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Lawrence A Gans, MD

Assistant Professor of Clinical Ophthalmology and Visual Sciences

Stephen M Garnett, OD

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N. Rex Ghormley, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Jeffrey M. Gidday, PHD

Associate Professor of Ophthalmology and Visual Sciences

Mae Etsuko Gordon, MS, PHD

Professor of Ophthalmology and Visual Sciences

James M Gordon, MD

Assistant Professor of Clinical Ophthalmology and Visual Sciences

Mark Gilbert Grand, MD

Professor of Clinical Ophthalmology and Visual Sciences

Kenneth O Green, MD

Assistant Professor of Clinical Ophthalmology and Visual Sciences

Martha Grace Green, MD

Instructor in Ophthalmology and Visual Sciences

Kevin William Greulich, MD

Instructor in Ophthalmology and Visual Sciences

Steven J Grondalski, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Daniel John Hammer, MD

Instructor in Ophthalmology and Visual Sciences (Pending Dean's Approval)

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Charles R Harris

Instructor in Clinical Ophthalmology and Visual Sciences

Alexander D Harris, MA, OD

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Jack Hartstein, MD

Professor of Clinical Ophthalmology and Visual Sciences

William L Herbold, OD

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Didier Hodzic, PHD

Assistant Professor of Ophthalmology and Visual Sciences

Nancy Melberg Holekamp, MD

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Augustine Richard Hong

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Douglas Lee Huff, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Michael J Isserman, MD

Assistant Professor of Clinical Ophthalmology and Visual Sciences

Jeffrey H Jacob, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Sharon Leslie Jick

Instructor in Clinical Ophthalmology and Visual Sciences

Daniel Paul Joseph, PHD, MD

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Stephen A Kamenetzky, MD

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Humeyra Karacal, MD

Assistant Professor of Ophthalmology and Visual Sciences

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Professor Emeritus of Clinical Ophthalmology and Visual Sciences

Vladimir Jivkov Kefalov, PHD

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Deborah Lynn Kerber, OD

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Sangeeta Khanna

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William F Kiefer Jr, OD

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Mark Alan Kleindorfer, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Vivian Marie Kloke, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Harry L Knopf, MD

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Ronald Joseph Knox, OD

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Michael S Korenfeld, MD

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Michael J Lachtrup, OD

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Robert Louis Lamberg, MD

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Steven F Lee, MD

Instructor in Clinical Ophthalmology and Visual Sciences

Scott W Lewis, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

James Walter Lieber, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

John T Lind, MS, MD

Assistant Professor of Ophthalmology and Visual Sciences

**Anthony J Lubniewski, MD**

Professor of Ophthalmology and Visual Sciences

**Gregg T Lueder, MD**

Professor of Ophthalmology and Visual Sciences

**Peter David Lukasiewicz, PHD**

Professor of Ophthalmology and Visual Sciences

**Lisa Marie Mackey, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Ranjan P Malhotra, MD**

Instructor in Clinical Ophthalmology and Visual Sciences

**Collin Matthew McClelland, MD**

Assistant Professor of Ophthalmology and Visual Sciences

**Mary Kay Migneco, OD**

Instructor in Ophthalmology and Visual Sciences

**Barry David Milder, MD**

Associate Professor of Clinical Ophthalmology and Visual Sciences

**Duane L Mitzel, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Eugene James Mobley, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Robert L Mobley, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Robert F Munsch, MD**

Instructor in Clinical Ophthalmology and Visual Sciences

**Raymond I Myers, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

Randall Earl Nacke

Instructor in Clinical Ophthalmology and Visual Sciences

Matthew Newman, MD

Assistant Professor of Clinical Ophthalmology and Visual Sciences

Paul F Nichols III, MD

Assistant Professor of Clinical Ophthalmology and Visual Sciences

Judith Mosinger Ogilvie, MA, PHD

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Jeffrey Robert Padousis, MD

Instructor in Clinical Ophthalmology and Visual Science

Anjali K Pathak, MD

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Monica S Perlmutter, BSOT, MA, OTD

Asst Prof of Ophthalmology and Visual Sciences

John Craig Perlmutter, MD

Associate Professor of Clinical Ophthalmology and Visual Sciences

Mujtaba A Qazi

Instructor in Clinical Ophthalmology and Visual Sciences

Rithwick Rajagopal, MD

Assistant Professor of Ophthalmology and Visual Sciences

Mark S Rallo, OD

Instructor in Ophthalmology and Visual Sciences

Prabakar Kumar Rao, MD

Associate Professor of Ophthalmology and Visual Sciences

V. Nathan Ravi, MS, PHD, MD

Professor of Ophthalmology and Visual Sciences

**Michael Dennis Rohde, OD**

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**Louis J Rosenbaum, MD**

Associate Professor of Clinical Ophthalmology and Visual Sciences

**Mark A Rothstein, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Michael B Rumelt, MD**

Assistant Professor Emeritus of Clinical Ophthalmology and Visual Sciences

**Scott Geoffrey Sagett**

Instructor in Clinical Ophthalmology and Visual Sciences

**Frederick W Schwagger, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Christopher G Seep, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**David Brian Seibel, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Gaurav Kirit Shah, MD**

Professor of Clinical Ophthalmology and Visual Sciences

**James Banks Shepherd III, MD**

Associate Professor of Ophthalmology and Visual Sciences

**Priya Saigal Shetty, MD**

Instructor in Clinical Ophthalmology and Visual Sciences

**Arsham Sheybani, MD**

Instructor in Ophthalmology and Visual Sciences

**Steven M Shields, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences



Alan Shiels, PHD

Professor of Ophthalmology and Visual Sciences

Howard Newton Short, MD

Instructor in Clinical Ophthalmology and Visual Sciences

Carla J Siegfried, MD

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Morton Edward Smith, MD

Professor Emeritus of Ophthalmology and Visual Sciences

Lecturer in Ophthalmology and Visual Sciences

Bradley Thomas Smith, MD

Instructor in Clinical Ophthalmology and Visual Sciences

Claud Randall Snowden, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Craig H Sorce, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Florentina Soto Lucas, PHD

Research Assistant Professor of Ophthalmology and Visual Sciences

Mark H Spurrier, MD

Instructor in Clinical Ophthalmology and Visual Sciences

James F Strieter, OD, MBA

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Brian Patrick Sumner, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Kenneth V Swanson

Instructor in Clinical Ophthalmology and Visual Sciences

Paul M Tesser, PHD, MD

Assistant Professor of Clinical Ophthalmology and Visual Sciences

Matthew A Thomas, MD

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Linda Mei-Lin Tsai, MD

Associate Professor of Ophthalmology and Visual Sciences

Robert Lawrence Tychsen, MD

Professor of Ophthalmology and Visual Sciences

John F. Hardesty M.D. Distinguished Professor of Ophthalmology and Visual Sciences

Gregory Paul Van Stavern, MD

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Gary Lee Vogel, OD

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David Edward Vollman, MD

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James J Wachter, OD

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Donald E Walter Jr, OD

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Stephen R Waltman, MBA, MD

Professor of Clinical Ophthalmology and Visual Sciences

Stephen Alan Wexler, MD

Professor of Clinical Ophthalmology and Visual Sciences

Richard Harris Wieder, MD

Assistant Professor of Ophthalmology and Visual Sciences

Michael L Wolf, OD

Adjunct Instructor in Ophthalmology and Visual Sciences

Ming-Fong Agnes Wong, MD, PHD

Adjunct Professor of Ophthalmology and Visual

## Department of Orthopaedic Surgery

Orthopaedic surgery is a discipline of surgery that is concerned with the axial and appendicular skeleton and its related structures. There are various subspecialties or subdivisions including fractures, arthritides, soft tissue processes, tumors, metabolic conditions, congenital and acquired conditions. A medical student rotation exposes one to various aspects of Orthopaedic surgery. This rotation should provide a variety of experiences ranging from operative, office and clinical practice and emergency room experience.

## MD Courses

### Third Year

#### THE MUSCULOSKELETAL CLERKSHIP: A PART OF THE COMPREHENSIVE SURGICAL CLERKSHIP

The objective of this rotation is to convey to the student appropriate knowledge, skills and attitudes for the recognition, diagnosis, investigation and treatment of conditions affecting the musculoskeletal system.

Most students at Washington University School of Medicine are not entering specialties that devote themselves to the treatment of diseases of the musculoskeletal system. It is noteworthy, though, that greater than one-third of complaints directed toward primary caregivers and general internists are related to the musculoskeletal system: the actual volume of these complaints presented to primary care physicians, general internists and pediatricians is second only to complaints related to the cardiovascular system (and for pediatricians, presentations related to infectious diseases).

Musculoskeletal signs and symptoms are encountered commonly in emergency medicine, trauma surgery, internal medicine, oncology, neurology, pediatrics and endocrinology as well as many other surgical and medical specialties. Since students who enter postgraduate training in these subspecialties as well as in general primary care will be required to evaluate, diagnose and treat these conditions, it is important for the undergraduate curriculum to have these topics addressed in an organized and consistent way. It is for this reason that we developed a comprehensive integrated exposure to musculoskeletal surgery and medicine during the third-year comprehensive surgical clerkship. This is a key component of the integrated third-year curriculum.

To accomplish these goals, there will be a balance between clinical, operative, emergency room and didactic (lecture and small group) experiences. Didactic sessions will be in several formats: lectures, physical examination demonstrations and small group discussions. Only instructor or assistant-

associate- or professor-level members of the full-time Washington University School of Medicine staff will deliver formal lectures to the students. Lecturers will be from the following specialties: Orthopaedic Surgery, Sports Medicine, and Physical Medicine and Rehabilitation (Physiatry) for balance and content expertise.

The following lecture topics will be scheduled monthly:

- 1) Spinal Disorders
- 2) Musculoskeletal Emergencies
- 3) Common Fractures
- 4) Bone and Mineral Physiology
- 5) Electrophysiology
- 6) Pediatric and Adolescent Sports Medicine
- 7) Adult Sports Injuries
- 8) Cancer

The clinical experience is one month in duration, and takes place during the comprehensive surgical clerkship for all Washington University medical students during either the first, second or third months of the 12-week clerkship. The one-month block is divided into two two-week sessions wherein the students would spend time with staff from the following specialties: orthopaedic surgery, rheumatology, physical medicine and rehabilitation, sports medicine, neurosurgery, bone and mineral physiology, foot & ankle and trauma.

The experience can be combined inpatient and outpatient, clinic and operating room, emergent and non-emergent care as well as both surgical and nonsurgical, based upon the student's own choosing. However, to ensure an appropriately balanced experience, students will usually be limited to specific rotation combinations from which to choose, such as those below:

- Hand/Joint Reconstruction (2 weeks/2 weeks)
- Shoulder and Elbow/Orthopaedic Oncology (2 weeks/2 weeks)
- Physical Medicine and Rehabilitation/Spine (2 weeks/2 weeks)
- Pediatric Orthopaedic Surgery/Sports Medicine or Sports Surgery (2 weeks/2 weeks)
- VA Orthopaedic Service/Rheumatology Bone and Mineral (2 weeks/2 weeks)
- Trauma (4 weeks)
- Foot and Ankle (2 weeks/2weeks)

The following Washington University School of Medicine full-time attending staff mentors are available to have students rotate with them during the rotation:

- 1) Martin Boyer (Hand)
- 2) Charles Goldfarb (Hand)
- 3) Ryan Calfee (Hand)
- 4) Daniel Osei (Hand)
- 5) Lindley Wall (Hand)
- 6) Matthew Matava (Sports)
- 7) Mark Halstead (Sports)
- 8) Robert Brophy (Sports)
- 9) Matt Smith (Sports)
- 10) Heidi Prather and Devyani Hunt (Physical Medicine and Rehabilitation)
- 11) John Metzler and Adam Labore (Physical Medicine and Rehabilitation)
- 12) Eric Gordon (Pediatric Orthopaedic Surgery)
- 13) Kate Keeler (Pediatric Orthopaedic Surgery)

- 14) Gary Miller (VA Orthopaedic Surgery Service)
- 15) James Keeney (Joint Reconstruction)
- 16) Ryan Nunley (Joint Reconstruction)
- 17) Richard Brasington and Kathy Diemer (Rheumatology Bone and Mineral)
- 18) Jacob Buchowski (Spine)
- 19) Paul Santiago (Neurosurgery Spine)
- 20) Douglas McDonald (Orthopaedic Oncology)
- 21) Leesa Galatz (Shoulder and Elbow)
- 22) Jay Keener (Shoulder and Elbow)
- 23) Jeremy McCormick (Foot and Ankle)
- 24) Sandra Klein (Foot and Ankle)
- 25) William Ricci (Trauma)
- 26) Mike Gardner (Trauma)
- 27) Chris McAndrew (Trauma)

There should only be ONE student per attending staff in order to promote one-on-one teaching; however, exceptions can be made in the event of vacations, illness, conference travel, etc. on the part of the attending staff.

The learning of physical examination skills by the students is a critical part of the musculoskeletal block. The coursemaster and other attendings will meet weekly with the students to demonstrate physical examination of the neck and spine, shoulder and elbow, hip and knee, and the hand and foot. The normal examination will be covered, and relevant common conditions and provocative tests will be covered as well.

## Fourth Year

### Electives

#### M95 838 PEDIATRIC ORTHOPAEDIC SPINE & SPORTS SURGERY

Instructor(s): Scott J. Luhmann, MD, 454-2045

Location: Washington University/St. Louis Children's Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Clinical elective available for four weeks during which time the student will work with 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. In addition to general pediatric orthopaedics, Dr. Luhmann has special interests in the treatment of pediatric spinal injuries and disorders as well as pediatric sports medicine. Attendance at and participation in the weekly pediatric orthopaedic conference activities required.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies ? generally one weekend call every two weeks

#### M95 839 ORTHOPAEDIC SPORTS MEDICINE

Instructor(s): Matthew Smith, MD, 514-3584

Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This clinical elective is available for four weeks during which the student participates in orthopaedic conferences, outpatient clinics, surgical cases, and patient rounds on the Sports Medicine service.

Student time distribution: Inpatient 5%, Outpatient 90%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attending and fellow/resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies ? generally one weekend call every two weeks

#### M95 840A ORTHOPAEDIC SURGERY - FOOT/ANKLE

Instructor(s): Jeremy J. McCormick, MD, 514-3584

Location: Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This four week clinical elective is available to medical students looking to further their knowledge/experience in orthopaedics, 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 non-operative care.

Student time distribution: Inpatient 20%, Outpatient 75%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings and fellow/resident mentors

Patients seen/weekly: 80

On call/weekend responsibility: Varies?generally one weekend call every two weeks

#### M95 842A ORTHOPAEDIC SHOULDER/ELBOW SURGERY

Instructor(s): Ken Yamaguchi, MD, 747-2534

Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 orthopaedic conferences, and dissection of upper-extremity anatomical specimens.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings and resident mentors  
Patients seen/weekly: Varies  
On call/weekend responsibility: Varies?generally one weekend call every two weeks

#### M95 842B ORTHOPAEDIC SHOULDER/ELBOW SURGERY

Instructor(s): Leesa Galatz, MD, 747-2813  
Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield  
Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)  
Other Information: Students should contact Kathy Jones prior to the first day of the elective.  
Enrollment limit per period: 1  
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.  
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 orthopaedic conferences, and dissection of upper-extremity anatomical specimens.  
Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%  
Major teaching responsibility: Faculty attendings and resident mentors  
Patients seen/weekly: Varies  
On call/weekend responsibility: Varies, generally one weekend call every two weeks

#### M95 842C ORTHOPAEDIC SHOULDER/ELBOW SURGERY

Instructor(s): Jay D. Keener, MD, 747-2639  
Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield  
Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)  
Other Information: Students should contact Kathy Jones prior to the first day of the elective.  
Enrollment limit per period: 1  
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.  
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 orthopaedic conferences, and dissection of upper-extremity anatomical specimens.  
Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%  
Major teaching responsibility: Faculty attendings and resident mentors  
Patients seen/weekly: Varies  
On call/weekend responsibility: Varies, generally one weekend call every two weeks.

#### M95 845A ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY

Instructor(s): Ryan P. Calfee, MD, 747-2813  
Location: Washington University/Barnes-Jewish Hospital; Shriners Hospital for Children; and St. Louis Children's Hospital; Washington University Orthopedics - Chesterfield  
Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)  
Other Information: Washington University/ Barnes-Jewish Hospital; Shriners Hospital for Children; and St. Louis Children's Hospital; Washington University Orthopedics - Chesterfield

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 traumatic, sports (arthroscopy), nerve, and degenerative disease.

Activities will include participation in outpatient procedures, attendance at faculty clinic office hours, and attendance at orthopaedic conferences.

Student time distribution: Inpatient 5%, Outpatient 85%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings, fellow and resident mentors

Patients seen/weekly: 70+

On call/weekend responsibility: Varies, generally one weekend call every two weeks

#### M95 845B ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY

Instructor(s): Charles Goldfarb, MD, 747-4705

Location: Washington University/Barnes-Jewish Hospital; Shriners Hospital for Children; and St. Louis Children's Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 orthopaedic conferences, and dissection of upper-extremity anatomical specimens.

Student time distribution: Inpatient 5%, Outpatient 85%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings, fellow and resident mentors

Patients seen/weekly: 100+

On call/weekend responsibility: Varies, generally one weekend call every two weeks

#### M95 845C ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY

Instructor(s): Richard H. Gelberman, MD, 747-2531

Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Clinical elective available, during which time the student will work with attending surgeon 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 orthopaedic conferences, and dissection of upper-extremity anatomical specimens.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Richard Gelberman, M.D.



Patients seen/weekly: Varies

On call/weekend responsibility: Varies, generally one weekend call every two weeks

#### M95 846A ORTHOPAEDIC TRAUMA

Instructor(s): William Ricci, MD, Michael Gardner, MD, Christopher McAndrew, MD, 747-2811

Location: Washington University/Barnes-Jewish Hospital

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Clinical elective available for a four-week period, during which time the student will work in orthopaedic trauma at Barnes-Jewish Hospital. The student will work with a team of attendings, residents, PA's, and NP's to provide care for orthopaedic trauma patients. Activities include participation in the care of hospitalized inpatients, inpatient surgical procedures, outpatient office visits and daily conferences.

Student time distribution: Inpatient 60%, Outpatient 35%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings and resident mentor

Patients seen/weekly: Varies

On call/weekend responsibility: Varies?generally one weekend call every two weeks

#### M95 846B ORTHOPAEDIC TRAUMA

Instructor(s): Michael Gardner, MD, 747-2523

Location: Washington University/Barnes-Jewish Hospital

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Clinical elective available for a four-week period, during which time the student will work in orthopaedic trauma at Barnes-Jewish Hospital. The student will work with a team of attendings, residents, PA's, and NP's to provide care for orthopaedic trauma patients. Activities include participation in the care of hospitalized inpatients, inpatient surgical procedures, outpatient office visits and daily conferences.

Student time distribution: Inpatient 60%, Outpatient 35%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies, generally one weekend call every two weeks

#### M95 846C ORTHOPAEDIC TRAUMA

Instructor(s): Christopher McAndrew, MD, 747-2523

Location: Washington University/Barnes-Jewish Hospital

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Clinical elective available for a four-week period, during which time the student will work in orthopaedic trauma at Barnes-Jewish Hospital. The student will work with a team of attendings, residents, PA's, and NP's to provide care for orthopaedic trauma patients. Activities include participation in the care of hospitalized inpatients, inpatient surgical procedures, outpatient office visits and daily conferences.

Student time distribution: Inpatient 60%, Outpatient 35%, Conferences/ Lectures 5%; Subspecialty Care

100%

Major teaching responsibility: Faculty attendings and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies?generally one weekend call every two weeks

#### M95 848A ORTHOPAEDIC

##### PEDIATRIC SURGERY

Instructor(s): Eric Gordon, MD, 454-2045

Location: Washington University/St. Louis Children's Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Clinical elective available for four weeks during which time the student will work with 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 orthopaedic conference activities required.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies, generally one weekend call every two weeks

#### M95 848B ORTHOPAEDIC PEDIATRIC SURGERY

Instructor(s): Kathryn Keeler, MD, 747-2523

Location: Washington University/St. Louis Children's Hospital, Barnes-Jewish Hospital

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Clinical elective available for four weeks during which time the student will work with 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 orthopaedic conference activities required.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies, generally one weekend call every two weeks

#### M95 849B ORTHOPAEDIC SPINE SURGERY IN ADULT PATIENTS

Instructor(s): Jacob Buchowski, MD, MS, 747-4950

Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 orthopaedic 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.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attending, spine fellow assigned to this service and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies, generally one weekend call every two weeks.

#### M95 855A RECONSTRUCTIVE and JOINT PRESERVATION SURGERY

Instructor(s): Robert L. Barrack, MD, 747-2562

Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 orthopaedic educational conferences and anatomy sessions.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings, fellow and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies, generally one weekend call every two weeks

#### M95 855B RECONSTRUCTIVE and JOINT PRESERVATION SURGERY

Instructor(s): John C. Clohisy, MD, 747-2566

Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 orthopaedic educational conferences and anatomy sessions.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings, fellow and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: On call one weekend every two weeks

#### M95 855C RECONSTRUCTIVE and JOINT PRESERVATION SURGERY

Instructor(s): Ryan M. Nunley, MD, 747-2523

Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 orthopaedic educational conferences and anatomy sessions.

Student time distribution: Surgical 60%, Clinics 30%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings, fellow and resident mentors

Patients seen/weekly: 40-60 patients in clinic, 8-12 surgeries

On call/weekend responsibility: On call one weekend every two weeks

#### M95 855D RECONSTRUCTIVE and JOINT PRESERVATION SURGERY

Instructor(s): James Keeney, MD, 747-2523

Location: James Keeney, MD, 747-2523

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 patients with basic and complex reconstruction concerns affecting the hip and knee. Students will be exposed to conventional approaches to hip and knee reconstruction surgery, minimally invasive total knee replacement, and revision surgery of the hip and knee. Students will participate in inpatient and outpatient procedures, attend designated office hours, and participate in orthopaedic educational conferences and anatomy sessions.

Student time distribution: Inpatient 55%, Outpatient 40%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings, fellow and resident mentors

Patients seen/weekly: 60 outpatients, 10-15 inpatient surgical cases. Some variance.

On call/weekend responsibility: On call one weekend every two weeks

#### M95 859 ORTHOPAEDIC ONCOLOGY

Instructor(s): Douglas J. McDonald, MD, 747-2563

Location: Washington University/Barnes-Jewish Hospital

Elective Contact: Kathy Jones, 747-2813, [jones.k@wustl.edu](mailto:jones.k@wustl.edu)

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This clinical elective, centered primarily at Barnes-Jewish Hospital, is available for four weeks during which the student participates in orthopaedic conferences, outpatient clinics, surgical cases, and patient

rounds on the Musculoskeletal Oncology service.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Douglas J. McDonald, M.D.

Patients seen/weekly: Varies

On call/weekend responsibility: Varies, generally one weekend call every two weeks

M95 8991 ORTHOPAEDIC SURGERY EXTERNSHIP (Visiting Students Only)

Instructor(s): Martin I. Boyer, MD, and Rick Wright, MD

Location: Washington University/Barnes-Jewish Hospital; Washington University Orthopedics - Chesterfield

Elective Contact: Orthopaedics Education Office, 747-2835, [orthosurg@wudosis.wustl.edu](mailto:orthosurg@wudosis.wustl.edu)

Other Information: Students meet in the Education Office, 8:00 a.m. first day of the elective.

Enrollment limit per period: Varies

June 4, 2012 through November 30, 2012

Students rotate on Orthopaedic Services for two- or four-week blocks. Students typically participate in two weeks of hand and upper extremity surgery with Dr. Martin Boyer and two weeks of sports medicine with Dr. Rick Wright. Two weeks on another clinical rotation may also be selected. Please contact the Orthopaedics Education Coordinator, Michelle Tuetken, for further information. E-mail address: [tuetken@wustl.edu](mailto:tuetken@wustl.edu).

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Faculty attendings and resident mentors

Patients seen/weekly: Varies

On call/weekend responsibility: Varies, generally one weekend call every two weeks

## Research

(M95 900)

Various orthopaedic surgery research opportunities are available with the following faculty attendings. If interested, please contact the Education Office at 747-2543, [orthosurg@wudosis.wustl.edu](mailto:orthosurg@wudosis.wustl.edu) or contact the faculty member directly.

Yousef Abu-Amer, PhD

Robert L. Barrack, MD

Jacob M. Buchowski, MD, MS

John Clohisy, MD

Matthew Dobbs, MD

Leesa Galatz, MD

Richard H. Gelberman, MD

Charles A. Goldfarb, MD

J. Eric Gordon, MD

Scott J. Luhmann, MD

Matthew J. Matava, MD

Linda Sandell, PhD

Perry Schoenecker, MD

Matt Silva, PhD

Stavros Thomopoulos, PhD

Rick Wright, MD

Ken Yamaguchi, MD

## Department of Orthopaedic Surgery Faculty

**Richard H Gelberman, MD**

Fred C Reynolds Professor of Orthopaedic Surgery

Head of the Department of Orthopaedic Surgery

**Yousef Abu-Amer, MS, PHD**

Professor of Orthopaedic Surgery

**Robert L Barrack, MD**

Charles F and Joanne Knight Distinguished Professor of Orthopaedic Surgery

**Donald R Bassman, MD**

Instructor in Clinical Orthopaedic Surgery

**Martin I Boyer, MD, MS**

Carol B and Jerome T Loeb Professor of Orthopaedic Surgery

**Keith Happ Bridwell, MD**

J Albert Key Distinguished Professor of Orthopaedic Surgery

**Robert Henry Brophy IV, MS, MD**

Associate Professor of Orthopaedic Surgery

**Jacob M Buchowski, MS, MD**

Associate Professor of Orthopaedic Surgery

**Cheryl Ann Caldwell, MHS, DPT**

Associate Professor of Orthopaedic Surgery

**Ryan Patrick Calfee, MD**

Assistant Professor of Orthopaedic Surgery

**Aaron Mark Chamberlain, B MUS, MD**

Assistant Professor of Orthopaedic Surgery

**Roberto Civitelli, MD**

Professor of Orthopaedic Surgery

**John C Clohisy, MD**

Daniel C. and Betty B. Viehmann Distinguished Professor of Orthopaedic Surgery

**Suzanne Marie Cornbleet, MA, DPT**

Associate Professor of Orthopaedic Surgery

**Sylvia Lin Czuppon, MS, DPT**

Assistant Professor of Orthopaedic Surgery

**Matthew Barrett Dobbs, MD**

Professor of Orthopaedic Surgery

**Robert Kelso Duddy**

Instructor in Clinical Orthopaedic Surgery

**Joy L English, MD**

Assistant Professor of Orthopaedic Surgery (Pending Executive Faculty Approval)

**Jack R. Engsborg, MS, MS1, PHD**

Professor of Orthopaedic Surgery

**Roberta Faccio, PHD**

Associate Professor of Orthopaedic Surgery

**Leesa Galatz, MD**

Associate Professor of Orthopaedic Surgery

Michael J Gardner, MD

Associate Professor of Orthopaedic Surgery

Louis Arnold Gilula, MD

Professor of Orthopaedic Surgery

Charles A Goldfarb, MD

Associate Professor of Orthopaedic Surgery

J. Eric Gordon, MD

Professor of Orthopaedic Surgery

Christina A. Gurnett, PHD, MD

Associate Professor of Orthopaedic Surgery

Mark E. Halstead, MD

Assistant Professor of Orthopaedic Surgery

Mary Kent Hastings, MS, DPT

Associate Professor of Orthopaedic Surgery

Marcie Harris Hayes, MS, DPT

Associate Professor of Orthopaedic Surgery

Damon Joseph Louis Hays, MD

Instructor in Clinical Orthopaedic Surgery

Gregory William Holtzman, MS, DPT

Associate Professor of Orthopaedic Surgery

Devyani M. Hunt, MD

Associate Professor of Orthopaedic Surgery

Renee A. Ivens, MHS, DPT

Associate Professor of Orthopaedic Surgery

Jeffrey E Johnson, MD

Professor of Orthopaedic Surgery

Jay Donovan Keener, MD



Assistant Professor of Orthopaedic Surgery

James A Keeney, MD

Assistant Professor of Orthopaedic Surgery

Michael Patrick Kelly, MD

Assistant Professor of Orthopaedic Surgery

Lynnette C Khoo-Summers, MS, DPT

Assistant Professor of Orthopaedic Surgery

Sandra E. Klein, BE, MD

Assistant Professor of Orthopaedic Surgery

Robert S Kramer, MD

Instructor in Clinical Orthopaedic Surgery

Adam J. LaBore, MD

Associate Professor of Orthopaedic Surgery

Robert Craig Lander, MD

Instructor in Clinical Orthopaedic Surgery

Ronald A Lehman Jr, MD

Professor of Orthopaedic Surgery

Lawrence G Lenke, MD

Jerome J. Gilden M.D. Distinguished Professor of Orthopaedic Surgery

Fanxin Long, MA, PHD

Professor of Orthopaedic Surgery

Scott J Luhmann, MD

Associate Professor of Orthopaedic Surgery

Matthew J Matava, MD

Professor of Orthopaedic Surgery

Audrey McAlinden, PHD

Assistant Professor of Orthopaedic Surgery

Christopher M McAndrew, MD

Assistant Professor of Orthopaedic Surgery

Jeremy James McCormick, MD

Assistant Professor of Orthopaedic Surgery

Douglas J. McDonald, MD

Professor of Orthopaedic Surgery

Mary Kate McDonnell, MHS, DPT

Associate Professor of Orthopaedic Surgery

Debra Ann McDonnell, MS, AS, DPT

Associate Professor of Orthopaedic Surgery

Patricia Navarro McGee

Instructor in Orthopaedic Surgery

John P Metzler, MD

Associate Professor of Orthopaedic Surgery

Gary Arthur Miller, MD

Associate Professor of Orthopaedic Surgery

Denis Nam, MD

Assistant Professor of Orthopaedic Surgery (Pending Executive Faculty Approval)

Ryan M. Nunley, MD

Assistant Professor of Orthopaedic Surgery

Margaret Mary Oakley, MD

Instructor in Clinical Orthopaedic Surgery

Daniel Akwasi Osei, MD

Assistant Professor of Orthopaedic Surgery

Debabrata Patra, PHD, MS

Research Assistant Professor of Orthopaedic Surgery

Terrence L Piper, MD

Assistant Professor of Clinical Orthopaedic Surgery

Heidi Prather, DOST

Professor of Orthopaedic Surgery

Muhammad Farooq Rai, PHD

Research Instructor in Orthopaedic Surgery

Wilson Z Ray, MD

Assistant Professor of Orthopaedic Surgery

William M Ricci, MD

Professor of Orthopaedic Surgery

K. Daniel Riew, MD

Mildred B. Simon Distinguished Professor of Orthopaedic Surgery

Linda J Sandell, MS, PHD

Mildred B Simon Research Professor of Orthopaedic Surgery

Paul Santiago, MD

Associate Professor of Orthopaedic Surgery

Perry Lee Schoenecker, MD

Professor of Orthopaedic Surgery

John Joseph Sheridan, MD

Instructor in Clinical Orthopaedic Surgery

Matthew J Silva, ME, PHD

Professor of Orthopaedic Surgery

Julia and Walter R. Peterson Research Professor of Orthopaedic Surgery

Nancy Bloom Smith, MS, DPT

Associate Professor of Orthopaedic Surgery

Matthew Vernon Smith, MD

Assistant Professor of Orthopaedic Surgery

James W Strickland, MD

Visiting Professor of Orthopaedic Surgery

Chi-Tsai Tang, MD

Assistant Professor of Orthopaedic Surgery

Simon Tang, MS, PHD

Assistant Professor of Orthopaedic Surgery

Stavros Thomopoulos, MS, MS1, PHD

Associate Professor of Orthopaedic Surgery

Stacy Lynne Tylka, MS, DPT

Assistant Professor of Orthopaedic Surgery

Linda R Van Dillen, MS, PHD

Professor of Orthopaedic Surgery

Harry John Visser, MD

Instructor in Clinical Orthopaedic Surgery

Lindley Bevelle Wall, MD

Assistant Professor of Orthopaedic Surgery

Pamela M. Wendl, MS, DPT

Assistant Professor of Orthopaedic Surgery

Rick Wayne Wright, MD

Asa C. & Dorothy W. Jones Distinguished Professor

Neill Marshall Wright, MD

Associate Professor of Orthopaedic Surgery

Ken Yamaguchi, MS, MD

Sam and Marilyn Fox Distinguished Professor of Orthopaedic Surgery

Lukas P Zebala, MD

Assistant Professor of Orthopaedic Surgery

# Department of Otolaryngology

Otolaryngology is presented to students in the first-, second-, third- and fourth-year classes. Physical diagnosis skills are taught in the first year. Clinically oriented lectures and a physical diagnosis workshop are presented to second-year students. In the third year of the medical curriculum, four-week elective rotations on one of the services in East Pavilion, the St. Louis VA Medical Center — John Cochran Division or St. Louis Children's Hospital are offered. During this period, there is teaching at the bedside, in the operating room and in the clinic, supplemented by daily afternoon lectures, Grand Rounds on Wednesdays and an introduction to audiology.

Fourth-year students interested in ENT as a specialty may take a two- to four-week elective designed to give them exposure to patient care, both in the outpatient clinic and the operating room and postoperative setting. An additional four-week elective that provides comprehensive ambulatory experience is offered to students headed for primary care.

## 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 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.

## MD Courses

### First Year

#### OTOLARYNGOLOGY CLINICAL SKILLS

Instructor: Jason Rich, MD, 362-0365

Introductory lecture and group sessions pertaining to the complete head and neck examination. After the one-hour lecture, students will be divided into small groups to learn the otoscopic, nasal, oral cavity and neck examination to be proctored by physicians from the ENT department.

## Second Year

### M55 660B CLINICAL TOPICS IN OTOLARYNGOLOGY

Instructor: Brian Nussenbaum, MD, 362-6599

This course consists of eight introductory lectures on common diseases of the head and neck, including head and neck carcinoma, hearing loss, vertigo, neck masses, pediatric otolaryngology, salivary gland disorders, sinusitis, otolaryngologic emergencies and facial fractures. 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.

## Fourth Year

### Electives

#### M55 801 OTOLARYNGOLOGY

Instructor(s): Joel Goebel, MD, FACS, 747-0553

Location: 9916 McMillan

Elective Contact: Maria Harrington, 747-0553

Other Information: Students considering a career in otolaryngology should speak to Dr. Goebel prior to scheduling this elective. Prior to first day of elective student should contact Dr. Goebel to discuss options of elective and to ascertain starting time and location.

Enrollment limit per period: Limit 3/period for Weeks: 1, 5; Limit 2/period for Weeks: 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 also includes time on the Pediatric ENT Service, Audiology, Voice Laboratory, and Vestibular Evaluation Laboratory. Option of rotation on the ENT Service at VAMC is available.

Student time distribution: Inpatient 40%, Outpatient 40%, Conferences/Lectures 20%; Primary Care 20%, Subspecialty Care 80%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 50

On call/weekend responsibility: Every fourth day

#### M55 802 GENERAL OTOLARYNGOLOGY

Instructor(s): Joel Goebel, MD, FACS, 747-0553

Location: 9916 McMillan

Elective Contact: Maria Harrington, 747-0553

Other Information: Students considering a career in otolaryngology should speak to Dr. Goebel prior to scheduling this elective. Prior to first day of elective student should contact Dr. Goebel to discuss options of elective and to ascertain starting time and location.

Enrollment limit per period: 1

Valid start weeks for two-week blocks are: Weeks 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, and 43.

This two-week elective is an extremely flexible program consisting of several options:

General Ear, Nose and Throat Service: Student functions as a junior resident at either Barnes-Jewish Hospital or John Cochran VA Medical Center. At Barnes-Jewish Hospital participation in clinic, hospital inpatient, and operating room settings would expose student to a broad spectrum of patients. At the VA Hospital the emphasis would be on head and neck tumors.

Head and Neck Service-Barnes-Jewish Hospital: Student functions as junior resident on ENT hospital

floor with great deal of exposure to head and neck surgery.

Pediatric Otolaryngology-St. Louis Children's Hospital: Student participates as a junior resident, involved in pre- and postoperative surgical care as well as outpatient medical care.

Preceptorships: Student is assigned to a private practitioner's office functioning in his/her office as well as hospital service.

Other options can be entertained and formulated according to the student's particular needs. Students participating in this elective will be required to spend an afternoon or morning in the Audiology/Vestibular Laboratory learning fundamentals of audiological and vestibular evaluation. Attendance at Monday afternoon conferences as well as Grand Rounds on Wednesday mornings is expected.

Student time distribution: Inpatient 20%, Outpatient 70%, Conferences/Lectures 10%; Primary Care 40%, Subspecialty Care 60%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 60

On call/weekend responsibility: None

#### M55 803 PEDIATRIC OTOLARYNGOLOGY

Instructor(s): David W. Molter, MD, 454-2136

Location: 3S35 St. Louis Children's Hospital

Elective Contact: Patty Tampow, 454-2136

Other Information: Students should report to 3S35, St. Louis Children's Hospital, 8:30 a.m. first day of elective.

Enrollment limit per period: 2

This course is offered as either a two- or four- week duration.

Valid start weeks for two- or four-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

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.

Student time distribution: Inpatient 50%, Outpatient 40%, Conferences/ Lectures 10%; Primary Care 30%, Subspecialty care 70%

Major teaching responsibility: Attending physician and residents

Patients seen/weekly: 100

On call/weekend responsibility: At student's discretion

#### M55 820 PRACTICUM IN ADULT CLINICAL AUDIOLOGY

Instructor(s): Michael Valente, PhD, 362-7489

Location: Eleventh Floor, Center for Advanced Medicine (CAM)

Elective Contact: Michael Valente, PhD, 362-7489

Other Information: Students should contact Dr. Valente to schedule this elective.

Enrollment limit per period: 8

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Guidance provided in the administration and interpretation of audiometric tests. Emphasis on defining the severity of auditory dysfunction in addition to identifying sites of pathological processes. Theoretical bases of acoustics, anatomy and physiology, and electronics reviewed as they relate to auditory assessment. Modification of conventional test paradigms and hearing aid procedures covered according to each student's interests and needs.

Student time distribution: Inpatient 10%, Outpatient 80%, Conferences/ Lectures 10%; Primary Care 50%, Subspecialty Care 50%

Major teaching responsibility: Audiology staff

Patients seen/weekly: 120

On call/weekend responsibility: None

#### M55 831 NEUROTOLOGY

Instructor(s): Joel Goebel, MD, FACS, 747-0553

Location: 9th Floor McMillan

Elective Contact: Maria Harrington, 747-0553

Other Information: Students should contact Dr. Goebel if interested in this elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Active student participation in the physical exam, advanced testing, and management of patients with balance dysfunction. Attend patient clinic two days a week and test patients on ENG, rotary chair, and computerized platform three days a week. Research participation welcome with prior arrangements.

Student time distribution: Outpatient 80%, Conferences/Lectures 20%; Primary Care 10%, Subspecialty Care 90%

Major teaching responsibility: Attending

Patients seen/weekly: 40

On call/weekend responsibility: None

#### M55 833 AMBULATORY OTOLARYNGOLOGY FOR THE PRIMARY CARE PHYSICIAN

Instructor(s): Joel Goebel, MD, FACS, 747-0553

Location: Barnes-Jewish Hospital and St. Louis Children's Hospital clinics

Elective Contact: Maria Harrington, 747-0553

Other Information: Students should contact Maria Harrington, 9906 McMillan, 747-0553, prior to the start of this elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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.

Student time distribution: Outpatient 100%; Primary Care 50%, Subspecialty Care 50%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: >100

On call/weekend responsibility: None

## Research

(M55 900)

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.



**Pablo M Blazquez, PhD**, 4566 Scott Avenue, East McDonnell Science Building, 362-1013. Role of the vestibulo-cerebellum and its target nuclei in eye movement control and spatial orientation. We used a range of methodologies: single and multiunit recordings, electrical brain stimulation, computational methods, pharmacology and behavioral studies. Our main lines of research are: 1-Signal transformations carried out by the the vestibulo-cerebellum during visual and vestibular stimulation. 2-Physiology of the vestibular nuclei 3-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.

**Barbara A. Bohne, PhD, and Gary W. Harding, MSE**, 2110 and 2154 CID Building, 362-7497. The structure and function of the normal and damaged hearing organ, the organ of Corti, are studied in this laboratory. Several projects utilize the chinchilla for determining mechanisms of cell degeneration in the organ of Corti following exposure to different ototoxicants, particularly noise. The chinchilla is an excellent model for these studies because its hearing is similar to that of humans, it is free of spontaneous middle ear disease and it is feasible to perform surgery on its middle and inner ears, including survival surgery. Current projects involve: (a) Using an inert tracer particle injected in-vivo into the endolymphatic space or perilymphatic space of the cochlea to determine if, when and for how long cell membranes are disrupted after a particular noise exposure; (b) Exposure to a damaging noise produces focal losses of outer hair cells and inner hair cells in the organ of Corti. The patterns of hair-cell loss in the low-frequency (i.e., apex) and high-frequency (i.e., base) of the organ of Corti are different, implying that different mechanisms are involved. We are trying to identify the mechanisms associated with the formation of focal losses of outer hair cells, inner hair cells, supporting cells and afferent nerve fibers following exposure to a high- or a low-frequency noise; and (c) Several cell death pathways have been identified for outer hair cells following exposure to moderate- to high-intensity noise. In-vivo treatment of the cochlea with the vital dye, trypan blue, allows us to identify cells with disrupted plasma membranes. By instilling trypan blue into the endolymphatic space or perilymphatic space, we can determine what portion of the hair-cell's plasma membrane initially breaks down when the cell has been damaged. The long-term goal of this research is to identify pharmacological agents that will ameliorate or attenuate noise-induced hearing loss and aging-related hearing loss in humans.

**Brian T. Faddis, PhD, 1020 McMillan**, 747-3665, [faddisb@wustl.edu](mailto:faddisb@wustl.edu). Our lab is interested in the cellular and molecular mechanisms that modulate sensitivity and temporal acuity in the auditory pathway and how deficits in these mechanisms lead to functional losses. We are particularly interested in molecules that have physiologic roles in normal auditory signal transduction but engender pathologic responses due to inflammation, noise and ototoxin exposure and aging. Utilizing a wide variety of functional, anatomical and molecular techniques, we are currently investigating the roles of the synuclein family of proteins in peripheral and central auditory processing. Our work has shown that alpha- and beta-synuclein localize to nerve endings and spiral ganglion cells and work in a compensatory fashion to modulate hearing sensitivity. Further, over-expression of alpha-synuclein can actually enhance the acuity of central auditory processing as well as protect the inner ear from oxidative damage so we are interested in exploring how these properties can be manipulated to improve auditory processing under adverse conditions and pathologic states. A wide variety of techniques are employed to gain a broad understanding of normal and disease processes at molecular, cellular and organism levels. We use a variety of molecular, anatomical and functional testing methods to assess the role of these proteins in normal and injured auditory structures. Students in the lab will typically take some time to become familiar with a variety of projects and techniques before selecting a specific area or project for more in-depth and independent study. Students or residents with specific but unrelated research questions that may benefit from the

techniques we employ are also welcome to discuss the possibility of conducting these studies in the lab.

**Joel A. Goebel, MD, FACS**, Eighth Floor McMillan, 747-0553. Clinical research testing of posture and ocular motor control. Projects include measurement of gaze stabilization during head movement, otolith input into dynamic subjective visual vertical measurements, computerized historical data screening for dizziness, and head-mounted vibrotactile balance prosthesis (BalCap). We welcome students to join these projects at any stage.

**Timothy E. Hullar, MD**, 2235 Central Institute for the Deaf Building, 362-8641. Vestibular Anatomy and Physiology. Our laboratory's efforts reflect the principal investigator's interest in problems of balance and equilibrium. We are pursuing three major directions. First, we use physiologic and anatomic techniques to understand the peripheral vestibular system's remarkable ability to transmit accurate information regarding rotational and linear head rotations. The temporal resolution of the system in humans is 7 ms or better, while the spatial resolution is not as well known. Animal studies are required to determine the cellular basis for this ability, using light and electron microscopy, digital image processing, and neural and eye movement recordings.

Second, dizziness remains a diagnostic and therapeutic challenge for all practitioners. We are developing novel tests of human vestibular function and improved techniques for replacement or rehabilitation of a damaged vestibular system in patients. Our studies with patients are aimed at making disequilibrium, which is an increasingly important symptom as the population ages, a condition which can be more accurately diagnosed and more effectively treated.

Finally, we are studying balance and equilibrium among marine mammals including sirenians, pinnipeds, and cetaceans (whales and dolphins). Using anatomic studies as well as recordings on captive animals, we are exploring how these animals orient in their aquatic medium. This research has implications for understanding the effect of anthropogenic noise (i.e., sonar) on these animals.

A student's involvement in the lab would be tailored to his or her background and interest. Possibilities range from hands-on animal surgery to analysis and interpretation of digitized anatomic images. Opportunities exist for summertime and school year projects as well as a yearlong full-time research experience.

**Judith E. C. Lieu, MD**, 3S35 Children's Hospital and Eighth Floor McMillan, 454-2138. 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 in otolaryngology for more details.) These techniques and methodologies are used to investigate clinical problems seen in pediatric otolaryngology. Projects currently underway include the evaluation of quality of life of children with hearing loss, progression of hearing loss in children, and evaluation of unilateral hearing loss, use of functional connectivity MRI to investigate effects of hearing loss in children, and quality of life of parents whose young children with recurrent otitis media. Other projects of the student's choosing that would utilize these research techniques may also be pursued.

**J. Gail Neely, MD, FACS**, 9902 McMillan, 362-7344. Facial Motion Analysis Laboratory: Clinical research application of subtracted digitized image light reflectance. The student(s) will participate in videotaping normal subjects and patients with facial paralysis and synkinesis, in using a unique computer program to analyze dynamic surface deformations during facial expression, and using spread sheet and statistical applications in order to quantitatively define outcomes during treatments of disorders of the facial nerve.

**Kevin K. Ohlemiller, PhD**, 2205 Central Institute for the Deaf, 747-717. 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 ABR assessment and intra-cochlear recording, quantitative light microscopy, immunohistochemistry, and western blots. We also collaborate to map, and perform 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 promoted by alleles and mutations that impair protective factors such as antioxidant enzymes, or that impair ion homeostasis. Neural presbycusis can be modeled by mutations that alter the function of cholinergic receptors. While 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 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 QTLs 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 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.

**Jay F. Piccirillo, MD**, Eighth Floor McMillan, 362-8641. The Clinical Outcomes Research Office of the Division of Research performs basic and applied clinical epidemiology and health services research. Clinical epidemiology is the study of the diagnosis, prognosis, and 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 treatment and outcome for patients with cancer and the impact of a web-based cancer patient-specific prognostic information (Prognostigram) on treatment choices, outcomes, and satisfaction with care. We also conduct research into treatment and outcomes for patients with tinnitus. Using clinical epidemiology methodology, we can also study a variety of other diseases.

## Department of Otolaryngology Faculty

**Richard A Chole, MD, PHD**

Lindburg Professor of Otolaryngology

Head of the Department of Otolaryngology

**Marc Bruce Abrams, DDENT**

Instructor in Clinical Otolaryngology

Nawal Mona Ahmed

Instructor in Clinical Otolaryngology (DDS)

Maha M Al Gilani, MD

Instructor in Otolaryngology (Pending Dean's Approval)

Murray Howard Appelbaum, DDENT

Instructor in Clinical Otolaryngology (DMD)

Sean B Bailey, MD, MS

Instructor in Clinical Otolaryngology

Jianxin Bao, PHD

Associate Professor of Otolaryngology

Perry J Bartels, DDENT

Instructor in Clinical Otolaryngology

Pablo M Blazquez Gamez, PHD

Research Assistant Professor of Otolaryngology

Gregory Harris Branham, MD

Professor of Otolaryngology

Douglas A Carano, DDENT

Instructor in Clinical Otolaryngology (DDS)

Chad Phadung Chadaratana, MD

Instructor in Clinical Otolaryngology

Rebecca D Chernock, MD

Assistant Professor of Otolaryngology

John Jeonhwan Chi, MS, MD

Assistant Professor of Otolaryngology (Pending Executive Faculty Approval)

John N Chiapel

Instructor in Clinical Otolaryngology

William W. Clark, MS, PHD

Professor of Otolaryngology

Gene C Cohen, DDENT

Instructor in Clinical Otolaryngology (DDS)

William Mark Cohen, DDENT, MS

Instructor in Clinical Otolaryngology (DMD)

Sheldon C Cohen, DDENT

Instructor in Clinical Otolaryngology

John Michael Conoyer, MD

Instructor in Clinical Otolaryngology

Lisa S. Davidson, MS, PHD

Research Assistant Professor of Otolaryngology

Richard Davidson, DDENT, MS

Instructor in Clinical Otolaryngology (DMD)

Jason Anthony Diaz, MD

Assistant Professor of Otolaryngology

Andrew J. Drescher, MD

Assistant Professor of Otolaryngology

Norman Steven Druck, MD

Assistant Professor of Clinical Otolaryngology

Julia D Edgar, PHD

Adjunct Instructor of Otolaryngology

Tamara Kay Ehlert, MD

Instructor in Clinical Otolaryngology

Carl F Ehrlich, MD

Assistant Professor of Otolaryngology

Samir Khattab El-Mofty, DDENT, MS, PHD, DDENT1

Associate Professor of Otolaryngology

Mohamed Elsafi

Assistant Professor of Clinical Otolaryngology

Brian T Faddis, MS, PHD

Research Assistant Professor of Otolaryngology

James A Fernandez, MD

Instructor in Clinical Otolaryngology

Jeffrey T Fierstein, MD

Assistant Professor of Clinical Otolaryngology

Debra Fink, MS, DDENT

Instructor in Clinical Otolaryngology (DMD)

Charles Coleman Finley

Adjunct Research Associate Professor of Otolaryngology

Jill B Firszt, MS, PHD

Associate Professor of Otolaryngology

Joel Goebel, MD

Professor of Otolaryngology

Vice Chairman of Otolaryngology

Richard I Goldberg, DDENT

Instructor in Clinical Otolaryngology (DMD)

Barry Steven Goldenberg, DDENT, MS

Instructor in Clinical Otolaryngology (DMD)

James Dean Gould, MD

Instructor in Clinical Otolaryngology

Meredith P Gronski, OTD

Instructor in Otolaryngology

Jason M. Hanson, MD

Instructor in Clinical Otolaryngology

Archie B Harmon Jr, MA, PHD

Instructor in Otolaryngology

William Hartel

Instructor in Clinical Otolaryngology

Alan A Harvey

Instructor in Clinical Otolaryngology

Bruce H Haughey, MBCHB, MS

Joseph B Kimbrough Professor of Otolaryngology

Jay Fredrick Hauser, DDENT

Instructor in Clinical Otolaryngology

Heather Hayes, M ED, PHD

Assistant Professor of Otolaryngology

Jacques A Herzog, MD

Assistant Professor of Clinical Otolaryngology

Stephen M Highstein, MD, PHD

Adjunct Professor of Otolaryngology

Keiko Hirose, MD

Associate Professor of Otolaryngology

Vice Chairman of Otolaryngology

Lawrence M Hoffman, DDENT

Instructor in Clinical Otolaryngology (DMD)

Dee Jay Hubbard, MA, PHD, MA1

Adjunct Assistant Professor of Otolaryngology (Speech Pathology)

Timothy Everett Hullar, MD

Associate Professor of Otolaryngology

Arnold Scott Jacobson, DDENT, MS

Instructor in Clinical Otolaryngology (DMD)

Susan Jerger

Adjunct Research Professor of Otolaryngology

Timothy N Kaiser, MD

Assistant Professor of Clinical Otolaryngology

Eugenia Kardaris

Instructor in Clinical Otolaryngology (DDS)

Roanne Kay Karzon, M ED, MS, PHD

Adjunct Assistant Professor of Otolaryngology

Andrew M Kim, DDENT, MS

Instructor in Clinical Otolaryngology

June Leslie Kleinfeld, DDENT

Instructor in Clinical Otolaryngology (DMD)

George R Kletzker, MD

Assistant Professor of Clinical Otolaryngology

David Seamus Leonard, MBCHB, MHA

Assistant Professor of Otolaryngology

Laurence A Levine, MA, DDENT, MD

Associate Professor of Clinical Otolaryngology

James S. Lewis Jr, MD

Associate Professor of Otolaryngology

Jeffery Lichtenhan, BAS, MSSH, PHD

ResearchAssistant Professor of Otolaryngology

Judith E Lieu, MD

Associate Professor of Otolaryngology

Michael Lillmars, DDENT

Instructor in Clinical Otolaryngology (DDS)

Robert Douglas Lowe, DDENT



Instructor in Clinical Otolaryngology (DMD)

Richard W Maack, MD

Instructor in Clinical Otolaryngology

Robert R Mac Donald III, MD

Instructor in Clinical Otolaryngology

Susan E Mackinnon, MD

Professor of Otolaryngology

Kamlesh R Makwana, DDENT

Instructor in Clinical Otolaryngology (DDS)

Marshall S Manne, DDENT, MS

Instructor in Clinical Otolaryngology (DDS)

Philip Latham Martin, MD

Associate Professor of Clinical Otolaryngology

Alicia B Matayoshi

Instructor in Clinical Otolaryngology (DDS)

Claire Matthews, MA, PHD

Adjunct Assistant Professor of Otolaryngology (Speech Pathology)

Scott A McClain, DDENT

Instructor in Clinical Otolaryngology (DDS)

Murray D McGrady, MD

Instructor in Clinical Otolaryngology

Jonathan L McJunkin, MD

Assistant Professor of Otolaryngology

John W McKinney, MD

Instructor in Clinical Otolaryngology

Maithilee D Menezes, MD

Assistant Professor of Otolaryngology

David W. Molter, MD

Professor of Otolaryngology

Stewart Edward Moreland, DDENT

Instructor in Clinical Otolaryngology (DMD)

Nancy Tye Murray, MS, PHD

Professor of Otolaryngology

John Gail Neely, MD

Professor of Otolaryngology

Johanna Grant Nicholas, MA, PHD

Research Associate Professor of Otolaryngology

Brian Nussenbaum, MD

Christy J. and Richard S. Hawes III Professor of Otolaryngology

Vice Chair for Clinical Affairs, Department of Otolaryngology

Margaret A Ogden, MD

Assistant Professor of Otolaryngology

Kevin Kenneth Ohlemiller, PHD

Research Associate Professor of Otolaryngology

Randal C Paniello, MS, MD, MBA

Professor of Otolaryngology

Margaret Grace Peak, MA, PHD

Adjunct Assistant Professor of Otolaryngology (Audiology)

Jonathan Erik Peelle, BAS, MS PSYC, PHD

Research Assistant Professor of Otolaryngology

Michael James Pernoud, DDENT

Instructor in Clinical Otolaryngology

Supote Phipatanakul, MD

Assistant Professor of Clinical Otolaryngology

Jay Francis Piccirillo, MD

Professor of Otolaryngology

Vice Chairman for Research, Dept of Otolaryngology

Gerald Raymond Popelka

Adjunct Professor of Otolaryngology

Lisa Gayle Potts, MS, PHD

Research Assistant Professor of Otolaryngology

Jason T. Rich, MD

Assistant Professor of Otolaryngology

Julie L Ring, DDENT

Instructor in Clinical Otolaryngology (DDS)

Robert V Rivlin, MS, DDENT

Instructor in Clinical Otolaryngology (DMD)

Albert F Ruehl, MS, MD

Assistant Professor of Clinical Otolaryngology

Mark A Rutherford, PHD

Research Instructor in Otolaryngology

Alec N Salt, MS, PHD

Professor of Otolaryngology

John Stone Schneider, BBA, MD, M PP

Assistant Professor of Otolaryngology (Pending Executive Faculty Approval)

Richard E Schrick, MEE, MD

Instructor in Clinical Otolaryngology

Allen Sclaroff, DDENT

Professor of Clinical Otolaryngology (Oral Surgery)

Karl Shanker, DDENT

Instructor in Clinical Otolaryngology (DDS)

Peter Gaillard Smith, ME, PHD, MD

Assistant Professor of Clinical Otolaryngology

Jules M Snitzer, DDENT, MS

Instructor in Clinical Otolaryngology (DDS)

Gershon J Spector, MD

Professor of Otolaryngology

Isolde E Thalmann, MA, PHD

Research Professor Emeritus of Otolaryngology

Ruediger Thalmann, MD

Professor Emeritus of Otolaryngology

Lecturer in Otolaryngology (Part-time 41%)

Stanley E Thawley, MD

Associate Professor of Otolaryngology

Rosalie May Uchanski, MS, PHD

Research Assistant Professor of Otolaryngology

Ravindra Uppaluri, PHD, MD

Associate Professor of Otolaryngology

Michael Valente, MS, PHD

Professor of Otolaryngology (Audiology)

Lora Maureen Valente, MS, PHD

Associate Professor of Otolaryngology

Thomas J Veraldi, DDENT, MS

Instructor in Clinical Otolaryngology

Wayne A Viers, MD

Associate Professor of Clinical Otolaryngology

Mark Edward Warchol, PHD

Professor of Otolaryngology

Calvin H Weiss, DDENT

Instructor in Clinical Otolaryngology (DDS)

Tatiana Yakusheva, MS, PHD

Research Instructor in Otolaryngology

## Department of Pathology and Immunology

The **Department of Pathology and Immunology** is involved in the clinical diagnosis and monitoring of disease, in the teaching of Pathology and Immunology, and in research on the molecular basis of disease and immunology.

The Department is responsible through its divisions for studying the pathogenesis and the biochemical and anatomical basis of diseases. Pathologists do research on disease processes using molecular, genetic and structural analysis. Pathologists have the responsibility for the cytological and anatomical diagnosis of diseases and for developing novel structural and molecular approaches for the analysis of them, particularly cancers and infectious diseases. The divisions of **Anatomic and Molecular Pathology** (headed by Peter A. Humphrey, MD, PhD), **Laboratory and Genomic Medicine** (headed by Barry P. Sleckman, MD, PhD) and **Neuropathology** (headed by Robert E. Schmidt, MD, PhD) 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 in 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 coursemaster 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 participate in the research activities of the faculty.

The **Division of Immunobiology** integrates immunobiology activities in the School. It is responsible for the teaching of immunology in the first year of the curriculum (Andrey S. Shaw, MD, is the coursemaster) 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**. The department has strong participation in the Immunology Graduate Program, which is headed by Barry P. Sleckman, MD, PhD.

# MD Courses

## First Year

### M30 523 IMMUNOLOGY

Instructors: Andrey S. Shaw, MD, 362-4614; Emil R. Unanue, MD, 747-0561; John P. Atkinson, MD, 362-8391; Brian Edelson, MD, PhD, 362-4427; Kenneth Murphy, MD, PhD, 747-4237; Eugene Oltz, PhD, 362-5515; Gwendalyn J. Randolph, PhD, 747-2345; Robert D. Schreiber, PhD, 362-9103; Barry P. Sleckman, MD, PhD, 747-8235; Herbert W. Virgin IV, MD, PhD, 362-9223

This course consists of lectures, laboratory exercises and small group clinical discussions. It covers all aspects of the immune response, general properties of the immune system, effector molecules, cells and their function, cellular interactions and immunological diseases. The Immunology course requires a strong background in biochemistry, genetics and cell biology. Some of the basic concepts from these fields should be reviewed during the course. There are two laboratory sessions. These will cover the areas of blood typing/blood banking and allergy. In these laboratories, students will type blood and be tested for allergies. POPS (Patient Oriented Problem-Solving System in Immunology) will also be used during each laboratory sessions and contain a clinical problem that is analyzed and solved by small groups of three to four students. There are five hours of small group clinical discussion sessions. In these sessions, students meet with physicians to discuss the role of immunology and a particular human disease. The Immune System (latest edition) by Peter Parham is used. For the small group clinical sessions, the latest edition of the textbook Case Studies in Immunology: A Clinical Companion by Rosen and Geha is used. There will be an online self-assessment (multiple-choice and true/false), a take-home exam (essay questions) and a formal final exam (multiple choice and short answer) on the topics described in the lectures and in the laboratory sessions. This course is restricted to medical students only.

## Second Year

### M60 665 PATHOLOGY

Instructor: Erika C. Crouch, PhD, MD, 454-8462

This course provides a comprehensive survey of the biology and morphology of human disease through a combination of lectures and laboratory/case study 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.

Considerable emphasis is placed on learning the “language” of human disease. During the year, students become familiar with the methods of contemporary pathologic analysis. They 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.

## Third Year

### Conferences

#### Tumor Conference

One hour each week for 12 weeks during the Surgery and Obstetrics and Gynecology clerkships. Problem cases are presented for illustration and discussion of all aspects of neoplastic disease.

Instructors: Staff

## Fourth Year

### Electives

#### M60 805 AUTOPSY PATHOLOGY

Instructor(s): Louis P. Dehner, MD, 362-0150

Location: West Building

Elective Contact: Louis P. Dehner, MD, 362-0150

Other Information: Students should contact Dr. Dehner prior to scheduling this elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks: Weeks 13, 17, 21, 25, 29, 33, 37, and 41

This full-time 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.

Student time distribution: Autopsy Activities 75%, Conferences/Lectures 25%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: N/A

On call/weekend responsibility: None

#### M60 807 DERMATOPATHOLOGY

Instructor(s): Anne Lind, MD, 362-0117

Location: Third Floor, Peters Building, Room 300N

Elective Contact: Anne Lind, MD, 362-0117

Other Information: Students will meet on the Third Floor, Peters Building, Room 300N, 9:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks: Weeks 9, 13, 17, 21, 25, 29, and 33

The student will be involved in all activities of the dermatopathology service. These include review, discussion and sign-out of gross and microscopic skin specimens. Sign-out occurs each day with a team that includes the attending, fellow, and residents from both dermatology and pathology. Study sets are available if an area of special interest is expressed by the student. Each week of the rotation, the student will be asked to present a brief discussion of an interesting case that was seen during sign-out. These are informal, at the microscope discussions. Conferences include the 8:00 am pathology conferences, which are optional, but strongly encouraged. Dermatology Grand Rounds and dermatopathology slide review conferences are held on Thursday mornings and are mandatory. 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.

Student time distribution: Inpatient 5%, Outpatient 80%, Conferences/Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: Dr. Anne Lind and two other dermatopathologists

Patients seen/weekly: Average number of specimens per week is 300; percentages above reflect specimens not patients.

On call/weekend responsibility: None

#### M60 815 OB-GYN PATHOLOGY SUBINTERNSHIP

Instructor(s): Phyllis Huettner, MD, 362-0118

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Phyllis Huettner, MD, 362-0118

Other Information: Students report to Dr. Huettners office, 300S Peters Building, Barnes-Jewish Hospital, South Campus, 9:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41

The elective stresses the principles of anatomic pathology when applied to operative material in obstetrics and gynecology. The subintern will examine gross and microscopic specimens in the Ob-Gyn Pathology Lab and review pertinent literature with a senior pathologist. Ample time will be available for attending regular conferences in ob-gyn and pathology.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: N/A

On call/weekend responsibility: None

#### M60 820 SURGICAL PATHOLOGY - BARNES-JEWISH HOSPITAL

Instructor(s): Samir El-Mofty DMD, PhD, and staff, 362-2681

Location: Division of Surgical Pathology, Third Floor Peters Building, Barnes-Jewish Hospital, South Campus

Elective Contact: Samir El-Mofty DMD, PhD, 362-2681, [elmofty@wustl.edu](mailto:elmofty@wustl.edu) or Julie Gutierrez, 362-0143, [jgutierrez@path.wustl.edu](mailto:jgutierrez@path.wustl.edu)

Other Information: See the pathology website for detailed orientation and introductory information (<http://pathimm.wustl.edu/>). If you need to discuss individual goals and interests, please call or e-mail Dr. Samir El-Mofty at least one week prior to the elective.

Enrollment limit per period:

In order to permit maximum interaction with the surgical pathology staff and house staff, the elective is limited to four students per four-week block. For the initial round of scheduling the available slots are allotted to accommodate two fourth year students and two third year students. Any open slots after the original scheduling period are then made available to either third and fourth year students on a first-come, first-serve basis. Contact your scheduling office for details.

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. At the end of the rotation the 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 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

#### M60 825 INTRODUCTION TO NEUROPATHOLOGY

Instructor(s): Robert E. Schmidt, MD, PhD, 362-7426

Location: West Building

Elective Contact: Robert E. Schmidt, MD, PhD, 362-7426

Other Information: Students report to 3720 Neuropathology, West Building, 9:00 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks: Weeks 13, 17, 21, 29, 33, 37, and 41

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. Time: 35 to 40 hours per week.

Student time distribution: Conferences/Lectures 100%; Subspecialty Care 100%

Major teaching responsibility: Attendings and fellows

Patients seen/weekly: N/A

On call/weekend responsibility: None

#### M60 855 DIAGNOSTIC HEMATOPATHOLOGY

Instructor(s): Anjum Hassan MD, and Nabeel Yasin MD, PhD, 362-1329

Location: Room 2303, Second Floor, Kingshighway Building

Elective Contact: Kevin Hutchinson, Heme Path Division Secretary, 362-1329,  
[khutchinson@path.wustl.edu](mailto:khutchinson@path.wustl.edu)

Other Information: Students will meet on the Second Floor, Kingshighway Building Room 2303, 10:00 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for two- or four-week blocks: Weeks 9, 11, 13, 15, 17, 19, 29, 31, 33, and 35

Student electives in diagnostics of diseases of hematopoietic cells aims to foster understanding of acute and chronic leukemias, reactive conditions mimicking malignancies, and lymphomas affecting adults and pediatric populations. This diverse field involves multiple ancillary diagnostic tests such as immunohistochemistry, flow cytometry and genetic testing. This elective will offer medical students an in-depth insight into what goes behind the final pathologic diagnoses in hematologic malignancies before a treatment plan can be executed. This insight is crucial to understand the importance of correct diagnosis (the answer to the usual "what's taking pathology so long" comment) and accurate, timely communication of preliminary and final diagnosis to the clinicians. Under general faculty and fellow supervision, the students will be primarily responsible for handling of their own cases such as bone marrow biopsies, simple lymph node biopsies, ordering the required tests, dictating the final reports and communicating with the clinicians. They will also participate in several conferences per week including Hematopathology consensus conference, weekly cytogenetic/molecular correlation conferences, journal club and interdepartmental bone marrow transplant and lymphoma conferences.

Student time distribution: Bench Signouts 60%, Conference/Lectures 40%

Major teaching responsibility: Anjum Hassan, MD

Patients seen/weekly: 60-70 bone marrow biopsies, 50 consults and in-house cases

On call/weekend responsibility: None

## M60 860 CLINICAL LABORATORY MEDICINE - BARNES-JEWISH HOSPITAL

Instructor(s): Mitchell Scott, PhD, 362-1503

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Mitchell Scott, PhD, 362-1503

Other Information: Students meet in chief resident's office, Second Floor Barnes-Jewish Hospital, South Service Building, 8:30 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks: Weeks 13, 17, 21, 29, 33, 37, and 41

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.

Student time distribution: Inpatient 25%, Conferences/Lectures 75%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 5

On call/weekend responsibility: None

## Research

(M60 900)

**Paul M. Allen, PhD**, Eighth Floor BJCIH, 362-8758. Research in immunology. 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 alloreactivity/graft rejection and the pathophysiological mechanisms involved in rheumatoid arthritis.

**Jacques U. Baenziger, MD, PhD**, Second Floor Kingshighway Building, Room 2423, 362-8730. Glycobiology, informational role of carbohydrates in protein targeting and reproductive endocrinology.

**Erika C. Crouch, MD, PhD**, 454-8462. The structure and function of collagenous carbohydrate bindings' proteins known as collectins. We are actively investigating the structure, function, synthesis, assembly and secretion of SP-D - a lung surfactant associated collectin that contributes to the innate pulmonary host defense against a wide variety of important bacterial, fungal, and viral pathogens. The laboratory is studying the human SP-D promoter and using site-directed mutagenesis to examine the structural requirements for assembly, secretion and biologic activity.

**Jeffrey I. Gordon, MD**, Fifth Floor 4444 Forest Park, 362-7243. Genomic and metabolic foundations of symbiotic host-microbial interactions in the human gut; impact on obesity and malnutrition.

**Jack Ladenson, PhD**, Cortex Building, 207J, 454-8436. Development and use of monoclonal antibodies including single-chain antibodies and antibody libraries.

**Michael McDaniel, PhD**, 3709 West Building, 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 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 in optimizing mTOR to induce cellular growth and proliferation to: (1) enhance pre- and post- islet transplantation in Type 1 diabetes and (2) prolong b-cell compensation in response to insulin resistance in Type 2 diabetes. b-cell failure in obesity-associated Type 2 diabetes is believed to correlate with the intracellular accumulation of lipids that contribute to defects in insulin secretion and maintenance of b-cell mass. Our studies have identified lipoprotein lipase in b-cells, a key enzyme for catalyzing the hydrolysis of lipoprotein-associated TAG, to produce free fatty acids (FFA) 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 FFA up-regulate 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 FFA and b-cell mitochondrial dysfunction in Type 2 diabetes.

**Robert D. Schreiber, PhD**, Eighth Floor BJCIH, 362-8747. Tumor Immunology and Cancer Immunoediting. Research on natural and therapeutically induced responses to tumors and definition of the molecular roles of interferon-gamma and interferon-alpha/beta in these processes.

**Andrey S. Shaw, MD**, Eighth Floor, BJCIH, 362-4614. Signal transduction in lymphocytes. Genetic basis of renal disease.

**Barry Sleckman, MD, PhD**, 4711 West Building, 747-8235. Cellular immunology; repair of DNA damage; Mechanisms of chromosomal translocations.

**Carl H. Smith, MD**, St. Louis Children's Hospital, 454-6029. Placental transport and surface membrane structure and function.

**Thaddeus S. Stappenbeck, MD, PhD**, Room 1020 CSRB North Tower, 362-4214. My lab studies the pathogenesis of inflammatory bowel disease including epithelial regeneration in response to injury, host gene mutations that predispose to IBD and host-microbe interaction that incite the pathology.

**Steven Teitelbaum, MD**, Barnes-Jewish Hospital, 454-8463. Cellular and molecular mechanisms of bone remodeling with particular emphasis on osteoclast biology as relates to pathogenesis and prevention of diseases, such as osteoporosis. We focus on integrin and cytokine biology utilizing a variety of genetically-manipulated mice.

**John Turk, MD, PhD**, 6609 Wohl, 362-8190. Phospholipase A2 (PLA2) enzymes in regulating insulin secretion from pancreatic islet -cells, e.g. a novel iPLA2 that does not require Ca<sup>2+</sup> cloned from rat and human islets that is involved in -cell secretion and proliferation. Studies of iPLA2, its post translational modifications, and its interactions with other proteins involve 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. Mass spectrometric characterization of proteins and complex lipids is an important tool in these studies.

**Emil R. Unanue, MD**, 1751 West Building, 362-7440. Research in immunobiology/immunopathology. Examination of cellular interactions resulting in immune induction and cellular immunity. These cellular

interactions are being studied in normal, in infectious processes, and in autoimmune diseases. The focus is to identify the proteins responsible for activation of lymphocytes in Type 1 diabetes as well as in infection with the intracellular pathogen *Listeria monocytogenes*.

**Herbert Virgin, MD, PhD**, 1754 West Building, 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. We focus on latency and pathogenesis of herpes viruses.

**Mark A. Watson, MD, PhD**, Barnes-Jewish Hospital, Room 2316 Kingshighway Building, 454-7919. Our laboratory is interested in defining gene transcriptional programs associated with the early progression of human breast cancer. The experimental approach utilizes histopathological review and laser capture microdissection of tumor tissue from patient biopsies coupled with state-of-the-art quantitative RT-PCR, DNA expression microarray, and tissue microarray technologies. Using bioinformatics and statistical analysis of microarray data, we are defining gene expression profiles associated with breast tumor progression, from cellular atypia to invasive disease. Individual genes and signaling pathways identified will be used to better understand the biology of breast cancer, to identify novel diagnostic markers, and to develop strategies for new, targeted therapies. Similar approaches using DNA microarrays and bioinformatics are being applied to molecularly classify several other types of inherited and sporadic solid tumor neoplasms.

## Department of Pathology and Immunology Faculty

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Head of the Department of Pathology and Immunology

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## Edward Mallinckrodt Department of Pediatrics

The primary aim of the teaching program of the **Department of Pediatrics** is to stimulate interest in developmental biology, especially human growth and development, and to provide the student with a foundation sufficiently comprehensive so that he or she will have an appreciation of clinical pediatric problems regardless of his or her future career choice in medicine.

The major clinical and research facilities are in St. Louis Children's Hospital, and the newborn services are at Barnes-Jewish Hospital. St. Louis Children's Hospital is a facility with 235 beds that accepts patients through 21 years of age with all types of medical and surgical problems. Hospital admissions average 11,000 annually. Pediatric medical ambulatory activity, including subspecialty and emergency visits, averages about 90,000 visits a year. Nearly 5,000 infants are born annually at the Washington University Medical Center.

## MD Courses

### First Year

#### Selectives

M04 526 NEW DISEASES, NEW PATHOGENS

For full description, see Department of Molecular Microbiology.

### Second Year

M65 640A PHYSICIANS, PATIENTS & SOCIETY: PEDIATRICS

Instructors: Amanda Emke, MD and Erika Hayes, MD

Students are introduced to the unique nature of pediatrics as a subspecialty through a series of lectures and Team-Based Learning sessions designed to demonstrate the longitudinal nature of pediatrics through a variety of sessions 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. The unique aspects of the physical examination of patients across various ages and developmental levels are presented in an optional Physical Examination Night.

### Third Year

M65 760 PEDIATRICS CLERKSHIP

Instructors: Michelle Estabrook, MD and Colleen Wallace, MD (both: 454-6299)

This six-week curriculum emphasizes pediatric pathophysiology and normal growth and development from birth through adolescence. This rotation consists of three two-week combinations of the following: Regular or special-care nurseries at Barnes-Jewish Hospital or Missouri Baptist Medical Center spent assessing newborns, seeing patients in the pediatric emergency department and Hematology/Oncology outpatient service and in St. Louis Children's Hospital on a variety of inpatient services. 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 grand rounds, further this emphasis. A core lecture series also is offered on Mondays and Thursdays during this six-week clerkship.

## Fourth Year

### Electives

M65 801 GENERAL PEDIATRIC SUBINTERNSHIP - ST. LOUIS CHILDREN'S HOSPITAL

Instructor(s): Middy Estabrook, MD, 454-6299

Location: St. Louis Children's Hospital

Elective Contact: Liz Scott, 5S50 St. Louis Children's Hospital, 454-6299

Other Information: Students should call Liz Scott, 454-6299, one month before start date. Floor assignments will be determined by lottery from floor choices 8 East and 8 West. Students should report to 5S20 Medical Education Office by 7:30 a.m. for orientation on their first day.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This is the general pediatric subinternship. Liz will hold a lottery in the pediatric medical student education office to determine if the student will be assigned to 8 East or 8 West. The student will be assigned patients on one of two inpatient pediatric floor teams. They will follow patients from initial evaluation and for continuing care. The student works as an extern and is expected to take call every fourth night. Students work directly under the supervision of the senior resident. 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 thrive, asthmatic exacerbations, poisonings and undiagnosed conditions may be seen.

Student time distribution: Inpatient 100%; Subspecialty Care/General Pediatrics 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 12

On call/weekend responsibility: Every fourth night

M65 808 PEDIATRIC ASTHMA AND ALLERGY

Instructor(s): Leonard B. Bacharier, MD; Robert C. Strunk, MD; Gordon Bloomberg, MD; Caroline Horner, MD; Avraham Beigelman, MD; Alysa Ellis, MD, 454-2694

Location: St. Louis Children's Hospital and Barnes-Jewish West County Hospital

Elective Contact: Kim Tinsley, 454-2158

Other Information: Students should call 454-2158 prior to the start of this elective for location and time.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

In predominantly an 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.

Student time distribution: Inpatient 10%, Outpatient 80%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Leonard B. Bacharier, MD, and Robert C. Strunk, MD

Patients seen/weekly: 20

On call/weekend responsibility: None

#### M65 809 PEDIATRIC PULMONARY SUBINTERNSHIP

Instructor(s): Thomas Ferkol, Jr., MD; Leonard Bacharier, MD; Avraham Beigelman, MD; Ferdinand Coste, DO; Alysa Ells, MD; Albert Faro, MD; Kay Horner, MD; James Kemp, MD; Peter Michelson, MD; Anand Patel, MD; Katherine Rivera-Spoljaric, MD; Stuart C. Sweet MD, PhD

Location: Room 8117, Northwest Tower

Elective Contact: Thomas Ferkol, Jr., MD, 454-2158

Other Information: Students report to 7 East Respiratory Unit, St. Louis Children's Hospital, 7:00 a.m. first day of elective

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

On the 7 East Respiratory Unit, the sub-intern is an active member of a multidisciplinary care team, consisting of attending pulmonologist or allergist, advanced practice nurses, second-year pediatric residents, unit nurses, and other care providers and takes responsibility for children with acute and chronic lung diseases admitted to the unit. The student will be co-managed with a senior pediatric resident and the sub-intern will be directly supervised by the pediatric residents and attending physician in the daily care of patients. The rotation is structured to provide students with a primarily clinical experience to allow them to gain exposure to the breadth of lung diseases seen at St. Louis Children's Hospital. The volume of patients on the 7 East Respiratory Unit varies with the number of patients covered by the sub-intern at any time, and he or she will typically be responsible for the care of two to six patients at any given time. The student 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 their clinical rotation. The student will also have the opportunity to participate in tests and procedures essential to the practice of pulmonary and allergy medicine, including pulmonary function studies, flexible fiberoptic bronchoscopy, and overnight polysomnography. Sub-interns 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.

Student time distribution: Inpatient 80%, Outpatient 10%, Conferences/ Lectures 10%; Primary Care 30%, Subspecialty Care 70%

Major teaching responsibility: Attending Physician

Patients seen/weekly: 10-15

On call/weekend responsibility: Two weekend days per month

#### M65 811 PEDIATRIC CRITICAL CARE MEDICINE

Instructor(s): John Lin, MD, [lin\\_j@kids.wustl.edu](mailto:lin_j@kids.wustl.edu), 286-1246

Location: St. Louis Children's Hospital

Elective Contact: Dawn Rouse, 286-1246

Other Information: Students report to the PICU, Seventh Floor St. Louis Children's Hospital, 7:15 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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, cardiocirculatory, 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.

Student time distribution: Inpatient 100%; Subspecialty Care 100%

Major teaching responsibility: Attending, critical care fellows, and pediatric residents

Patients seen/weekly: 150

On call/weekend responsibility: Yes

#### M65 813 PEDIATRIC CARDIAC CATHETERIZATION

Instructor(s): David Balzer, MD; Joshua Murphy, MD, and Shabana Shahanavaz, MBBS, 454-6095

Location: St. Louis Children's Hospital

Elective Contact: David Balzer, MD, 454-6095

Other Information: Students report to St. Louis Children's Hospital Cath Lab (Seventh Floor), 8:00 a.m. first day of elective

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Elective will focus on interpretation of hemodynamic and angiographic data acquired in the cardiac catheterization laboratory.

Student time distribution: Inpatient 95%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Two attendings, supplemented by one fellow

Patients seen/weekly: 10

On call/weekend responsibility: None

#### M65 819 PEDIATRIC CARDIOLOGY-OUTPATIENT SERVICE

Instructor(s): Joshua Murphy, MD; George Van Hare, MD; Dave Balzer, MD; Charles Canter, MD; Mark Grady, MD; Patrick Jay, MD; Mark Johnson, MD; Caroline Lee, MD; Mark Levin, MD; Joshua Murphy, MD; Jennifer Silva, MD, Shabana Shahanavaz, MBBS, and Gautam Singh, MD, 454-6095

Location: St. Louis Children's Hospital

Elective Contact: Joshua Murphy, MD, 454-6095

Other Information: Schedules are kept on the residents' hard drive. For additional information and questions, students should report to 8th Floor Northwest Tower, Division of Cardiology, Kim Graham, Room 8206, 8:00 a.m. first day of elective to pick up a rotation schedule/information packet.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will independently evaluate outpatients referred for cardiac murmurs, chest pain, arrhythmia and report findings to the attending physician. Clinics are held at St. Louis Children's Hospital and Barnes-Jewish West County Hospital. Auscultation skill acquisition will be enhanced through examination of patients and use of other teaching tools. The student will review with the attending all ECGs, holter monitors, echocardiograms performed. Participation in weekly surgical conference and other educational conferences is expected.

Student time distribution: Outpatient 95%, Conferences/Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Multiple attendings

Patients seen/weekly: 25

On call/weekend responsibility: None required

#### M65 826 GENETICS AND GENOMIC MEDICINE

Instructor(s): D. Kathy Grange, MD, 454-6093

Location: St. Louis Children's Hospital

Elective Contact: D. Kathy Grange, MD, 454-6093

Other Information: Students should report to the Genetics office on the 9th floor of the Northwest Tower at 9:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 in-patient 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.

Student time distribution: Inpatient 30%, Outpatient 60%, Conferences/Lectures 10%; Subspecialty Care 100%.

Major teaching responsibility: Attendings

Patients seen/weekly: 15

On call/weekend responsibility: None

#### M65 827 SUBINTERNSHIP-PEDIATRIC HEMATOLOGY/ONCOLOGY

Instructor(s): Robert Hayashi, MD, 454-4118

Location: St. Louis Children's Hospital, 9 West

Elective Contact: Robert Hayashi, MD, 454-4118

Other Information: Students report to 9 South Nursing Station, 8:00 a.m. first day of elective

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will assume the responsibilities of a pediatric resident on the inpatient Hematology/Oncology service at St. Louis Children's Hospital.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Single attending, first-year hem-onc fellow and junior resident

Patients seen/weekly: 2-3 patients a day

On call/weekend responsibility: Every four days with resident

#### M65 833 SPECIAL TOPICS IN REPRODUCTIVE HEALTH

Instructor(s): Tessa Madden, MD, 747-6495

Location: Division of Clinical Research, 4533 Clayton Ave, Second Floor

Elective Contact: Tessa Madden, MD, 747-6495

Other Information: Students should contact Dr. Madden a week prior to the beginning of the rotation, email [maddent@wustl.edu](mailto:maddent@wustl.edu).

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 17, 21, 29, 33, 37, and 41.

Students will attend a variety of outpatient clinics to interact with patients seeking different reproductive health services. These clinics include family planning and abortion services at Planned Parenthood, the County STD clinic, Adolescent and Pediatric Gynecology, Child Sexual Abuse, Teen OB, Ultrasound and Prenatal Diagnosis, and Postmenopausal Gynecology clinic. Clinical experiences will be ambulatory. Conferences include Obstetrics and Gynecology Grand Rounds and Family Planning Journal Club. Reading will include relevant articles and chapters. Students will be responsible for a brief presentation on a reproductive health topic at the conclusion of the course. Opportunities for clinical research in contraception are also available.

Student time distribution: Outpatient 100%; Primary Care 30%, Subspecialty Care 70%

Major teaching responsibility: Attendings

Patients seen/weekly: Varies

On call/weekend responsibility: None

#### M65 836 PEDIATRIC RHEUMATOLOGY

Instructor(s): Andrew White, MD, 454-6124; Megan Cooper, MD, PhD, and Anthony French, MD, PhD

Location: St. Louis Children's Hospital

Elective Contact: Andrew White, MD, 454-6124

Other Information: Students report to Rheumatology Clinic, Suite C, St. Louis Children's Hospital, 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 disorders of the immunologic system will be provided. Students will participate in evaluation of new patients with a variety of rheumatologic diseases including JRA, SLE, and scleroderma at both SLCH and Shriners Hospital clinics. Students may elect to participate in conferences and seminars.

Student time distribution: Inpatient 20%, Outpatient 70%, Conferences/ Lectures 10%; Primary Care 30%, Subspecialty Care 70%

Major teaching responsibility: Andrew White, MD

Patients seen/weekly: 35-40

On call/weekend responsibility: None

#### M65 838 PEDIATRIC GASTROENTEROLOGY, HEPATOLOGY & NUTRITION

Instructor(s): Yumi Turmelle, MD; Robert Heuckeroth, MD; Lori Holtz, MD; Robert Rothbaum, MD; David Rudnick, MD; Chip Samson, MD; Philip Tarr, MD; Liz Utterson, MD; and Alex Weymann, MD, 454-6173

Location: Gastroenterology Clinical Offices, 9th Floor, Northwest Tower

Elective Contact: Ariana Jasarevic, 454-6173, Jasarevic\_A@kids.wustl.edu

Other Information: Students should contact Ariana Jasarevic at least one week in advance of first day of elective for further information.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41

The rotation in Pediatric Gastroenterology, Hepatology, and Nutrition provides broad exposure to specialized and common pediatric problems. Gastroenterology patients are seen in the outpatient suites and in the hospital. Students see 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. Students participate in diagnostic and therapeutic endoscopic procedures. At weekly divisional conferences, attendings, fellows, and students review pathology slides from current cases and discuss difficult patient problems and topics of interest.

Student time distribution: Student time distribution: The time spent in the outpatient clinic and on the inpatient service can be individualized according to the student's interests. In general, the distribution is: Inpatient 50%, Outpatient 30%, Procedures 10%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings and fellows

Patients seen/weekly: Patients seen/weekly: 130 (entire division), students see a subset (most interesting/instructive cases)

On call/weekend responsibility: None

#### M65 840 PEDIATRIC INFECTIOUS DISEASES

Instructor(s): Gregory Storch, MD; Alexis Elward, MD; Michele Estabrook, MD; Stephanie Fritz, MD; David Haslam, MD; Ericka Hayes, MD; David Hunstad, MD; S. Celeste Morley, MD, PhD; Audrey Odom,

MD, PhD; and Rachel Orscheln, MD, 454-6050

Location: St. Louis Children's Hospital

Elective Contact: Pam Wilson, 286-2778

Other Information: Students should contact Fellow on call at 424-6877 one week prior to start of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41

This elective is designed to introduce students to the clinical aspects of infectious diseases in children.

Students will consult on both inpatients and outpatients. Regular daily activities will include evaluation of new patients, work rounds on inpatient consults, microbiology teaching rounds in the bacteriology and virology labs, and teaching rounds with the infectious diseases attending. Students will attend the general pediatric clinic and the pediatric HIV clinic once per week. Formal teaching sessions include a weekly pediatric infectious disease case conference, a weekly joint clinical conference with the adult infectious diseases group, and a weekly pediatric infectious diseases research conference.

Student time distribution: Inpatient 70%, Outpatient 20%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: One or two attendings, one or two fellows

Patients seen/weekly: 5-10 new patients primarily, over 15-20 new patients with team

On call/weekend responsibility: Saturdays optional

#### M65 845 PEDIATRIC EMERGENCY MEDICINE

Instructor(s): David M. Jaffe, MD, 454-2341

Location: St. Louis Children's Hospital

Elective Contact: Carol Heller, 454-2341

Other Information: Students report to Room 9105 Northwest Tower, 8:30 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41

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 a.m.-3:00 p.m.) or an evening shift (3:00 p.m.-11:00 p.m.) 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.

Student time distribution: Outpatient 90%, Conferences/Lectures 10%; Subspecialty Care (Emergency Medicine) 100%

Major teaching responsibility: All EM attendings

Patients seen/weekly: ~30

On call/weekend responsibility: None (unless making up time)

#### M65 849 PEDIATRIC ENDOCRINOLOGY AND DIABETES

Instructor(s): Abby Hollander, MD; Bess Marshall, MD; Paul Hruz, MD, PhD; Ana Maria Arbelaez, M.; Neil White, MD; and Michelle Vanstone, MD, 454-6051

Location: St. Louis Children's Hospital

Elective Contact: Lesa Sutherland, 286-2725

Other Information: Student has the option to extend elective. Students report to Endocrinology and Diabetes Office, Ninth Floor Northwest Tower, 8:30 a.m. first day of elective



Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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. Student time distribution: Inpatient 40%, Outpatient 50%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attending physicians and fellows

Patients seen/weekly: 10-20 by student

On call/weekend responsibility: None

#### M65 852 CLINICAL PEDIATRIC PULMONARY MEDICINE

Instructor(s): Thomas Ferkol, Jr., MD; Robert C. Strunk, MD; Leonard Bacharier, MD; Avraham Beigelman, MD; Gordon Bloomberg, MD; Ferdinand Coste, DO; Alysa Ells, MD; Albert Faro, MD; Kay Horner, MD; James Kemp, MD; Peter Michelson, MD; Anand Patel, MD; Katherine Rivera-Spoljaric, MD; Stuart C. Sweet, MD, PhD 454-2694

Location: St. Louis Children's Hospital

Elective Contact: Kim Tinsley, 454-2158

Other Information: Students should call 454-2158 prior to the start of elective for location and time.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This elective provides an 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 include: (1) to gain greater insights into the genetics, epidemiology, pathophysiology, and clinical presentations of lung diseases in children; (2) to learn the importance of the physical examination using inspection, percussion and auscultation; (3) 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) therapeutic interventions. 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.

Student time distribution: Inpatient varies, Outpatient varies, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: 25

On call/weekend responsibility: None

#### M65 861 NEWBORN MEDICINE

Instructor(s): Akshaya Vachharajani, MD, 454-6148

Location: Eighth Floor Northwest Tower

Elective Contact: Emily Alexander, 454-6148

Other Information: Students should schedule an appointment with Emily to meet with Dr. Vachharajani.

Appointments should be scheduled one week prior to class start date.

Enrollment limit per period: 3

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The goal of this course is to provide students with responsibility for caring for newborn infants who range

from normal to acutely ill to chronically ill and for their families. The physiology of the transition from fetal to extrauterine existence, the pathophysiology of specific diseases, and primary accountability of the student for patient management decisions and procedures will be emphasized. In addition, collaboration with nursing staff and other health care providers in decision-making (especially concerning the viability of individual infants) and family management will be regularly required.

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 labor and delivery services at Barnes-Jewish Hospital. Students assigned to the Labor and Delivery Service will routinely be involved in normal newborn care and delivery room management. The student will be expected to rotate patient responsibilities every fourth night. Student time distribution: Inpatient 90%, Outpatient 5%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Attending, fellow and residents

Patients seen/weekly: 30

On call/weekend responsibility: Every fourth night

#### M65 868 PEDIATRIC PALLIATIVE CARE

Instructor(s): Joan Rosenbaum, MD, 454-2683

Location: Suite 8130, Eighth Floor Northwest Tower

Elective Contact: Niya Beverly, 454-2683

Other Information: Schedule to be arranged between Dr. Rosenbaum and students.

Enrollment limit per period: 1

Valid start weeks for four-week block: Week 29

This new course is an introduction to pediatric palliative care. It will include independent reading and a discussion of the literature, shadowing opportunities with spiritual care givers, participation in complex care conferences at Ranken Jordan, (a pediatric subspecialty hospital that provides rehabilitation and sub-acute medical treatment of children with life limiting and life threatening diseases), following a family longitudinally through the prolonged hospitalization of their sick child, role play opportunities, and participation in palliative care conferences and consultations at St. Louis Children's Hospital.

The goal is to help students learn to listen generously, and provide patient care that extends beyond the science, technology, and procedures.

Student time distribution: Inpatient 80%, Conferences/Reading 20%; Subspecialty Care 100%

Major teaching responsibility: Joan Rosenbaum, MD

Patients seen/weekly: Average daily census 7-10, 2-3 new consults per week

On call/weekend responsibility: None

#### M65 875 PEDIATRIC RENAL DISEASE

Instructor(s): Vikas Dharnidharka, MD, MPH; Keith A. Hruska, MD; Anne M. Beck, MD; S. Paul Hmiel, MD, PhD; Sun-Young Ahn, MD; Thomas Keefe Davis, MD, and Michael Seifert, MD; 454-6043

Location: St. Louis Children's Hospital

Elective Contact: Vikas Dharnidharka, MD, MPH, 454-6043

Other Information: Students report to Danielle Janek, 286-1574, Tenth Floor Northwest Tower, Cubicle 1021, 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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, 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.

Student time distribution: Inpatient 50%, Outpatient 40%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: 12-15

On call/weekend responsibility: None

#### M65 876 PEDIATRIC LUNG TRANSPLANTATION

Instructor(s): Stuart C. Sweet, MD; Peter Michelson, MD; Albert Faro, MD; 454-2214

Location: St. Louis Children's Hospital

Elective Contact: Kim Tinsley, 454-2158

Other Information: Students should call 454-2158 prior to the start of elective for location and time.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

St. Louis Children's Hospital has the largest pediatric lung transplantation program 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.

Student time distribution: Inpatient 50%, Outpatient 40%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: 20-30

On call/weekend responsibility: None

#### M65 878 CLERKSHIP IN RURAL PRIMARY CARE PEDIATRICS

Instructor(s): Middy Estabrook, MD, 454-6299. Site Instructors: Kevin Blanton, MD, in Sikeston and Claudia Preuschoff, MD, in Cape Girardeau

Location: Sikeston or Cape Girardeau, MO

Elective Contact: Liz Scott, St. Louis Children's Hospital, 454-6299

Other Information: Students should call Liz Scott, 454-6299, at beginning of school year to indicate which rotation (Sikeston or Cape Girardeau) they have chosen, complete additional paperwork, and make housing reservations. Note: Must show current Tdap immunization before beginning of elective. Students should then report to their chosen site on their first day at 7:30 a.m.

Enrollment limit per period: 1 per site

Valid start weeks for two- or four-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, and 41.

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. Housing is available through SEMA ADHEC/Southeast Missouri Health Network at no cost to the student, however, reservations must be made early. Two-week or four-week blocks are available.

Student time distribution: Inpatient 10%, Outpatient 90%; Primary Care 100%

Major teaching responsibility: Single attending

Patients seen/weekly: 25-50

On call/weekend responsibility: Call with instructor, not in-house call

#### M65 880 QUALITY OF CARE THROUGH HEALTH INFORMATICS

Instructor(s): Feliciano Yu, MD, 454-2808

Location: St. Louis Children's Hospital, Suite 3S36

Elective Contact: Leslie Frandsen, 454-2724

Other Information: Students report to Dr. Yu's office, Suite 3S36, St. Louis Children's Hospital, 9:00 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21,29, 33, and 41.

Health Informatics lies at the intersection of information science, computer science and health care delivery. It is an emerging scientific field that deals with biomedical data, information and knowledge - their storage, retrieval, and optimal use for problem solving and decision making. It touches on all basic and applied fields in biomedicine and is closely tied to modern healthcare communication and information technologies, such as Electronic Health Records (EHR). EHRs are fast becoming ubiquitous in the clinical settings. These systems offer the greatest potential for practice-based learning and improvement as well as research. In this elective, the student will be exposed to the concepts and application of health informatics as it relates to improving the quality of care. The first week will involve a tour of the institution's health informatics infrastructure (i.e., clinical information systems, clinical decision support, electronic health records, etc.) and organizational structures that impact quality; didactics on health informatics and quality improvement; and real-world exposure to health informatics and quality improvement activities. The second week will involve a self-directed study on real clinical issues and its potential for process improvement. The major emphasis of this elective is to increase the student's awareness to a systems-based approach to improving quality of healthcare. The student will be evaluated by the attendance, level of participation as well as on a 1-2 page deliverable at the end of the rotation, describing a real-world clinical issue that is appropriate for quality improvement. At the end of the rotation, the student will have gained practical knowledge and exposure to health informatics and how it relates to improving the care delivery process.

Student time distribution: Inpatient 10%, Outpatient 10%, Conferences/ Lectures 80%; Primary Care 0%, Subspecialty Care 100%

Major teaching responsibility: Feliciano Yu, MD

Patients seen/weekly: None

On call/weekend responsibility: None

# Research

(M65 900)

**Ana Maria Arbelaez, MD**, Tenth Floor Northwest Tower, 286-1138. Clinical Research in Diabetes Mellitus. Clinical research studies on hypoglycemia associated autonomic failure in patients with type 1 diabetes mellitus and on cystic fibrosis related diabetes.

**Charles E. Canter, MD**, Eighth Floor Northwest Tower, Division of Cardiology, 454-6095. Single-center and multi-center clinical studies and trials in pediatric cardiomyopathy, heart failure, and heart transplantation.

**F. Sessions Cole, MD**, and Aaron Hamvas, MD, Eighth Floor Northwest Tower and Fifth Floor McDonnell Pediatric Research Building, 454-6148. Using population-based data based and case-control data bases, our laboratory focuses on understanding the contribution of genetic variation in candidate genes of the pulmonary surfactant metabolic pathway (surfactant protein B, surfactant protein C, and ABCA3), with neonatal respiratory distress syndrome (disease severity and pulmonary surfactant metabolic phenotype).

**Allan Doctor, MD**, Fifth Floor MPRB, 454-2527. Role of Erythrocytes in Pathologic Vascular Signaling. We employ several novel experimental platforms to pursue a range of basic, translational, and clinical studies exploring (1) the role of erythrocytes in context-responsive metabolism of vasoactive effectors in flowing blood; (2) molecular control of antioxidant defense in erythrocytes; (3) the role of acquired injury to normal erythrocytes in the pathophysiology of acute lung injury and multiple organ failure syndrome; and (4) the impact of genetic abnormalities in erythrocytes upon antioxidant defense and vascular signaling (modeled by sickle cell anemia). Query is modeled on many levels from isolated proteins - cell culture - isolated organ - whole mouse - to studies in humans. <http://research.peds.wustl.edu/>.

**Jennifer Duncan, MD**, Third Floor MPRB, 747-0802. Understanding the Transgenerational Impact of Maternal Nutrition. Our lab uses *Drosophila melanogaster* as a model system to evaluate the impact of maternal caloric excess on metabolism and mitochondrial function in offspring. We are currently pursuing epigenetic mechanisms, specifically the role of histone modification, for altering gene expression. In addition, we are evaluating the molecular mechanisms underlying triglyceride excess in the offspring and are evaluating tissue specific mitochondrial function. This elective is for students interested in research in any of these areas.

**Stephanie A. Fritz, MD**, MSCI, Room 10125 Northwest Tower, 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. Our lab also explores microbial virulence as well as the host immune response to staphylococcal toxins implicated in the pathogenesis of CA-MRSA in patients across a spectrum of disease states. Our goal is to develop novel approaches for the prevention of community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infections.

**Matthew Goldsmith, MD**, Room 7108 McDonnell Pediatric Research Building, 286-2769. Growth Control and Regeneration in Zebrafish. All of our patients are growing. Indeed, it's the sine qua non of pediatric medicine that distinguishes us from all other physicians. The research efforts of our laboratory center on understanding the biology of growth and regeneration. Growth control and the development of proper size and form is a fundamental problem for growing children, moreover multiple pediatric diseases result in undergrowth, overgrowth or dysregulated growth (i.e. structural birth defects). In addition, while many

animals are capable of extensive regeneration, the ability of diseased or damaged tissues and organs to regenerate in humans is quite limited.

We are using the zebrafish, *Danio rerio*, as a model system for studying the biology of growth and regeneration. Current studies are focused on: (1) Using fin overgrowth mutants already identified in forward genetic screens (e.g. *rapunzel*) to help dissect the genetics of growth control pathways; (2) Using forward genetic and pharmacologic screens to identify novel pathways/molecules important in organ regeneration, and; (3) Understanding how the nutritional environment is integrated into an overall hierarchy of growth regulatory signals.

An elective is offered for students wishing to pursue research on one of the three topics described above.

**David B. Haslam, MD**, Room 6107 McDonnell Pediatric Research Building, 286-2888. Mechanisms of disease caused by bacterial toxins. Research focuses on the binding and intracellular transport of shiga toxins within human cells. An area of particular interest is the genetic and evolutionary basis for human susceptibility to shiga toxins. In addition, research is examining the ability of shiga toxins to gain access to the cytoplasm by exploiting normal quality control mechanisms in the endoplasmic reticulum.

**Robert J. Hayashi, MD**, 9S St. Louis Children's Hospital, 454-4118. Clinical research interests include stem cell transplantation and its complications including Post Transplant Lymphoproliferative Disease and long-term side effects of therapy.

**Keith A. Hruska, MD**, Fifth Floor McDonnell Pediatric Research Building, 286-2772. The research in the laboratory focuses on chronic kidney disease (CKD) and its complications of skeletal frailty, cardiovascular disease and vascular calcification. The lab has discovered important new pathologic mechanisms of disease leading to vascular calcification through 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**, Third Floor McDonnell Pediatric Research Building, 286-2797. 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**, Room 6106 McDonnell Pediatric Research Building, 286-2710. The laboratory studies the molecular mechanisms by which Gram-negative pathogens such as uropathogenic *Escherichia coli* downregulate host immune responses, and how integral outer membrane proteins participate in virulence. In addition, we are designing and engineering novel nanoparticle-based antimicrobial therapies for use in recurrent and complicated urinary tract infections. Finally, we participate in translational studies of community-associated methicillin-resistant *Staphylococcus aureus* infections led by Dr. Stephanie Fritz. Our goal is to discover new avenues for the development of interventions that will prevent and treat bacterial infections affecting children.

**Terrie Inder, MD**, Tenth Floor Northwest Tower, 454-2200. Newborn Brain Injury and Development. Clinical and experimental studies on the nature and timing of brain injury and alterations in brain development in high risk infants, including prematurely born and asphyxiated infants. Studies focus predominantly clinically on newborn infants in the NICU at St Louis Children's Hospital but are complimented by animal models. Understanding in the human infant is assisted by technologies such as electroencephalography and MR scanning, the results of which are also related to neurodevelopmental outcomes. Neuroprotective strategies, such as hypothermia and treatment of 'clinically silent' seizures in infants are also being undertaken in trials within our laboratory.

**David M. Jaffe, MD**, Ninth Floor Northwest Tower, Suite 900C, Room 9105, 454-2341. Clinical research interests are: (1) occult bacteremia-identification, clinical decision making; (2) trauma?injury prevention, head and cervical spine injuries; (3) health care delivery system?role of the pediatric emergency department; and (4) pain management.

**S. Celeste Morley, MD, PhD**, Room 6105 McDonnell Pediatric Research Building, 286-2136. Our laboratory investigates the molecular mechanisms underlying immune cell signaling and trafficking using mouse models. We hope to identify molecules 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.

**Audrey R. Odom, MD, PhD**, Room 6108 McDonnell Pediatric Research Building, 747-2370. Research focuses on the basic biology of the parasite that causes severe malaria, *Plasmodium falciparum*. An area of particular interest is the metabolic pathway of isoprenoid biosynthesis, which is essential for parasite growth. Projects include exploration of isoprenoid biology using genetic and biochemical techniques, as well as development of assays and screens for new antimalarial agents.

**Jose A. Pineda, MD**, Tenth Floor, Northwest Tower, (Patient Oriented Research Unit), 286-1246. Mechanisms of brain injury in children. Our clinical research efforts focus on studies aimed at further understanding the complex pathophysiology of acute brain injury in children, with special emphasis on traumatic brain injury (TBI). In collaboration with a multidisciplinary team of investigators, our research aims at identifying neuroprotective therapies for severe TBI in children. We utilize advanced imaging techniques (MRI), physiological monitoring and biochemical analysis of clinical samples.

**Scott Saunders, MD, PhD**, 4105 McDonnell Pediatric Research Building, 286-2850. Investigative efforts are aimed at understanding the molecular basis of development through cell and molecular biological approaches, including transgenic and knockout mouse technology. A particular focus is on the role of a class of tissue- and cell-type specific glycoproteins (heparan sulfate proteoglycans) that play a unique and essential role in the regulation of growth factor and morphogen signaling during human development and diseases.

**Alan L. Schwartz, MD, PhD**, 3S36 St. Louis Children's Hospital, 454-6005. Investigative efforts are aimed at understanding: (1) the biology of cell surface receptors including biochemical and molecular dissection of the mechanisms responsible for receptor-mediated endocytosis of blood coagulation proteins; and (2) the regulation of intracellular protein turnover.

**Shalini Shenoy, MD**, 9S St. Louis Children's Hospital, 454-6018. Investigation of novel reduced intensity transplant strategies for pediatric non-malignant disorders and the immunologic basis of graft versus host disease and graft rejection.

**Gregory A. Storch, MD, Richard S. Buller, PhD**, and staff, 2N52 St. Louis Children's Hospital, 454-6079. Rapid diagnosis Role of viral and other unconventional infections. The Diagnostic Virology Laboratory is studying the use of the polymerase chain reaction and oligonucleotide sequencing formolecular techniques in the diagnosis of infections caused by viruses and other unconventional pathogens, and the detection of resistance. Our laboratory is interested in developing new diagnostic tests and using them to antimicrobialexpand clinical knowledge of infections caused by infectious agents. Detection of undiscovered for which existing diagnostic tests are suboptimal. We are also interested in discovery of novel pathogens in another area of interest. Recently, we have been using virus-specific PCR assays and high throughput nucleotide sequencing to study viral causes of fever in young children. We are now expanding those studies to investigate immunocompromised children.

**Robert C. Strunk, MD**, Tenth Floor Northwest Tower, 4990 Children's Place, 454-2694. Clinical studies of patients with asthma aimed at understanding the mechanisms of death due to asthma in children.

**Phillip I. Tarr, MD**, 6103 McDonnell Pediatric Research Building, 286-2848. Research in Pediatric Gastroenterology and Nutrition. Students have opportunities to participate 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), inflammatory bowel diseases (Crohn's Disease and ulcerative colitis), infections of the gastrointestinal tract (diarrhea), acute liver failure, Hirschsprung Disease, diarrhea, necrotizing enterocolitis, and functional gastrointestinal disorders. Short and long term projects can be arranged around these and other related efforts. The exact nature of the project depends on the time that the student can contribute to the effort, and the availability of any of the Division faculty, who all have established track records as mentors. Interested students should contact any of our faculty, or Dr. Tarr, to discuss the possibilities.

**Neil H. White, MD, CDE**, Ninth Floor Northwest Tower, St. Louis Children's Hospital, 286-1157. Our work involves patient-oriented research in the management of diabetes in children. Arrangements can be made for involvement in or development of projects aimed at improving outcome or prevention of diabetes mellitus and its complications.

**David B. Wilson, MD, PhD**, 3102 McDonnell Pediatric Research Building, 286-2834. Research is focused on the molecular switches that regulate control genes during early embryonic development and differentiation.

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Mary R Morgan, MD

Instructor in Clinical Pediatrics

Sharon Celeste Morley, MD, PHD

Assistant Professor of Pediatrics

Daniel R. Morra

Instructor in Clinical Pediatrics

Lisa Mae Moscoso, MD, PHD

Assistant Professor of Pediatrics

Margaret M Mueller

Instructor in Clinical Pediatrics

Janet Gwen Mueller, MD

Assistant Professor of Clinical Pediatrics

Steven Mueth

Instructor in Clinical Pediatrics

Monalisa Mullick, MD

Instructor in Pediatrics

Manohara Munimuddappa

Instructor in Clinical Pediatrics

Kevin J Murphy, MD

Professor of Clinical Pediatrics

Joshua J Murphy, MD

Assistant Professor of Pediatrics

Gian Marco Musarra, MD

Instructor in Pediatrics

John A Myers

Instructor in Clinical Pediatrics

Venkata S. Nagireddi

Instructor in Clinical Pediatrics

Tasnim A Najaf, MD

Assistant Professor of Pediatrics

Ayesha Najib

Instructor in Clinical Pediatrics

Alison C Nash, MD

Professor of Clinical Pediatrics

Lynn G Nelms

Instructor in Clinical Pediatrics

April Erwin Nesin

Instructor in Clinical Pediatrics

Tara Marie Neumayr, MD

Instructor in Pediatrics

**Khai Ngo, MD**

Instructor in Clinical Pediatrics

**Ellen Margaret Nicastrò**

Instructor in Clinical Pediatrics

**Ramzi T Nicolas**

Adjunct Assistant Professor of Pediatrics

**Michael Justin Noetzel, MD**

Professor of Pediatrics

**David Craig Norman, MD**

Assistant Professor of Clinical Pediatrics

**Karen K Norton, MD**

Associate Professor of Clinical Pediatrics

**Douglass Susumu Nozaki, MD**

Instructor in Clinical Pediatrics

**Audrey R Odom, PHD, MD**

Assistant Professor of Pediatrics

**Justin O Ogbevdèn, MBBS**

Instructor in Clinical Pediatrics

**Jerome H O'Neil Jr, MD**

Assistant Professor of Clinical Pediatrics

**Valerie Orrico**

Instructor in Clinical Pediatrics

**Rachel C. Orscheln, MD**

Assistant Professor of Pediatrics

**Cynthia M. Ortinau, MD**

Instructor in Pediatrics

Irma I Ortiz-Arroyo, MD

Assistant Professor of Clinical Pediatrics

Amir Mordechai Oryan

Visiting Assistant Professor of Pediatrics

Alison H Oswald

Instructor in Clinical Pediatrics

Jennifer Ann Panasci

Instructor in Clinical Pediatrics

Tae Sung Park, MD

Professor of Pediatrics

Anand C Patel, MD

Assistant Professor of Pediatrics

Jose A Pineda Soto, MD

Associate Professor of Pediatrics

Christopher James Pingel, MD

Instructor in Pediatrics

Kathryn L. Plax, MD

Associate Professor of Pediatrics

Daniel S Plax, MD

Assistant Professor of Clinical Pediatrics

Santiago Boye Plurad Jr, MD

Assistant Professor of Clinical Pediatrics

Juanita C Polito-Colvin, MD

Associate Professor of Clinical Pediatrics

Claudia Preuschoff, MD

Instructor in Clinical Pediatrics

Cassandra Michelle Pruitt, MD

Assistant Professor of Pediatrics

Peter J Putnam, MD

Assistant Professor of Clinical Pediatrics

Jenna M Putzel

Instructor in Clinical Pediatrics

Robert Louis Quaas, MD

Instructor in Clinical Pediatrics

Kimberly S Quayle, MD

Associate Professor of Pediatrics

Jennifer Quinn, MD

Instructor in Clinical Pediatrics

Mohammad H Rahman

Instructor in Clinical Pediatrics

Vidya Raman

Instructor in Clinical Pediatrics

Pathmawathy T Ramesvara, MS

Instructor in Clinical Pediatrics

Rakesh Rao, MBBS, MD

Assistant Professor of Pediatrics

Emanuel Rashed, MD

Instructor in Clinical Pediatrics

Sheryl S Ream, MD

Instructor in Clinical Pediatrics

Neil F. Rebbe, PHS, MD

Instructor in Clinical Pediatrics

Timothy Reed

Instructor in Clinical Pediatrics

Phillip D Reichert

Instructor in Clinical Pediatrics

Catherine R Remus, MSN, MD

Assistant Professor of Clinical Pediatrics

George H Rezabek, DOST

Instructor in Clinical Pediatrics

Edward K Rhee, MD

Adjunct Assistant Professor of Pediatrics

Katherine Rivera-Spoljaric, MD, MS

Assistant Professor of Pediatrics

William L. Rives, MS, MD

Assistant Professor of Pediatrics

Janis B Robinson, MA, MD

Associate Professor of Clinical Pediatrics

Sandeep Rohatgi, MD

Instructor in Clinical Pediatrics

James R Rohrbaugh, MD

Associate Professor of Clinical Pediatrics

Joan Lee Rosenbaum, MS, MD

Professor of Pediatrics

Isabel L Rosenbloom, MD

Associate Professor of Clinical Pediatrics

Daniel B Rosenbluth, MD

Professor of Pediatrics

Kelly Ross, MD

Assistant Professor of Pediatrics

William J Ross, MD

Associate Professor of Clinical Pediatrics

**Robert J Rothbaum, MD**

Centennial Professor of Pediatrics

**Ella Rozin**

Instructor in Clinical Pediatrics

**Joshua Bennett Rubin, MS, PHD, MD**

Associate Professor of Pediatrics

**Christina M Ruby-Ziegler, MD**

Assistant Professor of Clinical Pediatrics

**Martin D Rudloff, MD**

Assistant Professor of Clinical Pediatrics

**David Rudnick, PHD, MD**

Associate Professor of Pediatrics

**Daniel G. Rudolph, MD**

Instructor in Clinical Pediatrics

**Karen Elizabeth Ruecker, MD**

Instructor in Clinical Pediatrics

**Diane Mary Rup, MA, MD**

Instructor in Clinical Pediatrics

**Lisa A Ryan**

Instructor in Clinical Pediatrics

**Charles Michael Samson, MD**

Assistant Professor of Pediatrics

**Gretchen A Sander, MD**

Instructor in Clinical Pediatrics

**Heidi L Sandige, MA, MA1, MD**

Instructor in Pediatrics

Diana M Sater-Roukoz

Instructor in Clinical Pediatrics

Scott Saunders, PHD, MD

Associate Professor of Pediatrics

Brian J. Saville, MD

Instructor in Clinical Pediatrics

Blaine M Sayre, MD, M PH

Professor of Clinical Pediatrics

Joseph Schachter, MD

Assistant Professor of Clinical Pediatrics

Bradley L Schlaggar, PHD, MD

Professor of Pediatrics

Howard J Schlansky, MD

Instructor in Clinical Pediatrics

Margaret Ann Schmandt, MD

Associate Professor of Clinical Pediatrics

Martin P Schmidt, MD

Assistant Professor of Clinical Pediatrics

David Schnadower, MD, M PH

Assistant Professor of Pediatrics

Jacquelyn C Schnidman, MD

Instructor in Clinical Pediatrics

Laura Graves Schuettpelz, PHD, MD

Assistant Professor of Pediatrics

Colleen Erika Seematter

Instructor in Clinical Pediatrics

Michael Edward Seifert



Assistant Professor of Clinical Pediatrics

Martha Papay Sewall, MD

Instructor in Clinical Pediatrics

Purvi Shah, MD

Assistant Professor of Pediatrics

Shabana Shahanavaz, MD

Assistant Professor Pediatrics

Rachel E. Shakofsky, MD

Instructor in Pediatrics

Larry J Shapiro, MD

Spencer T and Ann W Olin Distinguished Professor of Pediatrics

Eleanor Maria Shaw, MD

Assistant Professor of Clinical Pediatrics

Shalini Shenoy, MBBS, MD

Professor of Pediatrics

Ross William Shepherd, MBBS, MD

Adjunct Professor of Pediatrics

Marwan Shinawi, MD

Associate Professor of Pediatrics

Min-Yi Katherin Shiue, MD

Instructor in Clinical Pediatrics

Michael Shoykhet, PHD, MD

Instructor in Pediatrics

Marilyn J Siegel, MD

Professor of Radiology in Pediatrics

Jennifer N Silva, MD

Assistant Professor of Pediatrics

Manuel De Jesus Silva-Carmona, MD

Instructor in Pediatrics

Connie Darlene Simmons

Instructor in Clinical Pediatrics

Paul S Simons, MD

Associate Professor of Pediatrics

Kathleen Elizabeth Simpson, MD

Assistant Professor of Pediatrics

Gautam K Singh, MBBS, MD

Professor of Pediatrics

Carl Jeffrey Sippel, PHD, MD

Assistant Professor of Clinical Pediatrics

Kelsey Alayne Sisti, MD

Instructor in Pediatrics

Harold B Sitrin, MD

Assistant Professor of Clinical Pediatrics

Alan Joseph Skoultchi, MS, MD

Instructor in Clinical Pediatrics

Carolyn Anne Delaney Smith, MD

Assistant Professor of Pediatrics

Joshua C Smith

Instructor in Clinical Pediatrics

Matthew D Smyth, MD

Associate Professor of Pediatrics

Nareshkumar J Solanki

Assistant Professor of Clinical Pediatrics

Umang Sood, MD

Instructor in Pediatrics

Robert D Spewak, MD

Instructor in Clinical Pediatrics

Craig A Spiegel, MD

Assistant Professor of Clinical Pediatrics

Philip Charles Spinella, MD

Associate Professor of Pediatrics

Jennifer E. Sprague, MD, PHD

Instructor in Pediatrics

Mythili Srinivasan, MS, PHD, MD

Assistant Professor of Pediatrics

Danielle R St Leger

Instructor in Clinical Pediatrics

Sarah A Stanage, MD

Instructor in Pediatrics

Norman P Steele, MD

Instructor in Clinical Pediatrics

Randall S Sterkel, MD

Assistant Professor of Clinical Pediatrics

Lynne M Sterni, MD

Assistant Professor of Pediatrics

Anita R Stiffelman, MD

Associate Professor of Clinical Pediatrics

Janis Marie Stoll, MD

Instructor in Pediatrics

Gregory A Storch, MD

Ruth L. Siteman Professor of Pediatrics

Robert H Strashun, MA, MD

Associate Professor of Clinical Pediatrics

Susan Kay Strecker, MA, DPT

Assistant Professor of Pediatrics

M. Anne Street, MA, MD

Assistant Professor of Clinical Pediatrics

Robert C Strunk, MD, MS

Professor of Pediatrics

Judith M. Stucki-Simeon, MD

Instructor in Clinical Pediatrics

Rosa M Suarez-Solar, MD

Instructor in Clinical Pediatrics

Lisa Suffian, MD

Instructor in Clinical Pediatrics

Toshifumi Sugatani, DDENT, PHD

Research Instructor in Pediatrics

Stuart C Sweet, PHD, MD

Professor of Pediatrics

Amanda Sweetland

Instructor in Clinical Pediatrics

Susan C. Sylvia

Instructor in Clinical Pediatrics

Aline T. Tanios, MD

Assistant Professor of Pediatrics

Phillip Irwin Tarr, MD

Melvin E Carnahan Professor of Pediatrics

Kristen A Terrill

Instructor in Clinical Pediatrics

**Donna T Thackrey, MD**

Instructor in Clinical Pediatrics

**Stephen Thierauf**

Instructor in Clinical Pediatrics

**Kwee L Thio, PHD, MD**

Associate Professor of Pediatrics

**Scott M. Thomas, MD**

Instructor in Pediatrics

**Mary A Tillman, MD**

Professor of Clinical Pediatrics

**Robert W Tolan Jr., MA, MD**

Instructor in Clinical Pediatrics

**Scott A. Trail, MD**

Instructor in Clinical Pediatrics

**Indi Trehan, MD, MPH**

Assistant Professor of Pediatrics (Pending Executive Faculty Approval)

**Garland R Tschudin, MD**

Instructor in Clinical Pediatrics

**Michael P Turmelle, MD**

Associate Professor of Pediatrics

**Yumirle Padron Turmelle, AA, MD**

Assistant Professor of Pediatrics

**Robert Lawrence Tychsen, MD**

Professor of Ophthalmology and Visual Sciences in Pediatrics

**April L Tyus**

Instructor in Clinical Pediatrics

Elizabeth C Utterson, MD

Assistant Professor of Pediatrics

Akshaya J Vachharajani, MBBS, MD

Associate Professor of Pediatrics

George Frederick Van Hare III, MD

Louis Larrick Ward Professor of Pediatrics

Michelle B Vanstone, MA, MD

Instructor in Pediatrics

Laird Henry Vermont

Instructor in Clinical Pediatrics

Mary Kristin Voellinger, MD

Instructor in Clinical Neurology

Jean V Wagner

Instructor in Clinical Pediatrics

William B. Waldrop, MD

Assistant Professor of Pediatrics

Colleen M Wallace, MD

Assistant Professor of Pediatrics

Jennifer Anne Wambach, MD

Assistant Professor of Pediatrics

Brad W. Warner, MD

Professor of Pediatrics

Barbara B. Warner, MS, MD

Professor of Pediatrics

Michael S Watson, MS, PHD

Adjunct Professor of Pediatrics

Benjamin David Weintraub

Instructor in Clinical Pediatrics

Don Weiss, MD, MS

Instructor in Clinical Pediatrics

Valerie B. Welch, MD

Instructor in Clinical Pediatrics

Jennifer Corinne Wessman, MD

Instructor in Pediatrics (Pending Dean's Approval)

Alexander Weymann, MD

Assistant Professor of Pediatrics

Neil Harris White, MD

Professor of Pediatrics

Frances V White, MS, MD

Associate Professor of Pediatrics

Andrew J White, MS, MD

Assistant Professor of Pediatrics

Nicole Izetta White, MD

Instructor in Clinical Pediatrics

Karen Whiteside

Instructor in Clinical Pediatrics

Michael Peter Whyte, MD

Professor of Pediatrics

Karen Mori Wickline, MD

Associate Professor of Pediatrics

Denise Wilfley, PHD

Professor of Pediatrics

Kristine G Williams, MD, MPH

Assistant Professor of Pediatrics

Marcia Christine Willing, MS, D SC, MD

Professor of Pediatrics

David B Wilson, MD, PHD

Associate Professor of Pediatrics

Loralee Jane Wold, MD

Instructor in Clinical Pediatrics

Patricia Ann Wolff, MD

Professor of Clinical Pediatrics

Michael Wong, MD, PHD

Associate Professor of Pediatrics

Lianne Jane Woodward, MS, PHD

Professor of Pediatrics

Jeffrey M Wright, MD

Assistant Professor of Clinical Pediatrics

Kathie R Wuellner, MD

Associate Professor of Clinical Pediatrics

Hayley Wurzel

Assistant Professor of Clinical Pediatrics

Kristine M Wylie, PHD

Research Instructor in Pediatrics

Christina Marie Yadao

Instructor in Clinical Pediatrics

Kelvin A Yamada, MD

Professor of Pediatrics

Mona Yassin, MD

Instructor in Clinical Pediatrics

Julia Catherine Young



Instructor in Clinical Pediatrics

**Cecilia H Yu, MD**

Assistant Professor of Clinical Pediatrics

**Feliciano Buenviaje Yu Jr, MD, MHS, M PH**

Associate Professor of Pediatrics

**Craig Mitchell Zaidman, MD**

Assistant Professor of Pediatrics

**John M Zempel, PHD, MD**

Associate Professor of Pediatrics

**Aurora Denise Zertuche-Sanchez**

Instructor in Clinical Pediatrics

**Amy Christine Zimmermann, MD**

Instructor in Clinical Pediatrics

**Andrew C. Zuckerman**

Instructor in Clinical 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 Psychiatry

The **Division of Child Psychiatry** 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 supervision of a fellow and attending physician.

# MD Courses

## Second Year

### M85 676A DISEASES OF THE NERVOUS SYSTEM: PSYCHIATRY

Instructor: Melissa A. Harbit, MD, 362-2440

This course emphasizes the diagnosis of major psychiatric illnesses in adults and children. Psychiatric diseases are described in terms of epidemiology, clinical presentation, natural history, genetics, differential diagnosis and clinical management. Interviewing techniques and performance of the mental status exam will be demonstrated by patient interviews.

## Third Year

### M85 770 PSYCHIATRY CLERKSHIP

Instructor: Fay Y. Womer, MD, 362-2469

Up to 11 students spend four weeks on the inpatient psychiatry service of Barnes-Jewish Hospital (BJH). Students also will have experiences in other settings, including the psychiatry consultation and electroconvulsive therapy services at BJH and the outpatient psychiatry services at the Center for Outpatient Health (COH), BJC Behavioral Health and/or Washington University Child and Adolescent Psychiatry Center. Students evaluate and treat patients under the supervision of house staff and attending physicians, attend teaching conferences including small group sessions with a psychiatrist to learn psychiatric interviewing and the mental status exam, and complete other assigned learning experiences. See <https://medportal.wustl.edu> for further details and to review the objectives and expectations of the clerkship.

### M85 771 AMBULATORY CLERKSHIP: PSYCHIATRY FOR GENERALISTS

Instructor: Fay Y. Womer, MD, 362-2469

Students may elect to pursue their ambulatory medicine selective through the Department of Psychiatry. Students will make an oral presentation on a relevant clinical topic of their choice and participate in clinical duties. Students may request one of the following clinical options: outpatient adult psychiatry at Barnes-Jewish Hospital (BJH) Wohl Clinic or psychiatry consultation service at BJH, or outpatient child and adolescent psychiatry at Washington University Child and Adolescent Psychiatry Center. See <https://medportal.wustl.edu/> for further details.

## Fourth Year

### Electives

#### M85 805 PSYCHIATRY CONSULT SERVICE

Instructor(s): Monica Bishop, MD, 362-2469

Location: 4410, Renard Building

Elective Contact: Tammie Repko, 362-2469

Other Information: Students should page the consult team at 848-2402, 8:00 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The fourth-year student will work closely with the consult resident and consult team that also includes the

attending and advanced practice nurse in the evaluation and treatment of patients referred to the psychiatry consult service. Students will attend weekly consult/liaison teaching conferences during the summer, and Grand Rounds and Research Rounds in non-summer months.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents and advanced practice nurses

Patients seen/weekly: 3 workups per week expected; follow up to 10 or more

On call/weekend responsibility: None

#### M85 810 OUTPATIENT COMMUNITY PSYCHIATRY

Instructor(s): Brianne Disabato, MD, 362-1222

Location: The Psychiatry Clinic and community sites

Elective Contact: Brianne Disabato, MD, 362-1222

Other Information: Location of first meeting will be specified in a mailing.

Enrollment limit per period: minimum 2; maximum 3.

Valid start weeks for four-week blocks are: Weeks 17 and 21.

This is a flexible clerkship where effort is made to tailor the activities to the students' interests. Students will assist in diagnosis and treatment of adult psychiatric clinic patients. The patients present with a wide variety of psychological and interpersonal problems, as encountered in an everyday office practice. In this setting, the student will have the opportunity to learn a variety of treatment techniques under supervision.

Student time distribution: Outpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attending Psychiatrist and psychiatry residents

Patients seen/weekly: 20

On call/weekend responsibility: None

#### M85 836 CLINICAL PSYCHIATRY - INPATIENT PSYCHIATRIC SERVICE

Instructor(s): Michael Jarvis, PhD, MD, 362-1816

Location: Barnes-Jewish South

Elective Contact: Michael Jarvis, PhD, MD, 362-1816

Other Information: Contact Cindy Bander prior to first day of elective at 362-1816.

Enrollment limit per period: 3

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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.

Student time distribution: Inpatient 85%, Conferences/Lectures 15%

Major teaching responsibility: Clinical attending, teaching attendings and residents

Patients seen/weekly: 5-15

On call/weekend responsibility: Every fifth night

#### M85 840 CHILD PSYCHIATRY

Instructor(s): Anne Glowinski, MD, 286-2217

Location: Montclair Building, 24 S. Kingshighway, Outpatient Psychiatry Clinic

Elective Contact: Anne Glowinski, MD, 286-2217

Other Information: Interested students should contact Dr. Anne Glowinski at 286-2217 in the Department of Psychiatry.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 25, 29, 33, 37, and 41 or contact Dr. Glowinski for modifications.

This elective in child psychiatry utilizes the Child Psychiatry Outpatient Clinic and the consult-liason service at St. Louis Children's Hospital. It provides experience in age-appropriate diagnostic and treatment methods in children and adolescents. A paper on topic of student's choosing is required.

Student time distribution: Outpatient 75%, Conferences/Lectures 25%; Subspecialty Care 100%

Major teaching responsibility: Attendings and fellows

Patients seen/weekly: 15-20

On call/weekend responsibility: No, but can shadow fellow during call if requested by student

#### M85 870 PSYCHIATRIC ONCOLOGY

Instructor(s): Monica Bishop, MD, 362-2469

Location: Center for Outpatient Health (COH), Suite 441

Elective Contact: Tammie Repko, 362-2469

Other Information: Students should contact Rita Hauer, 362-4270, prior to the first day to coordinate meeting time/place.

Enrollment limit per period: 3

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This elective will provide additional training related to consultation-liaison psychiatry with a special emphasis on caring for patients with cancer. The Institute of Medicine has identified the need to increase the availability of psychiatric services in the setting of cancer treatment, and this elective will allow students to gain additional experience working with inpatients and outpatients receiving treatment at Siteman Cancer Center. This elective will allow students to learn about the management of end of life issues, and experience the satisfaction of providing comfort to patients and families via psychotherapy and pharmacology. Opportunities also exist to focus on specific conditions, such as gynecological cancers. Dr. Bishop and Marty Clarke, PhD, PA-C will directly supervise students providing a unique opportunity for individualized teaching and autonomy.

Student time distribution: Inpatient 60%, Outpatient, 30%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Monica Bishop, MD, (coursemaster) and Marty Clarke, PhD, PA-C

Patients seen/weekly: 12

On call/weekend responsibility: None

#### M85 880 SCHIZOPHRENIA PRECURSORS & PRODROMAL STATES

Instructor(s): Angela M. Reiersen, MD, 747-6793

Location: Dr. Reiersen's office, Suite 1153-Room B, East Building and the Washington University Child and Adolescent Psychiatry Clinic at 24 S. Kingshighway (Montclair Building).

Elective Contact: Angela M. Reiersen, MD, 747-6793, [reiersea@wustl.edu](mailto:reiersea@wustl.edu)

Other Information: Students report to Dr. Reiersen's office, Suite 1153-Room B, East Building, 9:30 a.m. first day of elective. Contact instructor prior to rotation to confirm schedule for first day.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This is an opportunity for trainees to gain experience in the evaluation of children, adolescents, and young adults with symptoms suggestive of a schizophrenia prodrome. The rotation would center around the 'First Contact Assessment Service', which evaluates patients who show characteristics suggestive of prodromal schizophrenia. Since the full symptoms of schizophrenia are often preceded by a wide range of

childhood behavioral & 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 & cognitive testing), participate in multidisciplinary case conferences discussing new evaluation cases, and observe follow-up clinic visits involving patients with psychotic and/or neurodevelopmental disorders. Trainee would also be required to write a literature review on a topic relevant to the rotation. Student time distribution: Outpatient 50%, Conferences/Lectures 50%; Subspecialty Care 100% Major teaching responsibility: Coursemaster and/or psychiatry attending Patients seen/weekly: 4 On call/weekend responsibility: None

#### M85 889 INTERVENTIONAL PSYCHIATRY

Instructor(s): Charles Conway, MD; Donald Bohnencamp, MD; Pilar Cristancho, MD, Nuri Farber, MD; Michael Jarvis, PhD, MD; Yvette Sheline MD; Dragan Svrakic PhD, MD; Charles Zorumski, MD, and ECT staff

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Charles Conway, MD, 362-1816

Other Information: Students should call Cindy Bander 362-1816 prior to scheduling the elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Interventional Psychiatry involves the application of ECT (Electroconvulsive Therapy), rTMS (Repetitive Transcranial Magnetic Stimulation) and VNS (Vagus Nerve Stimulation) in the treatment of medication-resistant psychiatric illness. 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 involved in the neuropsychiatric assessment of patients referred for ECT. In addition, the student will receive training in the application of ECT and in the clinical management of patients receiving inpatient and outpatient ECT. As cases become available, the student will be involved in rTMS and VNS evaluations and treatment. 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, including deep brain stimulation (DBS) and magnetic seizure therapy (MST).

Student time distribution: Inpatient 70%, Outpatient 20%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Charles Conway, MD

Patients seen/weekly: 20

On call/weekend responsibility: None

## Research

(M85 900)

**Andrey Anokhin, PhD**, Central Institute for the Deaf (CID) Building, Suite 1, 660 S. Euclid Ave, 286-2201. E-mail: [andrey@wustl.edu](mailto:andrey@wustl.edu). Genetics of the brain, behavior and psychopathology. This research elective is intended for students interested in cognitive neuroscience, biological psychology, psychophysiology, and behavior genetics in relation to psychopathology. Dr. Anokhin's laboratory is

investigating relationships between genes, brain, and behavior in order to better understand complex etiology of mental disorders. Our main focus is on "externalizing" spectrum of psychopathology characterized by deficits in inhibitory self-regulation including ADHD, conduct disorder, and addictive behaviors. We are particularly interested in the intermediate phenotypes, or "endophenotypes", mediating genetic risk for addiction such as impulsivity, risk taking, and abnormal affective processing of social-emotional information. In our laboratory-based studies with human volunteers, including twins, we investigate individual differences in brain activity using the recording of brain oscillation (event-related brain potentials, or ERPs) during the performance of different behavioral tasks. A subsample of our twin subjects also undergoes functional magnetic resonance imaging (fMRI) scanning. Other assessments used in the lab include psychiatric diagnostic interviews, personality questionnaires, neuropsychological tests, and collection of DNA samples. For example, an ongoing longitudinal study of adolescent twins explores developmental trajectories and genetic determinants of brain activity related to inhibitory control of behavior and processing of emotional information in order to identify prospective predictors of substance abuse and associated behavioral problems. Another twin study investigates the consequences of heavy drinking during adolescence by comparing neurocognitive functioning in twins who are discordant for heavy drinking. Interested students will be able to learn a variety of methods used in these studies, such as the recording and analysis of brain oscillations, event-related neural dynamics, startle response, and autonomic measures, administration of neuropsychological and behavioral tests, and statistical analysis of data. Format of this research elective may include: (1) directed reading; (2) participation in laboratory experiments involving human subjects; (3) analysis of existing data from various research projects; (4) designing and piloting new behavioral tests and ERP experiments. Qualifications: Reliability and responsibility, ability to commit specified amount of time per week and work on schedule which can be negotiated on an individual basis, and good computer skills.

**Deanna M Barch, PhD**, 6612 Renard Hospital, 747-2160. Cognitive and Affective Neuroscience of Schizophrenia and Depression. 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 gaining experience in the techniques of assessing cognitive and emotional function using behavioral and brain imaging methods.

**Laura Jean Bierut, MD**, Maternity Building, 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 at risk for developing nicotine, alcohol and other substance dependence and protect others from the development of these disorders.

**Kevin J. Black, MD**, 4525 Scott Ave., Room 2106, 362-5041, E-mail: [Kevin@wustl.edu](mailto: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. See [www.nil.wustl.edu/labs/kevin](http://www.nil.wustl.edu/labs/kevin) for examples of past research.

**Alison Goate, DPhil**, Ninth Floor, BJH - 1H Building, 362-8691. Genetic studies of Alzheimer's disease. Studies can involve laboratory-based projects on the genetics or cell biology of Alzheimer's disease or clinical studies involving the collection of data through telephone or personal interview of individuals with a family history of dementia.

**Ginger E. Nicol, MD**, 4412 Renard Building, 362-5939. Clinical research concerning substrate (glucose and lipid) metabolism and the regulation of weight and body composition in persons with mental illness, particularly concerning the effect of psychotropic medications. Additional projects include the analysis of

large administrative data sets with respect to clinical prescribing and monitoring practices in antipsychotic-treated individuals, as well as the examination of clinical and cost effectiveness of novel service delivery paradigms to minimize medical comorbidity in mentally ill populations. 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

Rumi Kato Price, PhD, MPE\*, Kathleen B. Bucholz, PhD, MPE, Arpana Agrawal, PhD, Anne Glowinski, MD, MPE, Rick Grucza, PhD, MPE, Alexandre Todorov, PhD (\*Concentration program director), 4560 Clayton Rd., CID Building, 286-2282. Courses will be held at the Institute for Public Health TAB Bld starting in Jan, 2013. The Psychiatric and Behavioral Sciences Concentration, an integral component of the Master of Population Health Sciences (MPHS) accredited in WUSM and taught by Psychiatry faculty members, 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. With an emphasis on a clinical approach to psychiatric and addiction health research, training focuses on in-depth understanding of disease phenotypes, pathobiology and developmental trajectories; understanding the underlying biological and environmental factors and their interactions; understanding the role of psychiatric epidemiology in disease prevention and intervention; and evaluating psychiatric clinical treatment and management programs of psychopathology. A student has an option of applying for a MPHS degree program or taking appropriate courses as part of his/her training or academic program. A total of 18 credits are needed for this Concentration for a matriculated student. Currently available courses include: (1) Epidemiology of Psychiatric Disorders across the Lifespan (M19-561; Coursemaster, A. Glowinski, MD; 3 credits): This course takes an integrated developmental approach to the epidemiology, etiology and evolving nosology of psychiatric disorders. (2) Addictions and Addictive Behaviors (M19-562; Coursemaster, R. Grucza; 3 credits): This course provides an overview of the principles of substance-related addictions and the processes and mechanisms that underlie addiction. Students are 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. (3) Psychiatric Genetic Epidemiology (Coursemaster, A Todorov; I, 1 credit; II 2 credits): This two-part course provides an in-depth introduction to psychiatric genetic epidemiology, with a particular emphasis on the relevant methodology, study design and interpretation. Part I an introduction and assumes only basic knowledge of genetics or statistics on the part of the student; Part II has a basic science prerequisite. (4) Methods for Studying Global Burden of Diseases (Coursemaster, RK Price; 1 credit): This short course provides an overview of the current methods for studying global burden of medical and psychiatric diseases. In addition to understanding and applying the current methodology used in studying global burden of diseases, students will learn the updated knowledge of communicable and non-communicable chronic diseases including psychiatric and addiction diseases.

**Rumi Kato Price, PhD, MPE**, 4560 Clayton Rd., CID Building, 286-2282. The students and postdoctoral fellows will work closely with Dr. Price and her collaborators on ongoing research projects in substance abuse, psychiatric epidemiology, and human-genome epidemiology. The current projects include: a longitudinal study assessing the impact of war experience and trauma spectrum disorder (posttraumatic stress disorder (PTSD), mild-traumatic brain injury (mTBI), substance abuse) on National Guard service members and their families after service members deployment to Iraq and Afghanistan; prevention and intervention programs on this and other veteran populations; a 30-year longitudinal study of the impact of drug abuse and war trauma, PTSD and suicidality; epidemiology and human-genome epidemiology studies focusing on models for substance abuse and psychiatric disorder comorbidity using private and public domain large databases; and, epidemiologic applications of highly-flexible computational techniques to improve predictive modeling and to identify interactions of risk and protective factors. Other

opportunities include working with associated faculty members through the pre- and post-doctoral training for NIDA T32 drug abuse epidemiology, services and prevention program; working with WUSM investigators with a joint appointment with the VA, in the St. Louis VA Medical Center, Health Services Research & Development Group.

**Yvette Sheline, MD**, Renard 1115, East Building 2204, 362-8422. Neuroimaging, Depression and Affective Neuroscience. Students have the opportunity to participate in clinical studies of depression and post traumatic stress disorder. Students may choose to receive training and experience in interviewing patients, assessing patient cognitive and emotional function through behavioral testing or techniques of assessing brain functions through neuroimaging studies. In addition students may participate in ongoing studies measuring 3D striatal brain differences in late life depression.

NOTE TO STUDENTS: There are always a number of research projects in the Department of Psychiatry. For additional information contact Dr. Rubin, 362-2462.

## Department of Psychiatry Faculty

**Charles F Zorumski, MD**

Samuel B. Guze Professor of Psychiatry

Head of the Department of Psychiatry

**Arpana Agrawal, PHD**

Associate Professor of Psychiatry

**Aqeeb Ahmad**

Instructor in Clinical Psychiatry

**Dale J Anderson, MD**

Instructor in Clinical Psychiatry

**Richard H Anderson, MS, PHD, MD**

Instructor in Clinical Psychiatry

**Andrey P Anokhin, MS, PHD**

Associate Professor of Psychiatry

**Scott J Arbaugh, MD**

Instructor in Clinical Psychiatry

**Ahmad Beheshti Ardekani, MD**



Assistant Professor of Clinical Psychiatry

Victoria Brooke Ayden, MD

Instructor in Psychiatry

Michael Roman Banton, MD

Instructor in Clinical Psychiatry (Child Psychiatry)

Ronald Beach, MD

Instructor in Clinical Psychiatry

Andrew Curry Belden, MS, PHD

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Savita Bhat, MS, MS1

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Laura J Bierut, MD

Professor of Psychiatry

Monica E. Bishop, MD

Assistant Professor of Psychiatry

Kevin J. Black, MD

Professor of Psychiatry

Donald David Bohnenkamp, MD

Assistant Professor of Psychiatry

Kelly N Botteron, MD

Professor of Psychiatry (Child Psychiatry)

Susan Kathleen Boyer, MD

Instructor in Clinical Psychiatry

Allyson Boyle, MD

Instructor in Clinical Psychiatry

Robert Harry Brady, MD

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Adjunct Instructor in Psychiatry (Child Psychiatry)

Peter Anthony Brawer, MA, PHD

Instructor in Clinical Psychiatry

Steven E. Bruce, MA, PHD

Visiting Assistant Professor of Psychiatry

Tony Wayne Buchanan, MA, PHD

Adjunct Asst Professor of Psychiatry

Kathleen K Bucholz, MS, MS1, PHD

Professor of Psychiatry

Joan Rachel Butcher

Instructor in Clinical Psychiatry

James Byrd, MD

Instructor in Clinical Psychiatry (Child Psychiatry)

Joshua W. Calhoun, MD

Instructor in Clinical Psychiatry (Child)

Wilma J. Calvert, BN, MSN, PHD

Adjunct Instructor in Psychiatry

Luigi Cardella, MD

Instructor in Psychiatry

Robert Michael Carney, MS, PHD

Professor of Psychiatry

Patricia A Cavazos-Rehg, PHD

Assistant Professor of Psychiatry

Mina Charepoo, MD

Instructor in Clinical Psychiatry

Zhoufeng Chen, MS, PHD

Professor of Psychiatry

Li-Shiun Chen, MD, M PH, PHS

Assistant Professor of Psychiatry

Vesselin M. Chorbov, MS, PHD

Research Assistant Professor of Psychiatry

Theodore J Cicero, MS, PHD

Professor of Neuropharmacology in Psychiatry

Vice Chairman for Research, Department of Psychiatry

Martin J Clarke, MS, MA, PHD

Instructor in Psychiatry (Pending Dean's Approval)

William W Clendenin, MD

Assistant Professor of Clinical Psychiatry

C. Robert Cloninger, MD

Professor of Psychiatry

David M Conner, MD

Instructor in Clinical Psychiatry

John Nicholas Constantino, MD

Blanche F Ittleson Professor of Psychiatry (Child Psychiatry)

Charles Richard Conway, MD

Associate Professor of Psychiatry

Linda B Cottler, M PH, PHD

Adjunct Professor of Psychiatry

Douglas Floyd Covey, MA, PHD

Professor of Psychiatry

Lucia del Pilar Cristancho Pimiento, MD

Assistant Professor of Psychiatry

Jack L Croughan, MD

Associate Professor of Clinical Psychiatry

Carlos Cruchaga, MA, PHD

Assistant Professor of Psychiatry

Alejandro M Datuin, AA, MD

Assistant Professor of Clinical Psychiatry (On Staff at Malcolm Bliss Mental Health Center)

Mary A Davis, MD

Assistant Professor Emeritus of Clinical Psychiatry

Jon Todd Dean, MD

Instructor in Clinical Psychiatry

Paul Dewald, MD

Assistant Professor of Clinical Psychiatry

Plaridel C Deza, MD

Assistant Professor of Clinical Psychiatry (On Staff at Malcolm Bliss Mental Health Center)

Brianne Marie Disabato, MD

Assistant Professor of Psychiatry

Joseph D Dougherty, PHD

Assistant Professor of Psychiatry

James Earl Edwards, MD

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Nuri Bradford Farber, MD

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Beverly J. Field, B MUS, M MUS, PHD

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Instructor in Clinical Psychiatry

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Professor of Psychiatry

**Darrin Friesen, MD**

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**Michael S Gaffrey, PHD**

Instructor in Psychiatry

**Nick S. Garg**

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**Marcie Epstein Garland, MD**

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**Dawn Lee Garzon**

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**Fred W Gaskin, MD**

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**Luis Giuffra, MS, MD, PHD**

Professor of Clinical Psychiatry

**Anne L Glowinski, MD, MS**

Professor of Psychiatry (Child Psychiatry)

**Dehra Anne Glueck, MD**

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**Alison Goate, PHD**

Professor of Genetics in Psychiatry

**David Goldmeier, MD**

Instructor in Clinical Psychiatry

**Julia D. Grant, MA, PHD**

Research Associate Professor of Psychiatry

**Richard Gruzca, MS, PHD**

Associate Professor of Psychiatry

Dong Hyun Han

Visiting Instructor in Psychiatry

Melissa A. Harbit, MD

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Michael P. Harms, BE, PHD

Research Assistant Professor of Psychiatry

Sarah McConnell Hartz, PHD, MD

Assistant Professor of Psychiatry

Steven Arthur Harvey, MD

Instructor in Clinical Psychiatry

Andrew C Heath, PHD

Spencer T. Olin Professor of Psychology in Psychiatry

Tamara G Hershey, PHD

Professor of Psychiatry

Frederick G Hicks, MD

Assistant Professor of Clinical Psychiatry

Joshua Wade Hogins

Instructor in Clinical Psychiatry

Sheldon G Holstad, PHD, PHS

Assistant Professor of Clinical Pharmacy in Psychiatry (On Staff at Jewish Hospital and St Louis College of Pharmacy)

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Professor of Psychiatry

Vice Chairman for Clinical Affairs, Department of Psychiatry

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Virgil Lee Malmberg, MS, MD



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**Vinod Suri**

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**Dragan M Svrakic, MD, PHD**

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Matthew Stewart Wilson

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Edwin D Wolfgram, MD

Assistant Professor of Clinical Psychiatry

Fay Yeh Womer, MD

Assistant Professor of Psychiatry

David F Wozniak, MA, PHD

Research Professor of Psychiatry

Christopher Wuertz, MD

Assistant Professor of Clinical Psychiatry

Sean H Yutzy

Adjunct Professor of Clinical Psychiatry

## Department of Radiation Oncology

The Department of Radiation Oncology was created on July 1, 2001, 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 four divisions of clinical, physics, biology and bioinformatics; and teaching for residents in radiation oncology, medical students and allied health personnel. The department is one of the largest, most academically balanced and best equipped in the country, and is responsible for all radiation therapy procedures at Washington University Medical Center. Our faculty has gained international recognition for innovative technological advances in physics and treatment planning, biological research, computer applications and clinical investigation.

### Milestones

- demonstration of a hypoxic subpopulation in tumors in vivo
- demonstrated the importance of the cell cycle in the sensitivity to ionizing radiation
- customized (Cerrobend) shielding system to protect normal tissues during irradiation
- design and construction of the first small dedicated
- customized (Cerrobend) shielding system to protect normal tissues during irradiation



- design and construction of the first small dedicated computer for radiation therapy treatment planning in collaboration with Varian Associates and NCI, design and construction of the first generation of high-energy, dual-modality, multiple-energies linear accelerator (Clinac 35)
- development of three-dimensional radiation therapy treatment planning and delivery systems
- clinical applications of 3-D conformal and intensity-modulated radiation therapy
- use of multiple imaging modalities in treatment planning in
- customized (Cerrobend) shielding system to protect normal tissues during irradiation
- radiation therapy, including CT, PET and MRI scanning
- implementation of novel respiratory gating algorithms
- development of biomarkers of DNA repair capacity of tumors
- demonstrated the use of Proton Therapy

The Department of Radiation Oncology currently occupies a large, attractive and convenient clinical facility on the lower level of the Center for Advanced Medicine. The clinical facilities include nine linear accelerator rooms, four simulator rooms and a brachytherapy center with two high dose-rate treatment units. Furthermore, the facility houses the latest Gamma Knife unit, called Perfexion, which is operated in collaboration with HealthSouth Corporation. We have advanced treatment planning computer systems for 3-D conformal and intensity-modulated radiation therapy. We have four linear accelerators with on-board CT imaging capability. The brachytherapy suite includes capability for high dose-rate remote afterloading and for image-guided permanent prostate seed implants. Interstitial and external hyperthermia treatments are also available. Plans are in progress for the installation of a new type of proton treatment facility, using a miniaturized cyclotron mounted on a gantry.

The Physics faculty and the Bioinformatics group 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 CAM building. The Radiation Biology laboratory and faculty offices are housed at the 4511 Forest Park Building, where there has been a significant expansion of biology research space.

## MD Courses

### Third Year

#### M90 740 RADIATION ONCOLOGY CLERKSHIP

Instructor: Joseph R. Simpson, MD, PhD, 362-8567

The four-week clerkship in radiation oncology will provide students with an introduction to the evaluation and management of a broad range of patients referred for consultation regarding radiation therapy. Clerkship activities will take place within the Barnes-Jewish Hospital/Siteman Cancer Center complex, Christian Hospital, Barnes-Jewish West County Hospital and Barnes-Jewish South County Hospital.

Students will conduct inpatient and outpatient evaluations under the supervision of radiation oncology department residents and faculty. Students will also attend and participate in regularly scheduled departmental conferences at noon Monday through Wednesday and 8 a.m. on Friday. Students will also have the opportunity to attend the appropriate multidisciplinary conferences (such as pediatric neuro-oncology, cardiothoracic oncology, lymphoma, GYN oncology and ENT) pertaining to their rotation schedule. Students will be given the opportunity to make a teaching case presentation and will meet weekly with the Coursemaster and/or the department Chairman for small-group case discussions.

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 faculty members who supervise the student over the course of the four-week clerkship.

## Fourth Year

### Elective

M90 840 CLINICAL RADIATION ONCOLOGY

Instructor(s): Joseph Simpson, MD, PhD, 362-8567

Location: Center for Advanced Medicine, Lower Level

Elective Contact: Joseph Simpson, MD, PhD or Gwendolyn Jackson, Executive Secretary, 362-8567

Other Information: Students should meet the Chief Resident in the Department of Radiation Oncology in the Siteman Cancer Center on the lower level of the CAM Building.

Enrollment limit per period: 3

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The clinical division offers an elective with emphasis on the evaluation, planning of and administration of radiation therapy in patients with malignant tumors. The students have the opportunity to enhance their knowledge on the natural history, pathological, and biological features of cancer and to sharpen their clinical skills participating in the management of these patients.

Student time distribution: Inpatient 7%, Outpatient 78%, Conferences/ Lectures 15%; Subspecialty Care 100%

Major teaching responsibility: Attendings, residents and staff

Patients seen/weekly: 20-35 per physician

On call/weekend responsibility: None

## Research

(M90 900)

**Dennis Hallahan, MD**, 4511 Forest Park, Room 202, 362-9700. (1) Radiation Sensitizers: The overarching hypothesis of this research is that interruption of the signaling will improve cancer response to therapy. Inhibitors of these molecular targets are presently in development at pharmaceutical companies. We study the efficacy of specific inhibitors when combined with radiotherapy in mouse models of human cancer. (2) Radiation Protection of normal tissue: We study the mechanisms of cell death in normal tissues during cancer therapy. In particular, we have found that a signal transduction pathway required for radiation induced apoptosis in normal tissues involves glycogen synthase kinase 3beta. GSK-3beta

regulates the apoptosis machinery within normal tissues. Cancer cells do not require GSK-3beta or apoptotic machinery to respond to cancer therapy. In contrast, injuries in normal tissues such as the brain and intestine require GSK-3 signaling. We have found that inhibitors of GSK-3beta prevent injury in normal tissues. These inhibitors prevent injury to the brain and improve neurocognitive function and reduce injury in the intestine of animal models. Presently, we are studying the mechanisms by which GSK-3 inhibition prevents program cell death in normal tissues. We are also studying new drugs intended for clinical trials. (3) Targeted Drug Delivery to Cancer: We have identified several peptides and over a dozen monoclonal antibodies that bind to cancer following treatment with ionizing radiation. Using this strategy, drug delivery can be targeted specifically to cancer and guided by use of a beam of radiation therapy. These targeting ligands have been conjugated to the drug delivery systems, including liposomes and nanoparticles to improve the specificity of drug delivery of cancer. We collaborate extensively with pharmaceutical companies to target drug delivery to mouse models of human cancer. (4) Immunotherapy: We characterize the immunological response of antibodies targeted by radiation. These monoclonal antibodies bind to radiation inducible neo-antigens. These antibodies can activate immune response. In addition, therapeutic agents are conjugated to the antibodies to provide cancer specific drug delivery. Identification of radiation inducible neo-antigens involves the co-precipitation of antigens from cancer by use of monoclonal antibodies. Antigens are then identified by use of proteomic technology. Humanization of these mouse monoclonal antibodies is performed with the goal of bringing antibodies into clinical trials.

**Jeff Michalski, MD**, Radiation Oncology, Clinical Division, 362-8566. Broad range of opportunities for investigation in: (1) prognostic factors and therapy outcome in a variety of patients with cancer (2) three-dimensional treatment conformal and intensity-modulated radiation therapy in the treatment of patients with head and neck, lung, pancreas, rectal or prostate cancer.

## Department of Radiation Oncology Faculty

**Dennis E Hallahan, MD**

Professor of Radiation Oncology

Elizabeth H and James S McDonnell III Distinguished Professor of Medicine

Head of the Department of Radiation Oncology

**Michael Bernard Altman, PHD**

Instructor in Radiation Oncology

**Abdelkareem Azab, PHD**

Assistant Professor of Radiation Oncology

**Kathy Baglan**

Instructor in Clinical Radiation Oncology

**Walter R Bosch, BE, MS, PHS**

Research Associate Professor of Radiation Oncology

Jeffrey D Bradley, MD

S. Lee Kling Professor of Radiation Oncology

Frank Brooks, PHD

Research Instructor in Radiation Oncology

David T Curiel, MD, PHD

Distinguished Professor of Radiation Oncology

Venkata Rao Devineni, MD

Associate Professor of Clinical Radiation Oncology

Todd Alan DeWees, MSSP, PHD

Research Instructor in Radiation Oncology

Igor Dmitriev, PHD

Research Assistant Professor of Radiation Oncology

Robert E Drzymala, PHD

Professor of Radiation Oncology

Jacqueline Esthappan, PHD

Associate Professor of Radiation Oncology

Jose L Garcia, MS

Assistant Professor of Radiation Oncology

Hiram Alberto Gay, MD

Associate Professor of Radiation Oncology

Sreekrishna M Goddu, MS, PHD

Associate Professor of Radiation Oncology

Olga Leonidovna Green, MS, PHD

Instructor in Radiation Oncology

Perry W Grigsby, MS, MD, MBA

Professor of Radiation Oncology

Lannis E Hall-Daniels, MD, M PH

Assistant Professor of Clinical Radiation Oncology

Yanle Hu, MS1, PHD, MS

Assistant Professor of Radiation Oncology

Jiayi Huang, MD

Assistant Professor of Radiation Oncology

Jerry Jeff Jaboin, MD, PHD

Assistant Professor of Radiation Oncology

Sergey Kaliberov, MD, PHD

Research Assistant Professor of Radiation Oncology

Rojano Kashani, MS, PHD

Instructor in Radiation Oncology

James Alexander Kavanaugh, MS

Instructor in Radiation Oncology

Eric E. Klein, MS, PHD

Professor of Radiation Oncology

Andrei Laszlo, MS, PHD

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Hui Li, MS, PHD

Assistant Professor of Radiation Oncology

Hua Li, PHD

Assistant Professor of Radiation Oncology

Hsiu-San Lin, MD, PHD

Professor Emeritus of Radiation Oncology

Muhammad Saleem Mahmood, MD

Instructor in Clinical Radiation Oncology

Jeff Michael Michalski, MD, MBA

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## Department of Radiology

The Edward Mallinckrodt Institute of Radiology (more commonly known as Mallinckrodt Institute of Radiology or MIR) serves as the **Department of Radiology** for **Washington University in St. Louis School of Medicine**, helping to guide the consulting physician in the discovery, 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, improving 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 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, 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, comprising 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; and 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 provides diagnostic radiology for the Washington University Orthopedics and Barnes-Jewish Hospital Outpatient Orthopedic center.

MIR clinical facilities are on the second floor of the Institute (general diagnostic radiology); third floor (neuroradiology); fourth floor (gastrointestinal and genitourinary radiology, and ultrasonography); and the fifth floor (MRI). 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, 1 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 cosponsors 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 twelfth floors of the Institute.

## MD Courses

Michelle Miller-Thomas, MD, Coordinator of Radiology Medical Student Education; 362-5949, [thomasm@mir.wustl.edu](mailto:thomasm@mir.wustl.edu)

### Second Year

Course master: Michelle Miller-Thomas, MD, 362-5949, [thomasm@mir.wustl.edu](mailto:thomasm@mir.wustl.edu)

Eight hours of lecture are devoted to an introduction to radiology. The majority of the course is devoted to diagnostic radiology, including conventional radiography, computed tomography, ultrasound, nuclear medicine and magnetic resonance imaging. The economics of imaging and radiation biology are introduced. The course also includes review of individual teaching file cases at small group sessions and online.

### Third Year

M90 701 GENERAL RADIOLOGY CLERKSHIP

Coursemasters: Michelle Miller-Thomas, MD, 362-5949, [thomasm@mir.wustl.edu](mailto:thomasm@mir.wustl.edu), Matthew Parsons, MD, 362-5950, [parsonsm@mir.wustl.edu](mailto:parsonsm@mir.wustl.edu)

Contact Person: Melissa Varner, Radiology Staff Library, 362-5139, [varnerm@mir.wustl.edu](mailto:varnerm@mir.wustl.edu)

This four-week introductory radiology elective will be offered to third-year medical students. Each student will rotate through four of the following radiology services: Emergency Department, Pediatric Radiology, Cardiothoracic Imaging, Breast Imaging, Abdominal Imaging, Musculoskeletal Radiology, Neuroradiology, Nuclear Medicine and Interventional Radiology. The primary course objective is to familiarize students with the scope of diagnostic and interventional radiology, including the consulting role radiologists provide to primary care and specialty providers, risks/benefits and cost effectiveness of radiologic examinations, and guidelines for ordering common studies.

Students will report each morning for a service conference. These conferences are both case-based and didactic. Students will have a predominantly observational role in conferences, as they are principally

designed for radiology resident teaching. Students will then spend mornings in the reading rooms with residents, fellows and attending radiology faculty. This time will consist of interactive teaching based on daily clinical cases. Each student will keep a log of cases they see to facilitate reading and to provide a vehicle for follow-up of interesting cases. Students will present one case of interest to their peers each Friday at 3 p.m. during the clerkship. These brief (5 to 10 minutes) presentations will be evaluated by a resident or attending radiologist.

Monday through Thursday at 3 p.m., students will meet with a designated radiology resident who will present either a didactic or case-based lecture appropriate for third-year medical student teaching.

Students will select two of their four presented cases for submission to a digital teaching file. Reading lists, references and textbooks will be provided. The first and final days of the elective are mandatory. No high honors will be awarded if a student is absent for more than five days of the rotation.

The course will accommodate four to 10 students each month. The course will not be offered if enrollment falls below four.

## Fourth Year

### Electives

M90 801 GENERAL RADIOLOGY

Instructor(s): Michelle Miller-Thomas, MD, 362-5949 and Matthew Parsons, MD, 362-5950

Location: Radiology Staff Library (First Floor, Mallinckrodt Tower, Room 117)

Elective Contact: Missi Varner, 362-5139

Other Information: Students meet in Mini-Scarpellino, First Floor Mallinckrodt Institute of Radiology Building, 8:00 a.m. first day of elective.

Enrollment limit per period: 5

Valid start weeks for four-week blocks are: Weeks 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 radiologists provide to primary care and specialty providers, risks/benefits and cost effectiveness of radiologic examinations, and 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. At 3pm, students will convene with a radiology resident for a didactic lecture on a scheduled topic in radiology. An image-based quiz will be given in the final week of the elective covering topics presented in the daily student didactic lectures. Fridays at 3pm students present an interesting case from the week in Power-Point format. Two Power-Point presentations will be submitted at the end of the rotation for grading.

Students will keep a logbook of interesting cases seen daily in order to provide a foundation for further reading, as well as an opportunity for clinical or radiologic follow up of cases seen in the reading room. This log will be submitted to the Coursemaster at the end of the elective.

Students taking this elective for a second time who have a special interest in a particular area of radiology pertinent to their intended career choice may tailor their experience to focus on one or more services if

desired (i.e. 4th year student going into neurosurgery may spend up to 2 full weeks in neuroradiology). This will be considered on a case by case basis by the Coursemaster. These returning students will be expected to keep a log of cases seen but will be exempt from attending the daily afternoon teaching sessions. Returning 4th year students will be required to present four weekly presentations with the other students in the course and take the end of rotation quiz. Please see the separate course listings for Nuclear Medicine and Interventional Radiology.

Reading lists, references and text books will be provided. The first and final days of the elective are mandatory. Grades are based on daily attendance, logbook, end of rotation quiz, and Power-Point presentations. No honors will be awarded if a student is absent for more than 5 days of the rotation. Student time distribution: Inpatient 40%, Outpatient 30%, Conferences/ Lectures 30%; Subspecialty Care 100%

Major teaching responsibility: Radiology Faculty, Fellows, and Residents

Patients seen/weekly: N/A

On call/weekend responsibility: None

#### M90 820 CLINICAL NUCLEAR MEDICINE

Instructor(s): Akash Sharma, MD, 362-2809

Location: 956 West Pavilion

Elective Contact: Akash Sharma, MD, 362-2809

Other Information: Students report to 956 West Pavilion, 8:00 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This four-week elective will be offered to third and fourth year medical students. The clinical service in Nuclear Medicine is divided into five subsections: outpatient general Nuclear Medicine, in-patient general Nuclear Medicine, PET, Pediatric, and Cardiac Nuclear Medicine. The recommended schedule will be to spend week 1 and 3 on the North Campus, where the emphasis will be on outpatient general and Pediatric Nuclear Medicine with some focused time spent in the PET reading room. Week 2 will be split between the in-patient general Nuclear Medicine and Cardiac services. Week 4 schedule will be determined after a preferences discussion with the student.

The primary objective of this rotation is to provide exposure to the full range of clinical nuclear medicine. Under direct supervision of the clinical staff, the student will be able to participate in the planning and interpreting of imaging studies for patients referred to the Division. Opportunity also exists to explore instrumentation techniques, including dedicated computer applications in Nuclear Medicine.

In addition to the clinical experience, the student will attend the daily morning conference, held in the Miller Conference Room in 956 West Pavilion, from 8:30-9:30 a.m. From 12-1:00 p.m., the student will be excused to attend the daily department-wide conference. The student is not expected to do any formal presentations but may participate by preparing a case for the Friday follow-up conference. The student will also be excused to attend any conferences within the Department of Radiology, e.g. the 3 p.m. medical student didactic lectures, if desired.

Students may keep a log of interesting cases to use as a guide for additional reading, or for discussions with the Coursemaster or the other staff attendings.

A textbook will be provided. 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.

Student time distribution: Inpatient 25%, Outpatient 50%, Conferences/ Lectures 25%; Subspecialty Care 100%

Major teaching responsibility: Attendings, fellows and residents

Patients seen/weekly: ~200  
On call/weekend responsibility: None

#### M90 830 INTERVENTIONAL RADIOLOGY

Instructor(s): Robert Pallow, MD, 362-7877

Location: Mallinckrodt Institute of Radiology

Elective Contact: Robert Pallow, MD, 362-7877

Other Information: Students should contact Dr. Pallow to discuss meeting location and time for first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Students will be exposed to 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, post-procedure patient management, and longitudinal patient follow-up. Students will actively participate in interventional procedures. Students will attend the departmental noon conference (daily) and section conferences including didactic lectures, morbidity and mortality conference, and case conferences (3-4 times per week).

Student time distribution: Inpatient 60%, Outpatient 30%, Conferences 10%

Major teaching responsibility: Attending Interventional radiology physicians will provide the majority of teaching. Fellows and residents will provide additional teaching.

Patients seen/weekly: Approximately 150 patients per week are seen in consultation or for procedures in the south campus Interventional facility

On call/weekend responsibility: None

## Research

(M90 900)

Interested students should contact the appropriate individual in each division regarding the types of research projects available.

**Tom Conturo, MD, PhD**, Second Floor East Building, Room 2120, 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, non-invasive techniques can be devised to study neuronal activity, tissue perfusion, water mobility (diffusion), and neuronal fiber pathways in the human brain. The goals of Dr. Conturo's research lab are to develop and apply MR imaging techniques for quantitative imaging of cerebral perfusion, brain function, water diffusion, and neuronal fiber pathways. These techniques utilize the MR signal effects of exogenous bolus-injected contrast agents, endogenous hemoglobin, and microscopic water diffusion. Long-term goals are to apply these methodologies toward imaging and understanding tissue structure, function, and physiology in the brain and other organs in normal and abnormal conditions. The approaches that are used in this laboratory cover a broad range of areas, including MRI physics, MRI pulse sequence development, theoretical derivations, computer simulations, image-processing, computer graphics,

custom contrast agent design and synthesis, phantom studies, animal models, human studies, clinical patient studies, and comparison with other imaging modalities.

**Farrokh Dehdashti, MD**, Nuclear Medicine PET Facility, Tenth Floor Mallinckrodt Institute of Radiology, 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, (6), FLT-PET/CT to assess tumor cell proliferation in patient must have histologically or cytologically confirmed ER+ stage IV or metastatic invasive breast cancer.

**Rob J. Gropler, MD**, Room 1307, East Building, 747-3878. 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 non-invasively 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 to determine

the mechanisms responsible for these changes in this metabolic-functional relation and identify potential interventions that may reverse or ameliorate them. In this regard, similar imaging studies are being performed to determine the importance of nitric oxide and the PPAR $\alpha$  system in defining this metabolic-functional relation.

**Stephen M. Moerlein, PharmD, PhD**, First Floor East Building, 362-8466. 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.

**David Piwnica-Worms, MD, PhD**, Third Floor East Building, 362-9356. Research projects in molecular imaging are available. Molecular imaging is broadly defined as the characterization and measurement of biological processes in living animals, model systems and humans at the molecular and cellular level using remote imaging detectors such as PET, SPECT, MRI, bioluminescence, and near-infrared fluorescence. Our goal is to advance the understanding of normal biology and pathophysiology through noninvasive investigation of molecular and cellular events in vivo. Projects focus on creation, validation and use of luciferase reporters and bioluminescence imaging as well as PET reporters to investigate protein-protein interactions, signal transduction, and gene expression in cancer and infectious disease, development of peptide conjugates for membrane transduction of PET, SPECT and optical contrast agents, and investigations of the transport functions of the multidrug resistance (MDR1) P-glycoprotein family of membrane transporters in cancer and Alzheimer's Disease.

**Marc Raichle, MD**, Second Floor East Building, 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.

## Department of Radiology Faculty

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Professor of Radiology

Michael Jeffrey Mueller, MHS, PHD

Professor of Radiology

Vamsi R. Narra, MD

Professor of Radiology

John Hart Niemeyer, MD

Instructor in Clinical Radiology

Gary H Omell, MD

Assistant Professor of Clinical Radiology

Robert James Pallow Jr, MD

Assistant Professor of Radiology

Matthew S Parsons, MD



Assistant Professor of Radiology

Michael K Pasque, MD

Professor of Radiology

Michael W Penney, MD

Assistant Professor of Radiology

Joel S Perlmutter, MD

Professor of Radiology

Steven E Petersen, PHD

Professor of Radiology

Linda R Peterson, MD

Associate Professor of Radiology

Daniel D Picus, MD

Professor of Radiology

Vice Chair for Diagnostic Radiology in Radiology

David R Piwnica-Worms, MD, PHD

Adjunct Professor of Radiology

David Gerard Politte, MEE, D SC

Research Instructor in Radiology

Fred W Prior, MA, MA1, PHD

Research Associate Professor of Radiology

James D Quirk, MA, PHD

Research Assistant Professor of Radiology

Edward Floyd Ragsdale, MD

Instructor in Clinical Radiology

Marcus E Raichle, MD

Professor of Radiology

Constantine A Raptis, MD

Assistant Professor of Radiology

David E Reichert, PHD

Associate Professor of Radiology

Valerie C Reichert, MD

Assistant Professor of Radiology

Kathryn Ann Robinson, MD

Assistant Professor of Radiology

Buck Edward Rogers, MA, PHD

Professor of Radiology

Henry D Royal, MD

Professor of Radiology

Brian G Rubin, MD

Professor of Radiology

David A Rubin, MD

Professor of Radiology

Nael E. A. Saad, MBBCH

Assistant Professor of Radiology

Luis A Sanchez, MD

Professor of Radiology

Robert F Scheible, MD

Assistant Professor of Clinical Radiology

Bradley L Schlaggar, PHD, MD

Professor of Radiology

Sally J Schwarz, MS

Research Associate Professor of Radiology

Janice Semenkovich, MD

Associate Professor of Radiology

Benjamin J. Shannon, PHD

Instructor in Radiology

Vijay Sharma, MS, PHD

Associate Professor of Radiology

Akash Sharma, MD

Assistant Professor of Radiology

Aseem Sharma, MBBS

Associate Professor of Radiology

Joshua S Shimony, PHD, MD

Associate Professor of Radiology

Koresh Isaac Shoghi, MS, PHD

Assistant Professor of Radiology

Monica Shokeen, MBA, PHD

Instructor in Radiology

Hui Hua Shu, MD

Instructor in Radiology

Gregorio A Sicard, MD

Professor of Radiology

Barry Alan Siegel, MD

Professor of Radiology

Vice Chair for Nuclear Medicine in Radiology

Cary Lynn Siegel, MD

Professor of Radiology

Marilyn J Siegel, MD

Professor of Radiology

Celette Sugg Skinner, MA, PHD

Adjunct Assistant Professor of Radiology

Abraham Z Snyder, PHD, MD

Research Professor of Radiology

Steven Lee Solomon, MD

Assistant Professor of Clinical Radiology

Sheng-Kwei Song, MS, PHD

Professor of Radiology

William Marshall Spees, PHD

Research Instructor in Radiology

Robert Peter Stachecki, MD

Instructor in Radiology

Yi Su, PHD

Instructor in Radiology

Alexander L Sukstansky, MS, PHD, D SC

Research Associate Professor of Radiology

Yuan-Chuan Tai, MEE, PHD

Associate Professor of Radiology

Chandrakant Tailor, MD

Assistant Professor of Clinical Radiology

Lawrence R Tarbox, AA, PHD

Research Assistant Professor of Radiology

Sharlene A Teefey, BN, MD

Professor of Radiology

Robert W Thompson, MD

Professor of Radiology

Jerry Tobler, PHD, MD

Instructor in Clinical Radiology

Zhude Tu, MS, PHD, MS1

Assistant Professor of Radiology

Suresh Vedantham, MD

Professor of Radiology

Andrei G Vlassenko, MD, PHD

Research Assistant Professor of Radiology

Katie Dieu Thu Vo, MD

Associate Professor of Radiology

Jerold W Wallis, MD, MS

Associate Professor of Radiology

Yong Wang, PHD

Research Instructor in Radiology

Philip J Weyman, MD

Associate Professor of Clinical Radiology

Kimberly N Wiele, MD

Assistant Professor of Radiology

Franz J Wippold II, MD

Professor of Radiology

Pamela K Woodard, MD

Professor of Radiology

Jinbin Xu, ME, PHD

Instructor in Radiology

Dmitriy A Yablonskiy, MS, PHD, D SC

Professor of Radiology

Motoyo Yano, PHD, MD

Instructor in Radiology

Allyson R Zazulia, MD

Associate Professor of Radiology

Shiyong Zhao, MME, PHD

Adjunct Associate Professor of Radiology

Jie Zheng, MS, PHD

Associate Professor of Radiology

Dong Zhou, MS1, MS, PHD

Research Instructor in Radiology

Dequan Zou, ME, MS, D SC

Research Associate Professor of Radiology

Darryl Adam Zuckerman, MD

Assistant Professor of Radiology

## Mary Culver Department of Surgery

The formal instruction in surgery begins in 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 the department. The clerkship allows students opportunities to participate in the care of surgical patients, both in- and outpatient; spend time in the operating rooms; and attend seminars, teaching conferences and didactic sessions on a regular basis. In the fourth year, students may select “subinternship” electives within the Division of General Surgery, which includes a variety of general surgical specialties. In addition to the general surgery subinternships, electives are available in pediatric surgery, transplant surgery, vascular surgery, cardiovascular and thoracic surgery, urologic surgery, and plastic and reconstructive surgery.

## MD Courses

### Third Year

#### M95 790 INTEGRATED SURGICAL DISCIPLINES CLERKSHIP

During the 12-week surgery clerkship, students are assigned to three four-week rotations, one of which is a required four-week general surgery rotation at Barnes-Jewish Hospital, with alternative rotation sites available at St. Louis Connect Care and the Veterans Administration Medical Center. In addition to the general surgery rotation, each student selects two four-week elective rotations from a variety of surgical specialties and/or related disciplines, such as critical care/anesthesia or musculoskeletal. The 12-week clerkship focuses on the diagnosis, care and management of surgical patients. The student is an active participant in the daily care of patients on each service and attends clinics, rounds, operating rooms, call

nights and teaching conferences. Central to the 12-week clerkship are weekly small-group didactic sessions with assigned faculty members and a lecture/workshop series that covers a wide range of surgical topics and specialties, as well as provides opportunity for practice of basic clinical skills in simulated settings.

## Fourth Year

There is ample opportunity for fourth-year students to participate in elective rotations within each division of the Department of Surgery. Many of the fourth-year surgery electives are structured to allow the student to participate as a "subintern," facilitating experiences in preoperative, intraoperative and postoperative patient management. Generally, the minimum duration of a fourth-year elective rotation in the Department of Surgery is four weeks. Research electives are also available.

### Electives

#### M95 814 ACTING INTERNSHIP, TRAUMA SERVICE

Instructor(s): John Mazuski, MD; John Kirby, MD; Douglas Schuerer, MD; Robert Southard, MD; and Kareem Husain, MD

Location: 1411 Queeny Tower

Elective Contact: Jo Ann Thaller, 362-5345

Other Information: This is NOT a 'preceptor' elective. However, students may elect to make prior arrangements to work more closely with particular attendings on this service (based on availability).

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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. Student involvement in all aspects of clinical surgery is accomplished by student attendance in the outpatient office, preoperative patient evaluation, in-hospital patient management, and postoperative outpatient follow-up after discharge. Practical experience will focus on the initial evaluation and resuscitation of traumatized patients and other emergency care patients. The student will also participate in regular rounds, conferences, and in-house call. 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. If you have any questions regarding this notice, please call Doug Brown in the Surgical Education Office (362-8029).

Student time distribution: Inpatient 80%, Outpatient 10%, Conferences/ Lectures 10%; Primary Care 20%, Subspecialty Care 80%

Major teaching responsibility: Attendings, residents and fellows

Patients seen/weekly: 30

On call/weekend responsibility: Yes

#### M95 818 SURGICAL NIGHT FLOAT & ER SUBINTERNSHIP

Instructor(s): John Kirby, MD and L. Michael Brunt, MD

Location: ER

Elective Contact: Doug Brown, 362-8029

Other Information: Student should contact instructor prior to first day of elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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.

Student time distribution: Inpatient 50%, Outpatient 50%, Conferences/ Lectures TBD; Primary Care 100%

Major teaching responsibility: John Kirby, MD, and Surgical Residents

Patients seen/weekly: 20-30 each week

On call/weekend responsibility: No weekend call, rotation is nighttime based Tuesday through Friday for Floor two-week component and Tuesday, Wednesday, and Friday for ED two-week component

#### M95 820 CARDIOTHORACIC SURGERY

Instructor(s): Sunil Prasad, MD; Michael Avidan, MBBCH; Umar Boston, MD; Stephen Broderick, MD; Traves Crabtree, MD; Ralph Damiano, MD; Charl De Wet, MD; Pirooz Eghtesady, MD, PhD.; Dan Kreisel, MD, PhD; Sasha Krupnick, MD; Jennifer Lawton, MD; Bryan Meyers, MD; Marc Moon, MD; Michael K. Pasque, MD; G. Alexander Patterson, MD; Varun Puri, MD; Stephano Schena, MD; and Scott Silvestry, MD

Location: 3106H Queeny Tower

Elective Contact: Sunil Prasad, MD (Secretary, Sheryl Goessling, 362-8008)

Other Information: Students should contact Sheryl Goessling at 362-8008 prior to the first day of elective. Students should report to 3106H Queeny Tower, 7:00 a.m. first day of elective.

Enrollment limit per period: 3

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

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, repair of congenital heart defects, 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.

Student time distribution: Inpatient 80%, Outpatient 10%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 20

On call/weekend responsibility: One in three, no weekend call

#### M95 830 PLASTIC RECONSTRUCTIVE SURGERY

Instructor(s): Ida Fox, MD

Location: Eleventh Floor, Northwest Tower

Elective Contact: Sue Grimm, 314-747-0541

Other Information: Students should meet at 7 a.m. as scheduled by the secretary on the first day of the



rotation.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The period on plastic surgery may either be spent as a clinical clerkship or conducting a research project. The purpose of the clinical clerkship is to familiarize the student with the basic principles of tissue repair and reconstruction. 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 need to be approved prior to scheduling and confirming the research rotation.

Student time distribution: Inpatient 70%, Outpatient 20%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 12

#### M95 832 PLASTIC SURGERY EXTERNSHIP (Visiting Students Only)

Instructor(s): Keith E. Brandt, MD, 747-0541

Location: Eleventh Floor Northwest Tower

Elective Contact: Sue Grimm,  
(314) 747-0541

Other Information: Please contact the Plastic Surgery Residency Coordinator, Sue Grimm at [grimms@wustl.edu](mailto:grimms@wustl.edu) or (314) 747-0541 to arrange your schedule.

Enrollment limit per period: Varies

Flexible start days for three- to four-week blocks are available beginning July 1, 2011 through December 31. Certain rotation dates/weeks may be limited depending on the number of students requesting rotations.

Students rotate on each of the Plastic Surgery Services for one or two week blocks. Services include: breast reconstruction, hand, nerve and general recon. One week on each service is recommended to maximize exposure to all faculty. Participation in conferences is expected.

Please contact the Plastic Surgery Residency Coordinator, Sue Grimm at [grimms@wustl.edu](mailto:grimms@wustl.edu) or (314) 747-0541 to arrange your schedule.

Student time distribution: Inpatient 70%, Outpatient 20%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 12

On call/weekend responsibility: one day per week, one weekend per month

#### M95 850 UROLOGY

Instructor(s): Gerald Andriole, MD, 362-8212

Location: Wohl Hospital

Elective Contact: Sally Wahlbrink, 362-8212

Other Information: Students should contact Dr. Andriole's office at 362-8212 prior to first day for room assignment.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

A four-week clinical clerkship in pediatric and/or adult urology will offer the interested student experience with a spectrum of problems in clinical urology. The student will learn the basic diagnostic procedures and management of surgical and non-surgical aspects of patient care on the private and ward services under the supervision of the attending staff and house staff. Clinical conferences are held three days per week. Student time distribution: Inpatient 65%, Outpatient 25%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Several attendings, chief resident and resident staff

Patients seen/weekly: >20

On call/weekend responsibility: None

#### M95 862 ACTING INTERNSHIP, COLON AND RECTAL SURGERY

Instructor(s): Steve Hunt, MD; James W. Fleshman, MD; Elisa Birnbaum, MD; Anne Lin, MD; Ira Kodner, MD; Matthew Mutch, MD; and Bashar Safar, MD, 454-7182

Location: 14102 Queeny Tower, South Campus

Elective Contact: Joni Menke, 454-7182

Other Information: This is NOT a "preceptor" elective. However, students may elect to make prior arrangements to work more closely with a specific attending on this elective (based on availability).

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 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.

Student time distribution: Inpatient 75%, Outpatient 20%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: James W. Fleshman, MD, Steven Hunt, MD, and colorectal fellows

Patients seen/weekly: 25-50

On call/weekend responsibility: Every fifth night or negotiable

#### M95 863 ACTING INTERNSHIP, SURGICAL ONCOLOGY AND ENDOCRINE SURGERY

Instructor(s): Timothy Eberlein, MD; Rebecca Aft, MD; Amy Cyr, MD; William Gillanders, MD; Julie Margenthaler, MD; and Jeffrey Moley, MD

Location: Eleventh Floor, Northwest Tower

Elective Contact: Doug Brown, 362-8029

Other Information: This is NOT a "preceptor" elective. However, students may elect to make prior arrangements to work more closely with a specific attending (based on availability).

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This subinternship elective 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, parathyroid and adrenal 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. 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. If you have any questions regarding this notice, please call Doug Brown in the Surgical Education Office (362-8029).

Student time distribution: Inpatient 75%, Outpatient 15%, Conferences/ Lectures 10%

Major teaching responsibility: Attendings, chief resident, and junior residents

Patients seen/weekly: 20-40 (varies)

On call/weekend responsibility: Every third or fourth night with a resident who will directly supervise

#### M95 871 ACTING INTERNSHIP, VASCULAR SURGERY

Instructor(s): Patrick Geraghty, MD; Gregorio Sicard, MD; Brian Rubin, MD; M. Wayne Flye, MD; and Luis Sanchez, MD, 362-7841

Location: 5103 Queeny Tower

Elective Contact: Students should contact Andrea Portlock in Dr. Geraghty's office prior to the start of this rotation at 362-6519

Other Information: This is NOT a "preceptor" elective. However, students may elect to make prior arrangements to work more closely with Dr. Sicard (362-7841) or other attendings on this service (based on availability).

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 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. 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. If you have any questions regarding this notice, please call Doug Brown in the Surgical Education Office (362-8029).

Student time distribution: Inpatient 70%, Outpatient 20%, Conferences/ Lectures 10%; Primary Care 10%, Subspecialty Care 90%

Major teaching responsibility: Attending, fellows, chief resident, and junior residents

Patients seen/weekly: 100+ (varies)

On call/weekend responsibility: Student's option

#### M95 879 ACTING INTERNSHIP, HEPATOBILIARY PANCREATIC SURGERY

Instructor(s): Steven Strasberg, MD; William Hawkins, MD; Ryan Fields, MD; and David Linehan, MD, 362-7147

Location: Eleventh Floor, Northwest Tower

Elective Contact: Renee Bischoff, 362-7147

Other Information: This is NOT a "preceptor" elective. However, students may elect to make prior arrangements to work more closely with a specific attending on this service (based on availability).

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Hepatobiliary/Pancreatic (Unit II) Service. The Unit II Service is a busy upper gastrointestinal service with a focus on hepatobiliary and pancreatic diseases and their treatment. The course will offer 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. If you have any questions regarding this notice, please call Doug Brown in the Surgical Education Office (362-8029).

Student time distribution: Inpatient 75%, Outpatient 15%, Conferences/ Lectures 10%; Primary Care 100%

Major teaching responsibility: Attending, chief resident, fellow and junior residents

Patients seen/weekly: Varies

On call/weekend responsibility: Every third or fourth night with a resident who will directly supervise

#### M95 880 PEDIATRIC SURGERY

Instructor(s): Brad Warner, MD; Martin Keller, MD; Jacqueline Saito, MD; Pat Dillon, MD; Kate Bernabe, MD; and Brad Segura, MD

Location: 5S40 St. Louis Children's Hospital

Elective Contact: Ginny Sherrill, 454-8197

Other Information: Students should report at 6:00 a.m. on the first day of the rotation.

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The student will participate as a subintern in all aspects of pediatric surgical patient care and will be exposed to a wide variety of pediatric surgical cases. This includes the preoperative and postoperative evaluation of patients as well as the care of pediatric trauma patients. Daily rounds are made with both the resident and attending staff and active participation is expected in the pediatric surgery clinic and the operating room. Weekly conferences include Mortality and Morbidity, Radiology, Pathology and case presentations with the student expected to prepare a conference presentation on a topic of interest.

Student time distribution: Inpatient 60%, Outpatient 30%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: 35

On call/weekend responsibility: Optional

#### M95 891 ORGAN TRANSPLANTATION

Instructor(s): William Chapman, MD, 362-7792; Surendra Shenoy, MD, PhD, 362-4338; Majella Doyle, MD, 362-2880; Yiing Lin, MD, 362-2840; Jeffrey Lowell, MD, 362-2820; and Jason Wellen, MD, 362-2840

Location: Barnes-Jewish Hospital

Elective Contact: Dr. Shenoy's secretary, Hanah Paluga at 362-4338

Other Information: Student should contact instructor if interested in scheduling elective.

Enrollment limit per period: 2

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The care of transplant patients requires the integration of multiple diverse medical and surgical disciplines. This elective clerkship 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.

Student time distribution: Inpatient 80%, Outpatient 10%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Full attending and resident staff

Patients seen/weekly: 40

On call/weekend responsibility: Yes

#### M95 893 ACTING INTERNSHIP, MINIMALLY INVASIVE SURGERY

Instructor(s): L. Michael Brunt, MD, and Brent Matthews, MD, 454-8877

Location: Eleventh Floor, Northwest Tower

Elective Contact: Student should contact Dr. Brunt at 454-8877 prior to the first day of the elective.

Other Information: This is NOT a "preceptor" elective. However, students may elect to make prior arrangements to work more closely with Dr. Brunt on this elective (based on availability).

Enrollment limit per period: 1

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This subinternship elective in minimally invasive surgery is offered by L. Michael Brunt, MD, a member 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, inguinal hernia repair, ventral hernia repair and gastric bypass 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 may also have the opportunity to observe and participate in minimally invasive surgical procedures performed by various surgeons within the Division of General Surgery. Additionally, the student may also elect to participate in the laboratory of the Washington University Institute for Minimally Invasive Surgery one or two days per week. 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. If you have any questions regarding this notice, please call Doug Brown in the Surgical Education Office (362-8029).

Student time distribution: Inpatient/Operating Room 60%, Outpatient 30%, Conferences/ Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attending and residents

Patients seen/weekly: ~25 (varies)

On call/weekend responsibility: One call weekend which consists of morning rounds and home call. No in-house call.

#### M10 820 CRITICAL CARE

Instructor(s): Heidi Atwell, DO, 314-362-1196, Course Master;

Watler Boyle, MD; Grant Bochicchio, MD; Stephanie Bonne, MD; Anne Drewry, MD; Stephen Eaton, MD; Daniel Emmert, MD; Alex Evers, MD; Brian Fuller, MD; Thomas J. Graetz, MD; Richard Hotchkiss, MD; Kareem Husain, MD; Jacob Keeperman, MD; Paul Kerby, MD; John Kirby, MD; Isaac Lynch, MD; John

Mazuski, MD; Tiffany Osborn, MD; Patricia Penkoske, MD; Adnan Sadiq, MD; Doug Schuerer, MD; Jessica Smith, MD; Robert Southard, MD; George Tseng, MD; Mike Wall, MD; Brian Wessman, MD; and Robert Winfield, MD.

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Barbara McKinney, 747-3581

Other Information: Students should meet in the 4400 Surgical Intensive Care Unit, Fourth Floor of Barnes-Jewish Hospital, at 7:30 a.m. on the first day of the elective.

Enrollment limit per period: 4

Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 neurologic injuries, liver and/or renal 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 provide adequate nutrition. Practical experience is gained in placement of vascular access devices, interpretation of laboratory data, and use of guidelines, protocols and quality assurance tools in the management of critically ill patients.

Student time distribution: Inpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: ICU Attendings

Patients seen/weekly: 50

On call/weekend responsibility: Variable

## Research

(M95 900)

**L. Michael Brunt, MD**, 1160 Northwest Tower, Barnes-Jewish Hospital, 454-8877. Minimally invasive surgery, including endocrine applications. Minimum rotation length: four weeks. Under the auspices of the Washington University Institute for Minimally Invasive Surgery (WUIMIS), a number of surgeons are investigating the physiologic consequences of laparoscopic surgery and new applications for procedures and technologies. Dr. Brunt is currently investigating clinical outcomes of various laparoscopic surgical procedures laparoscopic hiatal hernia surgery and adrenal surgery, and is carrying out education related research of skills training for senior medical students planning to enter a surgical internship.

**Susan E. Mackinnon, MD**, 660 S. Euclid, Box 8238, 362-4586. Peripheral nerve surgical research. Our laboratory investigates nerve injury and regeneration including nerve transplantation. The student will be encouraged to design and complete his/her own research study during the elective. Minimum rotation length: six weeks. The research rotation can be conducted in the plastic surgery laboratories under the direction of Drs. Moore, Snyder-Warwick, Johnson or Mackinnon. Clinical research opportunities are available with Drs. Fox, Myckatyn, Patel, Tung, and Woo. A project will be designed with the student prior to his/her rotation on plastic surgery so that all the materials and methods will be available at the

beginning of the rotation. Ongoing projects include: (1) nerve repair and regeneration; (2) nerve and composite tissue transplantation; (3) in vivo tissue generation and tissue differentiation; (4) the mechanical, structural and biochemical effects of stress on scar tissue maturation; (5) in vivo anatomy of craniofacial deformities; and (6) outcome analysis of methods of cleft lip and palate management; (7) breast reconstruction and surgical education.

**Brent D. Matthews, MD**, 1160 Northwest Tower, Barnes-Jewish Hospital, 454-7195. Laparoscopic ventral hernia repair: prospective outcomes study. Insurance companies, HMOs and patients are interested in quantifying the outcomes of surgeons and hospital systems for complex surgical procedures and high-volume operations in search of the best possible care available. Year 2003 data from the National Center for Health Statistics revealed that approximately 800,000 inguinal hernia repairs and 90,000 ventral hernia repairs were performed in the United States. This underscores the importance of developing and implementing a surgical program with expertise in the care of hernia disease. Through the support of the Washington University Institute for Minimally Invasive Surgery (WUIMIS), this Washington University Medical Center Human Studies Committee-approved prospective outcomes study will investigate outcomes in patients undergoing laparoscopic ventral hernia repair in an attempt to define preoperative patient variables as surrogate markers for risk factors for a difficult laparoscopic repair. The student will participate in the perioperative evaluation of study patients, attend operative procedures, coordinate data collection and contribute in outcomes analysis.

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## Policies

The information provided here is intended to assist university students, faculty and staff in locating university policies related to the educational mission. These policies, procedures and guidelines exist to assist Washington University students, faculty and administrators in 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

Organized here are the university-wide policies, procedures and guidelines available to assist School of Medicine students, faculty, staff and administrators in doing the business of Washington University in St. Louis in ways that are effective, consistent and compliant. Please visit the links at left to learn more. Additional university-wide policies are available on the [Washington University website](#).

## Non-Discrimination 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. Inquiries about compliance should be addressed to the University's Vice Chancellor for Human Resources, Washington University, Campus Box 1184, One Brookings Drive, St. Louis, MO 63130. The School of Medicine is committed to recruiting, enrolling and educating a diverse student body.

## Sexual Harassment Policy

<http://hr.wustl.edu/policies/Pages/SexualHarassment.aspx>



## Drug and Alcohol Policy

<http://medschoolhr.wustl.edu/Policies/Documents/WUSM%20Drug%20and%20Alcohol%20Policy.pdf>

## Discriminatory Harassment Policy

<http://hr.wustl.edu/policies/Pages/DiscriminationAndDiscriminatoryHarassment.aspx>

## HIPAA Policies

<http://secpriv.wusm.wustl.edu/privacy/default.aspx>

## Computer Use Policy

<http://wustl.edu/policies/compolicy.html>

## Academic Integrity Policy for Graduate Students

<http://graduateschool.wustl.edu/files/graduate/AcademicIntegrity.pdf>

## Disability Resource Center

<http://cornerstone.wustl.edu/disabilityresources.aspx>

# Policy Governing Alcohol Service at Events Sponsored by Graduate Student Organizations

<http://pages.wustl.edu/prograds/alcohol-service-policy>

# Policy on Consensual Faculty-Student Relationships

<http://www.wustl.edu/policies/consent.html>

# University Judicial Code

<http://www.wustl.edu/policies/judicial.html>

# Washington University School of Medicine

Washington University School of Medicine is committed to providing a safe, professional and supportive environment in which to learn. The policies organized within the links at left pertain to professionalism, appropriate conduct and student rights. They exist to protect students and employees as they conduct their daily responsibilities.

# Policies Related to Professionalism and Conduct

## **Research Integrity Policy**

Allegations of breach of research integrity policy are the primary responsibility of the Research Integrity Committee of the School of Medicine. Complaints regarding students enrolled for the M.D. 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 CAPES as a breach of professional integrity if further action is warranted.

For further information, refer to the policy's web site: [www.wustl.edu/policies/research.html](http://www.wustl.edu/policies/research.html)

## **Policy Against Abusive Conduct**

### **A. Policy Statement**

Washington University School of Medicine (WUSM) is committed to having a positive learning and working environment for its students, faculty, and staff. All individuals have the right to enjoy an environment free from all forms of conduct that can be considered harassing, threatening or intimidating. In addition, academic freedom can exist only when every person is free to pursue ideas in a non-threatening atmosphere of mutual respect. WUSM is committed to protecting the academic freedom and freedom of expression of all members of the school community and this policy against abusive conduct will be applied in a manner that protects those freedoms. Abusive conduct is reprehensible and threatening to the careers, educational experience, and well being of all members of our community and will not be tolerated. This policy applies to all students, faculty and staff and is in addition to the Washington University Policy on Sexual Harassment.

### **B. What is Abusive Conduct?**

Abusive conduct is behavior that creates an intimidating environment and is likely to interfere with an individual's work or education. This conduct can be verbal, visual, physical, or communicated in writing or electronically. Such conduct is typically directed against a particular individual or individuals. It includes, but is not limited to, situations where one person has authority over another. In such situations, abusive conduct is particularly serious because it may unfairly exploit the power inherent in a faculty member's or supervisor's position.

1. Examples of conduct that may be considered abusive include but are not limited to:
  - a. Threatening or intimidating behavior or words (written or oral)
  - b. Obscenities/profanities (verbal or gestures) directed at a person
  - c. Threatening or obscene gestures, jokes or cartoons
  - d. Degrading a person or a group on the basis of a personal or cultural characteristic
  - e. Taunting, jeering, mocking or humiliating another person through acts or words
  - f. Screaming and/or yelling at or around others
  - g. Insulting someone, especially in the presence of others
  - h. Endangering the safety of an individual or individuals
2. In considering a complaint under this policy, the following understandings shall apply:
  - a. Abusive conduct must be distinguished from behavior which, even though unpleasant or disconcerting, is appropriate to the carrying out of certain instructional, advisory, or supervisory responsibilities. In the context of patient care clear and direct communication may be necessary in order to deliver safe, effective, appropriate and timely clinical treatment.

- b. Instructional responsibilities require appropriate latitude for pedagogical decisions concerning the topics discussed and methods used to draw students into discussion and full participation.

The fact that someone did not intend to be abusive is generally not considered a sufficient defense to a complaint, although the reasonableness of the accuser's perceptions may be considered. In most cases, it is the characteristics and the effect of the behavior on the complainant and whether a reasonable person would find the conduct abusive that determines whether the behavior was abusive.

## C. Reporting Abusive Conduct

The Medical School can respond to specific instances and allegations of abusive conduct only if it is aware of them and therefore encourages anyone who believes that he or she has experienced abusive conduct to come forward promptly with inquiries, reports, or complaints and to seek assistance. In addition, any faculty member, manager, or employee who becomes aware of instances or allegations of abusive conduct, by or against a person under his or her supervisory authority, is required to report it to the appropriate dean, director, department head or other similar administrator or to the Human Resources Department. Once a complaint is received, it is the responsibility of the dean, director, department head or similar administrator to respond to the allegations and reports of abusive conduct and take corrective action, if appropriate, or to work with Human Resources to develop such a response and corrective action, if appropriate. All complaints and their resolution must be reported to Human Resources.

## D. Protection of Rights

### 1. Retaliation

- a. Definition: Retaliation means conduct that adversely affects another's terms or conditions of employment or education and has the effect of harming a person for filing a complaint or for participating in the investigation. Retaliation can take many forms. Examples include but are not limited to:
  - Reassignment of work duties without good reason
  - Loss of job benefits (i.e., travel)
  - Loss of salary
  - Termination
  - Threats
- b. Against the Complainant: It is a violation of this policy to retaliate against persons who report or make a charge of abusive conduct or against those who testify, assist, or participate in any investigation involving a complaint. Any such retaliation – or any encouragement of another to retaliate – is a violation of this policy, independent of whether the particular claim is substantiated.
- c. Against the Respondent: Lodging a complaint is not proof of prohibited conduct. A complaint shall not be taken into account during reappointment, tenure, promotion, merit, or other evaluation or review until a final determination has been made that the policy has been violated.

2. **Knowingly False or Malicious Complaints:**

Accusations of abusive conduct typically have injurious and far-reaching effects on the careers and lives of accused individuals. Therefore allegations must be made in good faith and not out of malice. Knowingly making a false or frivolous allegation will not be tolerated and will subject the person making such a report to disciplinary action.

## E. Possible Sanctions

Possible sanctions for a person found to exhibit abusive conduct include but are not limited to the following:

In many situations, the following examples of sanctions may be sufficient.

- oral or written reprimand
- required attendance at a sensitivity program
- apology to the victim
- oral or written warning

In certain situations, the following sanctions may also need to be considered.

- loss of salary or benefit, such as sabbatical or research or travel funding
- loss of non-salary benefits (i.e., travel funding)
- demotion
- suspension, probation, termination

While counseling is not considered a sanction, it may be offered or required in combination with sanctions.

## Guidelines for Professional Conduct in Teacher / Learner Relationships

### Goals of Policy

1. To define standards of conduct among all members of the Washington University Medical Center community generally, and specifically within the teacher/learner relationship.
2. To specify a procedure for reporting potential student mistreatment or abuse.
3. To create an administrative mechanism for handling alleged incidents of mistreatment or abuse.
4. To develop a monitoring system to identify individuals or departments whose abusive behavior persists despite intervention.

## II. Preamble

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 on an atmosphere of mutual respect and collegiality among all those who work here. Disrespectful or abusive conduct of any kind at the Medical Center will not be tolerated. To this end, the School's Committee on the Professional Treatment of Medical Students endorses the Professional Service Commitments outlined by Washington

University School of Medicine, as well the standards put forth by the Barnes-Jewish Hospital BJH Cares campaign. These documents address the broad issues of respectful behavior among all members of our Medical Center community. The current document focuses instead on the special issues presented by the teacher/learner relationship, and applies to all years of the medical school curriculum.

Our students are exceptionally talented individuals, dedicated to becoming outstanding physicians, who have selected this medical school for their training. Effective learning is possible only in an environment where students can trust their teachers to treat them fairly and with respect. The teacher may be a faculty member, resident, student, or other member of the health care team. One manner in which the teacher/learner relationship is unique is that students are 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. Students learn professional behavior primarily by observing the actions of their teacher role models. Unprofessional, disrespectful or abusive behavior by teachers is antithetical to 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.

### III. Responsibilities of Teachers and Learners

The teacher-learner relationship confers rights and responsibilities on both parties. Behaving in ways that embody the ideal student-teacher relationship fosters respectful behavior, minimizes the likelihood of student mistreatment or abuse, and optimizes the educational experience for students.

#### A. Responsibilities of Teachers

- Be prepared and on time.
- Provide learners with most current materials.
- Treat students fairly, respectfully, and without bias related to their age, race, gender, sexual orientation, disability, religion or national origin.
- Give students timely, constructive and accurate feedback.
- Distinguish between the Socratic method, where insightful questions are a stimulus to learning and discovery, and over-aggressive questioning, where detailed questions are repeatedly presented with the endpoint of embarrassment or humiliation of the student.

#### B. Responsibilities of Learners

In all settings:

- Be courteous and respectful of teachers and fellow students regardless of their age, race, gender, sexual orientation, disability, religion or national origin.
- Treat fellow students as colleagues, not competitors.
- Take responsibility for maximizing your educational experience by addressing conflicts and discomforts which may impede your learning.
- Be an enthusiastic learner.
- Be trustworthy and honest.
- Know your limitations and ask for help when needed.

In the clinical setting:

- Put the patients' welfare first.
- Know what's going on with your patients.
- Take the initiative to educate yourself about their illness.
- Put patient welfare ahead of your educational needs.
- Treat all patients and members of the health care team respectfully, regardless of their age, race, gender, sexual orientation, disability, religion or national origin.
- Be compassionate.
- Respect patients' privacy.

## IV. Unprofessional and Abusive Behaviors

The responsibilities of teachers and students listed above constitute examples of respectful and professional behaviors. These should be our standards. Some behaviors which fall outside of these guidelines are clearly abusive. More commonly, however, they represent poor judgment, unprofessional behavior or mistreatment. Determining whether a given behavior constitutes abuse or unprofessional behavior is often a matter of perception. It involves a subjective assessment of the intentions of the doer and how the behavior in question was perceived by the recipient. The behaviors listed below in Section A are clearly abusive. Students who feel they may have been abused should discuss the incident or behavior in question with the individuals listed in Section V of this policy. Other disrespectful or unprofessional behaviors, such as (but not limited to) those noted in Section B, may also disrupt the student's educational experience. Students who feel they have been treated in this manner may also discuss the incident or behavior with other students, faculty members or residents, coursemasters, or the individuals listed in Section V of this policy. Students are encouraged to take responsibility for addressing issues which may be detrimental to their educational experience.

### A. What is Clearly Student Abuse

1. Unwanted physical contact (such as hitting, slapping, kicking, pushing) or threats of same.
2. Sexual harassment (see the institution's policy and procedure for filing grievances at <http://hr.wustl.edu/policies/Pages/SexualHarassment.aspx>)
3. Discrimination based on age, race, gender, sexual orientation, disability, religion or national origin.
4. Requiring students to perform personal chores (i.e., running errands, babysitting, etc).

### B. Disrespectful or Unprofessional Behavior

(This list is not intended to be all-inclusive, but to provide examples of inappropriate behaviors.)

1. Repeated questioning of a student with the primary intent to humiliate or embarrass.
2. Grading based on factors other than performance or merit.
3. Coercing students to do something they find morally objectionable.
4. Public humiliation.
5. Requiring excessive menial, noneducational chores. Work related to the care of patients contributes to the efficient functioning of the team, but must be balanced with educational opportunities.

## V. What to Do If You Believe That You Have Been Abused or Mistreated

First, carefully examine the circumstances of the incident or incidents which occurred. Discuss the event with someone else who witnessed it, or with another student or individual whose judgment you trust. Do they come under the behaviors listed in Section A above? If so, meet with your coursemaster and describe what happened. If the coursemaster takes action to settle the complaint, he/she will submit a written report of these actions to the Associate Dean for Medical Student Education. If you are not satisfied with your interaction with the coursemaster, or do not feel comfortable approaching him/her, meet with the Associate Dean for Medical Student Education. The Associate Dean will follow the procedure listed below.

If you determine that you have been treated disrespectfully or in an unprofessional manner, but have not been abused as described in Section A above, it may still be appropriate to pursue your complaint. You may do this by directly approaching the person whom you feel mistreated you, or by seeking assistance from another student, faculty member, resident, the coursemaster, or the Associate Dean for Medical Student Education. The goal of this process is to foster your educational experience by minimizing behaviors which detract from it.

The University will keep confidential all records of complaints, responses and investigations, to the extent permitted by law. Please refer to the University's policy on sexual harassment above for details regarding confidentiality.

## VI. Procedure for Handling Complaints of Student Abuse

The Associate Dean for Medical Student Education will be responsible for hearing complaints of student abuse (as described under Section A above) which are not settled at the coursemaster level. (Complaints settled by the coursemaster will also be relayed to the Associate Dean in writing.) He/she will be responsible for reviewing the complaint and obtaining additional information. If the initial review discloses that the complaint warrants further review, he/she will convene an ad hoc committee to hold a hearing. The accused will be notified in writing of the complaint and the policy for handling such complaints, and will be invited to attend the hearing. A confidential copy of the notification will be sent to the accused's department chair (for faculty and residents), training program director (for residents), or the Associate Dean for Student Affairs (for students).

If, however, the initial review discloses that the complaint has no merit, the Associate Dean for Medical Student Education will dismiss it. The student will be notified and may appeal to the Associate Dean for Student Affairs, who will convene an ad hoc committee to address the complaint.

The ad hoc committee will meet to review the facts of the complaint, and may receive written or oral testimony. All materials will be held confidential by the committee. The accused may attend the hearing, and will be provided the opportunity to rebut the complaint. The chair of the ad hoc committee will submit a written report of the committee's findings to the Associate Dean for Medical Student Education. The Associate Dean will notify the accused and the student in writing of the findings. The department chair,



program director or Associate Dean for Student Affairs will also be notified (see above), and will be responsible for determining disciplinary actions, which will not be disclosed to the accusing student. The Associate Dean for Medical Student Education will be notified in writing of any disciplinary action taken. Record of the proceedings will be kept by the Associate Dean for Medical Student Education. All complaints of student abuse brought to the Associate Dean will be cross-checked to determine if the accused has been cited previously.

## VII. Appeals Process

If the accused is a faculty member and wants to appeal the decision of the ad hoc committee or the disciplinary action of the supervisor, a written appeal may be submitted to the University's Committee on Faculty Rights, which will follow its policy for review. If the accused is a resident physician, a written appeal may be submitted to the Associate Dean for Graduate Medical Education.

If the accused is a student, a written appeal may be submitted to the Dean of the School of Medicine. The Dean or his designate will conduct an appeal review by examining the proceedings of the ad hoc committee as well as any new facts the accused student offers for consideration. The Dean or designate will notify the accused student in writing of his decision. There will be no further appeal.

### **Tobacco-Free Policy**

Effective June 11, 2008

It is the policy of the University to provide a healthy, comfortable and productive work and learning environment for all faculty, staff and students. All smoking and other use of tobacco products are strictly prohibited within the School of Medicine buildings and on our property, including during breaks and meal times. This policy applies to the entire School of Medicine community, including, but not limited to all faculty, staff, students, patients, contractors and visitors.

Individuals within the WUSM community are not permitted to smoke or use tobacco products within WUSM owned, leased or occupied facilities or on WUSM owned, leased or occupied property. This includes: the physical campuses; parking facilities and lots (including in personal vehicles at these locations); WUSM owned, leased or rented vehicles; within 25 feet of entryways or exits; near air intakes; or near fire/explosion hazards; any worksites in which individuals within the WUSM Community work.

If individuals within the WUSM community smoke or use tobacco products off WUSM properties, they are expected to be respectful of residents, hospitals and businesses neighboring WUSM facilities. They should not loiter in front of homes, hospitals or businesses near WUSM facilities and must discard tobacco products in appropriate receptacles.

Violations of the policy may result in disciplinary action.

# Policies Related to Student Rights, Procedures and Services

## 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 provide support in facing 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 insure 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, as well as those who become disabled while they are enrolled, must possess those 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 it and request accommodation from the Dean for Student Affairs or Program Director. The School encourages students with disabilities to identify themselves as early as possible in order to optimize the mobilization of resources and available accommodations.

### 2. Diagnosis of Disability

Students who are in academic difficulty that might 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 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. The student is financially responsible, unless there are extraordinary and compelling circumstances, for the costs related to the documentation by an appropriately educated and trained professional. The information provided by the professional must be factual, objective and technically valid, and 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 management of the disability. Based on this information, the affected student then should request in writing the accommodations which he or she requests be made. The Dean for Student Affairs or Program Director and the student should work together to arrive at 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 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 Program Director. An ad hoc assessment team may be convened which may include the Dean for Student Affairs, the educational Program Director (or curriculum supervisor), selected members of the Disabilities Oversight Committee (See Section B.5 below) and other consultants as appropriate to the individual circumstances. The assessment team usually should include: (1) individuals who understand the curriculum in question; (2) a person who is knowledgeable about the Americans with Disabilities Act; (3) a person with authority to authorize accommodations and cause them to be implemented.

### 2. Responsibilities for Accommodation

The School of Medicine is responsible for the costs incurred in making accommodations which are not unduly burdensome or unreasonable. Accommodations may include but may not be limited to academic modifications which do not fundamentally alter the nature of the program, auxiliary services, modifications of the circumstances and methods of qualification examinations, classroom modifications and others. The School's responsibility to accommodate ends when a student with a disability: (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 which fundamentally alters the nature of the program, is unduly burdensome or 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 disability, limitations, restrictions, and accommodations when they have a need to know such information.

4. Application of the CAPES Policies

The policies and procedures of the School regarding promotion and retention are contained in the CAPES Policies 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: periodic review of requests for accommodations and accommodations granted, provide recommendations regarding accommodations for disabilities, to serve as requested on 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 he or she has been discriminated against on the basis of a disability should direct his or her 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 following: the chair of the committee that oversees academic evaluation and advancement of students for the particular academic unit, students, and/or representatives of the Disabilities Oversight Committee.

### **Policy on Student Rights Under Family Educational Rights and Privacy Act (FERPA)**

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. They are:

- A. The right to inspect and review the student's education records within 45 days of the day the University receives a request for access.

Students should submit to the registrar, dean, head of the academic department or other appropriate official, written requests that identify the record(s) they wish to inspect. The University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

- B. The right to request the amendment of the student's education records that the student believes are inaccurate or misleading.

Students may ask the University to amend a record that they believe is inaccurate or misleading. They should write the University official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading. If the University decides not to amend the record as requested by the student, the University will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

- C. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent.

One exception which permits disclosure without consent is disclosure to school officials with legitimate educational interests. A school official is a person employed by the University in an administrative, supervisory, academic, research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the University has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks. A school official has a legitimate educational interest if that official needs to review an education record in order to fulfill his or her professional responsibility. Upon request, the University discloses education records without consent to officials of another school in which a student seeks or intends to enroll.

- D. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the University to comply with the requirements of FERPA.

The name and address of the Office that administers FERPA is:

**Family Policy Compliance Office**

U.S. Department of Education

400 Maryland Avenue, S.W.

Washington, D.C. 20202-4605

## **Student Academic Records and Transcripts**

The Family Educational Rights and Privacy Act of 1974 (FERPA) 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 University Registrars and Admission 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 may be obtained online at <http://studentrecords.wustl.edu/FERPA>.

Transcript requests may be made in person or by writing to the Registrar's Office. Faxes are accepted: (314) 362-4658. The written request must include your name, signature, date of birth and approximate dates of attendance.

## **Bloodborn 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 (HCWs). It is an ethical and moral obligation for the student/employees to report BBP infections.

The policy deals with 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 CDC 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 infection - 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 HCWs to patients, such as routine history/physical examinations, minor surface suturing, elective phlebotomy; and Category II - procedures for which bloodborne virus transmission is theoretically possible but unlikely such as minor local procedures, central venous lines, other specialty procedures; and Category III - procedures for which there is definite risk of bloodborne virus transmission such as General Surgery, CT surgery, Neurosurgery, etc. and non-elective procedures performed in the Emergency Department.

In 2012 a committee was formed including representation from Administration, Legal - Risk Management, Infectious Disease, Occupational Health, and the Director of Student Health. The SHS Director meets with the infected student and discusses the need for restricted activities and proper follow-up.

## **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 the School of Medicine (WUSM).

The benefit is provided to WUSM students for defense and indemnification of claims arising out of activities which are part of academic programs and only while a student is acting in his or her 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, or where the injury or damage resulted from intentional malicious

conduct or wrongdoing, or in the event that the action or proceeding is brought by or on behalf of Washington University. This indemnification does not cover any liability which is insured elsewhere, but it may be in excess of any amount payable under any other such insurance.

Any incident, either actual or alleged involving patient injury which could lead to a claim, which you have knowledge of must be reported immediately to the Risk Management Office of the School of Medicine, (314) 362-6956.

If you have any questions about Washington University's professional liability program, please feel free to call the Risk Management Office.

## Standards for Satisfactory Academic Progress for Financial Aid Eligibility

### MD Students

**The following policy applies to students pursuing a medical degree.**

Federal law and regulations require that all students receiving financial assistance from Federal Title IV funds maintain satisfactory academic progress. The policy presents the standards adopted by the Washington University School of Medicine and applies to all students.

In order to maintain satisfactory academic progress, 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:** 7-1/2 years
- **MA/MD program:** 7-1/2 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 but all periods of attendance, regardless of whether 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 percent maximum after six years of full-time enrollment, and the half-time student is expected to complete in twelve years. If a student vacillates between full-time and half-time enrollment, that student would have a maximum time frame between six and 12 years, and the maximum time frame for that student would be continuously adjusted.

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 Evaluation of Students (CAES). Refer to the Assessing Academic Achievement area of the Admissions and Educational Program section.

A student failing to meet the standards of progress as determined by the Committee on Academic Evaluation of Students shall be placed on financial aid probation. While on probation the student may receive financial assistance for one trimester, semester or equivalent time period. At the conclusion of this period, the student must have achieved compliance with each standard. 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.

A student shall be reinstated for financial aid eligibility at such time as that student has completed satisfactorily sufficient coursework to meet the standards of progress. A student on financial aid probation or suspension may appeal that status by indicating in writing to the Director of Student Financial Aid the existence of mitigating circumstances which should result in reinstatement of financial aid eligibility. Each appeal will be considered on its merit by the Committee on Student Financial Aid.

The Director of Student Financial Aid shall have primary responsibility for enforcement of this policy. The director shall provide in writing to each student at the time of initial enrollment a copy of this policy. The director 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.

## **Non-MD Students**

**The following policy applies to students pursuing graduate/professional training in the following programs:**

- Applied Health Behavior Research Audiology and Communications Sciences
- Biology and Biomedical Sciences
- Biomedical Engineering
- Biostatistics
- Clinical Investigation
- Doctor of Philosophy
- Genetic Epidemiology
- Occupational Therapy
- Physical Therapy
- Population Health Sciences

Federal law and regulations require that all students receiving financial assistance from Federal Title IV funds maintain satisfactory academic progress (SAP). This policy presents the standards adopted by the Washington University School of Medicine and applies to all MD students.



The School of Medicine at Washington University in St. Louis evaluates SAP at the end of each semester. If you are not maintaining progress, you 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 you appeal your status and it is approved by CAPES and the Director of Financial Aid.

In order to be considered to be maintaining SAP, and thus eligible for financial aid, students must be satisfactorily progressing toward their academic objectives. Federal regulations require three measurements for determining SAP; qualitative, quantitative and timeframe.

**Maximum Time Frame:**

To maintain eligibility you must complete your program by attempting no more than 150% of the credits required to complete your program. For example, if your program requires 120 credits to complete your degree, you must be able to complete the program by attempting no more than 180 credits. This includes credits attempted without financial aid. Specific information for each program may be found in each program?s Handbook or Bulletin.

Periods of non-enrollment are NOT counted in the measurement of satisfactory academic progress but all periods of attendance, regardless of whether the student received Title IV aid, are counted.

If you reach a point where you cannot complete your program within the 150% maximum, students become ineligible for aid.

**Qualitative Requirement:**

The minimum semester and cumulative GPAs needed to meet the SAP requirement are set by each program. The program's Bulletin or Handbook will help you determine your minimum GPA requirements. If you are not achieving the minimum GPA requirements for your program at the end of each semester when the SAP review is performed, you are not considered to be making SAP.

**Financial Aid Warning:**

A student failing to meet the standards of progress as determined by their Program at the end of each semester will be placed on ?financial aid warning? for the following term. At the end of that term, the student must be meeting SAP to receive financial aid for future semesters. Any student not meeting SAP at the end of the warning period will be suspended from future financial aid. 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 he or she can now make SAP. If the student successfully appeals, the student will be place 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 Aid 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.

## Needle Stick / Human Blood and Body Fluid Exposure Policy

<http://medicine.wustl.edu/students/needle>

## Pharmaceutical and Medical Device Industry Policy

[https://fpp.wusm.wustl.edu/fpppolicies/Pages/Conflict%20of%20Interest%20\(Clinical\)%20-%20PharmaceuticalMedicalDeviceIndustry.aspx](https://fpp.wusm.wustl.edu/fpppolicies/Pages/Conflict%20of%20Interest%20(Clinical)%20-%20PharmaceuticalMedicalDeviceIndustry.aspx)

## Student Constitution and Bylaws

### Article I:

Name, Purpose, and Membership

The name of this organization shall be the Medical Student Government of The Washington University School of Medicine.

The purpose of the Medical Student Government shall be the advancement of student interests and welfare to achieve excellence in academic pursuits and professional interactions.

The Medical Student Government shall represent all students pursuing a medical degree who are in good standing with the University.

### Article II:

Class Officers

**A. Offices:** Each Class shall elect the following officers: President, Medical Education Representative (MER), Representative to the Organization of Student Representatives (OSR Rep) of the Association of American Medical Colleges (AAMC), Representative to the Graduate-Professional Council (GPC Rep), and a Social Chair/Committee.

**B. Duties:** Each class officer shall have specific responsibilities:

1. **President:** Each class shall elect one President. This person shall serve as the official spokesperson for the class in dealings with the Student Government and with the University. The President shall disseminate information regarding medical student affairs and activities. The President shall have oversight and approve of all moneys spent by the Social Chair/Committee. The President shall perform any and all duties that are unique to the class represented.
2. **MER:** The MER shall represent the class at all meetings of the MERs and Curriculum Evaluation Committee and serve as a liaison between students and faculty on curricular matters. The MER shall poll the class as needed regarding course evaluations and selection of recipients for the various Faculty Awards presented each year.
3. **OSR Rep:** The OSR Rep shall keep class members up to date with news from the OSR and from the AAMC. The OSR Rep shall represent the University at regional and national meetings of the OSR under an agreement with the University.
4. **GPC Rep:** The GPC representatives shall represent the School of Medicine at GPC meetings and shall inform the GPC of issues affecting the School of Medicine, learn about issues affecting other schools, discuss and find solutions to problems affecting the whole graduate and professional student population, and plan and advertise social activities that foster communication between all graduate and professional students. The Reps shall be the liaison to the other programs within the School of Medicine, as well as to the rest of the University community. In addition, the four Reps will divide the responsibilities of serving on the Professional and Graduate Students Coordinating Committee (ProGrads), the Medical Campus Committee (temporarily named), and other inter-school/division committees as needed. Specifically in regards to the Health Professional Student Leadership Council (HPSLC), two of the four GPC representatives will serve as voting members on HPSLC. One of these voting members must be the 1st or 2nd year GPC representative. The selection of MSG's voting members on HPSLC must be made before the end of the sixth week of first-semester classes in the academic year.
5. **Social Chair/Committee:** The Social Chair/Committee shall organize social functions for class members and interact with other Social Chairs/Committees to organize social functions with other classes and within the University community. The Social Chair/Committee shall consult and obtain approval from the class President for all moneys spent on such functions.

**C. Elections:** An Election Official designated by the Student Government shall be responsible for the organization and execution of all elections held for offices specified under the Constitution, including President, MER, OSR, GPC, and social chair. Elections shall be held for each of the class officer positions according to the following format:

1. **Voting Eligibility:** All students who will be a member of the class during the term for which the elected officers will serve will be eligible to vote in the election. Efforts should be made by the appointed election official to extend the opportunity to vote to students who will be entering their respective classes in the upcoming year, including but not limited to the large number of MD/PhD students returning for their clinical clerkships.
  - a. **First and second year offices:** A member of the class will be considered to be an individual who is currently planning on taking the MD course of study for the upcoming year.
  - b. **Third and fourth year offices:** A member of the class will be considered to be an individual who is planning on taking the MD course of study anytime during the upcoming two years, including any individual planning to pursue an MA degree for one year after either the second or third year of medical school.
2. **Nominations:** Nominations for each office shall be held starting at least one week prior to the election and ending no later than three days prior to the election. Nominations shall be submitted in writing to the Election Official. Any student eligible to run for office may nominate him/herself or another medical student in good standing. Candidates must have the firm intention of carrying out all the duties and obligations of the office for the entire term.
3. **Candidate Eligibility:** All students who will be a member of the class during the term for which the elected officers will serve, as defined in Article II.C.1, will be eligible to be nominated for election except as described below:
  - a. **President:** The class president does not need to be taking the same course of study as the classmates he or she represents. Any individual who meets the criteria defined in Article II.C.1 will be eligible to serve.
  - b. MER
    - i. **Third year MER:** Due to the duties of the third year MER, it is essential that the third year MER be an individual who is currently taking the MD course of study with the rest of his or her classmates.
    - ii. **Fourth year MER:** The fourth year MER rep does not need to be taking the same course of study as the classmates he or she represents. Any individual who meets the criteria defined in Article II.C.1 will be eligible to serve.
  - c. **OSR Rep:** An OSR rep does not need to be taking the same course of study as the classmates he or she represents. Any individual who meets the criteria defined in Article II.C.1 will be eligible to serve.
  - d. **GPC Rep:** A GPC rep does not need to be taking the same course of study as the classmates he or she represents. Any individual who meets the criteria defined in Article II.C.1 will be eligible to serve.
  - e. **Off-Campus Students:** Students who have chosen to pursue a course of study that results in his or her not being in Saint Louis will not be eligible to retain or be

nominated for a position. This exclusion does not apply to students who will off-site temporarily for an away rotation.

4. **Elections and Terms:** All terms shall begin upon election. Regular elections shall be held according to the following schedule:
  - a. **First Year:** Elections shall be held within three to six weeks of the beginning of the first-semester classes. Each position carries a term of one academic year.
  - b. **Second Year:** Elections shall be held within six weeks prior to the completion of the first academic year. Each position carries a term of one academic year.
  - c. **Third and Fourth Year:** Elections shall be held within six weeks prior to the completion of the second academic year. Each position carries a term of two academic years.
5. **Class Officer Balloting:** To be elected a candidate must receive a simple majority (greater than 50 percent) of the votes cast for that particular office by at least a quorum of one-half of the eligible voters. Write-in candidates shall be allowed on this ballot. Absentee ballots shall be allowed if they are given in writing to the Election Official prior to the day of election. Ballot counting shall be the responsibility of the Election Official under the observation of a witness agreeable to all candidates.
6. **Class Officer Runoff Procedures:** If no candidate receives a simple majority for a particular position, a runoff between the top two candidates shall be held within three days of the initial election. Write-in candidates will not be allowed on this ballot. To be elected a candidate must receive the most votes cast for that particular office by at least a quorum of one-half of the eligible voters.
7. **Social Chair Election Procedure:** Social chair elections will be conducted in conjunction with MSG class officer elections. A maximum of four social chairs can be elected into office. Candidates do not have to receive a majority of votes to be elected into office. All other MSG election procedures apply.
8. **Appeals:** All decisions are made by the Election Official during the election period. Appeals may be made by a candidate in writing to the Chair of the Medical Student Government and will be reviewed and ruled on by a group consisting of the current President, MER, OSR, and GPC from each of the four classes; the decisions of this group will be considered final.
9. **Vacant Offices:** If any office is vacated before its set term, an election will be held for that office using the procedures outlined above within three weeks of the vacancy. If a current class officer runs for the vacated office, that officer must vacate the post he/she occupies.
10. **Removal from Office:** In the unfortunate event that a class officer is not fulfilling his/her obligations and duties, MSG by a two-thirds majority of a quorum of one-half may vote to recommend that an officer be removed from office to the class that elected the officer. A vote of recall shall then be held within one week. If a three-fourths majority of a quorum of two-thirds of a class votes to recall the officer, the officer shall be removed from office. An election for vacant office shall then be held.

**D. MD/PhD Research Students:** There shall be two Representatives of the MD/PhD students who are outside the core medical curriculum. These Representatives shall be selected by a method chosen by the Medical Scientist Training Program (MSTP.) In addition, these individuals shall be full voting members of the MSG. Each Representative shall serve a two-year term, with elections for one Representative each summer, so the terms of the two Representatives overlap by one year.

**E. Technology Liaison:** The responsibilities of the class appointed Technology Liaison include serving as the representative to the administration regarding the availability and utilization of technology and addressing related class concerns. In addition, the Technology Liaison will work with Instructional Technologies and Library Systems (ITLS) to provide new services and assist the MER with technology-related education initiatives. One Technology Liaison will be appointed for each medical school class after the class-wide elections have taken place. After a call for applications from the class, the four (4) elected MSG members of that class review each application and select the Technology Liaison by consensus. The term of the Technology Liaison will be the same as the elected officials of that class.

## Article III:

### The Medical Student Government

**A. Membership:** The Student Government shall consist of the President, the MER, the OSR Rep, and the GPC Rep from each of the four classes, as well as two representatives of MD/PhD Students.

1. **Additional voting members:** Any student who has served on MSG for a minimum of two years and is no longer eligible to serve as a class representative due to departure from the traditional four-year MD curriculum may remain on MSG as a voting member in an advisory role. All students will only be eligible to serve as a voting member for up to five total years.
2. **Non-voting members:** In addition, the Student Government may offer a non-voting position to a duly elected representative of any student group which is recognized nationally, regionally or within the Medical School so long as such a group is open to all medical students without discrimination and that such a group is not in conflict with the goals of the Student Government.

**B. Purpose and Responsibilities:** The Student Government shall carry out the business of the Student Government pursuant to the goals stated in Article I. The purpose of the Student Government shall be to represent and promote the interests and concerns of the medical student body through activities including but not limited to:

1. Forming and representing official student body opinions for interaction with the University, its Administration and other groups associated with medical education.
2. Serving as a forum for interaction between student groups.
3. Serving as a forum for student-initiated curricular review and reform in the pursuit of academic excellence.
4. Promoting interaction among the School of Medicine students, faculty and administration, and with the wider University community.

5. Establishing a funding mechanism and budget with the associated collection and disbursements of funds for activities pursuant to goals stated in Article I.
6. Organizing elections for class officers and any other official representative of the student body at large.
7. Exercising any such additional authority as may be granted to it by the School of Medicine or by other organizations, so long as such authority is consistent with the purposes stated in Article I.
8. Posting agenda of all meetings for public reference.
9. Formulating all rules and bylaws necessary for the Student Government to carry out the responsibilities and powers granted through this constitution. Such rules and bylaws shall require a simple majority of a quorum of two-thirds of the voting Student Government members.
10. The Student Government shall meet regularly and at intervals of no more than six weeks.
11. Representatives from the various student groups sitting on the Student Government shall keep the Student Government informed of all activities associated with their posts in the form of a written brief to be presented at the Student Government meeting as appropriate for their group's activities.

**C. Student Government Offices:** There shall be a Student Government Chair and Vice-Chair elected from the voting members of the Student Government. Election shall require a simple majority of the voting Student Government. The election shall be held within six weeks prior to the completion of the academic year. The terms of these offices shall be one academic year.

1. **Student Government Chair:** The Student Government Chair shall preside at all meetings of the Student Government and have specific responsibilities:
  - a. The Chair shall serve as official representative and spokesperson for the Student Government to the University, its Administration, and to other groups associated with medical education.
  - b. The Chair shall be responsible to ensure the duties of the Student Government are carried out efficiently and in a timely manner.
  - c. The Chair shall report the names of the Class Officers to the Dean, and post such a list for public reference.
  - d. The Chair shall be responsible for overseeing and maintaining records and to set the agenda for such meetings in written form for distribution to Student Government members prior to each meeting.
  - e. The MSG shall be responsible for overseeing and maintaining records of all financial transactions of the Student Government. The second-year class president shall regularly update the Student Government on its financial standing, and must make all financial records available to any medical student, member of the Administration, or to any official of the University. All transactions shall require the signatures of the Chair and the Vice-Chair.

- f. The Chair shall be empowered to call for standing and ad hoc committees to evaluate and make recommendations about specific areas of concern to the Student Government, the School of Medicine and its students. MSG shall appoint these committees.
- g. The Chair shall be empowered to designate another Student Government member to take on one or more of his/her duties.

## Article IV:

### Ratification and Amendments

A. In 1993 this Constitution was ratified by a 2/3 majority of a quorum of one-half of the student body pursuing a medical degree.

B. This Constitution can be amended by either a 2/3 majority of a quorum of one-half of the students in their first, second, and third years, or by a unanimous vote of the elected members of the Medical Student Government.

## MD Program

Provided here are policies related to students in the medical degree program. Included are policies covering professionalism, student evaluation, absences and leaves, payment and technical standards. Additional School of Medicine policies are available within the [Washington University School of Medicine section](#).

# Assessing Academic Achievement and Professionalism

## Committee on Academic and Professional Evaluation of Students (CAPES)

### Responsibility of the Committee

Overall academic and professional evaluation of medical students at the Washington University School of Medicine will be made by the Committee on the Academic and Professional Evaluation of Students (CAPES). 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 CAPES has several important roles, including:

- A. Approving promotion of students to a subsequent year of study;



- B. Recommending to the Executive Faculty those students who have successfully completed all the prescribed requirements of the School and are qualified to receive the Doctor of Medicine degree;
- C. Requiring entry of a student into an individualized program of study (ISP); and
- D. Deciding upon matters of disciplinary action including instances of unprofessional behavior brought to the CAPES.

It is also the ultimate responsibility of the CAPES to decide whether each student meets the academic and ethical standards necessary to enter the profession of medicine.

The rules governing operation of the CAPES apply to students in the following categories:

- A. Students who are engaged in the preclinical and clinical education requirements for the M.D. degree;
- B. Students in dual degree programs including the M.A./M.D. and the M.D./Ph.D. (MSTP) program taking the pre-clinical or clinical portion of their M.D. education.
- C. Students in all years of the Five-Year M.D. program.

## Membership of the CAPES

- A. **Appointed and ex officio membership** — There will be 12 voting faculty members of the CAPES, and members will be appointed for a four-year term by the Dean of the School of Medicine following nomination of suitable individuals by the department heads and Associate Deans. Initial appointments will be staggered for periods of one-, two-, three- or four-year terms.  
A faculty member may be reappointed to serve on the CAPES. Membership will include both clinical and preclinical departments. In addition, the CAPES membership will include, in ex officio capacity, the Registrar (non-voting) and the Associate Dean for Student Affairs (non-voting). The Associate Deans for Medical Student Education, Admissions, Diversity Programs and the Director of the Student Health Service may attend the CAPES meetings as non-voting observers.
- B. **Guests** — A course master who is not a member of the CAPES but who has submitted a Fail/Incomplete grade for a student which is to be discussed at a meeting of the CAPES will be present at the meeting to provide information concerning the student's performance. Alternatively, a course master may send a designated representative or may submit additional information in writing. In the event that a course master or designated representative is not present or sufficient information has not been forwarded, final action for that student will be deferred until adequate information concerning the student's performance is available. 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 instead be allowed to submit information in writing.

- C. **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.

## Meeting Frequency

The CAPES meetings must occur in a timely manner after final examinations or re-examinations (i.e., as soon as practical after grades are submitted to the Registrar). Generally grades will be submitted to the Registrar within 10 days of the completion of an examination or within four days of a re-examination. A meeting of the Committee also may be convened at any time such that timely review of student performance and action thereupon is provided.

### Quorum for the CAPES Meetings

Seven voting members must be present to consider academic or disciplinary actions.

### Procedures for Making Changes to this Document

Major revisions in this document will be approved by the Academic Affairs Committee.

## The Academic and Professional Evaluation of Students

- A. In order to continue their studies at the Washington University School of Medicine, students 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 and integrity, responsibility, a sensitivity and compassion for individual needs, and compliance with applicable laws, policies and regulations. Serious or repeated breaches of these principles will be referred to the CAPES for review. See the section called Guiding Principles of Professionalism.
- B. It is the responsibility of students who feel that personal concerns, health problems, or any other factors may be adversely affecting their academic performance to bring such matters to the attention of the Director of the Student Health Service or the Associate Dean for Student Affairs for possible accommodations.
- C. Students are required to take all examinations at the specified time. A student may be excused from this rule for extenuating circumstances at the discretion of the Associate Dean for Student Affairs, who will inform the course master. Extenuating circumstances are defined as sudden personal illness, extreme family circumstance, or significant professional obligation. Doctor appointments of a routine nature or vacation time are not considered to be extenuating circumstances for which students can be exempted from the regularly scheduled exam date. In

the event of a student's inability to attend a scheduled examination due to sudden illness, extreme family circumstance or significant professional obligation, the student is required to inform the Associate Dean for Student Affairs prior to the examination. If the issue is sudden illness, the student must also be evaluated by the Student Health Service. In the event that the student cannot reach the Associate Dean for Student Affairs, the student should contact the relevant course master.

At his or her discretion, the Associate Dean for Medical Student Education may occasionally approve an exam date change for the entire class if the need arises, but this is an exception, as the complete schedule is reviewed prior to the start of each academic year by course masters and student representatives.

- D. At the conclusion of each academic year students receive a grade report which indicates the grade achieved in each course. When all the official grades have been received, the official transcript, in addition to listing courses and grades achieved, lists the grade distribution in each course (with the exception of selective and elective courses).
- E. At the annual end-of-year CAPES meeting, the Committee will vote to recommend promotion of students who have successfully completed all the requirements of the current academic year to the studies of the subsequent year.
- F. Prior to graduation, students are required to complete and pass all required coursework and examinations. Occasionally students are permitted to complete equivalent coursework at other institutions with the permission of the responsible department and written notification to the Registrar.

## Grading System

### A. First Year

Courses in the first-year curriculum are evaluated on a Pass (P) or Fail (F) basis. For purposes of the official grade records of the School of Medicine, grades used for the first year are:

P = Pass, indicating satisfactory performance

F\* = Fail

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

L = Successful audit

NG = Course credit earned, students not graded

W = Withdrawal from a course

Z = Unsuccessful audit

Failure of any examination which comprises a significant portion of the final grade (typically 20% or more) must be reported by the course master to the Associate Dean for Student Affairs. In the event of a failure

of a single exam within the course, the course master may allow one attempt at remediation of this examination. The scheduling of a remedial examination will be agreed upon by the course master and student but in general should not extend beyond 30 days after the end of the course or academic year, whichever occurs first. Days of recess for Winter Break or Spring Break will not be counted in the 30 days. A grade of E will be submitted by the course master if the remedial examination 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). If the student successfully remediates the examination, 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.

\*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.

\*\*Incomplete (I) indicates that, because of a delay excused by the course master, the student has not completed the requirements to pass a course.

## B. Second and Subsequent Years

For purposes of the 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

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

Cr#/NCr# = Credit/No Credit for some second-year courses

L = Successful audit

NG = Course credit earned, students not graded

W = Withdrawal from a course

Z = Unsuccessful audit

\*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.

A failing grade for clinical clerkships will be recorded on the official educational record when a student fails the subject examination (defined as scoring at less than the 10th percentile as reported by the NBME) for the second time. A failing grade will be recorded when a student fails the clinical portion of the clinical clerkship or elective. In both events, the failing grade remains on the student's official educational record. When the course is remediated the new grade will also appear on the student's official educational record.

\*\*In clinical clerkships which 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.

\*\*\*Incomplete (I) indicates that, because of a delay excused by the course master, the student has not completed the requirements to pass a course.

## C. Grade Reporting

Final grades will be submitted to the Registrar by course masters within ten (10) working days of the final examination or final class meeting for the first two years. For third and fourth years, grades are due within ten (10) working days of the receipt of standardized examination scores or the last day of the rotation if no examination is given. A web-based University system, WEBSTAC, provides timely access to grades for the first two years. Grades and evaluations of student clinical performance are submitted on a standardized form and are available for review in the Office of Student Affairs throughout the academic year. Final grades for the clinical clerkships and electives are recorded in the University student information system at the end of the academic year and are subsequently available on WEBSTAC, which is updated quarterly. A paper copy of final grades is available upon request from the Registrar's Office.

## D. Grade Point Average, Class Ranking and Grade Distributions

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 and each academic year. This ranking is not recorded on the permanent academic record and therefore does not appear on transcripts. It may appear in the student's dean's letter. 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.

## E. Grade Appeals

A student who wishes to appeal his/her grade with the course master should file his/her request for review by completing the grade appeal form which includes the basis for the appeal. This should be filed within 30 days of the course completion. If reasons beyond the student's control delay the resolution of the appeal past the 30-day deadline, the Registrar must be notified so that the final transcripts, grade distributions and class rankings for match can be held pending resolution of the matter. If this notice is not filed with the Registrar prior to the deadline, the new grade cannot be accepted. Students participating in the residency match should also notify the office of career counseling that a grade appeal is in process. The resolution of the appeal will be noted on the grade appeal form and forwarded to the Registrar and Associate Dean for Student Affairs. A copy of the grade appeal form is available in the Registrar's Office and is also included in this document.

NO GRADE CHANGES ARE PERMITTED FOR THE ACADEMIC YEAR AFTER JULY 15.

## Grade Appeal Form

Please see Appendix A in the "Rules Governing Review of Student Performance" booklet.

## Individual Study Program

The educational program is designed to assist the specialized needs of all medical students in an individualized and personalized manner. Tutorial assistance is available to any student at any time as

detailed below. Occasionally students who have difficulty in handling the normal academic course load will enter an Individual Study Program (ISP), requiring five years to complete rather than four years.

The following rules govern students engaged in an ISP:

- A. The intent of an ISP is to optimize the prospect that the student will successfully complete the curriculum.
- B. Entry into an ISP may occur in one of three ways: 1) a student may request an ISP, or after careful consideration of the student's academic performance at intervals throughout the curriculum, the CAPES may either 2) recommend or 3) require entry into an ISP.
- C. The specific program of any ISP (i.e. the content and sequences of courses) will be determined by the student and the Associate Dean for Student Affairs with input from relevant course masters and the CAPES. The specific recommendations of the CAPES will generally be adopted. The plan for execution of an ISP, once established, will be recorded in the student's file in the Registrar's office and a copy provided to the student.
- D. Unless extenuating circumstances exist, ISP students are required to take the examinations for a particular course in their usual temporal relationship to the coursework. Requests for consideration of unusual circumstances should be recorded in the student's file in the Registrar's office.
- E. 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. The consequences may include remediation, repeat of the course or dismissal.
- F. At the completion of the time for their ISP, ISP students who have not successfully completed and received a grade of Pass or above in the usual courses of the first- and second-year curricula by the start of the second six-week period in the year of the clinical clerkship will be dismissed from enrollment in the School.

### **Tutorial Assistance Program**

Students experiencing difficulty in any course may request tutorial assistance. Such requests should initially be directed towards the course masters and thereafter to the Associate Dean for Student Affairs. Students who are repeating courses will be offered the opportunity for tutorial assistance. The CAPES may also require it. There is no charge to the student for tutorial assistance.

### **Indications for Review of Academic Performance**

## General

"Indications for Academic Review" refers to guidelines used at the School in the event that a student fails a course or fails to complete a course in the requisite time.

- A. In the event of any initial failure of a course offered at the School, the student will meet with the Associate Dean for Student Affairs to formulate a plan to remediate such failure.
- B. If the Registrar has recorded a Fail or Incomplete grade in two or more courses in a single year or cumulatively three courses between years, the student's academic performance will be referred to the CAPES for review and determination of a course of action.
- C. Refer to The Individual Study Program (ISP) section for guidelines pertaining to students engaged in an ISP.
- D. When the performance of a student is referred to the CAPES for potential academic review, the following rules will apply:
1. No student may take more than three years to complete the coursework required for the first two years. The end of such a "three year" period, is defined as 36 months from the date of matriculation to the School. Time periods included in a "Leave of Absence" are not counted in these 36 months.
  2. In the absence of extenuating circumstances, no student may take more than two academic years to complete the coursework required in the first year curriculum.
  3. The maximum number of attempts to pass any individual course during enrollment in the School, including time in an ISP, will be three.
- E. 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 breaches of professionalism.

## First Year

- A. Failure of any examination which comprises a significant portion of the final grade (typically 20% or more) must be reported by the course master to the Associate Dean for Student Affairs. In the event of a failure of a single exam within the course, the course master may allow one attempt at remediation of this examination. A student may remediate only one examination in any course.
- B. If a student has received a Fail/E grade in a single first-year course, the Associate Dean for Student Affairs will meet with the student to formulate a plan from the following options:
  1. Take a re-examination in the course at a time prescribed by the course master. The scheduling of a remedial examination will be agreed upon by the course master and student but in general should not extend beyond 30 days after the end of the course or academic year, whichever occurs first. Days of recess for Winter Break or Spring Break will not be counted in the 30 days. A grade of E will be submitted by the course master if the remedial examination 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). If the student successfully remediates the examination, 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.

2. Enroll in and successfully complete, at the level designated by the course master, a summer course at a different institution, such course being completed and passed by the beginning of classes for the second year.
3. A student who, for a single course, fails the re-examination taken to remediate a failed course or fails to successfully complete an approved summer course will be referred for the CAPES to review and propose a recommended course of action. The CAPES may require such a student to enter an ISP or may terminate enrollment. Alternatively, the CAPES may permit a re-examination. If this re-examination is failed enrollment will be terminated.
  1. 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 require that the student enter an ISP, or to permit the student to take re-examinations, if a re-examination has not already been taken, in the courses for which Failed/Incomplete grades have been recorded. Such re-examinations will generally occur during the last week of the inter-academic year break. If such a re-examination is failed, the student may be required to enter an ISP or be dismissed from enrollment in the School.
  2. The Associate Dean for Student Affairs may also request that the CAPES review performance of a student who has demonstrated poor academic performance, either by demonstrating poor academic performance in two or more courses at interval evaluations conducted throughout the course, or by failing two or more examinations within one course. In such instances the CAPES may recommend a course of action.

If Fail/Incomplete grades have been recorded for two or more courses or a single re-examination, the CAPES may require that a student enter an Individual Study Program or that enrollment in the School be terminated. If a student has failed three attempts to pass a course, enrollment will be terminated.
  3. All first-year courses must be completed before the start of the next academic year.

## Second Year

- A. The Associate Dean for Student Affairs will meet with students in the following categories regarding taking a re-examination, according to the schedule listed under the next section (B):
  1. a student for whom a Fail or Incomplete grade has been recorded in a single interval examination in a year-long course, OR
  2. a student for whom a Fail or Incomplete grade has been recorded in one or two block-long courses.



- B. Re-examinations in complete courses in Pathology or Clinical Medicine will generally be offered during the last week of the inter-academic year break, prior to entry into the third year. Re-examinations for students who have failed one or two block-long courses will be generally offered at a time determined by the course master and the Associate Dean for Student Affairs. All re-examinations must be offered to students and completed by them prior to the start of the next academic year.
- Students who fail a re-examination of a single course will be referred to the CAPES to determine a course of action. The CAPES may decide that the student must enter an ISP. Alternatively, a re-examination may be offered. If the re-examination is failed, enrollment will be terminated.
- C. Students in the second year for whom the Registrar has recorded Fail/Incomplete grades under the following categories will be referred to the CAPES for review and resolution of a recommended course of action:
1. one year-long course OR
  2. three or more block-long courses OR
  3. an interval examination in one year-long course and two block-long courses OR
  4. an interval examination in two year long courses OR
  5. students for whom the Registrar has recorded a Fail/Incomplete grade in any re-examination.
- D. At review by the CAPES for students referred to above, the Committee may decide to permit the student to take re-examinations, if a re-examination has not already been taken, in the courses for which Failed/Incomplete grades have been recorded. Such re-examinations will generally occur during the inter-academic year break. The CAPES may allow the student to defer beginning the clinical rotations so that re-examinations may be taken up to 6 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. In the event that a Fail/Incomplete grade is recorded at a re-examination, the CAPES may require that a student enter an Individualized Study Program or that enrollment in the School of Medicine be terminated.
- In the event that the CAPES decides not simply to permit re-examination, the CAPES may require that the student enter an Individualized Study Program as detailed below, or that enrollment in the School be terminated.
- E. No student will be permitted to begin clinical rotations of the third year until all first- and second- year courses have been successfully completed.

## Cumulative Academic Review/Academic Warning

Prior to promotion to the clinical year, the CAPES will review the cumulative academic record of each student brought forth by the Associate Dean for Student Affairs to determine whether the student's academic performance justifies advancement to the clinical phase of the medical education without warning. Typically, three (3) remediated examinations and/or failing grades during the first two years of the curriculum would raise concerns about the student's fund of knowledge and readiness to participate in clinical care of patients. Students with overall records indicating such serious academic failure may be dismissed, may be required to repeat specific preclinical course work or may be advanced to the third year with academic warning.

Upon written notification of advancement with academic warning into the clerkship year, the student must meet with the Associate Dean for Student Affairs

- A. to review the planned clerkship schedule in order to consider schedule changes to facilitate successful clinical experiences;
- B. to pursue available resources for academic intervention; and
- C. to address any additional problems that may arise. It is recommended that these students seek tutorial assistance through each clerkship course master.

A third-year student who has received an academic warning after the first two years and then fails any component of a clinical clerkship may be dismissed from the school.

## Third and Subsequent Years

A. Regarding performances beyond the second year, the Associate Dean for Student Affairs will meet with a student for whom a single Fail/Incomplete/E grade has been entered regarding the requirements stipulated by the relevant course master to remediate the grade entered. Options will generally include a re-examination or repeating all or a portion of the course. If a Fail/Incomplete grade has been entered following the prescribed remediation, the student will be referred to the CAPES to determine a course of action. When such a student is referred to the CAPES, the CAPES may permit a re-examination or repeating all or a portion of the course. If the course is failed a third time, enrollment in the School of Medicine will be terminated.

B. A student beyond the second year for whom the Registrar has recorded two or more failing grades in the clinical rotations or electives will be referred to the CAPES for review and proposal of a course of action.

C. Any student who fails to achieve a passing grade (defined as greater than or equal to 10th percentile as reported by the NBME) on any two or more subject

(shelf) examinations conducted as part of the evaluation of clerkships will be referred to the CAPES for review and proposal for a course of action.

D. The Associate Dean for Student Affairs may also request that the CAPES review performance of a student who has demonstrated poor academic performance in two or more courses at interval evaluations conducted throughout the course when such performance has been reported to the Associate Dean. In such instances, the CAPES may recommend a course of action.

E. For students referred to the CAPES, the Committee may endorse or amend the remediation recommendations of course masters from whom Fail/Incomplete grades have been entered. In the event that a student fails such a course of remediation, as defined by the course master and approved by the CAPES, the CAPES may require that the rotation be repeated or that enrollment of a 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 examination grades or final clerkship grades have been submitted for a course, enrollment will be terminated.

F. A student who advances to the clinical years with academic warning and who fails any component of a clerkship will be referred to the CAPES for action including possible termination.

See Cumulative Academic Review/Academic Warning.

### **Procedures Concerning Review of Academic Performance**

Actions for Academic Review shall be referred to the CAPES for consideration by the Associate Dean for Student Affairs or Registrar's office.

- A. The Associate Dean for Student Affairs will convene a meeting of the CAPES. He/she shall notify the student in writing of the course(s) for which Academic Review is scheduled and the date and time at which the CAPES will address the matter.
- B. The Associate Dean for Student Affairs, the Registrar, the course master(s) or their designated representatives, shall present the matter to the CAPES in a closed and confidential CAPES meeting.
- C. For students referred for course failure, the CAPES meetings will have, in addition to the grade report forms for the course for which the student is referred to the CAPES, a complete record of the student's academic performance and the student file.
- D. Seven voting members must be present to consider items of academic disciplinary action (i.e., dismissal from enrollment or required entry into Individual Study Program).
- E. All students 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 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.

- F. The student shall be permitted, upon request in advance of the CAPES meeting, to appear before the CAPES on his or her own behalf. At the student's request, he or she may be accompanied by a member of the faculty or staff of the School of Medicine for guidance and support. Alternatively, again following request, the student may be accompanied by a fellow student enrolled in the School of Medicine.
- G. A record of the CAPES meeting shall be preserved for purposes of review by the School of Medicine's Appeals Committee, as necessary.
- H. Action taken by the CAPES for poor academic performance may include dismissal. Sanctions short of dismissal from the school include but are not limited to warning, probation, defined penalty, and suspension. Additional consequences may include a program of remediation or additional oversight. The CAPES may also rule that the Dean's letter/MSPE should include a citation regarding the matter. The CAPES decision shall be by simple majority vote unless the vote is for dismissal, in which case, a three-fourths majority will be required. The decision of the CAPES shall be communicated, in writing, to the student by the Registrar's office.
- I. After the meeting, 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 of the result within ten working days.

### **Indications for Review of Professional Integrity**

Matters involving possible breaches 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 them in writing to the Associate Dean for Student Affairs by completing a Professionalism Concern Form providing other detailed written information as necessary. Individuals submitting such forms are reminded of the need for confidentiality regarding all matters of misconduct.

Behaviors inappropriate to the medical profession shall include, but are not limited to breaches of personal confidence and trust, including cheating or unauthorized use of materials during examinations; abuse, misrepresentations or other seriously improper conduct in relation to patients or colleagues including breaches of confidentiality; other misconduct; illegality; substance abuse; failure of judgment including that related to non-compliance in the treatment of any personal medical condition; and misrepresentation or failure in personal actions or in meeting obligations, so as to raise serious unresolved doubts about the integrity of the student to enter the practice of medicine. See Guiding Principles of Professionalism below.

### **Procedures Concerning Review of Professional Integrity**

At the discretion of the Associate Dean for Student Affairs, in cases of serious or repeated breaches of professionalism raising concern about a pattern of behavior, the Associate Dean for Student Affairs will convene a meeting with the Associate Dean for Admissions or the Associate Dean for Medical Student Education to review the complaint 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 or Admissions will discuss the complaint with the student. If the two Associate Deans deem that further action is warranted, the Associate Dean for Student Affairs will follow the procedures below:

- A. The Associate Dean for Student Affairs will convene a meeting of the CAPES. If the person bringing the complaint is a member of CAPES, he or she will not vote but may participate in the discussion. If the person bringing the complaint is not a member of CAPES, he or she will be asked to present the complaint and will then be excused. The CAPES chairperson will be responsible for overseeing the procedure of the meeting. The Registrar will attend the meeting to record the minutes. The CAPES shall, whenever possible, convene within one to two weeks after the initial meeting between the student and the Associate Dean for Student Affairs.
- B. Seven voting members must be present to consider items of academic disciplinary action (i.e., dismissal from enrollment or required entry into Individual Study Program).
- C. 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 its decision regarding disciplinary action.
- D. 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. Such notification shall also state that the proceedings are confidential, and that the student may bring a faculty member, staff member or fellow student of the School of Medicine for guidance and support.

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.

- E. 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 academic record, or any other evidence which could assist the CAPES in determining an appropriate sanction. 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 evidence presented and may present evidence and witnesses on his or her own behalf.

- F. 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 misconduct alleged.
- G. If the person who has submitted the Professionalism Concern Form which is being discussed by the CAPES is a member of the CAPES, that member will provide information about the professionalism issue to the CAPES, but will then recuse him/herself from voting.
- H. Action taken by the CAPES for breaches of professional integrity may include dismissal. Sanctions short of dismissal from the school include but are not limited to warning, probation, defined penalty, suspension, fine and restitution. Additional consequences may include a program of remediation or additional oversight. The CAPES may also rule that the Dean's letter/MSPE should include a citation regarding the matter. A simple majority will prevail, except when the motion is to dismiss from the school where three fourths majority will be required.
- I. After the meeting and decision of the CAPES, the Associate Dean for Student Affairs will inform the student verbally of the result. The Registrar will inform the student in writing of the result within ten (10) working days.
- J. The record of such proceedings will be held confidentially with access restricted to Committee members, the student involved, and members of the Administration involved in the proceedings.
- K. All witnesses who appear before the Committee are assured that there will be no personal repercussions from their testimony.
- L. Unless it is 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 the 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 section B of Leave of Absence applies.
- M. Should a student be referred to the CAPES for an issue(s) involving both academic performance and professionalism concerns, the procedures for Professionalism Concerns will be followed.

### **Appeals Process for the CAPES Decisions**

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.

Within twenty (20) days of the date on which an Academic Disciplinary Action 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 or that the Appeals Committee request that the CAPES consider additional information which was not previously presented to the CAPES. The letter to the Registrar should include the basis for the appeal as well as any new relevant information.

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 Committee may not be appointed to the Appeals Committee. A quorum of this committee shall consist of five (5) members.

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 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 opinions of the merit of matter and appeal for those of the CAPES.

On all appeals the Appeals Committee may either remand the matter to the CAPES for reconsideration with its explanation for the remand, or deny the appeal. 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. The Appeals Committee shall provide its decision in writing to the Dean, the student, the CAPES, the Associate Dean for Student Affairs and the Registrar. The Appeals Committee shall determine whether the student may continue his or her curriculum pending its review of a CAPES decision.

Within twenty (20) days of the date of an Appeals Committee's decision or referral back to the CAPES, 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 shall be final.

## Policies Related to Evaluation

### **United States Medical Licensing Exam (USMLE)**

Washington University School of Medicine students who anticipate practicing clinical medicine are required to take the USMLE Step 1 and 2 examinations.

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 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 Bulletin of Information published by the National Board of Medical Examiners, and is available, along with application forms and information, at <http://www.usmle.org>.

### **Guidelines for Exam Administration**

## **Guidelines for Exam Administration\***

*Following are general guidelines for exams administered in the undergraduate medical curriculum. Additional requirements may be posed by the individual course master.*

### **Expectations for Students:**

- Take the exam during the originally scheduled time, excepting extenuating circumstances. Note the Committee on the Academic Evaluation of Students' policy:  
“Students are required to take all examinations at the specified time. A student may be excused from this rule for extenuating circumstances at the discretion of the course master. Extenuating circumstances are normally defined as sudden personal illness. Doctor appointments of a routine nature or vacation time are not considered to be extenuating circumstances for which students can be exempted from the regularly scheduled exam date. Such occasions will be promptly reported to



the Registrar. In the event of inability to attend a scheduled examination due to sudden illness the student is required to inform the course master prior to the examination and to be evaluated by the Student Health Service. In the event that the student cannot reach the relevant course master, the student should contact the associate dean for student affairs.”

- Be punctual and assemble in the designated exam area before the official start time of the exam. Tardiness will not be excused except in extenuating circumstances.
- Not share study materials, exchange information, collaborate or communicate with others during the exam.
- Turn off and leave cell phones and other electronic devices in their bags.
- Hand their exam to the proctor prior to leaving the room.

### **Expectations for Faculty:**

- Exams should be proctored by the course master or a designee appointed by the course master comfortable with proctoring and exam administration guidelines. Exams will not be proctored by Office of Medical Education/Office of Medical Student Education Staff. NBME subject exams are proctored 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 masters are notified of these students through the Associate Dean for Student Affairs.
- If a student behaves inappropriately, the course master should notify the Associate Dean for Student Affairs immediately (see below for examples of inappropriate behaviors).
- All requirements of students should be communicated to all students PRIOR to the start of the exam.

\*Not applicable to take-home exams

**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 paper.
- 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.
- Utilizing a calculator, cell/smart phone, 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.

## Policies Related to Absences and Leaves

### **Absence Policy for MD Students on Clinical Clerkships**

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 the clinical clerkship.

The clinical clerkship year at Washington University School of Medicine comprises 48 weeks of required core clinical experiences. All students on the clinical clerkships have a scheduled 2-week winter recess break, a 3-day spring break and a 2-week break between the end of the third-year clinical clerkships and the start of fourth-year elective rotations (or free time prior to graduation for MSTP students). During every clinical clerkship, each student is expected to participate fully in all activities of the clerkship up until the designated end time of the clerkship 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.

If a student is ill or has a personal emergency, (s)he should notify the clerkship course master's office and the resident supervising his/her clinical team the morning of the absence. If the absence extends beyond two consecutive days, the student should also notify the Office of Student Affairs.

It is recognized that a student may, on a very occasional basis, desire to be excused from clinical activities for professional or significant personal events. For the third year, the Curriculum Evaluation Committee agreed upon the following guidelines regarding the maximum number of days of excused absences (including illness) from clerkships: Students may miss up to 5 days on a 12-week clerkship, 3 days on a 4-week clerkship, and 1 day for a 2-week clerkship without making up the missed time. Students must recognize that clerkship teaching, learning and evaluation are dependent on the student's presence and participation in every aspect of the clerkship. While students will not be graded down only because of an excused absence, time spent away from the clerkship may decrease learning and impede effective evaluation; 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 clerkship director. It is the

responsibility of the student to directly contact the clinical clerkship course master in writing (by letter or e-mail) to obtain permission for any planned absences well in advance of the planned absence.

At the discretion of the course master, any student who misses portions of the clinical clerkship 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 clerkships to complete the 48 weeks of mandatory clinical clerkships.

### **Absence Policy for MSTP Students on Clinical Clerkships**

It was agreed at the April 17, 2003, CEC-III meeting that MSTP students would be allowed to miss up to three days of any four-week clerkship, and up to nine days of any 12-week clerkship for any reason including interviews. This is a substantially more flexible policy than we have towards the M.D. students, in which we limit the number of days off to three in a four-week period, and five in a twelve-week period. We recognize that for some MSTP students entering competitive specialties with limited interview dates it may be necessary for them to plan far enough ahead in their training to schedule a month for either a very light elective or a free month to allow appropriate flexibility for interviews. The committee also agreed that the MSTP students should be encouraged to:

1. talk with Dr. Kathryn Diemer early for assistance in residency planning;
2. seriously consider coming out of lab a month earlier to allow flexibility for interviewing; and
3. delaying graduation by one year to increase flexibility. When absences are necessary on a clerkship, advanced discussion with the clerkship director will better allow placement on a team to allow maximum educational value. We believe this policy strikes an appropriate balance between increased flexibility for the MSTP students and assuring a meaningful educational experience on the core clerkships.

### **Absence Policy for MD Students on Fourth-Year Electives**

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 the clinical clerkship and elective years.

The elective year at Washington University School of Medicine encompasses a 44-week time block and requires students take a minimum of 36 weeks of elective experiences. All students have a scheduled two-week winter recess and a three-day spring break during the academic year. During each elective, each student is expected to participate fully in all activities of the elective up until the designated end time of the elective or the start time of a holiday break. This could require participation beyond formal weekday hours to include evening and nighttime call and clinical responsibilities on weekends.

If a student is ill or has a personal emergency, (s)he should notify the elective course master's office and the resident supervising his/her clinical team the morning of the absence. If the absence extends beyond two consecutive days, the student should also notify the Office of Student Affairs.

It is recognized that a student may, on a very occasional basis, desire to be excused from clinical activities for professional absences or significant personal events. For the fourth year, the Curriculum Evaluation Committee agreed upon the following guidelines regarding the maximum number of days of excused absences (including illness) from electives: During interview season, students will be allowed to miss up to five days in a four-week rotation; any additional days off would require approval by the Associate Dean for Medical Student Education and the elective course master. Days off in excess of three days are to be used for residency interviews.

The rest of the elective year follows the third-year absence policy: Students may miss up to five days on a twelve-week rotation, three days on a four-week rotation, and one day for a two-week rotation without making up the missed time. Students must recognize that elective teaching, learning and evaluation are dependent on the student's presence and participation in every aspect of the elective. While students will not be graded down because of an excused absence alone, time spent away from the elective may decrease learning and impede effective evaluation. Because of these meaningful learning experiences, students are encouraged to make up missed work on rotations and should discuss this option with the course master. It is the responsibility of the student to directly contact the course master in writing (by letter or e-mail) to obtain permission for any planned absences well in advance of the planned absence.

At the discretion of the course master, any student who misses portions of the elective experience due to planned and/or unplanned absences that exceed the maximum time may be required to utilize winter recess, spring break or free time to complete the elective.

### **Leave of Absence Policy**

- A. 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 leave 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 CAPES for additional years 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 the Student Health Service. A written statement of medical clearance will be required before the student may return from such a leave.
- B. 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 procedure applies:

1. 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 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 himself or herself, to patients or to the rights of others to continue their normal University function and activities.
2. 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.
3. 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.
4. 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:
  - a. Whether the suspending authority's information concerning the student's conduct is reliable; and
  - b. 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.
5. 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.
6. A temporary suspension shall end when
  - a. rescinded by the suspending authority, or
  - b. upon the failure of the suspending authority to promptly file a statement of charges with the University Judicial Board or a Disciplinary Committee, or
  - c. 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 the Student Health Service and the Associate Dean for Student Affairs.

- C. 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.
- D. 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 section on Registration, Payment of Financial Obligations, Withdrawal and Refund Policy regarding policies on the effect of a leave of absence on tuition and other financially related matters.

## 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 program. Students are registered in the graduate school during the research years. Both student health and disability coverage are provided by the Division of Biology and Biomedical Sciences.

### MA/MD

Student status is maintained while in the research phase of the MA/MD program. Students are registered in the graduate school during the research year. Both student health and disability coverage are provided.

### Five-Year MD Program

**Research Year Here:** 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.

**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 Here:** 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/MA and 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:** Same as Leave of Absence Year Here

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.

## Guiding Principles of Professionalism

### A. 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 his/her 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 on-going 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. Rather, four broad categories of professional behaviors are described below, with specific principles cited for each in bold print, and examples provided for some of the principles in regular text. While this document was developed with medical students in mind, it is generally applicable to all medical professionals.

### B. 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 life-long, 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.

## C. 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.

## D. 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.

Respect for the ethnic and cultural diversity of classmates provides for a more nurturing environment for all.

- d. 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 personal and professional growth of all.
  - e. 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.
3. 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.
4. 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.
5. Understanding the appropriate venues for feedback to house staff/fellows/faculty is critical to successfully resolving conflicts .
  - a. 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.
  - b. [medicine.wustl.edu/students/conduct.htm](http://medicine.wustl.edu/students/conduct.htm)
6. 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 ([www.wustl.edu/policies/consent.html](http://www.wustl.edu/policies/consent.html))  
Students engaged in such relationships should review these codes and avoid any situation that can cause potential conflict of interest in the academic setting.
7. 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.
8. Students should treat hospital staff with appreciation and respect as they are vital members of the health care team.

## E. 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. [link to University's definition]
  - 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 Master 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 his/her 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 his/her 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 him/herself 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.

## Washington University School of Medicine Professionalism Concern Form

Please see Appendix B in the "Rules Governing Review of Student Performance" booklet.

# 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 take a history, examine a person, synthesize the findings into a diagnosis and plan of evaluation and treatment independently. 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.

## Dress Code

While Washington University School of Medicine does not have a written dress code, it is expected that all students will dress in attire that is appropriate for a professional.

Appropriate attire in the clinical setting is especially important, not only because the student will be part of the team representing the medical profession to patients, but also because the student will be representing the School of Medicine.

Appropriate attire for male students on the clinical services includes man-tailored shirt and tie, trousers or slacks and closed toe shoes. Appropriate attire for female students includes a dress, a blouse, tailored shirt or sweater, slacks or skirt, and closed-toe shoes. Both men and women should wear a short white jacket with the appropriate identification card clearly visible.

## Duty Hour Policy for Medical Students

<http://medicine.wustl.edu/students/dutyhour>

## Payment of Financial Obligations, Withdrawal and Refunds Policy

<http://bulletinoftheschoolofmedicine.wustl.edu/Admission/mdprogram/Pages/Payment-of-Financial-Obligations,-Withdrawal-and-Refunds-Policy.aspx>

# People

Washington University Medical Center is one of the nation's biggest academic medical centers and among the largest employers in the St. Louis metropolitan area.

## By the Numbers

Total Students: 1,350

- MD, MD/PhD, MA/MD: 598
- Audiology and Communication Sciences: 72
- Clinical Investigation: 104
- Genetic Epidemiology: 29
- Occupational Therapy: 274
- Physical Therapy: 274
- Population Health Sciences: 13

Faculty: 1,968

Non-faculty Assistants and Others: 174

Staff: 6,708

Total Employees: 8,850

Affiliated Private Practice Faculty: 1,349

Fellows and Trainees: 883

House Staff: 1,110

## Leadership

<http://bulletinoftheschoolofmedicine.wustl.edu/About/administration/Pages/Officers-of-the-School-of-Medicine.aspx>

## Faculty

The **All Faculty** listing in the Bulletin of the School of Medicine is drawn from the Washington University Human Resources Management System (HRMS). To update or change a faculty member's listing, please contact the HRMS representative for your department, division or program. Thank you.

**Elliot Efrem Abbey, MD**

Professor of Clinical Medicine

**Camille N. Abboud, MD**

Professor of Medicine

**Basem Abdeen, MD**

Instructor in Clinical Medicine

**Shabaana Abdul Khader, PHD**

Associate Professor of Molecular Microbiology

**Haley J Abel, MA, PHD**

Research Instructor in Genetics

**Dana Ray Abendschein, PHD**

Associate Professor of Medicine

Associate Professor of Cell Biology and Physiology

**Enyo Ama Ablordeppey, MD, M PH**

Instructor in Emergency Medicine in Medicine (Pending Dean's Approval)

**Marc Bruce Abrams, DENT**

Instructor in Clinical Otolaryngology

**Barry K Abramson, MD**

Instructor in Clinical Medicine

**Yousef Abu-Amer, MS, PHD**

Professor of Orthopaedic Surgery

Professor of Cell Biology and Physiology

**Mouhammed O Abuattieh, MD, PHD**

Instructor in Ophthalmology and Visual Sciences

**Nada A Abumrad, PHD**

Robert C Atkins Professor of Obesity Research in Medicine

Professor of Cell Biology and Physiology

**Aninda Bhat Acharya, MD**

Instructor in Clinical Neurology

**Samuel I Achilefu, PHD**

Professor of Radiology

Professor of Biochemistry and Molecular Biophysics

**Samuel I Achilefu**

Siteman Cancer Center

**Joseph JH Ackerman**

Siteman Cancer Center

**Tracy Adair-Kirk, PHD**

Research Assistant Professor of Medicine

**William S Adams, MD**

Associate Professor of Clinical Pediatrics

**Susan E Adams, PHD, MD**

Assistant Professor of Clinical Pediatrics

**Susan R Adams, MD**

Instructor in Clinical Medicine

**Foluso O Ademuyiwa, MBBS, M PH**

Assistant Professor of Medicine

**Foluso O. Ademuyiwa**

Siteman Cancer Center

**Tara Joshi Adhikari, MBBS**

Instructor in Medicine

**Laura Jean Adhikari, MD**

Assistant Professor of Pathology and Immunology

**Douglas R Adkins, MD**

Professor of Medicine

**Rebecca L Aft, PHD, MD**

Professor of Surgery (General Surgery)

**Kelly Lynn Agarwal, MD**

Instructor in Medicine

**Sirajuddin Agha, MBBS**

Assistant Professor of Anesthesiology

**Randy Agolia**

**Arpana Agrawal, PHD**

Associate Professor of Psychiatry

**Aqeeb Ahmad**

Instructor in Clinical Psychiatry

**Fahd Aqeeb Ahmad, MD**

Instructor in Pediatrics

**Nawal Mona Ahmed**

Instructor in Clinical Otolaryngology (DDS)

**Walter John Akers, DVM, PHD**

Assistant Professor of Radiology

**Walter J Akers**

Siteman Cancer Center

**Abdulla Akfaly, MD**

Instructor in Clinical Medicine

**Gustav Akk, PHD**

Assistant Professor of Anesthesiology

**Maha M Al Gilani, MD**

Instructor in Otolaryngology (Pending Dean's Approval)

**Hussam Al Kateb, MA, PHD**

Assistant Professor of Pathology and Immunology

**Bassam Albarcha**

Instructor in Clinical Medicine

**Suzanne G Albrecht**

Instructor in Clinical Pediatrics

**Jorge M Alegre, MD**

Instructor in Clinical Medicine

**Etihad S. Al-Falahi**

Instructor in Clinical Pediatrics

**Muhammad A Ali, MD**

Instructor in Clinical Medicine

**Zarmeena Ali, MBBS**

Instructor in Medicine

**Paul M Allen, MS, PHD**

Robert L. Kroc Professor of Pathology and Immunology

**Henry W Allhoff, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Ardis Kay Allison, DOST**

Instructor in Clinical Pediatrics

**Muhammad Taher Al-Lozi, MD, MS**

Professor of Neurology

**Florence Michelle Almiron-Torralba**

Instructor in Clinical Medicine

**David Hershel Alpers, MD**

William B Kountz Professor of Gerontology in Medicine

**Denis Ian Altman, MBBCH**

Associate Professor of Clinical Neurology

Assistant Professor of Clinical Pediatrics

**Michael Bernard Altman, PHD**

Instructor in Radiation Oncology



**Lizette Alvarez-Montero, MD**

Instructor in Clinical Neurology

**Jamaluddin Faisal Amanullah**

Instructor in Clinical Medicine

**Gaya K Amarasinghe, PHD**

Assistant Professor of Pathology and Immunology

Assistant Professor of Biochemistry and Molecular Biophysics

**Ferdinand Enginco Amarillo, PHD**

Assistant Professor of Pathology and Immunology

**Maryellen Amato, MD**

Instructor in Clinical Radiology

**Patricia J Amato, MD**

Associate Professor of Clinical Pediatrics

**Navinkumar J Amin, MS**

Associate Professor of Clinical Ophthalmology and Visual Sciences

**Shilpa S Amin, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Amit P. Amin, MD**

Assistant Professor of Medicine

**Manik A Amin, MD**

Instructor in Medicine

**Manik A. Amin**

Siteman Cancer Center

**Mohamad T Amjad, MD**

Professor of Clinical Pediatrics

**Ping An, MD**

Research Assistant Professor of Genetics

**Milan J. Anadkat, MD**

Assistant Professor of Medicine (Dermatology)

**Jagruti Shah Anadkat**

Instructor in Pediatrics

**Mark A Anastasio**

Siteman Cancer Center

**Beau Mark Ances, MS, PHD, MD**

Associate Professor of Neurology

Associate Professor of Biomedical Engineering

Associate Professor of Radiology

**Kristen Minette Andersen**

Instructor in Clinical Pediatrics

**Frank Kim Anderson, MD**

Instructor in Clinical Medicine (Dermatology)

**Dale J Anderson, MD**

Instructor in Clinical Psychiatry

**Scott J Anderson, PHD, MD**

Instructor in Clinical Medicine

**Richard H Anderson, MS, PHD, MD**

Instructor in Clinical Psychiatry

**Usha P Andley, MS, PHD**

Professor of Ophthalmology and Visual Sciences

Assistant Professor of Biochemistry and Molecular Biophysics

**Dorothy A Andriole, MD**

Associate Professor of Surgery (General Surgery)

Assistant Dean for Student Affairs and Medical Education

**Gerald L Andriole, MD**

Robert Killian Royce, M.D. Distinguished Professor of Urologic Surgery

**Dana E Ankney, MD**

Instructor in Clinical Pediatrics

**Andrey P Anokhin, MS, PHD**

Associate Professor of Psychiatry

**George Ansstas**

Instructor in Medicine (Pending Dean's Approval)

**Lucinda L. Antonacci-Fulton, MS**

Academic Rank held in Genetics

Research Instructor in Genetics

**Amal F. Antoun**

Instructor in Clinical Pediatrics

**Shafkat Anwar**

Instructor in Pediatrics

**Murray Howard Appelbaum, DDENT**

Instructor in Clinical Otolaryngology (DMD)

**John K Appelbaum, MD**

Assistant Professor of Clinical Obstetrics and Gynecology

**Catherine M Appleton, MD**

Assistant Professor of Radiology

**Catherine M. Appleton**

Siteman Cancer Center

**Rajendra Apte, MD, PHD**

Paul A. Cibis Distinguished Professor of Ophthalmology and Visual Sciences  
Professor of Developmental Biology

**Tomas Ismael Aquino**

Assistant Professor of Clinical Obstetrics and Gynecology

**Scott J Arbaugh, MD**

Instructor in Clinical Psychiatry

**Jeffrey Michael Arbeit, MD**

Professor of Surgery (Urologic Surgery)  
Professor of Cell Biology and Physiology

**Ana Marie Arbelaez Perez, MD**

Assistant Professor of Pediatrics

**Ahmad Beheshti Ardekani, MD**

Assistant Professor of Clinical Psychiatry

**Kenneth J Arnold, MD**

Assistant Professor of Clinical Surgery (General Surgery)

**Suzanne V Arnold, MHA, MD**

Adjunct Assistant Professor of Medicine

**Lauren D. Arnold**

Siteman Cancer Center

**Anna Maria Arroyo Plasencia, MD**

Assistant Professor of Medicine

**Jennifer L. Arter**

Assistant Professor of Clinical Pediatrics

**Maksym Artomov, MS, PHD**

Assistant Professor of Pathology and Immunology

**Saira M Asadullah, MD**

Instructor in Clinical Medicine

**Phillip V. Asaro, MD**

Assistant Professor of Emergency Medicine in Medicine

**John Patterson Atkinson, MD**

Samuel Grant Professor of Medicine  
Professor of Molecular Microbiology

**Elizabeth L Atkinson, MD**

Instructor in Clinical Pediatrics

**Jeffrey Jay Atkinson, MD**

Assistant Professor of Medicine  
Assistant Professor of Pediatrics

**Robert K Atteberry**

Instructor in Clinical Pediatrics

**Crystal Lynn Atwood, MD**

Instructor in Medicine

**Adrienne Denise Atzemis, MD**

Assistant Professor of Pediatrics

**Chandra Aubin, MD**

Associate Professor of Emergency Medicine in Medicine

**Sarah Elizabeth Aubuchon, MD**

Instructor in Clinical Pediatrics

**Paul F Austin, MD**

Associate Professor of Surgery (Urologic Surgery)

**James G Avery, MD**

Associate Professor of Clinical Medicine

**Michael Simon Avidan, MBBCH**

Professor of Anesthesiology  
Professor of Surgery (Cardiothoracic Surgery)

**Michael Magdi Awad, MD, PHD**

Assistant Professor of Surgery (General Surgery)  
Associate Dean for Medical Education

**Sylvia Awadalla, MD**

Professor of Neurology

**Victoria Brooke Ayden, MD**

Instructor in Psychiatry

**Sara Ayers, MD**

Instructor in Clinical Pediatrics

**Abdelkareem Azab, PHD**

Assistant Professor of Radiation Oncology

**Abdel Kareem Azab**

Siteman Cancer Center

**Riad Azar, MD**

Associate Professor of Medicine

**Fariba Azarpour, MD**

**Sangeeta Kaur Babar, MD**

Instructor in Clinical Obstetrics and Gynecology

**Hilary M Babcock, MD, MPH**

Associate Professor of Medicine

**Richard G. Bach, MS, MD**

Associate Professor of Medicine

**Leonard B Bacharier, MD**

Professor of Pediatrics

Professor of Medicine

**Kyongtae T Bae, ME, MS, PHD, MD**

Adjunct Associate Professor of Radiology

**Jacques Ulrich Baenziger, PHD, MD**

Professor of Pathology and Immunology

Professor of Cell Biology and Physiology

**Nancy L Baenziger, PHD**

Research Associate Professor of Neurobiology

**Jill M Baer, MD**

Assistant Professor of Clinical Pediatrics

**Nusayba Bagegni, MD**

Instructor in Medicine

**Maria Quintos Baggstrom, MD**

Associate Professor of Medicine

**Maria Q Baggstrom**

Siteman Cancer Center

**Kathy Baglan**

Instructor in Clinical Radiation Oncology

**Om Parkash Bahl, MS**

Assistant Professor of Clinical Medicine

**Thomas C Bailey, MD**

Professor of Medicine

**Sean B Bailey, MD, MS**

Instructor in Clinical Otolaryngology

**Jeffrey Allen Bailey, M PA, MD**

Assistant Professor of Surgery (General Surgery)

**Jonathan C Baker, MD**

Assistant Professor of Radiology

**Gregory Eden Baker, MD**

Instructor in Clinical Medicine

**Elizabeth A Baker**

Siteman Cancer Center

**Parul Bakhshi**

Research Assistant Professor of Occupational Therapy

**Dennis M Balfe, MD**

Professor of Radiology

**Dennis M Balfe**

Siteman Cancer Center

**Fred J Balis, MS, MD**

Assistant Professor of Clinical Medicine

**Robert H Baloh, MD, PHD**

Adjunct Assistant Professor of Neurology

**Sirine A. Baltagi, MD**

Instructor in Pediatrics (Pending Dean's Approval)

**David T Balzer, MD**

Professor of Pediatrics

**Sonya Bamba, MD**

Instructor in Ophthalmology and Visual Sciences

**David Ban, MD**

Associate Professor of Clinical Medicine

**James William Banks, MD**

Instructor in Clinical Medicine

**Michael Roman Banton, MD**

Instructor in Clinical Psychiatry (Child Psychiatry)

**Jianxin Bao, PHD**

Associate Professor of Otolaryngology

Associate Professor of Audiology and Communication Sciences

**Abraham Barake, MD**

Associate Professor of Clinical Medicine

**Thomas J Baranski, MD, PHD**

Associate Professor of Medicine

Associate Professor of Developmental Biology

**Peggy Barco, MED**

Instructor in Occupational Therapy

Instructor in Medicine

**Angela L Bard, MD**

Associate Professor of Clinical Pediatrics

**Rachel Hannah Bardowell, MD**

Instructor in Medicine

**Philip M Barger, MD**

Assistant Professor of Medicine

**Wayne Morris Barnes, PHD**

Associate Professor of Biochemistry and Molecular Biophysics

**Alan Roy Barnette**

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**Joaquin Barnoya, MD, MS**

Research Assistant Professor of Surgery (General Surgery)

**Robert L Barrack, MD**

Charles F and Joanne Knight Distinguished Professor of Orthopaedic Surgery

**Michael James Barratt, PHD**

Research Instructor in Pathology and Immunology

**Ernie-Paul Barrette, MA, MD**

Associate Professor of Medicine

**Melissa Anne Barrow, PHD**

Research Instructor in Pathology and Immunology

**Perry J Bartels, DDENT**

Instructor in Clinical Otolaryngology

**Thomas Joseph Bartholet, MD**

Instructor in Clinical Medicine

**Nancy Lee Bartlett, MS, MD**

Koman Professor of Medical Oncology in Medicine

**Robert W Barton, MD, PHD**

Assistant Professor of Clinical Medicine

**Kevin Barton, MD**

Instructor in Pediatrics (Pending Dean's Approval)

**Adil Bashir, MEE, PHD**

Research Instructor in Radiology

**Donald R Bassman, MD**

Instructor in Clinical Orthopaedic Surgery

**Steven Bassnett, PHD**

Professor of Ophthalmology and Visual Sciences  
Professor of Cell Biology and Physiology

**Amy J Bastian, PHD**

Adjunct Assistant Professor of Physical Therapy

**Maria S Baszis**

Instructor in Clinical Pediatrics

**Kevin W Baszis, MD**

Instructor in Pediatrics

**Randall John Bateman, MD**

Associate Professor of Neurology

Charles F and Joanne Knight Distinguished Professor of Neurology

**Luis Francisco Zirnberger Batista, PHD**

Assistant Professor of Medicine (Pending Executive Faculty Approval)

**Natalie Christine Battle, MD**

Instructor in Medicine

**M. Carolyn Baum, MA, PHD**

Professor of Occupational Therapy

Professor of Neurology (Occupational Therapy)

Elias Michael Executive Director of the Program in Occupational Therapy

**Margaret Elizabeth Baum, MD**

Instructor in Clinical Obstetrics and Gynecology

**Susan L Baumer, MD**

Associate Professor of Clinical Pediatrics

**Frederick D Bauschard, MD**

Assistant Professor of Clinical Medicine (Dermatology)

**Daniel B Bauwens, MD**

Instructor in Clinical Medicine

**Michael D Bavlsik, MD**

Assistant Professor of Clinical Medicine

**Rebecca Ann Bavolek, MD**

Instructor in Emergency Medicine in Medicine

**Christie A. Bayer, MD**

Instructor in Clinical Pediatrics

**Susan Joy Bayliss, MD**

Professor of Medicine (Dermatology)

Professor of Pediatrics

**Ronald Beach, MD**



Instructor in Clinical Psychiatry

**Wandy L. Beatty, PHD**

Research Assistant Professor of Molecular Microbiology

**Paul Douglas Becherer, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Anne Marie Beck, MD, MS**

Professor of Pediatrics

**William L Becker, MA, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Julia M. Becker, MD**

Instructor in Clinical Pediatrics

**Robert L Becker, MD**

Assistant Professor of Clinical Obstetrics and Gynecology

**Stanley C Becker, MA, PHD, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Jeffrey John Bednarski, MD, PHD**

Instructor in Pediatrics

**David C Beebe, MS, PHD**

Janet and Bernard Becker Professor of Ophthalmology and Visual Sciences

Professor of Cell Biology and Physiology

**Earl C Beeks Jr, MD**

Associate Professor of Clinical Pediatrics

**Avraham Beigelman, MD**

Assistant Professor of Pediatrics

**Melissa S. Belanger, MD**

Instructor in Pediatrics

**James E Belcher, MD**

Instructor in Clinical Obstetrics and Gynecology

**Andrew Curry Belden, MS, PHD**

Research Instructor in Psychiatry

**Joe E Belew, MD**

Associate Professor of Clinical Obstetrics and Gynecology

**Richard C Bell, MD**

Instructor in Clinical Medicine (Dermatology)

**C. Elliott Bell Jr, MD**

Instructor in Clinical Medicine

**Arbi Ben Abdallah, PHD**

Instructor in Anesthesiology

**William Waite Benedict, MD**

Instructor in Clinical Medicine

**Bruno Antonio Benitez Vilorio, MD**

Research Instructor in Medicine (Pending Dean's Approval)

**Kenneth J Bennett, MD**

Associate Professor of Clinical Surgery (General Surgery)

**Walter F Benoist, MD**

Professor of Clinical Pediatrics

**Brian Michael Benway, MD**

Assistant Professor of Surgery (Urologic Surgery)

**Max Prely Benzaquen**

Instructor in Clinical Neurology

**Tammie Lee Smith Benzinger, PHD, MD**

Assistant Professor of Radiology

Assistant Professor of Neurological Surgery

**Tammie LS Benzinger**

Siteman Cancer Center

**George Richard Benzinger III, PHD, MD**

Assistant Professor of Anesthesiology

**Kathleen Mary Berchelmann, MD**

Assistant Professor of Pediatrics

**Louise E Berdan, MA, PHS**

Instructor in Clinical Pediatrics

**Gregg Jonathan Berdy, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Susan Berdy, MD**

Assistant Professor of Clinical Medicine

**Mikhail Y Berezin, MS, PHD**

Assistant Professor of Radiology

**Mikhail Y Berezin**

Siteman Cancer Center

**Christine R. Berg, BSOT, MS, PHD**

Assistant Professor of Occupational Therapy

Assistant Professor of Neurology

**Daniel Ralph Berg, MD**

Assistant Professor of Clinical Medicine

**Michael A Berk, MD**

Professor of Clinical Medicine

**Lynda Cheryl Berkowitz, MS**

Instructor in Audiology and Communication Sciences

**John Rutledge Bermingham Jr**

Research Associate Professor of Genetics (Pending Executive Faculty Approval)

**Kathryn Quitasol Bernabe, MD**

Assistant Professor of Surgery (Pediatric Surgery)

**Cory Thomas Bernadt, PHD, MD**

Assistant Professor of Pathology and Immunology

**Carlos Bernal-Mizrachi, MD**

Associate Professor of Medicine

Associate Professor of Cell Biology and Physiology

**Lisa Marie Bernhard, MD**

Assistant Professor of Obstetrics and Gynecology

**Paul M Bernier, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Marc Jordan Bernstein, MD**

Associate Professor of Clinical Medicine

**Keith A Bernstein, MD**

Instructor in Clinical Medicine

**Aaron M Bernstein, MD**

Assistant Professor of Clinical Medicine

**Douglas R Berson, MD**

Instructor in Clinical Medicine

**Mary Ellen Bertrand, MD**

Associate Professor of Neurology

Associate Professor of Pediatrics

**Stephen M Beverley, PHD**

Marvin A Brennecke Professor of Molecular Microbiology

Head of the Department of Molecular Microbiology

**Sanjeev Bhalla, MD**

Professor of Radiology

**Pavan Kumar Bhamidipati, MD**

Instructor in Clinical Medicine

**Anita R. Bhandiwad, MD**

Assistant Professor of Medicine

**Mythili C. Bharadwaj**

Instructor in Clinical Medicine

**Shobha Bhaskar, MBBS**

Instructor in Pediatrics

**Savita Bhat, MS, MS1**

Instructor in Clinical Psychiatry

**Deepta Bhattacharya, PHD**

Assistant Professor of Pathology and Immunology

**Deepta Bhattacharya**

Siteman Cancer Center

**Sam B Bhayani, MD**

Professor of Surgery (Urologic Surgery)

**Rakhee Kapadia Bhayani, MD**

Assistant Professor of Medicine

**Anjali Maruti Bhorade, MD**

Associate Professor of Ophthalmology and Visual Sciences

Associate Professor of Occupational Therapy

**Stanley I Biel, MD**

Instructor in Clinical Medicine

**Gabriel Alejandro Bien-Willner, PHD, MD**

Research Instructor in Pathology & Immunology (Pending Dean's Approval)

**Frank Joseph Bier, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Andrew J Bierhals, MPH, MD**

Assistant Professor of Radiology

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**Ellen F Binder, MD**

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Associate Professor of Occupational Therapy

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**William D Birenbaum, MD**

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**Clifford Allen Birge, MD**

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Professor of Radiology  
Professor of Neurology  
Professor of Neurobiology

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Professor of Pathology and Immunology

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**Kendall Jay Blumer, PHD**

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**Michael Bolger**

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Professor of Radiology  
Professor of Biomedical Engineering  
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**Joan Rachel Butcher**

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**Melvin J Butler**

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**James Byrd, MD**

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**Charlene A Caburnay**

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**Cheryl Ann Caldwell, MHS, DPT**

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**Archna Calfee, MD**

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**Ryan Patrick Calfee, MD**

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**Charles E Canter, MD**

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**Russell C. Cantrell, MD**

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**Yuqing Cao, PHD**

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**John R Carlile, MD**

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**Douglas W Carlson, MD**

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**Kim Alan Carmichael, MD**

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**Robert Michael Carney, MS, PHD**

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Professor of Psychology

**Michael J. Carney, MD**

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**Christopher Robert Carpenter, MD**

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**Mario Castro, MD, M PH**

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Professor of Pediatrics

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Professor of Developmental Biology

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Assistant Professor of Medicine

**Zhouji Chen, MS, PHD**

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Professor of Psychiatry

Professor of Developmental Biology

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**Qing Chen, MD, MS**

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**Phyllis Chen, MD**

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**Junjie Chen, PHD**

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**Lee-Kui Chen, PHD**

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**Li-Shiun Chen**

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**Steven Chih Nung Cheng, MD**

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Assistant Professor of Otolaryngology

**Rebecca D Chernock**

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**John N Chiapel**

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August A. Busch, Jr. Distinguished Professor

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**Kelly Lynne Chilson, MD**

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**David Steve Chin Yee, MD**

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**Philip Chu Pak-Yu, MD**

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Professor of Neurobiology

**Thomas Michael Ciesielski, MD**

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**John R. Cirrito, PHD**

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**Geoffrey Cislo, MD**

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Instructor in Clinical Surgery (Plastic and Reconstructive Surgery)

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Professor of Cell Biology and Physiology

Interim Head of the Department of Biochemistry

Professor of Biochemistry and Molecular Biophysics

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Assistant Professor of Pathology and Immunology

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**Douglas E Coplen**

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Professor of Radiology

Professor of Neurobiology

Associate Professor of Psychology

**Joseph C. Corbo, AB, PHD, MD**

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Associate Professor of Genetics

Associate Professor of Ophthalmology and Visual Sciences

**Joseph C Corbo**

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**Suzanne Marie Cornbleet, MA, DPT**

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Associate Professor of Orthopaedic Surgery

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Adjunct Professor of Anthropology

**Catherine E Cottrell, PHD**

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Professor of Psychiatry

Professor of Anesthesiology

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**John Jeffrey Cras, MS, MD**

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Assistant Professor of Genetics

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**Veronica Lynn Cross**

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**Michael G Crowley, PHD**

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**Li Ding, PHD**

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Academic Rank held in Genetics

Academic Rank held in Genetics

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**Matthew P Dougherty**

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**Joseph D Dougherty, PHD**

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**Ryan Patrick Duncan, MS, DPT**

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Instructor in Neurology

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Associate Professor of Neurobiology

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**Royal J Eaton, MD**

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Director of The Alvin J. Siteman Cancer Center  
Spencer T. and Ann W. Olin Distinguished Professor  
Professor of Pathology and Immunology

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**Steven A. Edmundowicz, MD**

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Adjunct Associate Professor of Neurology

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**Charmaine E. Edwards, MD**

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**John R. Edwards, PHD**

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**Carl F Ehrlich, MD**

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Associate Professor of Pediatrics

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Professor of Cell Biology and Physiology

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**Isabel Fernandez-Holtzman**

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**Herman L Ferrell, MD**

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Associate Professor of Audiology and Communication Sciences

**Lewis Conrad Fischbein, MD**

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Associate Professor of Cell Biology and Physiology

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Associate Professor of Pathology and Immunology  
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**Deborah Frenchie, MD**

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**Theresa Marie Frey, MD**

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**Michael V Friedman, MD**

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Assistant Professor of Anesthesiology (Pending Executive Faculty Approval)

**Jason M. Held**

Siteman Cancer Center

**Daniel Luke Helsten, MD**

Assistant Professor of Anesthesiology

**Jeffrey P. Henderson, MD, PHD**

Assistant Professor of Medicine

Assistant Professor of Molecular Microbiology

**Katherine Eileen Henderson, MD**

Assistant Professor of Clinical Medicine

**Kristina Louise Henderson, MD**

Instructor in Clinical Medicine

**Kamal Hanee Henderson, MD**

Instructor in Medicine

**Nathan Henninger**

Instructor in Clinical Pediatrics

**William L Herbold, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Thomas Eugene Herman, MD**

Associate Professor of Radiology

**Cheryl R Herman, MD**

Assistant Professor of Radiology

**Cheryl R. Herman**

Siteman Cancer Center

**Catherine Hermann, M ENG, MD**

Instructor in Clinical Medicine

**Mary Jo Hernandez-Zipfel, MD**

Instructor in Clinical Pediatrics

**Robert E Herold, MD**

Assistant Professor of Anesthesiology

**Pilar Herrero, MS, ME**

Research Associate Professor of Radiology

**Tamara G Hershey, PHD**

Professor of Psychiatry

Professor of Neurology

Adjunct Assistant Professor of Psychology (Courtesy)

Professor of Radiology

**Jacques A Herzog, MD**

Assistant Professor of Clinical Otolaryngology

**Erik D. Herzog**

Siteman Cancer Center

**Albert E Hesker, MD**

Assistant Professor of Clinical Radiology

**Laurel D Hibbs**

Instructor in Clinical Obstetrics and Gynecology

**Scot G Hickman, MD**

Professor of Medicine

**Frederick G Hicks, MD**

Assistant Professor of Clinical Psychiatry

**Stuart T. Higano, MD**

Instructor in Clinical Medicine

**Stephen M Highstein, MD, PHD**

Adjunct Professor of Otolaryngology

**SueLin Ming Hilbert, MD**

Instructor in Emergency Medicine in Medicine

**Charles F Hildebolt, DDENT, MA, PHD**

Professor of Radiology

Adjunct Professor of Anthropology

**Laura Hill**

Assistant Professor of Clinical Pediatrics

**Travis J Hillen, MS, MD**

Assistant Professor of Radiology

**Travis J. Hillen**

Siteman Cancer Center

**Elizabeth Hilliker, MD, MA**

Assistant Professor of Emergency Medicine in Medicine

Assistant Professor of Surgery (General Surgery)

**Jennifer M Hinton**

Instructor in Clinical Pediatrics

**Paul Flack Hintze, MD**

Assistant Professor of Clinical Medicine

**Keiko Hirose, MD**

Associate Professor of Otolaryngology

Vice Chairman of Otolaryngology

Associate Professor of Audiology and Communication Sciences

Associate Professor of Pediatrics

**Gary E Hirshberg, MD**

Professor of Anesthesiology

Professor of Anesthesiology in Pediatrics

**Stanley P Hmiel, M PHIL, PHD, MD**

Professor of Pediatrics

**Sandra Jean Hodel**

Instructor in Clinical Pediatrics

**Dee Hodge III, MD**

Professor of Pediatrics

**Didier Hodzic, PHD**

Assistant Professor of Ophthalmology and Visual Sciences

Assistant Professor of Cell Biology and Physiology

**John T Hoff, MD**

Instructor in Clinical Obstetrics and Gynecology

**J. Langston Hoffman, MD**

Instructor in Clinical Medicine

**Robert J Hoffman, MD**

Professor of Clinical Pediatrics

**Lawrence M Hoffman, DDENT**

Instructor in Clinical Otolaryngology (DMD)

**Russell G. Hoffmann, PHD**

Instructor in Clinical Pediatrics

**Sandra S Hoffmann, MD**

Instructor in Clinical Medicine

**Kathleen M Hogan, MD**

Instructor in Clinical Obstetrics and Gynecology

**Robert Edward Hogan III, MD**

Associate Professor of Neurology

**Joshua Wade Hogins**

Instructor in Clinical Psychiatry

**Nicholas Alan Holekamp, MD**

Instructor in Clinical Pediatrics

**Nancy Melberg Holekamp, MD**

Professor of Clinical Ophthalmology and Visual Sciences

**Abby Solomon Hollander, MD**

Associate Professor of Pediatrics

**Susan O Holley, PHD, MD**

Assistant Professor of Radiology

**Christopher Lee Holley, PHD, MD**

Instructor in Medicine

**Susan O. Holley**

Siteman Cancer Center

**John Otto Holloszy, MD**

Professor of Medicine

**Robert Franklyn Holloway Jr**

Instructor in Clinical Obstetrics and Gynecology

**Nancy E Holmes, MD**

Professor of Clinical Pediatrics

**Sheldon G Holstad, PHD, PHS**

Assistant Professor of Clinical Pharmacy in Psychiatry (On Staff at Jewish Hospital and St Louis College of Pharmacy)

**Christopher Vincent Holthaus, MD**

Assistant Professor of Emergency Medicine in Medicine

**Barbel Holtmann, MD**

Associate Professor of Anesthesiology

**Sumner Holtz, MD**

Associate Professor of Clinical Radiology

**Lori Rachel Holtz, MD**

Assistant Professor of Pediatrics

**Gregory William Holtzman, MS, DPT**

Associate Professor of Physical Therapy

Associate Professor of Orthopaedic Surgery

**David Michael Holtzman, MD**

Andrew B. and Gretchen P. Jones Professor of Neurology



Professor of Developmental Biology  
Head of the Department of Neurology

**Michael J Holtzman, MD**

Selma and Herman Seldin Professor of Medicine  
Professor of Cell Biology and Physiology

**Rochelle LeAnn Holtzman, MS, PHD**

Instructor in Clinical Pediatrics

**Timothy E. Holy, MA, PHD**

Associate Professor of Neurobiology

**Neal Holzum**

Instructor in Clinical Medicine

**Barry Allen Hong, MDI, PHD**

Professor of Psychiatry  
Professor of Psychology  
Vice Chairman for Clinical Affairs, Department of Psychiatry  
Professor of Medicine

**Augustine Richard Hong**

Instructor in Ophthalmology and Visual Sciences (Pending Dean's Approval)

**Joshua L. Hood, MD**

Research Instructor in Medicine

**Bruce Jay Hookerman, MD**

Assistant Professor Emeritus of Clinical Medicine (Dermatology)

**J. Joseph Horan, MD**

Instructor in Clinical Pediatrics

**Barbra A Horn, MD**

Instructor in Clinical Medicine

**Linda S Horne, MD**

Instructor in Clinical Psychiatry

**Caroline Clare Horner, MD**

Assistant Professor of Pediatrics

**Ian Kerst Hornstra, MD, PHD**

Assistant Professor of Medicine (Dermatology)

**Timothy Adam Horwedel, PHD**

Adjunct Instructor in Medicine

**Terri L Hosto, BSW, MSW**

Research Instructor in Neurology

**Richard S Hotchkiss, MD**

Professor of Anesthesiology  
Professor of Surgery (General Surgery)  
Professor of Developmental Biology  
Professor of Medicine

**Jianghui Hou, MS, PHD**

Assistant Professor of Medicine

**William Edward Houck, MD**

Instructor in Clinical Obstetrics and Gynecology

**Dennis Emil Hourcade, MA, PHD**

Research Professor of Medicine

**Stacey L House, PHD, MD**

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**Matthew A Howard**

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**Jacqueline Howard**

Instructor in Clinical Medicine

**Randall A Howell, MD**

Assistant Professor of Emergency Medicine in Medicine

**Christine M Hrach, BSW, MD**

Assistant Professor of Pediatrics

**Keith A Hruska, MD**

Professor of Pediatrics

Professor of Cell Biology and Physiology

Professor of Medicine

**Paul W. Hruz, PHD, MD**

Associate Professor of Pediatrics

Associate Professor of Cell Biology and Physiology

**Chyi-Song Hsieh, MD, PHD**

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Associate Professor of Pathology and Immunology

Alan A and Edith L Wolff Distinguished Professor

**Chyi-Song Hsieh**

Siteman Cancer Center

**Hawpeng Stephen Hsu, MD, MS**

Assistant Professor of Anesthesiology

**Fong Fu Hsu, MS, PHD**

Research Professor of Medicine

**Chung Hsu, MD, PHD**

Adjunct Professor of Neurology

**Raymond J Hu, MD**

Instructor in Clinical Medicine

**Yanle Hu, MS1, PHD, MS**

Assistant Professor of Radiation Oncology

**David H Hua**

Instructor in Clinical Obstetrics and Gynecology

**Henry V Huang, PHD**

Associate Professor of Molecular Microbiology

**Howard Jeng Huang, MD**

Assistant Professor of Medicine

**Ren-Huai Huang, MA, PHD**

Research Instructor in Medicine

**Jing-Wei Huang, MD**

Professor of Ophthalmology and Visual Sciences

**Frederick Szujuei Huang, MD**

Associate Professor of Pediatrics

**Wei-Wei Huang**

Instructor in Clinical Medicine (Dermatology)

**Jiayi Huang, MD**

Assistant Professor of Radiation Oncology

**Andrew J.W. Huang**

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**Dee Jay Hubbard, MA, PHD, MA1**

Adjunct Assistant Professor of Otolaryngology (Speech Pathology)

**John W Hubert, MD**

Associate Professor of Clinical Medicine

**James J Hudziak**

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**Donald V Huebener, DDENT, MS, MA**

Professor of Surgery (Plastic and Reconstructive Surgery)

Instructor in Pediatric Dentistry

**Rocco Hueneke, MD**

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**James E Huettner, PHD**

Associate Professor of Cell Biology and Physiology  
Assistant Professor of Biomedical Engineering

**Phyllis C Huettner, MD**

Associate Professor of Pathology and Immunology  
Associate Professor of Obstetrics and Gynecology

**Douglas Lee Huff, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Michael S. Hughes, MA, PHD**

Research Associate Professor of Medicine

**Sung Ho Huh, MS, PHD**

Research Instructor in Developmental Biology

**Monica L Hulbert, MD**

Assistant Professor of Pediatrics

**Laura Hulbert, MD**

Instructor in Clinical Obstetrics and Gynecology

**Rebecca L Hulett, AB, MD**

Assistant Professor of Radiology

**Timothy Everett Hullar, MD**

Associate Professor of Otolaryngology  
Associate Professor of Neurobiology  
Associate Professor of Audiology and Communication Sciences

**Scott James Hultgren, PHD**

Helen L Stoeber Professor of Molecular Microbiology

**Theresa Human**

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**Peter A Humphrey, MD, PHD**

Ladenson Professor of Pathology in Pathology and Immunology  
Professor of Surgery (Urologic Surgery)

**Peter A Humphrey**

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**David A Hunstad, MD**

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Associate Professor of Molecular Microbiology

**Linda Ann Hunt**

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Adjunct Associate Professor of Neurology

**Steven R Hunt, MD**

Associate Professor of Surgery (General Surgery)

**Devyani M. Hunt, MD**

Associate Professor of Orthopaedic Surgery

Associate Professor of Neurology

**Michelle A. Hurchla Pyles**

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**Eva A Hurst, MD**

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**Eva A. Hurst**

Siteman Cancer Center

**Mark Albert Hurt, MD**

Instructor in Clinical Medicine (Dermatology)

**Kareem D. Husain, MD**

Assistant Professor of Surgery (General Surgery)

**Thy N Huskey, MD**

Associate Professor of Neurology

**Krzysztof L Hyrc, MS, PHD**

Research Assistant Professor of Neurology

**Catherine Ifune, PHD, MD**

Associate Professor of Anesthesiology

**Richard G. Ilnat, MD**

Instructor in Clinical Medicine

**Richard J Iken, MD**

Instructor in Clinical Pediatrics

**Maxenia Garcia Ilagan, PHD**

Research Instructor in Developmental Biology

**Shin-Ichiro Imai, MD, PHD**

Professor of Developmental Biology

Professor of Medicine

**Shin-Ichiro Imai**

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**Terrie Eleanor Inder, MBBS, MD**

Adjunct Professor of Pediatrics

**Carl S Ingber, MD**

Instructor in Clinical Pediatrics

**Joseph Edward Ippolito, MD, PHD**

Instructor in Radiology

**Joseph E Ippolito**

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**Belinda K. Ireland, MD**

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**Warren Isakow, MD**

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**Jill Christine Isenberg, MS PSYC, PHD**

Instructor in Clinical Neurology

**Selma E.h.o. Ishag, MD, PHD**

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**Michael J Isserman, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Eva Susanne Istvan, PHD**

Research Assistant Professor of Medicine

HHMI Research Specialist II

**Akinobu Itoh, MD, PHD**

Instructor in Surgery (Cardiothoracic Surgery) (Pending Dean's Approval)

**Jennifer Lynn Ivanovich, MS, MBA**

Research Assistant Professor of Surgery (General Surgery)

**Jennifer L Ivanovich**

Siteman Cancer Center

**Renee A. Ivens, MHS, DPT**

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Associate Professor of Orthopaedic Surgery

**Yukitoshi Izumi, MD, PHD**

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**Jerry Jeff Jaboin, PHD, MD**

Assistant Professor of Radiation Oncology

**Jerry J Jaboin**

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**Carolyn M Jachna, MD**

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**Ronald R Jackups Jr., MD, PHD**

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Assistant Professor of Pediatrics

**Saji Jacob, MS, MD, DIP**

Instructor in Clinical Obstetrics and Gynecology

**Jeffrey H Jacob, OD**

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**Sindhu Saji Jacob, MD**

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**Daryl Jacobs, ME, MD**

Instructor in Clinical Medicine

**Myron H Jacobs, MD**

Instructor in Clinical Medicine

**Steven Jacobson, MD**

Instructor in Clinical Medicine

**Arnold Scott Jacobson, DDENT, MS**

Instructor in Clinical Otolaryngology (DMD)

**Meagan A. Jacoby, MD, PHD**

Instructor in Medicine

**Mark F Jacquin, PHD**

Professor of Neurology

**David M Jaffe, MD**

Dana Brown Professor of Pediatrics

**Sue E Jagler**

Instructor in Clinical Pediatrics

**Sudhir Kumar Jain, MBBS**

Associate Professor of Medicine

**Sanjay Jain, PHD, MD**

Associate Professor of Medicine

Associate Professor of Pathology and Immunology

**Patricia A Jamerson**

Instructor in Clinical Pediatrics

**William P James, MD**

Assistant Professor of Radiology

**Aimee S. James, MA, PHD, M PH**

Associate Professor of Surgery (General Surgery)

**Aleksandar Janca, MD**

Adjunct Professor of Psychiatry

**William Edward Janes, OTD, MS**

Instructor in Occupational Therapy  
Instructor in Neurological Surgery

**James W Janetka, PHD**

Associate Professor of Biochemistry and Molecular Biophysics

**Judy Lee Jang, MD, MHS**

Assistant Professor of Medicine

**David P. Jaques**

Professor of Surgery (General Surgery)

**George Jarad, MD**

Assistant Professor of Medicine

**Michael R Jarvis, MS, PHD, MD**

Professor of Psychiatry

Vice Chairman for Clinical Affairs, Department of Psychiatry

**Daniel Ragin Jasper, MD**

Instructor in Clinical Medicine

**Cylene Javidan-Nejad, MD**

Associate Professor of Radiology

**Patrick Y Jay, PHD, MD**

Associate Professor of Pediatrics

Associate Professor of Genetics

**Yasangi Maina Jayasiha, MD**

Instructor in Clinical Pediatrics

**Donna Beth Jeffe, MA, PHD**

Research Professor of Medicine

**Christopher M. Jenkins, PHD**

Research Instructor in Medicine

**Jack W Jennings, MS, PHD, MD**

Assistant Professor of Radiology

**Jack W. Jennings**

Siteman Cancer Center

**Susan Jerger**

Adjunct Research Professor of Otolaryngology

**Li Jia, PHD**

Assistant Professor of Medicine

**Xuntian Jiang, PHD**

Research Instructor in Medicine

**Sharon Leslie Jick**



Instructor in Clinical Ophthalmology and Visual Sciences

**Jeffrey Jim, MS, MD**

Assistant Professor of Surgery (General Surgery)

**Hongjun Jin, MD, PHD**

Instructor in Radiology

**Shannon M. Joerger**

Instructor in Pediatrics

**Morris Joftus, MD**

Assistant Professor of Clinical Medicine

**Stephen L Johnson, PHD**

Professor of Genetics

**William Lee Johnson, MD**

Associate Professor of Clinical Pediatrics

Adjunct Associate Professor of Pediatrics

**Jeffrey E Johnson, MD**

Professor of Orthopaedic Surgery

**Mark C Johnson, MD**

Associate Professor of Pediatrics

**Joyce D Johnson, MD**

Assistant Professor of Clinical Pediatrics

**Michael K Johnson, MD**

Instructor in Clinical Obstetrics and Gynecology

**Mark C. Johnson, MD**

Associate Professor of Clinical Psychiatry

**Denise R Johnson, MD**

Associate Professor of Clinical Pediatrics

**Staci R. Johnson, MD**

Instructor in Clinical Pediatrics

**Eric Keith Johnson, MD**

Instructor in Medicine

**Stephen L Johnson**

Siteman Cancer Center

**Kimberly J Johnson**

Siteman Cancer Center

**Eugene Malcolm Johnson Jr, PHD**

Professor of Neurology

Professor of Developmental Biology

**Larry A Jones, MD, MBA**

Assistant Professor of Clinical Pediatrics

**Angela Marie Jones, MD**

Instructor in Clinical Pediatrics

**La Rhonda Jones**

Instructor in Clinical Psychiatry (Child Psychiatry)

**Katherine McMullin Jones, MD**

Instructor in Pediatrics (Pending Dean's Approval)

**Amy M Joseph, MD**

Associate Professor of Medicine

**Daniel Paul Joseph, PHD, MD**

Associate Professor of Clinical Ophthalmology and Visual Sciences

**Susan M. Joseph, MD**

Assistant Professor of Medicine

**R. Gilbert Jost, MD**

Elizabeth E Mallinckrodt Professor of Radiology

Director of the Edward Mallinckrodt Institute of Radiology

Head of the Department of Radiology

**Sarah C. Jost**

Adjunct Assistant Professor of Neurological Surgery

**Barbara Jost, MS, MD**

Instructor in Clinical Medicine

**Sandy Lynn Jost**

Adjunct Instructor in Obstetrics and Gynecology

**Mark J Jostes, MD**

Assistant Professor of Clinical Obstetrics and Gynecology

**Randall S Jotte, MD**

Associate Professor of Emergency Medicine in Medicine

**Yo-EI S Ju, MD**

Assistant Professor of Neurology

**John Patrick Judd, MD**

Assistant Professor of Obstetrics and Gynecology

**Neringa Juknis, MD**

Assistant Professor of Neurology

**Erzsebet Jung, MD**

Instructor in Clinical Pediatrics

**Emily Susan Jungheim, MD**

Assistant Professor of Obstetrics and Gynecology

**Emily S. Jungheim**

Siteman Cancer Center

**James A Junker, MD**

Instructor in Clinical Radiology

**Caroline Holleck Kahle, MD**

Instructor in Medicine

**Timothy N Kaiser, MD**

Assistant Professor of Clinical Otolaryngology

**Sergey Kaliberov, MD, PHD**

Research Assistant Professor of Radiation Oncology

**Vinay Gopal Kamat, MD**

Instructor in Clinical Medicine

**Sona Sharad Kamat**

Instructor in Clinical Medicine

**Stephen A Kamenetzky, MD**

Professor of Clinical Ophthalmology and Visual Sciences

**Daniel Thomas Kane, MD**

Assistant Professor of Anesthesiology

**Pamela B Kane, MD**

Instructor in Clinical Pediatrics

**Deborah Shipley Kane, MD**

Assistant Professor of Emergency Medicine in Medicine

**Ivan M Kangrga, MD, PHD**

Associate Professor of Anesthesiology

**Kimberly Anne Kaphingst, MA, MS, D SC**

Associate Professor of Surgery (General Surgery)

**Kimberly A Kaphingst**

Siteman Cancer Center

**Humeyra Karacal, MD**

Assistant Professor of Ophthalmology and Visual Sciences

**Fatima Karaki, MD**

Instructor in Medicine

**Menelaos Karanikolas, MD**

Associate Professor of Anesthesiology

**Wajiha Parveen Karatela**

Instructor in Clinical Psychiatry (Child)

**Celeste Marie Karch, PHD**

Research Instructor in Psychiatry

**Eugenia Kardaris**

Instructor in Clinical Otolaryngology (DDS)

**Morvarid Karimi, MD**

Assistant Professor of Neurology

**Robert S Karsh, MD**

Professor of Clinical Medicine

**Roanne Kay Karzon, M ED, MS, PHD**

Adjunct Assistant Professor of Audiology and Communication Science

Adjunct Assistant Professor of Otolaryngology

**Rojano Kashani, MS, PHD**

Instructor in Radiation Oncology

**Victoria Kaskutas, MHS, OTD**

Assistant Professor of Occupational Therapy

Assistant Professor of Medicine

**Thomas J Kasper**

Instructor in Clinical Pediatrics

**Michael A Kass, MD, MS**

Bernard Becker Professor of Ophthalmology and Visual Sciences

Head of the Department of Ophthalmology and Visual Sciences

Senior Associate Dean for Human Research Protection

**Andrew M. Kates, MD**

Associate Professor of Medicine

**Demetrios Katsikas, MD**

Instructor in Clinical Surgery (Urological Surgery)

**Richard T. Katz, MA, MD**

Professor of Clinical Neurology

**David A Katzman, MD**

Instructor in Clinical Medicine

**Jenny E Kaufman, MD**

Instructor in Clinical Pediatrics

**Robert L Kaufman, MD**

Assistant Professor of Clinical Medicine

**James Alexander Kavanaugh, MS**

Instructor in Radiation Oncology

**Jack Kayes, MD**

Professor Emeritus of Clinical Ophthalmology and Visual Sciences

**Robert S Kebler, MD**

Instructor in Clinical Pediatrics

**Dalius Kedainis, MD**

Instructor in Clinical Medicine

**Elizabeth A Keegan Garrett, M PH, MD**

Instructor in Clinical Obstetrics and Gynecology

**Jay Donovan Keener, MD**

Assistant Professor of Orthopaedic Surgery

**James A Keeney, MD**

Assistant Professor of Orthopaedic Surgery

**Jacob Brian Keeperman, MD**

Assistant Professor of Anesthesiology

Assistant Professor of Emergency Medicine in Medicine

**Vladimir Jivkov Kefalov, PHD**

Associate Professor of Ophthalmology and Visual Sciences

Associate Professor of Neurobiology

**Sarah Lynn Keller, MD**

Assistant Professor of Obstetrics and Gynecology

**Martin S Keller, MD**

Associate Professor of Surgery (Pediatric Surgery)

Associate Professor of Pediatrics

**Robert V Kellow**

Assistant Professor of Clinical Pediatrics

**Amy Frances Kells, PHD, MD**

Assistant Professor of Surgery (Plastic and Reconstructive Surgery)

**Brian J Kelly, MD**

Assistant Professor of Clinical Pediatrics

**Daniel P Kelly, MD**

Adjunct Professor of Medicine

**John J Kelly, MD**

Associate Professor of Clinical Medicine

**James E. Kelly, MD, MA**

Instructor in Radiology

**Michael Patrick Kelly, MD**

Assistant Professor of Orthopaedic Surgery  
Assistant Professor of Neurological Surgery

**James Scott Kemp, MD**

Professor of Pediatrics

**Michele E Kemp, MD**

Associate Professor of Clinical Pediatrics

**Robert M Kennedy, MD**

Professor of Pediatrics

**Charlotte J Kennedy, PHD, MD**

Assistant Professor of Clinical Medicine

**Melanie M Kennedy**

Instructor in Emergency Medicine in Medicine

**Tiffany Lauren Kent, MD**

**Rainer Kentner, MD**

Assistant Professor of Anesthesiology

**Joseph L Kenzora, MD**

Associate Professor of Medicine

**Deborah Lynn Kerber, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Paul William Kerby, MBBS**

Assistant Professor of Anesthesiology

**Thomas Archibald Kerr, MD, PHD**

Assistant Professor of Medicine

**Jimmy Lee Kerrigan, MD**

Instructor in Medicine

**Martin Hurley Kerrigan, MD**

Assistant Professor of Medicine

**Daniel Kerschensteiner, PHD**

Assistant Professor of Ophthalmology and Visual Sciences

Assistant Professor of Neurobiology

**Rafi Thomas Kevorkian, MD**

Assistant Professor of Clinical Medicine

**Salah G. Keyrouz, MD**

Associate Professor of Neurology

Associate Professor of Neurological Surgery

**Syed Ahmed Khader, MD**

Instructor in Clinical Neurology

**Rushaniya Khairova, MD, PHD**

Instructor in Psychiatry

**Sangeeta Khanna**

Instructor in Clinical Ophthalmology and Visual Sciences

**Geetika Khanna, MBBS, MS**

Associate Professor of Radiology

**Evan David Kharasch, PHD, MD**

Russell and Mary Shelden Professor of Anesthesiology

Vice Chancellor for Research

Professor of Biochemistry and Molecular Biophysics

**Evan D Kharasch**

Siteman Cancer Center

**Shahrdad Khodamoradi, MD**

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**Saaid Khojasteh, MD**

Assistant Professor of Clinical Psychiatry

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

Assistant Professor of Physical Therapy

Assistant Professor of Orthopaedic Surgery

**Thomas B Kibby, MD, MPH**

Instructor in Emergency Medicine in Medicine (Pending Dean's Approval)

**George Kichura, MD**

Instructor in Clinical Medicine

**William F Kiefer Jr, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Mary Kiehl, AS, MD**

Assistant Professor of Clinical Medicine

**Kent Leon Killian, MD**

Instructor in Clinical Pediatrics

**Charles Kilo, MD**

Professor of Medicine

Professor of Pathology and Immunology

**Charles John Kilo, MD**

Instructor in Clinical Medicine

**Albert H Kim, MA, PHD, MD**

Assistant Professor of Neurological Surgery

Assistant Professor of Neurology

Assistant Professor of Developmental Biology

**Andrew M Kim, DDENT, MS**

Assistant Professor of Clinical Surgery (Plastic and Reconstructive Surgery)

Instructor in Clinical Otolaryngology

**Joong Hee Kim, MS, PHD**

Instructor in Radiology

**In-Kwon Kim, MS, PHD**

Research Assistant Professor of Biochemistry and Molecular Biophysics

**Alfred Kim, PHD, MD**

Instructor in Medicine

**Seung Kwon Kim, MD**

Assistant Professor of Radiology

Assistant Professor of Surgery (General Surgery)

**Albert J Kim**

Instructor in Emergency Medicine in Medicine

**Seung K. Kim**

Siteman Cancer Center

**Helen Young Kim-James, MD**

Instructor in Clinical Medicine (Dermatology)

**Rosa Anne Kincaid, MD**

Instructor in Clinical Medicine

**Erin L King, MD**

Instructor in Clinical Obstetrics and Gynecology

**Donald Kevin King, MD**

Assistant Professor of Clinical Medicine

**Tinna P King**

Instructor in Clinical Medicine

**Tessa Marie King, MD**

Assistant Professor of Anesthesiology

**Allison A King, MD**

Assistant Professor of Occupational Therapy

Assistant Professor of Pediatrics

**Kevin Patrick King, MD**

Instructor in Clinical Medicine

**John P. Kirby, MD, MS**

Associate Professor of Surgery (General Surgery)

**Erik Paul Kirk, MS, PHD**



Adjunct Assistant Professor of Medicine

**Nigar Kirmani, MD**

Professor of Medicine

**Neha Navsaria Kirtane, MA, PHD**

Instructor in Psychiatry (Pending Dean's Approval)

**Sameer M. Kirtane, MD**

Instructor in Clinical Medicine

**Zulfia Kisrieva-Ware, MD, PHD**

Research Instructor in Radiology

**John M Kissane, MD**

Retiree - Professor of Pathology and Immunology

**Laurie Klabi, MD**

Instructor in Clinical Obstetrics and Gynecology

**Joseph W. Klaesner, MS, PHD**

Research Associate Professor of Physical Therapy

Research Associate Professor of Radiology

**Jeffery M. Klco, MD, PHD**

Research Instructor in Pathology and Immunology

**Michael K Klebert, BN, MSN, PHD**

Research Instructor in Medicine

**Eynav Yafit Klechevsky, PHD**

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**Eynav Y Klechevsky**

Siteman Cancer Center

**Robert E Kleiger, MD**

Professor of Medicine

**Eric E. Klein, MS, PHD**

Professor of Radiation Oncology

**Samuel Klein, MD, MS**

Danforth Professor of Medicine

Professor of Cell Biology and Physiology

**Saul Klein, MD**

Instructor in Clinical Surgery (Urologic Surgery)

**Jacob Klein, MD**

Professor of Clinical Obstetrics and Gynecology

**Sandra E. Klein, BE, MD**

Assistant Professor of Orthopaedic Surgery

**Robyn Sue Klein, MS, MD, PHD**

Associate Professor of Medicine  
Associate Professor of Neurobiology  
Associate Professor of Pathology and Immunology

**Christina L Klein, MD**

Assistant Professor of Medicine

**Seth Jonathan Klein, BSA, MD**

Assistant Professor of Radiology

**Eric E. Klein**

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Assistant Professor of Clinical Otolaryngology

**Mary E Klingensmith, MD**

Professor of Surgery (General Surgery)  
Mary Culver Distinguished Professor  
Vice Chairman for Education, Department of Surgery

**Vivian Marie Kloke, OD**

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**Linda Marie Klutho, MD**

Instructor in Clinical Medicine

**Carl G Klutke, MD**

Professor of Surgery (Urologic Surgery)

**Vitaly A Klyachko, MS, PHD**

Assistant Professor of Cell Biology and Physiology  
Assistant Professor of Biomedical Engineering  
Assistant Professor of Neurobiology

**Kathleen Marie Kniepmann, DED, M PH**

Instructor in Occupational Therapy  
Instructor in Neurology

**Shirley M Knight, MD**

Professor of Clinical Pediatrics

**Richard D Knight**

Instructor in Clinical Pediatrics

**Teresa Lee Knight, MS, MD**

Instructor in Clinical Obstetrics and Gynecology

**Hayley Michelle Knollman, MD**

Instructor in Medicine

**Harry L Knopf, MD**

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**Valerie S. Knopik, MA, PHD**

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**Ronald Joseph Knox, OD**

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**Joel S Koenig, MD**

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**Ismail Kola, PHD**

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**Marin H Kollef, MD**

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**Hermann M Koller, MD**

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**Sri Devi Kolli, MBBS**

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Assistant Professor of Pediatrics

**Mary E. Koly, MD**

Instructor in Clinical Medicine

**Yosuke Komatsu**

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**Katherine L Komendowski, MD**

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**Jamie L Kondis, MD**

Instructor in Pediatrics

**Kevin L Konzen, MD**

Assistant Professor of Clinical Medicine

**Raphael Kopan, MS, PHD**

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**Robert G Kopitsky, MD**

Assistant Professor of Clinical Medicine

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**Phillip E Korenblat, MD**

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**Michael S Korenfeld, MD**

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Professor of Biochemistry and Molecular Biophysics

**Stephen K Kornfeld, PHD, MD**

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**Kerry Kornfeld**

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**John Jay Kotyk, MA, PHD**

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**Paul Thomas Kotzbauer, MD, PHD**

Assistant Professor of Neurology

Assistant Professor of Developmental Biology

**Sandor J Kovacs, MS, PHD, MD**

Professor of Medicine

Professor of Biomedical Engineering

Professor of Cell Biology and Physiology

Adjunct Professor of Physics

**Attila Kovacs, MD**

Associate Professor of Medicine

**Maria Kovacs**

Visiting Professor of Psychiatry

**Beth Ann Kozel, MD, PHD**

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Assistant Professor of Genetics

**Alexander Kozlov, MS, PHD**

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**Amanda Kracen**

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**Thomas Errol Kraemer, OD**

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**James M Krafcik**

Instructor in Clinical Pediatrics

**Aldi T Kraja, PHD**

Research Associate Professor of Genetics

**David Paul Krajcovic, MD**

Instructor in Clinical Surgery (General Surgery)

**Robert S Kramer, MD**

Instructor in Clinical Orthopaedic Surgery

**Joseph F Kras, DDENT, MD**

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**Claudia Krasnoff, MA, MD**

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**Mark S Krasnoff, MD**

Instructor in Clinical Medicine

**Richard A Kraus, MD**

Assistant Professor of Radiology

**Frederick Thier Kraus, MD**

Adjunct Professor of Obstetrics and Gynecology

**Lily Tadayyon Kregenow**

Instructor in Clinical Pediatrics

**Friederike H. Kreisel, MD**

Associate Professor of Pathology and Immunology

**Daniel Kreisel, MD, PHD**

Associate Professor of Surgery (Cardiothoracic Surgery)

Associate Professor of Pathology and Immunology

**Friederike Kreisel**

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**Daniel Kreisel**

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**Katherine L Kreusser, MD**

Professor of Clinical Pediatrics

**Andrzej Modest Krezel, MS, PHD**

Research Associate Professor of Biochemistry and Molecular Biophysics (Pending Executive Faculty Approval)

**Kristen Louise Kroll, PHD**

Associate Professor of Developmental Biology

**Ronald J Krone, MD**

Professor of Medicine

John E Simon Scholar in Medicine

**Catherine P Krucylak, MD**

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**Elaine Susan Krul, PHD**

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**Alexander S. Krupnick, MD**

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**Thomas Kuciejczyk-Kernan, MD**

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**Ralph F Kuhlman, MD**

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**Frederick Matthew Kuhlmann, MD**

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Associate Professor of Molecular Microbiology

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Associate Professor of Pediatrics

Associate Professor of Genetics

**Shashikant Kulkarni**

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**Robin A. Kundra, MD, PHD**

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**Denise Kung, MD**

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**David I. Kuperman, MD**

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**Vladimir Kushnir, MD**

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Associate Professor of Neurology

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**Jennifer S Ladage, MD**

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**Christine Marie Ladd, MD**

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Professor of Clinical Chemistry in Medicine

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**Richard Laforest**

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**Robert Craig Lander, MD**

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**Daniel K Lane, MD**

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**Michael A. Lane, MS, MD**

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**Barbara A Lanfer, M ED**

Instructor in Audiology and Communication Sciences

**Catherine Eckels Lang, MS, PHD**

Associate Professor of Physical Therapy

Associate Professor of Neurology

Associate Professor of Occupational Therapy

**Susan M Langhorst, ME, PHD**

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Assistant Professor of Radiology

**Gregory Mark Lanza, MS, PHD, MD**

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**Suzanne Lapi**

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Research Associate Professor of Neurology

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**Suzanne Nicole L'Ecuyer**

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Professor of Radiology

**Gary G Lee, DOST**

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**Kim Lynette Lee, MD**

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**Steven F Lee, MD**

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**Kirstin Lee Abel Lee, MD**

Instructor in Pediatrics

**Caroline Kim Lee, MD**

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**Eileen May Lee, MD**

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**Sena Lee, AB, PHD, MD**

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**Michelle Lee**

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Assistant Dean for the Humanities Program in Medicine

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**Ronald A Lehman Jr, MD**

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**Barbara L. Leighton, MD**

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**Walter Lemann III, MD**

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**Sarah Jean Lenhardt, MD**

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**Lawrence G Lenke, MD**

Jerome J. Gilden M.D. Distinguished Professor of Orthopaedic Surgery

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Assistant Professor of Pathology and Immunology

**Deborah J Lenschow**

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Associate Professor of Pediatrics

**David Seamus Leonard, MBCHB, MHA**

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**Jeffrey R. Leonard**

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**Christina Lessov-Schlaggar, PHD**

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**Alison M Leston, PHD, MD**

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**Daisy W Leung, PHD**

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**Eric Claude Leuthardt, MD**

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**Eric C. Leuthardt**

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**Marvin E Levin, MD**

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**Mark David Levin, MD**

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**Mark D Levine, MD**

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**Laurence A Levine, MA, DENT, MD**

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**Jerome F Levy**

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**Edward S Levy, MD**

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**Kenneth C Levy, MD**

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**Philip Thaler Levy, MD**

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**Collins E Lewis, MD, M PH**

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**Lawrence M Lewis, AA, MD**

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**Scott W Lewis, OD**

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**Amanda Lark Lewis, PHD**

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Assistant Professor of Obstetrics and Gynecology

**Warren Graybill Lewis, PHD**

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**James S. Lewis Jr, MD**

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Associate Professor of Otolaryngology

**Timothy J Ley, MD**

Lewis T and Rosalind B Apple Professor of Medicine  
Professor of Genetics

**Ellen Li, PHD, MD**

**Ben Wen Li, MD, PHD**

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**Tingting Li, MD**

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**Hui Li, MS, PHD**

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**Wenjun Li, MD, MS**

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**Shunqiang Li, PHD**

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**Mingjie Li, MD, PHD**

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**Hua Li, PHD**

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**Li Li, MD, PHD**

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**Weikai Li, MS, PHD**

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**Shunqiang Li**

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**Min Lian, MD, M PH, PHD**

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**Stephen Yuan-Tung Liang, MD**

Instructor in Medicine

**Steve Ming-Che Liao, MD**

Assistant Professor of Pediatrics

**Helen Liapis, MD**

Professor of Pathology and Immunology

Professor of Medicine

**Jeffery Lichtenhan, BAS, MSSH, PHD**

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**Amy K Licis, MD**

Assistant Professor of Neurology

**James Walter Lieber, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Harvey Liebhaber, MD**

Associate Professor of Clinical Medicine

**Huiping C Lieser, MA, PHD**

Research Instructor in Occupational Therapy (Pending Dean's Approval)

**Charles H Lieu, MD**

Instructor in Clinical Medicine

**Judith E Lieu, MD**

Associate Professor of Otolaryngology

**Barry Light, PHD, MD**

Associate Professor of Clinical Pediatrics

**Anna Lijowska, MD**

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**Stephen Bradley Lillard, MD**

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**Michael Lillmars, DDENT**

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**Kian-Huat Lim, MD, PHD**

Assistant Professor of Medicine

**Kian-Huat Lim**

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**David D Limbrick Jr, MD, PHD**

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Assistant Professor of Pediatrics

**Hsiu-San Lin, MD, PHD**

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**Michael Yun Lin, MD**

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**Yiing Lin, PHD, MD**

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**Congxing Lin, PHD**

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**Michael Fu-Yen Lin, MS, MD**

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**John Chao-Chun Lin, MD**

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**Penelope Alathea Lind**

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**John T Lind, MS, MD**

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**Brian Richard Lindman, MA, MD**

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Associate Professor of Neurological Surgery

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Professor of Neurobiology

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**Michael Brayer Lippmann, MD**

Professor of Medicine

**Mauricio Lisker-Melman, MD**

Professor of Medicine

**Jay L Liss, MD**

Associate Professor of Clinical Psychiatry

**Mary Kathryn Liszewski**

Research Instructor in Medicine

**Howard S Lite, MA, MD**

Instructor in Clinical Medicine

**Adam Daniel Littich, MD**

Instructor in Medicine

**Blake Allen Little, MD**

Instructor in Clinical Pediatrics

**Marina Litvin, MD**

Instructor in Medicine

**Jianmei Liu, MD, MS**

Instructor in Clinical Medicine

**Qianjin Liu, MD, PHD**

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**Xinping Liu, MS, PHD**

Research Instructor in Medicine

**Ying Liu, MD, PHD**

Instructor in Surgery (Public Health Sciences)

**Yongjian Liu, MS, PHD**

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**Jingxia Liu, MS, PHD**

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**Qin Liu, PHD**

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**Rebecca Lobb**

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Vice Chairman of Anesthesiology

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**Christina M. Lockwood, PHD**



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**Lola J Loeb, MA, MD**

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Brennecke Professor of Biophysics in Biochemistry and Molecular Biophysics

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**Jane Loitman, MS, MD**

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Instructor in Clinical Medicine

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**Fanxin Long, MA, PHD**

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Professor of Developmental Biology

Professor of Medicine

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**Gregory D Longmore, MS, MD**

Professor of Medicine

Professor of Cell Biology and Physiology

**Greg D Longmore**

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**Glenn Lopate, MD**

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**Latisha D Love-Gregory, PHD**

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Professor of Pediatrics

**Zhi Hong Lu, PHD**

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**Brendan Patrick Lucey, MD**

Instructor in Neurology

**Philip A Ludbrook, MBBS**

Professor of Medicine

Professor of Radiology

Professor of Psychiatry

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Mabel Dorn-Reeder Distinguished Professor of the History of Medicine

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**Lauren Michelle Ludwig Lee, MD**

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**Gregg T Lueder, MD**

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Professor of Pediatrics

**Gregg T Lueder**

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**Peter David Lukasiewicz, PHD**

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Professor of Neurobiology

**Angela Kumari Lumba, MD, AS**

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**Jingqin (Rosy) Luo**

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Professor of Psychology

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**John P Lynch, MD**

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**Isaac P Lynch, MD**

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**Ryan Christopher Lynch, MD**

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**Carl A Lyss, MD**

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**Liang Ma, PHD**

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**Cynthia Xiuguang Ma, MD, PHD**

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**Richard W Maack, MD**

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**Robert R Mac Donald III, MD**

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**Luigi Maccotta, PHD, MD**

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**Donna Alexandra MacDuff, PHD**

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**Colin Mackenzie**

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**Lisa Marie Mackey, OD**

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Professor of Otolaryngology

Professor of Occupational Therapy

**George Andrew Macones, MD, MS**

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Head of the Department of Obstetrics and Gynecology

**George A Macones**

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**Pamela AF Madden**

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**Christopher A Maher**

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Instructor in Pediatrics

**Philip W Majerus, MD**

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Professor of Biochemistry and Molecular Biophysics

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**Daniel T. Mamah, MD**

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**Maria Maminta-Streiff**

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**Mark John Manary, MD**

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Academic Rank held in Genetics

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Instructor in Neurology

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Research Associate Professor of Surgery (Public Health Sciences)

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**Lindsey Appenzoller Olsen, MS**

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**Margaret A Olsen**

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**Jeffrey R. Olsen**

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**Gary H Omell, MD**

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**Robert F Onder Jr, MD**

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**Theodore Otti**

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**Ben Julian Palanca, MD**

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**Ross Ian Palis, MD**

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**Matthew S Parsons, MD**

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**Varun Puri**

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**Jenna M Putzel**

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**Patricia M Quinley, MD**

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**Janet Sue Rader, MD**

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Professor of Psychology  
Professor of Biomedical Engineering  
Professor of Neurobiology  
Professor of Neurology

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Professor of Biostatistics in Genetics  
Professor of Biostatistics in Psychiatry  
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Professor of Developmental Biology

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Professor of Radiology

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Associate Professor of Neurology

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**Sonny Satnam Saggar**

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**John Mark Samet, MD**

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**Charles Michael Samson, MD**

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**Paul M Stein, MD**

Professor of Clinical Medicine

**Richard Ian Stein, PHD**

Research Assistant Professor of Medicine

**Alan Joel Stein, MD**

Assistant Professor of Clinical Surgery (Urologic Surgery)

**Joseph H Steinbach, PHD**

Russell and Mary Sheldon Professor of Anesthesiology

Professor of Neurobiology

Professor of Biomedical Engineering

**Holly L Steiner, MD**

Assistant Professor of Obstetrics and Gynecology (Pending Executive Faculty Approval)

**William F Stenson, MD**

Dr Nicholas V Costrini Professor of Medicine

**William F Stenson**

Siteman Cancer Center

**Barbara B Sterkel**

Adjunct Associate Professor of Medicine

**Randall S Sterkel, MD**

Assistant Professor of Clinical Pediatrics

**Lynne M Sterni, MD**

Assistant Professor of Anesthesiology

Assistant Professor of Pediatrics

**Tracey Wagner Stevens, MD**

Instructor in Anesthesiology

**Sheila Stewart-Wigglesworth, PHD**

Associate Professor of Cell Biology and Physiology

Associate Professor of Medicine

**Anita R Stiffelman, MD**

Associate Professor of Clinical Pediatrics

**Wayne A Stillings, MD**



Assistant Professor of Clinical Psychiatry

**Jennifer S Stith, MS, PHD, MSW**

Associate Professor of Physical Therapy  
Division Director for Education in Physical Therapy  
Associate Director of Professional Curriculum  
Associate Professor of Neurology

**Nathan O. Stitzel, MD, PHD**

Instructor in Medicine

**Marissa Christine Stock, MD**

**Keith Evan Stockerl-Goldstein, MD**

Associate Professor of Medicine

**Keith Stockerl-Goldstein**

Siteman Cancer Center

**Daniel Charles Stoeckel**

Instructor in Clinical Surgery

**James Andrew Stokes, MD**

Instructor in Clinical Medicine

**Janis Marie Stoll, MD**

Instructor in Pediatrics

**John A Stopple, MD**

Instructor in Clinical Obstetrics and Gynecology

**Gregory A Storch, MD**

Ruth L. Siteman Professor of Pediatrics  
Professor of Molecular Microbiology  
Professor of Medicine

**Gary D Stormo, MA, PHD**

Professor of Genetics  
Joseph Erlanger Professor  
Professor of Computer Science  
Professor of Biomedical Engineering

**Eric A Strand, MD**

Associate Professor of Obstetrics and Gynecology

**Steven M Strasberg, MD**

Pruett Professor of Surgery (General Surgery)  
Associate Professor of Cell Biology and Physiology

**Steven M Strasberg**

Siteman Cancer Center

**Robert H Strashun, MA, MD**

Associate Professor of Clinical Pediatrics

**William L Straube, MEE**

Research Associate Professor of Radiation Oncology

**Susan Kay Strecker, MA, DPT**

Assistant Professor of Physical Therapy

Assistant Professor of Pediatrics

**M. Anne Street, MA, MD**

Assistant Professor of Clinical Pediatrics

**James W Strickland, MD**

Visiting Professor of Orthopaedic Surgery

**James F Strieter, OD, MBA**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Catherine Striley**

Asjunct Assistant Professor of Psychiatry

**Cristina Strong, PHD**

Assistant Professor of Medicine (Dermatology)

**Seth A Strobe, MD, M PH**

Assistant Professor of Surgery (Urologic Surgery)

**Robert C Strunk, MS, MD**

Professor of Pediatrics

**Judith M. Stucki-Simeon, MD**

Instructor in Clinical Pediatrics

**Xiong Su, PHD**

Assistant Professor of Medicine

Assistant Professor of Cell Biology and Physiology

**Yi Su, PHD**

Instructor in Radiology

**Brian K Suarez, MA, PHD**

Professor of Psychiatry

Professor of Genetics

**Rosa M Suarez-Solar, MD**

Instructor in Clinical Pediatrics

**Hamsa Subramanian**

Instructor in Clinical Medicine

**Priya Sudarsanam, PHD**

**Abbe L Sudvarg**

Instructor in Clinical Obstetrics and Gynecology

**Lisa Suffian, MD**

Instructor in Clinical Pediatrics

**Toshifumi Sugatani, DDENT, PHD**

Research Instructor in Pediatrics

**Alexander L Sukstansky, MS, PHD, D SC**

Research Associate Professor of Radiology

**Hani Suleiman, MD**

Research Instructor in Pathology and Immunology (Pending Dean's Approval)

**Shelby A Sullivan, MD**

Assistant Professor of Medicine

**Melissa Sum, MD**

Instructor in Medicine (Pending Dean's Approval)

**Kaharu Sumino, MD, PHD, M PA**

Assistant Professor of Medicine

**William Craig Summers, MD**

Instructor in Clinical Medicine

**Brian Patrick Sumner, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Walton Sumner II, MD**

Associate Professor of Medicine

**Yun Ju Sung, PHD**

Research Assistant Professor of Biostatistics

Research Assistant Professor of Psychiatry

**Herbert Sunshine, MD**

Instructor in Clinical Surgery (Urologic Surgery)

**Rama Suresh, MBBS**

Assistant Professor of Medicine

**Rama Suresh**

Siteman Cancer Center

**Jagdish C Suri, MD**

Assistant Professor of Clinical Psychiatry (Child Psychiatry)

**Vinod Suri**

Instructor in Clinical Psychiatry (Child Psychiatry) (Full-Time at Hawthorn Children's Psychiatric Hospital)

**Siobhan Sutcliffe, MHS, MS, PHD**

Associate Professor of Surgery (General Surgery)

**Siobhan Sutcliffe**

Siteman Cancer Center

**Rudee Suwannasri, MD**

Instructor in Clinical Medicine

**Bridgette B Svancarek, MD**

Instructor in Emergency Medicine in Medicine

**Dragan M Svrakic, MD, PHD**

Professor of Psychiatry

**Sanjay Joshua Swamidass, MA, PHD, MD**

Assistant Professor of Pathology and Immunology

Assistant Professor in Computer Science and Engineering

**Kenneth V Swanson**

Instructor in Clinical Ophthalmology and Visual Sciences

**Robert A Swarm, MD**

Professor of Anesthesiology

**Robert A Swarm**

Siteman Cancer Center

**Wojciech A. Swat, MS, PHD**

Associate Professor of Pathology and Immunology

**Stuart C Sweet, PHD, MD**

Professor of Pediatrics

**Amanda Sweetland**

Instructor in Clinical Pediatrics

**Melissa Swiecki, PHD**

Research Instructor of Pathology and Immunology

**Elzbieta Anna Swietlicki, MS, PHD**

Research Instructor in Medicine

**Susan C. Sylvia**

Instructor in Clinical Pediatrics

**Susan C Sylvia**

Siteman Cancer Center

**William J. Symons, MD**

Assistant Professor of Surgery (General Surgery)

**Adel Tabchy, MD, MS**

Assistant Professor of Medicine

**Adel Tabchy**

Siteman Cancer Center

**Steven D Taff, MS, PHD**

Instructor in Occupational Therapy

Instructor in Medicine

**Paul H Taghert, PHD**

Professor of Neurobiology

**Mohammad Tahir, MD**

Instructor in Clinical Medicine

**Yuan-Chuan Tai, MEE, PHD**

Associate Professor of Radiology

**Yuan-Chuan Tai**

Siteman Cancer Center

**Chandrakant Tailor, MD**

Assistant Professor of Clinical Radiology

**Akiko Takeda, PHD**

Research Assistant Professor of Pathology and Immunology

**Benjamin R Tan, MD**

Associate Professor of Medicine

**David Tan, MD**

Assistant Professor of Emergency Medicine in Medicine

**Kari Tanderup, PHD**

Professor of Radiation Oncology (Pending Executive Faculty Approval)

**Mini Tandon, MD**

Assistant Professor of Psychiatry (Child Psychiatry)

**Chi-Tsai Tang, MD**

Assistant Professor of Orthopaedic Surgery

**Simon Tang, MS, PHD**

Assistant Professor of Orthopaedic Surgery

**Michael J. Tang, MD**

Instructor in Medicine

**Aline T. Tanios, MD**

Assistant Professor of Pediatrics

**Kongsak Tanphaichitr, MD**

Professor of Clinical Medicine

**Richard S Tao, MD, MIM**

Instructor in Emergency Medicine in Medicine

**Lawrence R Tarbox, AA, PHD**

Research Assistant Professor of Radiology

**Phillip Irwin Tarr, MD**

Melvin E Carnahan Professor of Pediatrics

Professor of Molecular Microbiology

**Sandra L Tate, MD**

Instructor in Clinical Neurology

**John-Stephen A Taylor**

Siteman Cancer Center

**Sharlene A Teefey, BN, MD**

Professor of Radiology

**Sharlene A Teefey**

Siteman Cancer Center

**Steven L Teitelbaum, MD**

Messing Professor of Pathology and Immunology

Professor of Medicine

**Steven L Teitelbaum**

Siteman Cancer Center

**Rene Tempelhoff, MD**

Professor of Anesthesiology

Professor of Neurological Surgery

**Marissa Morningstar Tenenbaum, MD**

Assistant Professor of Surgery (Plastic and Reconstructive Surgery)

**Melissa Dawn Tepe, MS, MD**

Instructor in Clinical Obstetrics and Gynecology

**Arnold S Tepper, MD**

Instructor in Clinical Medicine

**Raghu P Terkonda, MD**

Assistant Professor of Anesthesiology

**Wanda T Terrell, MD**

Associate Professor of Clinical Medicine

**Kristen A Terrill**

Instructor in Clinical Pediatrics

**Paul M Tesser, PHD, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Larissa Bryka Thackray, PHD**

Research Assistant Professor of Medicine (Pending Executive Faculty Approval)

**Donna T Thackrey, MD**

Instructor in Clinical Pediatrics

**Premal H Thaker, MD, MS**

Associate Professor of Obstetrics and Gynecology

**Isolde E Thalmann, MA, PHD**

Research Professor Emeritus of Otolaryngology

**Ruediger Thalmann, MD**

Professor Emeritus of Otolaryngology

Lecturer in Otolaryngology (Part-time 41%)

**George K. Thampy, MD**

Instructor in Clinical Medicine

**Stanley E Thawley, MD**

Associate Professor of Otolaryngology

**Marie Angele Theard, MD**

Assistant Professor of Anesthesiology

**Daniel Leonidas Theodoro, MD**

Assistant Professor of Emergency Medicine in Medicine

**J. Allen Thiel, MD**

Associate Professor of Clinical Medicine

**Stephen Thierauf**

Instructor in Clinical Pediatrics

**Kwee L Thio, PHD, MD**

Associate Professor of Neurology

Associate Professor of Pediatrics

Associate Professor of Neurobiology

**Mark S Thoenke, MD, PHD**

Associate Professor of Medicine

**Matthew A Thomas, MD**

Professor of Clinical Ophthalmology and Visual Sciences

**Maria A Thomas, PHD, MD**

Assistant Professor of Radiation Oncology (Pending Executive Faculty Approval)

**Scott M. Thomas, MD**

Instructor in Pediatrics

**Jean Alfred Thomas Sr., MD**

Instructor in Clinical Obstetrics and Gynecology

**Stavros Thomopoulos, MS, MS1, PHD**

Associate Professor of Orthopaedic Surgery  
Associate Professor of Biomedical Engineering

**Robert W Thompson, MD**

Professor of Surgery (General Surgery)  
Professor of Cell Biology and Physiology  
Professor of Radiology

**Jeffrey Bryant Thompson, MD**

Instructor in Clinical Obstetrics and Gynecology

**M. Bryant Thompson, MD**

Associate Professor of Clinical Obstetrics and Gynecology

**Joseph M Thornhill, MD**

Assistant Professor of Anesthesiology

**Wade L Thorstad, MD**

Associate Professor of Radiation Oncology

**Dinesh Thotala, MS, PHD**

Research Assistant Professor of Radiation Oncology

**Erik P Thyssen, MD**

Assistant Professor of Clinical Medicine

**LinLin Tian, PHD**

Research Instructor in Neurology

**Lawrence S Tierney, MD**

Associate Professor of Clinical Medicine

**Jeffrey P Tillinghast, MD**

Associate Professor of Clinical Medicine

**Mary A Tillman, MD**

Professor of Clinical Pediatrics

**Jeffrey B. Titus, MA, PHD**

Assistant Professor of Clinical Neurology

**Albro C Tobey, MD**

Assistant Professor of Clinical Obstetrics and Gynecology

**Garry S Tobin, MD**

Associate Professor of Medicine

**Jerry Tobler, PHD, MD**

Instructor in Clinical Radiology

**Randall W Tobler, MD**

Assistant Professor of Clinical Obstetrics and Gynecology

**Alexandre Todorov, M ED, PHD**



Research Professor of Psychiatry

**Robert W Tolan Jr., MA, MD**

Instructor in Clinical Pediatrics

**Niraj Harish Tolia, PHD**

Assistant Professor of Molecular Microbiology

Assistant Professor of Biochemistry and Molecular Biophysics

**Douglas M Tollefsen, PHD, MD**

Professor of Medicine

Assistant Professor of Biochemistry and Molecular Biophysics

Professor of Pathology and Immunology

**Michael H. Tomasson, MD**

Associate Professor of Medicine

Associate Professor of Genetics

**Adetunji Toriola**

Assistant Professor of Surgery (General Surgery)

**Adetunji Toriola**

Siteman Cancer Center

**Ralph J Torrence, MD**

Instructor in Clinical Surgery (Urologic Surgery)

**Waseem Touma, MD**

Instructor in Clinical Medicine

**Robert R Townsend, MD, MS, PHD**

Professor of Medicine

Professor of Cell Biology and Physiology

**Elizabeth A Tracy, MD**

Instructor in Clinical Medicine

**Scott A. Trail, MD**

Instructor in Clinical Pediatrics

**David D Tran, PHD, MD**

Assistant Professor of Medicine

**Erica J Traxel, MD**

Assistant Professor of Surgery (Urologic Surgery)

**Yvonne Perle Treece, AA, MD**

Instructor in Clinical Obstetrics and Gynecology

**Indi Trehan, MPH, MD**

Assistant Professor of Pediatrics (Pending Executive Faculty Approval)

**Norman Edwin Trevathan III, MS, MD**

Adjunct Professor of Neurology

**Sandeep Kumar Tripathy, PHD, MD**

Assistant Professor of Medicine

**Sandeep K Tripathy**

Siteman Cancer Center

**William R. True, MA, PHD, M PH**

Adjunct Professor of Psychiatry

**Heather L. True, MS, PHD**

Associate Professor of Cell Biology and Physiology

**Elbert P Trulock III, MD**

Rosemary and I Jerome Flance Professor of Pulmonary Medicine in Medicine

**Linda Mei-Lin Tsai, MD**

Associate Professor of Ophthalmology and Visual Sciences

**Garland R Tschudin, MD**

Instructor in Clinical Pediatrics

**Thomas F Tse, MD**

Instructor in Clinical Medicine

**George S Tseng, MD**

Assistant Professor of Anesthesiology

**Zhude Tu, MS, PHD, MS1**

Assistant Professor of Radiology

**Dolores R Tucker, MD**

Assistant Professor of Clinical Medicine (Dermatology)

**David J Tucker, MD**

Assistant Professor of Clinical Medicine

**Stacey S Tull, MD, M PH**

Assistant Professor of Clinical Medicine (Dermatology)

**Thomas H Tung, MD**

Associate Professor of Surgery (Plastic and Reconstructive Surgery)

**John W Turk, PHD, MD**

Professor of Medicine

Professor of Pathology and Immunology

**Michael P Turmelle, MD**

Associate Professor of Pediatrics

**Yumirle Padron Turmelle, AA, MD**

Assistant Professor of Pediatrics

**Jacqueline Sue Turner, MD**

Instructor in Clinical Obstetrics and Gynecology

**Lesley A Turner**

Siteman Cancer Center

**Peter G Tuteur, MD**

Associate Professor of Medicine

**Peter G Tuteur**

Siteman Cancer Center

**Methodius Gamuo Tuuli, M PH, MBBS**

Assistant Professor of Obstetrics and Gynecology

**Robert Lawrence Tychsen, MD**

Professor of Ophthalmology and Visual Sciences

Professor of Neurobiology

Professor of Ophthalmology and Visual Sciences in Pediatrics

John F. Hardesty M.D. Distinguished Professor of Ophthalmology and Visual Sciences

**Stacy Lynne Tylka, MS, DPT**

Instructor in Physical Therapy

Assistant Professor of Orthopaedic Surgery

**April L Tyus**

Instructor in Clinical Pediatrics

**Rosalie May Uchanski, MS, PHD**

Research Assistant Professor of Otolaryngology

Research Assistant Professor of Audiology and Communication Sciences

**Robert C. Uchiyama, MD**

Instructor in Clinical Medicine

**Hideyo Ugai, MS, PHD**

Research Instructor in Radiation Oncology

**John H Uhlemann, MD**

Assistant Professor of Clinical Medicine (Dermatology)

**Emil Raphael Unanue, MD**

Paul and Ellen Lacy Professor of Pathology and Immunology

**Emil R Unanue**

Siteman Cancer Center

**Ravindra Uppaluri, PHD, MD**

Associate Professor of Otolaryngology

**Fumihiko Urano, MD, PHD**

Samuel E Schechter Associate Professor of Medicine  
Associate Professor of Pathology and Immunology

**Mwiza Ushe, MS, MD**

Instructor in Neurology

**Elizabeth C Utterson, MD**

Assistant Professor of Pediatrics

**Geoffrey L Uy, MA, MD**

Assistant Professor of Medicine

**Akshaya J Vachharajani, MBBS, MD**

Associate Professor of Pediatrics

**Brij R Vaid, MD**

Instructor in Clinical Medicine

**Michael Valente, MS, PHD**

Professor of Otolaryngology (Audiology)

Professor of Audiology and Communication Sciences

**Lora Maureen Valente, MS, PHD**

Associate Professor of Otolaryngology

Associate Professor of Audiology and Communication Sciences

Director of Audiology Studies in Audiology and Communication Sciences

**Albert Lee Van Amburg III, MD**

Assistant Professor of Clinical Medicine

**Dorothy J. Van Buren, PSYD**

Assistant Professor of Psychiatry

**Linda R Van Dillen, MS, PHD**

Professor of Physical Therapy

Professor of Orthopaedic Surgery

**Michele Van Eerdewegh, MD**

Instructor in Clinical Psychiatry

**David C Van Essen, PHD**

Alumni Endowed Professor of Neurobiology

Professor of Biomedical Engineering

**George Frederick Van Hare III, MD**

Louis Larrick Ward Professor of Pediatrics

**Gregory Paul Van Stavern, MD**

Associate Professor of Ophthalmology and Visual Sciences

Associate Professor of Neurology

**Renee Bailey Van Stavern, MD**

Associate Professor of Neurology

**Brian Andrew Van Tine, PHD, MD**

Assistant Professor of Medicine

**Brian A. Van Tine**

Siteman Cancer Center

**Jeffrey A. Vander Kooi, MD**

Instructor in Clinical Psychiatry

**Andrea Vannucci, MD**

Assistant Professor of Anesthesiology

**Michelle B Vanstone, MA, MD**

Instructor in Pediatrics

**Swarup Varaday, MBBS**

Assistant Professor of Anesthesiology

**Arun S. Varadhachary, PHD, MD**

Assistant Professor of Neurology

**Gil M Vardi, MD**

Assistant Professor of Clinical Medicine

**Javier Esteban Varela, MD, M PH**

Associate Professor of Surgery (General Surgery)

**Suresh Vedantham, MD**

Professor of Radiology

Professor of Surgery (General Surgery)

**Chandu Vemuri, MD**

Assistant Professor of Surgery (General Surgery)

**Emmanuel A Venkatesan**

Associate Professor of Clinical Medicine

**Thomas J Veraldi, DDENT, MS**

Instructor in Clinical Otolaryngology

**Laird Henry Vermont**

Instructor in Clinical Pediatrics

**Garry M. Vickar**

Instructor in Clinical Psychiatry

**Zevidah Vickery, MD**

Instructor in Clinical Obstetrics and Gynecology

**Wayne A Viers, MD**

Associate Professor of Clinical Otolaryngology

**Monika Vig, MS, PHD**

Assistant Professor of Pathology and Immunology

**Ravi Vij, MBBS**

Associate Professor of Medicine

**Kiran Raj Vij, MD**

Assistant Professor of Medicine

Assistant Professor of Pathology and Immunology

**Anitha Vijayan, MD**

Professor of Medicine

**Dennis T Villareal, MD**

Adjunct Associate Professor of Medicine

**Herbert W Virgin IV, MD, PHD**

Mallinckrodt Professor of Pathology and Immunology

Head of the Department of Pathology and Immunology

Professor of Molecular Microbiology

Professor of Medicine

**Harry John Visser, MD**

Instructor in Clinical Orthopaedic Surgery

**Andrei G Vlassenko, MD, PHD**

Research Assistant Professor of Radiology

**Katie Dieu Thu Vo, MD**

Associate Professor of Radiology

**Erin Foster Voegtli, OTD**

Assistant Professor of Occupational Therapy

Assistant Professor of Neurology

Assistant Professor of Psychiatry

**Mary Kristin Voellinger, MD**

Instructor in Clinical Neurology

**Joseph Paul Vogel, PHD**

Associate Professor of Molecular Microbiology

**Gary Lee Vogel, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Adam Mark Vogel, BE, MD**

Assistant Professor of Surgery (Pediatric Surgery)

**David Edward Vollman, MD**

Assistant Professor of Ophthalmology and Visual Sciences

**Gershon Ram Volotzky, MD**

Assistant Professor of Anesthesiology

**Oksana Volshteyn, MD**

Professor of Neurology

Professor of Medicine

**Benjamin Allen Voss, MD**

Instructor in Clinical Medicine

**Stanley G Vriezelaar, MD**

Instructor in Clinical Medicine

**James J Wachter, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Harry Lee Wadsworth, MD**

Instructor in Clinical Medicine

**Jason Cass Wagner, MD**

Assistant Professor of Emergency Medicine in Medicine

**Daniel G Wagner, MD**

Instructor in Clinical Obstetrics and Gynecology

**Jean V Wagner**

Instructor in Clinical Pediatrics

**Nina Delaney Wagner-Johnston, MD**

Assistant Professor of Medicine

**Nina D Wagner-Johnston**

Siteman Cancer Center

**Gabriel Waksman, MS, PHD**

Adjunct Professor of Biochemistry and Molecular Biophysics

**Stanley M Wald, MD**

Associate Professor of Clinical Medicine

**Mary C. Waldron, PHD**

Adjunct Assistant Professor of Psychiatry

**William B. Waldrop, MD**

Assistant Professor of Anesthesiology

Assistant Professor of Pediatrics

**Howard S Walker, MD**

Instructor in Clinical Surgery (Cardiothoracic Surgery)

**Sara Walker, MD**

Instructor in Clinical Psychiatry

**Leonard Lewis Wall, MD, PHD, MS**

Professor of Obstetrics and Gynecology  
Professor of Anthropology

**Lindley Bevelle Wall, MD**

Assistant Professor of Orthopaedic Surgery

**Colleen M Wallace, MD**

Assistant Professor of Pediatrics

**David Wallace, MD**

Instructor in Clinical Medicine

**Jerold W Wallis, MD, MS**

Associate Professor of Radiology  
Associate Professor of Biomedical Engineering

**David A Walls, MD**

Instructor in Clinical Medicine

**Sarah N. Walsh**

Instructor in Clinical Medicine (Dermatology)

**Matthew John Walter, MD**

Associate Professor of Medicine  
Associate Professor of Genetics

**William Lee Walter, MD**

Assistant Professor of Clinical Ophthalmology and Visual Sciences

**Donald E Walter Jr, OD**

Adjunct Instructor in Ophthalmology and Visual Sciences

**Richard Coburn Walters, MD**

Instructor in Clinical Medicine (Dermatology)

**Stephen R Waltman, MBA, MD**

Professor of Clinical Ophthalmology and Visual Sciences

**Bruce J Walz, MD**

Associate Professor of Clinical Radiation Oncology

**Jennifer Anne Wambach, MD**

Assistant Professor of Pediatrics

**Jen-Chyong Wang, MS, PHD**

Research Associate Professor of Psychiatry

**Xiaoli Wang, MD, MS, PHD**

Research Assistant Professor of Pathology and Immunology

**Lawrence L. Wang, PHD, MD**

Instructor in Clinical Medicine (Dermatology)



**Caihong Wang, PHD**

Research Instructor in Obstetrics and Gynecology (Pending Dean's Approval)

**Ting Wang, MS, PHD**

Assistant Professor of Genetics

Assistant Professor of Computer Science and Engineering

**Yong Wang, PHD**

Research Instructor in Radiology

**David Wang, PHD**

Associate Professor of Molecular Microbiology

Associate Professor of Pathology and Immunology

**Xiaowei Wang, PHD**

Assistant Professor of Radiation Oncology

**Jean S Wang, MD, PHD**

Associate Professor of Medicine

Associate Professor of Surgery (General Surgery)

**Jeff Filbert Wang, MD**

Assistant Professor of Pathology and Immunology

**Yian Wang**

Siteman Cancer Center

**Xiaowei Wang**

Siteman Cancer Center

**Lihong V Wang**

Siteman Cancer Center

**Ting Wang**

Siteman Cancer Center

**Andrea Wang-Gillam, MD**

Assistant Professor of Medicine

**Saiama Naheed Waqar, MD**

Instructor in Medicine

**Mark Edward Warchol, PHD**

Professor of Otolaryngology

Professor of Audiology and Communication Sciences

Professor of Neurobiology

**Brad W. Warner, MD**

Jessie L. Ternberg, M.D., PhD. Distinguished Professor of Pediatric Surgery in Surgery (Pediatric Surgery)

Professor of Pediatrics

**Barbara B. Warner, MS, MD**

Professor of Pediatrics

**David K. Warren, MD, MPH**

Associate Professor of Medicine

**Corinna Hendrell Warren, MD**

Instructor in Clinical Medicine

**Wesley Charles Warren, MS, PHD**

Academic Rank held in Genetics

Research Associate Professor of Genetics

**Lukas Delbert Wartman, MD**

Assistant Professor of Medicine

**Andrzej J. Wasiak, MD, PHD**

Assistant Professor of Clinical Medicine

**Gary Michael Wasserman, MD**

Assistant Professor of Clinical Obstetrics and Gynecology

**Mark S Wasserman, MD**

Instructor in Clinical Obstetrics and Gynecology

**Scott P Wasserstrom, MD, MA**

Instructor in Clinical Medicine

**Erika Waters, MS PSYC, PHD, M PH**

Assistant Professor of Surgery (General Surgery)

**Mark A Watson, MD, PHD**

Associate Professor of Pathology and Immunology

**Michael S Watson, MS, PHD**

Adjunct Professor of Pediatrics

**Andrew M. Wayne, MD**

Instructor in Clinical Neurology

**Jason Dean Weber, PHD**

Associate Professor of Medicine

Associate Professor of Cell Biology and Physiology

**H. James Wedner, MD**

Phillip & Arleen Korenblat Professor of Allergy and Immunology in Medicine

**Ling Wei, MD**

Adjunct Research Assistant Professor of Neurology

**Xiaochao Wei, PHD**

Research Instructor in Medicine

**Conrad Christian Wehl, PHD, MD**

Associate Professor of Neurology

**Kevin D Weikart, MD**

Instructor in Clinical Medicine

**Gary J Weil, MD**

Professor of Medicine

Professor of Molecular Microbiology

**Katherine N Weilbaeher, MD**

Associate Professor of Medicine

Associate Professor of Pathology and Immunology

Associate Professor of Cell Biology and Physiology

**Carla Joy Weinheimer, MS**

Research Associate Professor of Medicine

**David L Weinstein, MD**

Associate Professor of Clinical Obstetrics and Gynecology

**Leonard B Weinstock, MD**

Associate Professor of Clinical Medicine

Assistant Professor of Clinical Surgery (General Surgery)

**George Matthew Weinstock, PHD**

Academic Rank held in Genetics

Professor of Molecular Microbiology

Professor of Genetics

**Steven Jay Weintraub, MS, MD**

Assistant Professor of Medicine

**Benjamin David Weintraub**

Instructor in Clinical Pediatrics

**Edmond Weisbart**

Assistant Professor of Clinical Medicine

**Judith L. Weisenberg, MD**

Assistant Professor of Neurology

**Alan N Weiss, MD**

Professor of Medicine

**Don Weiss, MD, MS**

Instructor in Clinical Pediatrics

**Peter Douglas Weiss, MD**

Instructor in Clinical Medicine

**Calvin H Weiss, DDENT**

Instructor in Clinical Otolaryngology (DDS)

**Stuart Weiss, MD**

Professor of Clinical Neurology

**Howard I Weiss, MD**

Assistant Professor of Clinical Neurology

**Edward P Weiss, MS, PHD**

Adjunct Research Assistant Professor of Medicine

**Michael D Weiss**

Assistant Professor of Surgery (General Surgery) (Pending Executive Faculty Approval)

**Timothy P Welch, MD**

Assistant Professor of Anesthesiology

**John Sutton Welch, PHD, MD**

Assistant Professor of Medicine

**Valerie B. Welch, MD**

Instructor in Clinical Pediatrics

**Jennifer Welch, MD**

Instructor in Medicine (Pending Dean's Approval)

**Michael J Welch**

Siteman Cancer Center

**John S Welch**

Siteman Cancer Center

**Reuben R Welch II, M ED, PHD**

Associate Professor of Psychiatry

**Jason R Wellen, MD**

Assistant Professor of Surgery (General Surgery)

**Lynn Ellis Welling, MD**

Adjunct Associate Professor of Medicine

**Zila Welner, MD**

Associate Professor of Clinical Psychiatry (Child Psychiatry)

**Pamela M. Wendl, MS, DPT**

Assistant Professor of Physical Therapy

Assistant Professor of Orthopaedic Surgery

**Michael C Wendl, MS, PHS, D SC**

Academic Rank held in Genetics

Research Assistant Professor of Mechanical Engineering & Materials Science

Research Assistant Professor of Mathematics

Research Assistant Professor of Genetics

Research Assistant Professor of Genetics  
Research Assistant Professor of Genetics

**Alvin S Wenneker, MD**

Professor of Clinical Medicine

**Nicole Joy Werner, MS, PHD**

Assistant Professor of Neurology

**Brian T Wessman, MD**

Assistant Professor of Anesthesiology

Assistant Professor of Emergency Medicine in Medicine

**Jennifer Corinne Wessman, MD**

Instructor in Pediatrics (Pending Dean's Approval)

**Peter Westervelt, MD, PHD**

Associate Professor of Medicine

**Stephen Alan Wexler, MD**

Professor of Clinical Ophthalmology and Visual Sciences

**Philip J Weyman, MD**

Associate Professor of Clinical Radiology

**Alexander Weymann, MD**

Assistant Professor of Pediatrics

**Alison J Whelan, MD**

Professor of Medicine

Senior Associate Dean for Education

Professor of Pediatrics

**Alison J Whelan**

Siteman Cancer Center

**Neil Harris White, MD**

Professor of Pediatrics

Professor of Medicine

**Frances V White, MS, MD**

Associate Professor of Pathology and Immunology

Associate Professor of Pediatrics

**Andrew J White, MS, MD**

Assistant Professor of Pediatrics

**Bruce I White, MD**

Instructor in Clinical Surgery (Plastic and Reconstructive Surgery)

**Brad C White, MD**

Instructor in Clinical Surgery (Urologic Surgery)

**Michael Aaron White, MS, PHD**

Research Instructor in Genetics

**Nicole Izetta White, MD**

Instructor in Clinical Pediatrics

**Brian Stephen White, PHD**

Research Assistant Professor of Medicine

**Karen Whiteside**

Instructor in Clinical Pediatrics

**John Bair Whitfield**

Adjunct Instructor in Psychiatry

**Michael Peter Whyte, MD**

Professor of Medicine

Professor of Pediatrics

Professor of Genetics

**Martin B Wice, MD, MS**

Associate Professor of Neurology

**Burton M Wice, PHD**

Research Associate Professor of Medicine

**Cynthia A Wichelman, MD**

Associate Professor of Emergency Medicine in Medicine

Course Director for the Mini-Medical School

Course Director for the Mini-Medical School

Course Director for the Mini-Medical School

**Samuel A Wickline, MD**

Professor of Medicine

James R Hornsby Family Professor of Medicine

Adjunct Professor of Physics

Professor of Biomedical Engineering

Professor of Cell Biology and Physiology

**Karen Mori Wickline, MD**

Associate Professor of Pediatrics

**Richard Harris Wieder, MD**

Assistant Professor of Ophthalmology and Visual Sciences

**John F Wiedner, MD**

Instructor in Clinical Medicine

**Christopher William Wieland, MD**

Instructor in Medicine

**Kimberly N Wiele, MD**

Assistant Professor of Radiology

**Kimberly N Wiele**

Siteman Cancer Center

**Deborah A Wienski, MD**

Instructor in Clinical Medicine

**Tanya M Wildes, MD**

Assistant Professor of Medicine

**Troy S Wildes, MD**

Assistant Professor of Anesthesiology

**Katherine Anne Henzler Wildman, PHD**

Assistant Professor of Biochemistry and Molecular Biophysics

**Scott A Wildman, MS, PHD**

Research Assistant Professor of Biochemistry and Molecular Biophysics

**Denise Wilfley, PHD**

Professor of Psychiatry

Professor of Medicine

Professor of Psychology

Professor of Pediatrics

Scott Rudolph University Professor

**Robert S Wilkinson, MA, PHD**

Professor of Cell Biology and Physiology

**Denise Michelle Willers, MD**

Assistant Professor of Obstetrics and Gynecology

**Kristine G Williams, MD, MPH**

Assistant Professor of Pediatrics

**Nancy J Williams, MD**

Instructor in Clinical Medicine

**George A Williams III, MA, MD**

Assistant Professor of Clinical Medicine

**R. Jerome Williams Jr, MD**

Associate Professor of Clinical Medicine

**Marcia Christine Willing, MS, D SC, MD**

Professor of Pediatrics

**Richard K Wilson, PHD**

Academic Rank held in Genetics

Professor of Molecular Microbiology

Professor of Genetics

**Monita Elaine Wilson, MS, PHD**

Research Associate Professor of Medicine

**David B Wilson, MD, PHD**

Associate Professor of Pediatrics

Associate Professor of Developmental Biology

**Matthew Stewart Wilson**

Instructor in Clinical Psychiatry

**Patrick H Win**

Instructor in Clinical Medicine

**David William Windus, MD**

Professor of Medicine

Associate Dean for Medical Education

**Robert David Winfield**

Assistant Professor of Surgery (General Surgery)

**Anke Christiane Winter**

Assistant Professor of Surgery (Public Health Sciences)

**Karen Winters, MD**

Associate Professor of Medicine

Director of the Student and Employee Health Service - Medical Campus

**Franz J Wippold**

Siteman Cancer Center

**Franz J Wippold II, MD**

Professor of Radiology

**Paul Edward Wise, MD**

Associate Professor of Surgery (General Surgery)

**Chad Alan Witt, MD**

Assistant Professor of Medicine

**Keith Frederic Woeltje, MD, PHD**

Professor of Medicine

**Mary Kaye Wojczynski, PHD**

Research Instructor in Genetics

**Anna Wolaniuk, PHD, MD**

Instructor in Clinical Obstetrics and Gynecology

**Loralee Jane Wold, MD**

Instructor in Clinical Pediatrics

**Michael L Wolf, OD**



Adjunct Instructor in Ophthalmology and Visual Sciences

**Timothy J Wolf, OTD**

Assistant Professor of Occupational Therapy

Assistant Professor of Neurology

**Edward M Wolfe, MD**

Instructor in Clinical Medicine (Dermatology)

**Brett D Wolff, MD**

Associate Professor of Anesthesiology

**Patricia Ann Wolff, MD**

Professor of Clinical Pediatrics

**Gerald Wolff, MD**

Assistant Professor of Clinical Medicine

**Edwin D Wolfgram, MD**

Assistant Professor of Clinical Psychiatry

**Nathan E Wolins, PHD**

Research Assistant Professor of Medicine

**Fay Yeh Womer, MD**

Assistant Professor of Psychiatry

**Michael Wong, PHD, MD**

Associate Professor of Neurology

Associate Professor of Pediatrics

Associate Professor of Neurobiology

**Ming-Fong Agnes Wong, MD, PHD**

Adjunct Professor of Ophthalmology and Visual Sciences

**Albert S Woo, MD**

Assistant Professor of Surgery (Plastic and Reconstructive Surgery)

**John A Wood, MD**

Associate Professor of Clinical Medicine

**Matthew D Wood, MS, PHD**

Research Assistant Professor of Surgery (Plastic and Reconstructive Surgery)

**Pamela K Woodard, MD**

Professor of Radiology

**Terry A Woodford-Thomas, MS, PHD**

Adjunct Research Assistant Professor of Pathology and Immunology

**Michele C Woodley, MD**

Assistant Professor of Clinical Medicine

**Lianne Jane Woodward, MS, PHD**

Professor of Pediatrics

**Thomas A Woolsey, MD**

Professor of Experimental Neurological Surgery

George H and Ethel R Bishop Scholar in Neuroscience in Neurological Surgery

Professor of Experimental Neurology

George H and Ethel R Bishop Scholar in Neuroscience in Neurology

Professor of Anatomy and Neurobiology

Professor of Physiology

Professor of Biomedical Engineering

**Hasani Omar Wooten, MS, PHD**

Instructor in Radiation Oncology

**David F Wozniak, MA, PHD**

Research Professor of Psychiatry

Adjunct Research Associate Professor of Psychology

**Ricardo J Wray**

Siteman Cancer Center

**Megan Elizabeth Wren, MD**

Associate Professor of Medicine

**Rick Wayne Wright, MD**

Asa C. & Dorothy W. Jones Distinguished Professor

**Neill Marshall Wright, MD**

Herbert Lourie Professor of Neurological Surgery

Associate Professor of Orthopaedic Surgery

**Jeffrey M Wright, MD**

Assistant Professor of Clinical Medicine

Assistant Professor of Clinical Pediatrics

**Neill M Wright**

Siteman Cancer Center

**Gregory Frederick Wu, MD, PHD**

Assistant Professor of Neurology

Assistant Professor of Pathology and Immunology

**Xiaobo Wu, MD**

Research Assistant Professor of Medicine

**Heather E. Wuebker, MD**

Instructor in Clinical Obstetrics and Gynecology

**Kathie R Wuellner, MD**

Associate Professor of Clinical Pediatrics

**Christopher Wuertz, MD**

Assistant Professor of Clinical Psychiatry

**Hayley Wurzel**

Assistant Professor of Clinical Pediatrics

**Kristine M Wylie, PHD**

Research Instructor in Pediatrics

**Xiaoming Xia, MS, PHD**

Research Assistant Professor of Anesthesiology

**Yan Xie, MD, MS**

Research Instructor in Medicine

**Chengjie Xiong, MS, PHD**

Professor of Biostatistics

Professor of Neurology

**Mai Xu, MD, MS, PHD**

Research Instructor in Medicine (Pending Dean's Approval)

**Jinbin Xu, ME, PHD**

Instructor in Radiology

**Weining David Xu, MD**

Instructor in Medicine

**Dmitriy A Yablonskiy, MS, PHD, D SC**

Professor of Radiology

Adjunct Professor of Physics

**Christina Marie Yadao**

Instructor in Clinical Pediatrics

**Sridhar Yaddanapudi, MS**

Instructor in Radiation Oncology

**Tatiana Yakusheva, MS, PHD**

Research Instructor in Otolaryngology

**Naga M Yalla, MD**

Instructor in Medicine

**Kelvin A Yamada, MD**

Professor of Neurology

Professor of Pediatrics

**Kathryn Ayako Yamada, PHD**

Research Professor of Medicine

**Ken Yamaguchi, MS, MD**

Sam and Marilyn Fox Distinguished Professor of Orthopaedic Surgery

**Yan Yan, MD, MHS, PHD**

Research Associate Professor of Surgery (General Surgery)

Research Associate Professor of Biostatistics

**Heping Yan, MD, MS**

Research Assistant Professor of Radiation Oncology

**Kui Yang, ME, PHD**

Research Instructor in Medicine

**Qin Yang, MD, PHD**

Associate Professor of Radiation Oncology

**Deshan Yang, MS, PHD**

Assistant Professor of Radiation Oncology

**Deshan Yang**

Siteman Cancer Center

**Motoyo Yano, PHD, MD**

Instructor in Radiology

**Hiroko Yano, MS, PHD**

Assistant Professor of Neurological Surgery

Assistant Professor of Genetics

Assistant Professor of Neurology

**Kevin E Yarasheski, MA, PHD**

Professor of Medicine

Professor of Cell Biology and Physiology

Professor of Physical Therapy

**Nabeel Rasheed Yaseen, MD, PHD**

Associate Professor of Pathology and Immunology

**Mona Yassin, MD**

Instructor in Clinical Pediatrics

**William D Yates, MD**

Instructor in Clinical Surgery (General Surgery)

**Timothy Teng-Kay Yau, MD**

Assistant Professor of Medicine

**Hairong Ye, MD**

Instructor in Anesthesiology

**Kai Ye**

Academic Rank held in Genetics

Research Assistant Professor of Genetics

**Branden Edward Yee, MD**

Instructor in Anesthesiology

**Xiaobin Yi, MD**

Assistant Professor of Anesthesiology

**Yongjun Yin, PHD**

Research Instructor in Developmental Biology

**Wayne M Yokoyama, MD**

Sam and Audrey Loew Levin Professor of Medicine (Rheumatology)

Howard Hughes Medical Institute Investigator in Medicine

Professor of Pathology and Immunology

**Andrew Seungjo Yoo, MS, PHD**

Assistant Professor of Developmental Biology

**Jun Yoshino, MD, PHD**

Research Assistant Professor of Medicine

Research Assistant Professor of Developmental Biology

**Zhongsheng You, MS, PHD**

Assistant Professor of Cell Biology and Physiology

Assistant Professor of Medicine

**Zhongsheng You**

Siteman Cancer Center

**Alexander H Young, MD**

Assistant Professor of Anesthesiology

**Robert A Young, MS, MD, JD**

Instructor in Clinical Surgery (Plastic and Reconstructive Surgery)

**Julia Catherine Young**

Instructor in Clinical Pediatrics

**Anna Rebecca Young, MD**

Instructor in Anesthesiology

**Haifaa Tawifiq Younis, MD**

Instructor in Clinical Obstetrics and Gynecology

**Simon Yu, MD**

Instructor in Clinical Medicine

**Jinsheng Yu, MS, MD, PHD**

Research Instructor in Genetics

**Cecilia H Yu, MD**

Assistant Professor of Clinical Pediatrics

**Feliciano Buenviaje Yu Jr, MD, MHS, M PH**

Associate Professor of Pediatrics

**Liya Yuan, MS, PHD**

Research Instructor in Neurological Surgery

**Peng Yuan, PHD**

Assistant Professor of Cell Biology and Physiology

**Carla Marie Yuede, PHD**

Research Instructor in Neurology

**Roger D. Yusen, MD, MPH**

Associate Professor of Medicine

**Sean H Yutzy**

Adjunct Professor of Clinical Psychiatry

**Craig Mitchell Zaidman, MD**

Assistant Professor of Neurology

Assistant Professor of Pediatrics

**Alan Zajarias, MD**

Assistant Professor of Medicine

Assistant Professor of Surgery (Cadiothoracic Surgery)

**Sandra G.H. Zakroff**

Instructor in Clinical Obstetrics and Gynecology

**John F. Zalewski, MD**

Instructor in Clinical Medicine

**Paul Battista Zanaboni, PHD, MD**

Associate Professor of Anesthesiology

**Choendal Marlaan Zasaretti, MD**

Instructor in Anesthesiology

**Allyson R Zazulia, MD**

Associate Professor of Neurology

Associate Professor of Radiology

**Lukas P Zebala, MD**

Assistant Professor of Orthopaedic Surgery

Assistant Professor of Neurological Surgery

**Joel Zeffren**

Instructor in Clinical Medicine

**John M Zempel, MD, PHD**

Associate Professor of Neurology

Associate Professor of Pediatrics

**Jessica Ann Zenga, MD**

Assistant Professor of Anesthesiology

**Aurora Denise Zertuche-Sanchez**

Instructor in Clinical Pediatrics

**Yong Zhang, MD, MS, PHD**

Research Instructor in Medicine

**Qunyuan Zhang, MS, PHD**

Research Assistant Professor of Genetics

**Haixia Zhang, MD, MS, PHD**

Research Instructor in Cell Biology and Physiology

**Shiying Zhao, MME, PHD**

Adjunct Associate Professor of Radiology

**Tianyu Zhao, MS, PHD**

Instructor in Radiation Oncology

**Guoyan Zhao, MS, PHD**

Research Assistant Professor of Pathology and Immunology

**Jie Zheng, MS, PHD**

Associate Professor of Radiology

**Dong Zhou, MS1, MS, PHD**

Research Instructor in Radiology

**Yu Zhou, MS, PHD**

Research Instructor in Anesthesiology

**Dong Zhou**

Siteman Cancer Center

**Yanli Zhu, MD, MS**

Research Instructor in Neurological Surgery

**Lirong Zhu, MD, PHD**

Instructor in Clinical Neurology

**Robert E Ziegler, MD, PHD**

Assistant Professor of Clinical Medicine (Dermatology)

**Amy Christine Zimmermann, MD**

Instructor in Clinical Pediatrics

**Darryl Thomas Zinck**

Instructor in Clinical Obstetrics and Gynecology

**Bernd Heinrich Zinselmeyer, PHD**

Research Instructor in Pathology and Immunology

**Gregory Joseph Zipfel, MD**

Associate Professor of Neurological Surgery

Associate Professor of Neurology

**Imran Zoberi, MD**

Associate Professor of Radiation Oncology

**Imran Zoberi**

Siteman Cancer Center

**Charles F Zorumski, MD**

Samuel B. Guze Professor of Psychiatry

Professor of Neurobiology

Head of the Department of Psychiatry

**Dequan Zou, ME, MS, D SC**

Research Associate Professor of Physical Therapy

Research Associate Professor of Radiology

**Wei Zou, MA, PHD**

Research Assistant Professor of Pathology and Immunology

**Darryl Adam Zuckerman, MD**

Assistant Professor of Radiology

Assistant Professor of Surgery (General Surgery)

**Andrew C. Zuckerman**

Instructor in Clinical Pediatrics

## Medical Students

### Alphabetical Listing

**Note:** This may not be a complete listing. Some students may have elected to withhold directory information.

**Musa Raed Abdelaziz**

St. Louis MO

BS, Washington U in St. Louis '09

Program: Doctor of Medicine

2013 Graduate



Advocate Lutheran General Hospital  
Oak Lawn IL  
Ophthalmology  
Case Western Reserve University  
Cleveland OH

**Torgom Abraamyan**

Glendale CA  
BS, University of California- '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Damien Abreu**

BS, Yale University '10  
Program: MSTP  
Second Year Medical Student

**Temidayo Modupe Adebiji**

St Louis MO  
BS, U of Illinois at Chicago '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Christopher James Adkins**

Melbourne FL  
BA, Vanderbilt University '09  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
Northwestern - McGaw Medical Center  
Chicago IL

**Rashmi Agarwal**

Mclean VA  
BA, Dartmouth College '09  
Program: Doctor of Medicine  
2013 Graduate  
Orthopaedic Surgery  
University of Pittsburgh Medical Center  
Pittsburgh PA

**Aouod Quang Agenor**

BH, Jean-de-Brebeuf '07  
Program: Doctor of Medicine  
Second Year Medical Student

**Gerald Kwesi Aggrey**

Durham NC

BS, Indiana University-Bloomi '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Ji Won Ahn**

BA, Williams College '12

Program: Doctor of Medicine

Second Year Medical Student

**Ehiole Ogboma Akhirome**

BS, Emory University '12

Program: MSTP

Second Year Medical Student

**Usman Akhtar**

Brooklyn CT

BA, New York University '09

Program: Doctor of Medicine

Elective Year

**Bilal Al-Khalil**

BS, Georgia Institute of Tech '12

Program: Doctor of Medicine

First Year Medical Student

**Brannon Joseph Altenhofen**

Saint Louis MO

BS, University of California- '11

Program: Doctor of Medicine

**Tonya Wei An**

Encinitas CA

BS, Washington University in '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Britt Juul Andersen**

BS, University of Maryland-Ba '11

Program: MSTP

Second Year Medical Student

**Samuel Michal Anderson**

Phoenix AZ

BS, Arizona State University- '05

Program: Doctor of Medicine (5 Year)

Elective Year

**Afua Helen Annor**

Los Angeles CA

BS, Yale University '09

Program: Doctor of Medicine

Elective Year

**Guillermo Javier Ares Maisonet**

Carolina PR

BS, Washington U in St. Louis '09

Program: Doctor of Medicine

2013 Graduate

General Surgery

University of Illinois

Chicago IL

**Adam Brody Aronson**

Los Angeles CA

BS, University Of Southern Ca '09

Program: Doctor of Medicine

Clinical Clerkship Year

**Moises William Arriaga**

BS, Brown University '13

Program: MSTP

First Year Medical Student

**Mackenzie Capshaw Asel**

Columbia MO

BS, Yale University '08

Program: Doctor of Medicine

2013 Graduate

Beth Israel Deaconess Medical Center

Boston MA

Dermatology

Dartmouth-Hitchcock Medical Center

Lebanon NH

**Elisabeth Thames Boehme Askin**

St. Louis MO

BA, University Of Texas At Au '06

Program: Doctor of Medicine

Elective Year

**Jordan Jerrell Atkins**

Houston TX  
BS, Morehouse College '10  
Program: MD/MPHS  
Clinical Clerkship Year

**Elyse Aufman**

Cranberry Twp. PA  
BH, University Of Pittsburgh- '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Diane Jewon Aum**

BA, University of California- '12  
Program: Doctor of Medicine  
First Year Medical Student

**Marina Avetisyan**

St. Louis MO  
BA, Johns Hopkins University '09  
Program: MSTP  
Third Year Research

**Colin Bacorn**

BS, Rice University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Ramy A Badie**

BA, Johns Hopkins University '10  
Program: Doctor of Medicine

**Asante Badu**

BA, Harvard University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Alexandra Hathaway Baker**

East Falmouth MA  
BS, Cornell University '08  
Program: Doctor of Medicine  
Elective Year

**Wajeeh R Bakhsh**

Glendale Hts IL  
BA, Northwestern University '11  
Program: Doctor of Medicine

Clinical Clerkship Year

**Moises Baltazar Garcia**

Pahokee FL

BA, Florida Atlantic University '10

Program: Doctor of Medicine

Second Year Medical Student

**Somalee Banerjee**

Friendswood TX

BA, Washington U in St. Louis '08

Program: Doctor of Medicine

2013 Graduate

Internal Medicine

Kaiser Permanente Medical Group

Oakland CA

**Anchal Bansal**

Hoover AL

BS, Washington University in '11

Program: Doctor of Medicine

Second Year Medical Student

**Jennifer Sigrid Barklund**

St Louis MO

BA, College Of Saint Catherine '08

Program: Doctor of Medicine

Clinical Clerkship Year

**Laura Alycia Battle**

Los Altos Hills CA

BS, Univ Of CA-LA '07

Program: Doctor of Medicine

2013 Graduate

Internal Medicine

California Pacific Medical Center

San Francisco CA

**Desiree Cherie Baumgartner**

Bartlesville OK

BS, University Of Oklahoma No '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Kevin Timothy Baumgartner**

BS, Stanford University '11

Program: Doctor of Medicine  
Clinical Clerkship Year

**Jhoanne Lynne Bautista**

Yonkers NY  
BA, Barnard College '99  
Program: MSTP  
Elective Year

**Chelsea Ann Bayer**

Rogers MN  
BS, Gustavus Adolphus College '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Ignacio Becerra-Licha**

Tucker GA  
BS, Georgia Institute Of Tech '09  
Program: Doctor of Medicine  
2013 Graduate  
Family Medicine  
University of California, San Francisco  
San Francisco CA

**Emily Michelle Beck**

St. Louis MO  
BS, Univ Of Missouri-Columbia '09  
Program: Doctor of Medicine  
2013 Graduate  
St. Lukes Hospital  
St. Louis MO  
Dermatology  
Barnes-Jewish Hospital  
St. Louis MO

**Bahaa Ahmad Bedair**

Sunnyvale TX  
BS, Southern Methodist Univ '09  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
Barnes-Jewish Hospital  
St. Louis MO

**Casey Michelle Beleckas**

BS, Emory University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Miriam Rose Ben Abdallah**

Webster Groves MO  
BA, Washington University in '12  
Program: Doctor of Medicine  
First Year Medical Student

**Lawrence Nathaniel Philip Benjamin**

Salt Lake City UT  
BA, Harvard University '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Nicole Suzanne Benzoni**

Sioux City IA  
BS, Iowa State University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Ari Nachum Berlin**

BS, Rice University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Michael David Bern**

Roanoke VA  
BS, Duke University '11  
Program: MSTP  
Second Year Medical Student

**Kayla Berry**

BA, Harvard University '13  
Program: MSTP  
First Year Medical Student

**Amit Indra Bery**

Roswell GA  
BS, Emory University '10  
Program: Doctor of Medicine  
Elective Year

**Francesca Betti**

Incline Village NV  
BS, Stanford University '10

Program: Doctor of Medicine  
Elective Year

**Alexander Barton Beyer**

Seattle WA  
BS, Washington U in St. Louis '10  
Program: Doctor of Medicine  
Elective Year

**Sandeep Ramesh Bhawe**

BS, Duke '09  
Program: Doctor of Medicine  
Elective Year

**Miles Jordan Bichanich**

Stanley WI  
BS, University of Minnesota-T '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Nyabosamba Gati Binagi**

Whitewater WI  
BA, Yale University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Katherine Corey Bishop**

Prompton PA  
BS, Bucknell University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**John William Blackett**

New York NY  
BA, Johns Hopkins University '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Gregory William Bligard**

BS, University of Iowa '10  
Program: MSTP  
Second Year Research

**Laura Annette Bliss**

BS, University of California- '12  
Program: Doctor of Medicine  
First Year Medical Student



**Allison Marie Blonski**

Waukesha WI

BA, University of Minnesota-T '12

Program: Doctor of Medicine

Second Year Medical Student

**Steven Louis Bokshan**

Saint Louis MO

BS, University of Michigan-An '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Lucy Bollinger**

Boulder CO

BA, Case Western Reserve Univ '12

Program: Doctor of Medicine

Second Year Medical Student

**Nicholas Michael Bontumasi**

St. Louis MO

BS, Univ of MI-Ann Arbor '08

Program: Doctor of Medicine

2013 Graduate

Henry Ford Hospital/Wayne State University

Detroit MI

Dermatology

Univerisity of Iowa Hospitals and Clinics

Iowa City IA

**Sean Logan Boone**

Geneva IL

BS, Ohio State University-Mai '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Brian Andrew Bouchard**

BS, Davidson College '12

Program: Doctor of Medicine

Second Year Medical Student

**Shari Diane Brauer**

St. Louis MO

BA, Greenville College '12

Program: Doctor of Medicine

First Year Medical Student

**Matthew Ryan Brier**

St. Louis MO  
BS, Univ Of Texas At Dallas '09  
Program: MSTP  
Second Year Research

**Natalia Brito Rivera**

San Juan PR  
BS, Cornell University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Brittanie Broersma**

Tucson AZ  
BH, University Of Arizona '08  
Program: Doctor of Medicine  
Elective Year

**Adrienne Michelle Brower-Lingsch**

Greenville SC  
BS, Duke University '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Carl Thomas Bruce**

Saint Louis MO  
BA, George Washington Univ '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Brent Steven Bruck**

BS, Creighton University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Gregory Randal Bryant**

Scotch Plains NJ  
BS, U of Maryland-College Pk '09  
Program: Doctor of Medicine  
2013 Graduate

**Lindsay Burton**

BA, Harvard University '07  
Program: Doctor of Medicine  
First Year Medical Student

**Alice Cai**

Tucson AZ  
BS, University of Arizona '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Ravi Varkki Chacko**

BS, Columbia University In Th '10  
Program: MSTP  
First Year Research

**Varun Chalivendra**

Champaign IL  
BA, Washington University in '07  
Program: Master of Arts/Doctor of Medicine  
Master of Arts

**Ellen Yulin Chang**

San Jose CA  
BS, Univ of California-LA '08  
Program: Doctor of Medicine  
Elective Year

**Ronald Chang**

Sugar Land TX  
BA, Washington U in St. Louis '09  
Program: Doctor of Medicine  
2013 Graduate  
General Surgery  
University of Texas Medical School  
Houston TX

**Andrew Lee Chang**

Rockville MD  
BS, University Of Maryland-Co '11  
Program: MSTP  
First Year Research

**Jodie Chang**

Potomac MD  
BA, Cornell University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Stephanie Kae Charshafian**

St Louis MO

BS, University Of Florida '09  
Program: Doctor of Medicine  
Elective Year

**Anita Nandkumar Chary**

Savoy IL  
BS, U of IL-Urbana-Champaign '08  
Program: MSTP  
Third Year Research

**Nilika Chaudhary**

BS, Massachusetts Institute O '06  
Program: Doctor of Medicine  
Elective Year

**Rittik Chaudhuri**

Maumee OH  
BS, Duke University '04  
Program: MSTP  
Elective Year

**Tina H. Chen**

Reston VA  
BA, Washington U in St. Louis '09  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine  
University of Connecticut Health Center  
Hartford CT

**Jacqueline Wenjia Chen**

Plano TX  
BA, Washington U in St. Louis '10  
Program: Doctor of Medicine  
Elective Year

**Lu Chen**

Rockville MD  
BS, California Institute Of T '10  
Program: Doctor of Medicine  
Elective Year

**Athena Chen**

Athens OH  
BS, Case Western Reserve Univ '09  
Program: Doctor of Medicine

Elective Year

**Sara Xu Chen**

Shanghai, 201107

BS, Vanderbilt University '10

Program: Doctor of Medicine

Elective Year

**Christopher Tsung-jer Chen**

San Marino CA

BA, Harvard University '10

Program: Doctor of Medicine

Elective Year

**Yulong Chen**

San Francisco CA

BA, University Of California- '09

Program: MSCI/MD

**Ishita Chen**

Saint Louis MO

BS, University of Toledo '05

Program: Doctor of Medicine

Second Year Medical Student

**Raymond Edward Chen**

Chesterfield MO

BS, Duke University '12

Program: Doctor of Medicine

Second Year Medical Student

**Simon Boyi Chen**

BS, University of Toronto '12

Program: Doctor of Medicine

Second Year Medical Student

**Tiffany Lillian Cheng**

Santa Clara CA

BA, University of California- '11

Program: Doctor of Medicine

Second Year Medical Student

**Jenny Zhao Cheng**

Richmond

BS, University of British Col '13

Program: Doctor of Medicine

First Year Medical Student

**William Deyang Cheng**

Bar Harbor ME

BA, Washington University in '13

Program: Doctor of Medicine

First Year Medical Student

**Neena Rose Cherayil**

Media PA

BA, Swarthmore College '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Stephen Wen-Yan Chi**

Fairfax VA

BS, College Of William And Ma '10

Program: Doctor of Medicine

Clinical Clerkship Year

**Tingying Chi**

St. Louis MO

BA, Harvard University '12

Program: Doctor of Medicine

First Year Medical Student

**Leslie ying Chiang**

Fremont CA

BA, University Of California- '10

Program: Master of Arts/Doctor of Medicine

Master of Arts

**Alicia E. Chionchio**

Smithtown NY

BS, State University of New Y '12

Program: Doctor of Medicine

Second Year Medical Student

**Ami Chung-Hui Chiu**

BS, University of California- '12

Program: Doctor of Medicine

First Year Medical Student

**Madeleine Blair Chollet**

St. Charles MO

BA, Rice University '06

Program: Doctor of Medicine

Clinical Clerkship Year

**Chris Alison Chou**

Medina WA

BA, University of Washington '11

Program: Doctor of Medicine

Second Year Medical Student

**Jennifer Chu**

Fresh Meadows NY

BS, Massachusetts Institute O '10

Program: Doctor of Medicine

Elective Year

**Cheryl Shuay-Ru Chu**

Rowland Heights CA

BA, University of California- '10

Program: Doctor of Medicine

Second Year Medical Student

**Christopher Lim Chung**

Lafayette CA

BS, University Of California- '09

Program: Doctor of Medicine

Clinical Clerkship Year

**Nicole K Cibulka**

Ixonia WI

BS, Univ of Wisconsin-Madison '09

Program: Doctor of Medicine

2013 Graduate

Internal Medicine

Northwestern - McGaw Medical Center

Chicago IL

**Frances Wynne Clow**

BA, Stanford University '09

Program: Doctor of Medicine

First Year Medical Student

**Nathaniel Dow Coddington**

BA, University of Virginia-Ma '13

Program: Doctor of Medicine

First Year Medical Student

**Jordan Janae Cole**

BS, University of Arizona '13

Program: Doctor of Medicine

First Year Medical Student

**Lyndsey Dyan Cole**

BS, University of Arizona '13  
Program: Doctor of Medicine  
First Year Medical Student

**Miranda Denise Colletta**

Dallas TX  
BS, University Of Texas At Au '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Emily Elaine Connor**

Manchester IA  
BA, Drake University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Tamara Mildred Cooks**

Omaha NE  
BA, Washington University in '08  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Rachel Sarah Corbin**

BS, Yale University '11  
Program: Doctor of Medicine  
First Year Medical Student

**Sarah Renee Cortez**

Clarkston MI  
BS, University of Michigan-An '10  
Program: Doctor of Medicine  
Elective Year

**David Graham Cotter**

Henderson NV  
BS, Univ of Nevada-Las Vegas '08  
Program: MSTP  
Clinical Clerkship Year

**Colleen Helen Cotton**

Herndon VA  
BS, University Of Georgia '09  
Program: Doctor of Medicine  
2013 Graduate



Did not match in specialty choice  
St. Christopher's Hospital for Children  
Philadelphia PA

**Kevin Cross**

Clayton MO  
BA, Vanderbilt University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Jason W Curtis**

St. Louis MO  
BS, Brigham Young University '09  
Program: Doctor of Medicine  
2013 Graduate  
John Peter Smith Hospital  
Fort Worth TX  
Diagnostic Radiology  
University of California, San Francisco  
San Francisco CA

**David Yaw Amoah Dadey**

St. Louis MO  
BS, Morehouse College '10  
Program: MSTP  
Second Year Research

**Stacy Zhao Dai**

Gurnee IL  
BS, Brandeis University '09  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
Barnes-Jewish Hospital  
St. Louis MO

**Giuseppe Salvatore D'Amelio**

BS, Fordham University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Na Le Dang**

BA, Wesleyan University '11  
Program: MSTP  
Second Year Medical Student

**Kristen Marie Danley**

St. Louis MO  
BS, Bucknell University '08  
Program: Doctor of Medicine  
2013 Graduate  
Pediatrics  
Cincinnati Children's Hospital  
Cincinnati OH

**Agnes Z Dardas**

WORCESTER MA  
BA, Harvard University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Jyotirmoy Husayn Das**

Gainesville FL  
BS, University of Florida '13  
Program: Doctor of Medicine  
First Year Medical Student

**Bethany Amber Davis**

BS, U of California-San Diego '08  
Program: Doctor of Medicine  
2013 Graduate  
Family Medicine  
Ft. Collins Family Medicine Program  
Ft. Collins CO

**Elizabeth Davlantes**

Jacksonville FL  
BS, University Of Florida '08  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine  
Emory University School of Medicine  
Atlanta GA

**Diana Souza DeAndrade**

Wildwood MO  
BA, Johns Hopkins University '10  
Program: Doctor of Medicine  
Elective Year

**Douglas James Dearth, Jr**

Lancaster OH  
BS, Ohio Univ - Main Campus '09  
Program: Doctor of Medicine  
2013 Graduate  
Anesthesiology  
Ohio State University Medical Center  
Columbus OH

**Francis Deng**

Bristow VA  
BA, Harvard University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**George Olen Denny**

St. Louis MO  
BS, Saint Louis University-Ma '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Cori Lynn DeSanto**

Mexico NY  
BS, College Of William And Ma '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Robert Warren DesPain**

St. Louis MO  
BS, Davidson College '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Jeffrey Nelson Dines**

Bothell WA  
BS, University of Washington '08  
Program: Doctor of Medicine  
2013 Graduate  
Mercy Hospital  
St. Louis MO  
Diagnostic Radiology  
Beth Israel Deaconess Hospital  
Boston MA

**Chad Joseph Donahue**

St. Louis MO

BS, University of Massachusetts '08  
Program: MSTP  
First Year Medical Student

**Sarah Elizabeth Jeann Donaldson**

Rolling Meadows IL  
BS, Wake Forest University '09  
Program: Doctor of Medicine  
Elective Year

**Yanqun Dong**

St. Louis MO  
ND, Southern Connecticut State University '13  
Program: Doctor of Medicine  
2013 Graduate  
University of Illinois  
Chicago IL  
Radiation Oncology  
Fox Chase Cancer Center  
Philadelphia PA

**Jarrold August Dornfeld**

Geneseo IL  
BS, University of Iowa '10  
Program: Doctor of Medicine  
Elective Year

**Scott M Douglas**

Nicholasville KY  
BS, University of Kentucky '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Umber Dube**

Ottawa, Ontario  
BS, University of Waterloo '13  
Program: MSTP  
First Year Medical Student

**Jennifer Thanh Duong**

San Jose CA  
BA, University of California- '12  
Program: Doctor of Medicine  
First Year Medical Student

**Vivek Durai**

Naperville IL  
BA, Northwestern University '11  
Program: MSTP  
First Year Research

**Lucas Alexander Dvoracek**

Wheeling WV  
BS, West Liberty State Colleg '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Gregory Charles Ebersole**

BS, Ohio State University-Mai '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**John Steven Ekman**

Ventura CA  
BA, Harvard University '12  
Program: MSTP  
First Year Medical Student

**Roy L. Emanuel**

Missouri City TX  
BS, University Of Houston '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Baris Can Ercal**

St. Louis MO  
BA, Harvard University '10  
Program: MSTP  
Second Year Research

**Krisztina Elise Escallier**

BS, University Of California- '08  
Program: Doctor of Medicine  
Research (Here)

**Amirhossein Esmaeeli**

Carbondale IL  
BS, Washington University in '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Kow Akaa Essuman**

York PA

BS, Temple University '10

Program: Doctor of Medicine

Second Year Medical Student

**Kathryn Meredith Evans**

Saint Louis MO

BA, Illinois Wesleyan Univ '09

Program: Doctor of Medicine

2013 Graduate

Internal Medicine

Vanderbilt University Medical Center

Nashville TN

**William Harvey Everett**

Morton MS

BS, Millsaps College '11

Program: MSTP

First Year Research

**Jessica Fan**

BS, University of California- '13

Program: Doctor of Medicine

First Year Medical Student

**Daniel Scott Feng**

Troy MI

BA, Washington University in '11

Program: MD/MPHS

**Elizabeth Fenstermacher**

Forestdale MA

BA, Mount Holyoke College '04

Program: Doctor of Medicine

Elective Year

**Estefania Fernandez**

Allen TX

BS, University of Texas at Au '11

Program: MSTP

Second Year Medical Student

**Amarilys Fernandez Maldonado**

St. Louis MO

BS, Cornell University '13

Program: Doctor of Medicine  
First Year Medical Student

**Caroline Rose Fischer**

Cedar Rapids IA  
BA, Coe College '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Heidi Elisabeth Fjeldstad**

1394 Nesbru  
BA, Carleton College '10  
Program: Doctor of Medicine  
Elective Year

**Raymond Bamvi Fohung**

BS, University Of Wisconsin-W '10  
Program: Doctor of Medicine  
Elective Year

**Jerry Fong**

Norcross GA  
BS, Washington University in '13  
Program: MSTP  
First Year Medical Student

**Lindsay Forbes**

BS, Duke University '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Ronald Joseph Fowle Grider**

BA, Illinois Wesleyan Univer's '12  
Program: MSTP  
Second Year Medical Student

**Gregory Chandler Fox**

Saint Louis MO  
BS, Baylor University '13  
Program: MSTP  
First Year Medical Student

**Brianna Rachel Fram**

Haddonfield NJ  
BA, University of Pennsylvani '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Ann Catherine Frisse**

St. Louis MO  
BA, Barnard College '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Bradley Alexander Fritz**

Independence OH  
BS, Case Western Reserve Univ '10  
Program: MSCI/MD

**Stephen Ernest Fuest**

Penfield NY  
BS, Niagara University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Hilary Yablon Gallin**

BS, Yale University '10  
Program: Doctor of Medicine  
Second Year Medical Student

**Paul Gowdy Gamble**

BA, University of Pennsylvania '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Akshay Ganju**

Dublin OH  
BA, Harvard University '08  
Program: Doctor of Medicine  
Elective Year

**Arun Ganti**

Saint Louis MO  
BS, U of California-San Diego '08  
Program: MD/MPHS  
Elective Year

**Charise Joy Garber**

Lancaster PA  
BA, Eastern Mennonite College '12  
Program: MSTP  
Second Year Medical Student

**Rachel Gartland**



Pittsford NY  
BS, University of Pittsburgh '13  
Program: Doctor of Medicine  
First Year Medical Student

**Tianjia Jessie Ge**

Saint Louis MO  
BS, California Institute of T '12  
Program: Doctor of Medicine  
First Year Medical Student

**Ashley Miranda Gefen**

BS, McGill University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Taylor Elizabeth Geisman**

St. Charles MO  
BS, University of Dayton '13  
Program: Doctor of Medicine  
First Year Medical Student

**Paul Edward George**

Saint Charles MO  
BS, Tulane University Of Loui '07  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Elizabeth Anne Germino**

St. Louis MO  
BS, Washington U in St. Louis '08  
Program: MSTP  
Third Year Research

**Victoria Merrill Gershuni**

Palos Verdes Es CA  
BS, University Of Southern Ca '08  
Program: Doctor of Medicine  
Elective Year

**Rahel Ghiorghis Ghenbot**

Germantown MD  
BH, University Of Minnesota-T '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Colton Gits**

BA, Northwestern University-E '12  
Program: Doctor of Medicine  
First Year Medical Student

**Jeffrey Alan Gluckstein**

Claremont CA  
BS, Franklin W. Olin College '10  
Program: Doctor of Medicine  
Second Year Medical Student

**Tracey Lynn Godbold**

St. Louis MO  
BA, Wellesley College '07  
Program: Doctor of Medicine  
Second Year Medical Student

**Jakub Godzik**

San Diego CA  
BA, Univ of CA-Berkeley '08  
Program: MSCI/MD  
Elective Year

**Arjun C Gokhale**

BA, Cornell University '11  
Program: Doctor of Medicine  
First Year Medical Student

**Jared Vega Goodman**

BS, Emory University '13  
Program: MSTP  
First Year Medical Student

**Ravi Gottumukkala**

Burr Ridge IL  
BA, Northwestern University '10  
Program: Doctor of Medicine  
Elective Year

**Stephen Charles Gradwohl II**

Saint Louis MO  
BS, Washington U in St. Louis '09  
Program: MSCI/MD  
Elective Year

**Cassandra Lynn Graham**

Minnetrissa MN  
BS, University Of Minnesota-T '11

Program: Doctor of Medicine

**Jose Gabriel Grajales**

Toa Alta PR

BS, University of Puerto Rico '12

Program: MSTP

Second Year Medical Student

**Gary E Grajales Reyes**

BS, University Of Puerto Rico '10

Program: MSTP

Second Year Research

**Kristen Suzanne Grant**

St. Louis MO

BA, Dartmouth College '06

Program: Doctor of Medicine

2013 Graduate

Pediatrics

Children's Hospital

Boston MA

**Jacob Kalman Greenberg**

Scarsdale NY

BA, Washington University in '09

Program: MSCI/MD

**Daniel Seth Greenstein**

St. Louis MO

BA, Middlebury College '05

Program: Doctor of Medicine

Second Year Medical Student

**Harleen Kaur Grewal**

saint louis MO

BA, Boston University '13

Program: Doctor of Medicine

First Year Medical Student

**Whitney Rose Grither**

Saint Louis MO

BA, Johns Hopkins University '09

Program: MSTP

Second Year Research

**Andrew Paul Groves**

Arlington VA

BS, Northwestern University-E '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Ridhima Rao Guniganti**

BA, Columbia University in th '13  
Program: Doctor of Medicine  
First Year Medical Student

**LeMoyne Michael Habimana-Griffin**

Alexandria IN  
BS, Rose-Hulman Institute Of '11  
Program: MSTP  
First Year Research

**Rowland Hua Han**

BS, University of Pennsylvani '13  
Program: Doctor of Medicine  
First Year Medical Student

**Eric Paul Hanson**

BS, Drake University '13  
Program: Doctor of Medicine  
First Year Medical Student

**David Christopher Harris**

Vestavia Hills AL  
BH, Vanderbilt University '10  
Program: Doctor of Medicine  
Elective Year

**Georgina Elizabeth Hartzell**

Larkspur CA  
BS, University Of California- '09  
Program: Doctor of Medicine  
Elective Year

**Yizheng He**

Carmel IN  
BS, Duke University '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Lauren Elizabeth Henke**

BA, Saint Olaf College '10  
Program: Doctor of Medicine

Elective Year

**Stephanie Higgins**

Lake Oswego OR

BA, Washington University in '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Kelly Kathrene Hill**

Fairfax VA

BS, Washington University in '12

Program: Doctor of Medicine

Second Year Medical Student

**Nicholas A Hoerter**

Highland Park IL

BS, Cornell University '09

Program: Doctor of Medicine

Elective Year

**Kurt Joseph Hoffmeister**

St. Louis MO

BA, Washington U in St. Louis '05

Program: Doctor of Medicine

2013 Graduate

Anesthesiology

New York Presbyterian Hospital-Columbia

New York NY

**Jessica Kimberley Holttum**

Mukilteo WA

BA, University of Washington '13

Program: Doctor of Medicine

First Year Medical Student

**Charles Robert Hong**

Kowloon

BS, Georgetown University '10

Program: Doctor of Medicine

Elective Year

**Seth Green Howdeshell**

BA, Truman State University '08

Program: Doctor of Medicine

First Year Medical Student

**Jennifer Ann Hranilovich**

St. Louis MO  
BS, U of CA-Los Angeles '09  
Program: Doctor of Medicine  
2013 Graduate  
Child Neurology  
University of Utah Affiliated Hospitals  
Salt Lake City UT

**Shannon Leigh Hritz**

BS, Houghton College '13  
Program: Doctor of Medicine  
First Year Medical Student

**June Yueheng Hu**

Katy TX  
BS, Rice University '09  
Program: Doctor of Medicine  
2013 Graduate  
Pediatrics  
St. Louis Children's Hospital  
St. Louis MO

**Xiaojing Huang**

Franklin Park NJ  
BA, Princeton University '08  
Program: MSTP  
Second Year Research

**Andrew Everett Oliver Hughes**

Fairfax VA  
BS, College of William & Mary '08  
Program: MSTP  
Third Year Research

**Matthew Terrence Humbert**

St. Cloud MN  
BA, University Of St Thomas '10  
Program: Doctor of Medicine  
Elective Year

**Putzer Joseph Hung**

BS, Brown University '10  
Program: MSTP  
First Year Research

**Ari Roy Huverserian**

BA, University of Pennsylvania '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Tien-Phat Vuong Huynh**

BS, University of California- '11  
Program: MSTP  
Second Year Medical Student

**Abiye Lawrence Ibiebele**

Boyd MD  
BA, Washington University in '13  
Program: Doctor of Medicine  
First Year Medical Student

**Sarah Katherine Zeller Ihnen**

University City MO  
BA, Indiana Univ-Bloomington '03  
Program: MSTP  
Sixth Year Research

**Uzoh Erick Ikpeama**

BH, University Of Pittsburgh- '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Santoshi Shalini Indrakanti**

Santa Rosa CA  
BS, U of California-Berkeley '08  
Program: Doctor of Medicine  
2013 Graduate  
Neurological Surgery  
Barnes-Jewish Hospital  
St. Louis MO

**Celina Rose Jacobi**

Glen Ellyn IL  
BA, Vanderbilt University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Kyle Glenn Jacobsen**

BS, Emory University '10  
Program: Doctor of Medicine  
Elective Year

**Jordan Michael Jacquez**

St. Louis MO  
BS, Duke University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Nhila Jagadeesan**

Schererville IN  
BS, Indiana University-Purdue '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Nisha Jain**

BA, Barnard '10  
Program: Doctor of Medicine  
Elective Year

**Bayan Thomas Jalalizadeh**

Carrollton TX  
BS, Washington University in '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Rohan Ariel Jalalizadeh**

Carrollton TX  
BS, Washington University in '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Andrew Philip Jallouk**

St. Louis MO  
BH, Vanderbilt University '10  
Program: MSTP  
Second Year Research

**Michael Gardner James**

St. Louis MO  
BS, University of Winnipeg '12  
Program: Doctor of Medicine  
First Year Medical Student

**Jared James**

BS, Truman State University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Raymond Alexander Jean**



Manhasset NY  
BA, Harvard University '08  
Program: Master of Arts/Doctor of Medicine  
Elective Year

**Joyce Ji**

Superior CO  
BS, Brown University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Naomi Yiyi Jiang**

Northborough MA  
BS, Massachusetts Institute O '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Allan Jiang**

BH, McMaster University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Linda X Jin**

BS, University Of Washington '08  
Program: Doctor of Medicine  
Elective Year

**Linda Marie Johnson**

Roscoe IL  
BS, University Of Illinois At '09  
Program: MSTP  
Second Year Research

**Rachael Celeste Johnston**

Wichita KS  
BS, University Of Tulsa '10  
Program: Doctor of Medicine  
Elective Year

**Vovanti Tivoli Jones**

St. Louis MO  
BS, U of Maryland-BaltimoreCo '09  
Program: Doctor of Medicine (5 Year)  
Research (Here)

**Kavita B. Joshi**

Cincinnati OH

BA, Washington U in St. Louis '09  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine  
University of Texas Southwestern Medical School  
Dallas TX

**Neel Shailendra Joshi**

San Jose CA  
BA, Washington University in '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Andrew Warren Judd**

Oregon City OR  
BA, Portland State University '07  
Program: Doctor of Medicine  
Elective Year

**Braden Noah Juengel**

BS, Oral Roberts University '10  
Program: Doctor of Medicine  
Elective Year

**Jennifer Mae Jupitz**

St. Louis MO  
BA, Johns Hopkins University '10  
Program: Doctor of Medicine  
Elective Year

**Wumesh K.C.**

BS, Univ of CO, Boulder '06  
Program: MSTP  
Clinical Clerkship Year

**Vasilios Kalas**

Orland Park IL  
BS, University Of Chicago '10  
Program: MSTP  
Second Year Research

**Kristen Michelle Kapalka**

West Chester PA  
BS, Case Western Reserve Univ '11  
Program: Doctor of Medicine

Clinical Clerkship Year

**Monica Kasbekar**

Matthews NC

BS, University Of Virginia-Ma '10

Program: MSTP

Second Year Research

**Sarah Kathryn Kaufman**

St. Louis MO

BA, University Of California- '09

Program: MSTP

Second Year Research

**Daniel Martin Kaufman**

Chatsworth CA

BS, University Of California- '11

Program: MSTP

First Year Research

**Johanna Rose Kaufman**

Dix Hills NY

BA, Washington University in '12

Program: Doctor of Medicine

Second Year Medical Student

**Chelsea Ann Kebodeaux**

Olathe KS

BA, Washington University in '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Philip Scott Kemp**

Saint Louis MO

BS, Columbia University In Th '09

Program: Doctor of Medicine

Elective Year

**Jeffrey Scott Ketchersid**

South Boston VA

BS, Massachusetts Institute O '09

Program: Doctor of Medicine

2013 Graduate

Internal Medicine

Stanford University Program

Stanford CA

**Taleef Raza Khan**

Creve Coeur MO

BA, Washington University in '13

Program: Doctor of Medicine

First Year Medical Student

**Sunaina Khandelwal**

BS, University Of Maryland-Ba '11

Program: MSTP

First Year Research

**Elaine Ching-Feng Khoong**

Downers Grove IL

BS, Univ of Pennsylvania '07

Program: MSCI/MD

Elective Year

**Han Kim**

Little Rock AR

BA, Harvard University '08

Program: Doctor of Medicine

2013 Graduate

Mercy Hospital

St. Louis MO

Ophthalmology

University of Wisconsin

Madison WI

**Jenna May Kim**

McLean VA

BA, University Of Virginia-Ma '08

Program: Doctor of Medicine

Elective Year

**Aram Kim**

Seoul

BS, Duke University '09

Program: Doctor of Medicine

Elective Year

**David Hyunghwa Kim**

Las Vegas NV

BS, Yale University '10

Program: Doctor of Medicine

Clinical Clerkship Year

**Judith Ann Kim**

Paramus NJ  
BA, Harvard University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Janice S Kim**

Syosset NY  
BS, Yale University '12  
Program: Doctor of Medicine  
First Year Medical Student

**Charles Elwood Kircher**

Saint Louis MO  
BA, Dartmouth College '07  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine  
University Hospital  
Cincinnati OH

**Vanessa Lynn Kleckner**

New Brighton MN  
BA, St. Olaf College '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Roger Davies Klein**

BA, College Of Wooster '11  
Program: MSTP  
First Year Research

**Robert Jared Klemisch**

Mandan ND  
BA, Washington University in '07  
Program: Doctor of Medicine  
Elective Year

**Dylan Girard Kluck**

Boulder CO  
BA, University Of California- '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Brent Alexander Knight**

St. Louis MO

BS, Whitworth University '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**James Jiann-Yeu Ko**

Cockeysville MD  
BA, Washington University in '13  
Program: Doctor of Medicine  
First Year Medical Student

**Brianna Cristine Kolody**

Flagstaff AZ  
BS, University of Arizona '09  
Program: MSCI/MD

**Andrew W. Kraft**

University City MO  
BA, Washington University in '09  
Program: MSTP  
Second Year Research

**Sangitha Krishnan**

BS, University of California- '13  
Program: Doctor of Medicine  
First Year Medical Student

**Justin David Krogue**

St Louis MO  
BS, Brigham Young University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Alyssa Jean Kronen**

BA, Middlebury College '12  
Program: Doctor of Medicine  
First Year Medical Student

**Runjun Dev Kumar**

BS, University Of Toronto '10  
Program: MSTP  
Second Year Research

**Rachel Lea Kylo**

Lester Prairie MN  
BS, University Of Minnesota-T '10  
Program: Doctor of Medicine

**Randy Olivier Laine**

ND, Harvard University (Extension)  
Program: Doctor of Medicine  
First Year Medical Student

**Gopal Ram Lalchandani**

Sacramento CA  
BA, University of California- '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Ramin Mathew Lalezari**

Los Angeles CA  
BA, University of California- '12  
Program: Doctor of Medicine  
First Year Medical Student

**Andrea Nicole Lambert**

Canby OR  
BS, University Of Portland '10  
Program: Doctor of Medicine  
Elective Year

**Colleen Walsh Lang**

St. Louis MO  
BS, University Of Notre Dame '06  
Program: MSTP  
Second Year Research

**Julia Meredith Lange**

BS, University of California- '10  
Program: Doctor of Medicine  
First Year Medical Student

**Oswaldo Jose Laurido-Soto**

Guaynabo PR  
BS, University Of Puerto Rico '10  
Program: Doctor of Medicine  
Elective Year

**Christopher William Arvind Lawrence**

Sunnyvale CA  
BS, U of California-Irvine '09  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine

Barnes-Jewish Hospital  
St. Louis MO

**Catherine N. Le**

Rochester MN  
BS, U of Minnesot-Twin Cities '08  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
Vanderbilt University Medical Center  
Nashville TN

**Katherin Eliza Leckie**

Bozeman MT  
BS, Montana State University- '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Sarah Beth Lederhandler**

Miami FL  
BS, Yale University '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Iris Lee**

Madison WI  
BA, Williams College '09  
Program: Master of Arts/Doctor of Medicine  
Elective Year

**Andrew Robert Lee**

Orinda CA  
BS, Duke University '09  
Program: Doctor of Medicine  
2013 Graduate  
St.Mary's Health Center  
St. Louis MO  
Ophthalmology  
Duke University  
Durham NC

**Audrey Alexandra Lee**

La Selva Beach CA  
BS, Rice University '11  
Program: Doctor of Medicine



Clinical Clerkship Year

**Dong Young Lee**

St Louis MO

BS, University of Illinois at '08

Program: Doctor of Medicine (5 Year)

Second Year Medical Student

**Dov Bernard Lerman-Sinkoff**

West Bloomfield MI

BH, University of Michigan-An '10

Program: MSTP

First Year Research

**Adam Nathaniel Letvin**

BA, Harvard University '10

Program: Doctor of Medicine

**Ann Leu**

Union City CA

BS, California Institute Of T '05

Program: Doctor of Medicine

Clinical Clerkship Year

**Lucy Xiaotian Li**

ACTON MA

BA, Cornell University '10

Program: MSTP

First Year Research

**Sophia Mengting Li**

Lexington KY

BA, Washington University in '11

Program: MD/MPHS

**Han Li**

Southgate MI

BS, University of Michigan-An '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Yedda Li**

St. Louis MO

BA, Washington University in '10

Program: MSTP

First Year Research

**Kevin Kai Li**

Cary NC

BS, Massachusetts Institute of Technology '13

Program: Doctor of Medicine

First Year Medical Student

**Amy Margaret Liang**

Whitestone NY

BA, Princeton University '09

Program: Doctor of Medicine

2013 Graduate

General Surgery

St. Luke's-Roosevelt Hospital

New York NY

**Zhe Liang**

BS, University of Toronto '12

Program: Doctor of Medicine

First Year Medical Student

**Kenny Fei Lin**

Sammamish WA

BS, Boston University '09

Program: Doctor of Medicine

2013 Graduate

Otolaryngology

New York Presbyterian Hospital-Columbia & Cornell

New York NY

**Leanne Yuanci Lin**

Muncie IN

ND, Purdue Univ-Main Campus '11

Program: Doctor of Medicine (5 Year)

Research (Here)

**Amber Rebecca Lin**

Centennial CO

BS, Massachusetts Institute of Technology '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Jonathan Beaux Lin**

Dayton OH

BS, Emory University '12

Program: MSTP

Second Year Medical Student

**Kenneth Michael Lin**

Castro Valley CA

BS, Massachusetts Institute of '12

Program: Doctor of Medicine

Second Year Medical Student

**Charlotte Lin**

BA, Johns Hopkins University '13

Program: Doctor of Medicine

First Year Medical Student

**Angela Hao-Ting Lin**

BA, Rice University '13

Program: Doctor of Medicine

First Year Medical Student

**Miranda Renee Lindburg**

Sandy UT

BA, Washington University in '10

Program: Doctor of Medicine

Second Year Medical Student

**Stephen Wheeler Linderman**

Rome NY

BS, Cornell University '10

Program: MSTP

First Year Research

**Andrew Daniel Linkugel**

BA, Thomas More College '13

Program: Doctor of Medicine

First Year Medical Student

**Tzyy-Nong Tina Liou**

Saint Louis MO

BS, Washington U in St. Louis '08

Program: Doctor of Medicine

2013 Graduate

Otolaryngology

Barnes-Jewish Hospital

St. Louis MO

**Patricia Elizabeth Litkowski**

Zionsville IN

MD, New York Univ '

Program: Doctor of Medicine

2013 Graduate  
Internal Medicine  
Barnes-Jewish Hospital  
St. Louis MO

**Lucy Liu**

Woodbury MN  
BA, Washington University in '10  
Program: Doctor of Medicine  
Elective Year

**James Chang Liu**

Tucson AZ  
BA, Harvard University '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Carol Wing-See Liu**

St. Louis MO  
BA, Harvard University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Austin James Lohse**

BS, Vanderbilt University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Karly Lorbeer**

Saint Johns FL  
BS, University of Florida '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Luke Michaud Lowry**

Ames IA  
BS, Iowa State University '09  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine  
University of Iowa  
Iowa City IA

**Andrew Joseph Loza**

Dublin OH  
BS, University Of Notre Dame '10

Program: MSTP  
Second Year Research

**Amelia Claire Lucisano**

St. Louis MO  
BS, University Of Notre Dame '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Micah John Luderer**

Portage MI  
MS, Michigan State University '11  
Program: MSTP  
First Year Research

**Jimmy Ma**

Overland Park KS  
BA, Washington University in '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Lisa Shisi Ma**

Warren NJ  
BA, Harvard University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Yuntong Ma**

Houston TX  
BA, Columbia University in th '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Natalie Arianna Macaruso**

Columbia SC  
BS, Duke University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Kenneth Dewey Macneal**

BS, University of Denver '13  
Program: Doctor of Medicine  
First Year Medical Student

**Michael Joseph Madigan**

BS, Duke University '13

Program: Doctor of Medicine  
First Year Medical Student

**Chinwe Christine Madubata**

Riverdale MD  
BS, Harvard University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Annelise Yoo Mah**

St. Louis MO  
BS, Stanford University '12  
Program: MSTP  
Second Year Medical Student

**Tatenda Mahlkozera**

BA, Colby College '09  
Program: MSTP  
Second Year Medical Student

**Raymond Bernard Mailhot**

Birmingham AL  
BA, Washington U in St. Louis '08  
Program: Doctor of Medicine  
2013 Graduate  
Mt. Auburn Hospital  
Cambridge MA  
Radiation Oncology  
New York University School of Medicine  
New York NY

**Laura Esther Mainardi Villarino**

San Juan PR  
BS, Brown University '10  
Program: Doctor of Medicine  
Elective Year

**Shahriyar Patrick Majidi**

Chesterfield MO  
BA, Washington University in '12  
Program: MSTP  
Second Year Medical Student

**Jeffrey Michael Marinshaw**

Chapel Hill NC  
BA, Washington University in '12

Program: Doctor of Medicine  
First Year Medical Student

**Lauren Ashley Marks**

Saint Louis MO  
BA, Vanderbilt University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Brigid Kathleen Marshall**

Tucson AZ  
BS, University Of Arizona '09  
Program: Doctor of Medicine  
Elective Year

**Lauren Therese Josiah Martin**

Holden ME  
BS, Andrews University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Mary Clare Masters**

Oak Park IL  
BA, Stanford University '08  
Program: Master of Arts/Doctor of Medicine  
Elective Year

**Matthew Kelly Matlock**

BS, University of Tulsa '09  
Program: MSTP  
First Year Medical Student

**Jori Ellen May**

Birmingham AL  
BS, Duke University '09  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
University of Alabama Medical Center  
Birmingham AL

**Jared Michael McAllister**

Longview TX  
BS, University Of Texas At Au '10  
Program: Doctor of Medicine  
Elective Year

**Martha Morris Orms McGilvray**

BA, Wellesley College '10  
Program: Doctor of Medicine  
Second Year Medical Student

**Phillip Andrew McGuinness**

Vancouver WA  
BS, Pacific Lutheran University '10  
Program: Doctor of Medicine  
Elective Year

**Paul Scott McNair**

Orlando FL  
BA, University Of Florida '08  
Program: Doctor of Medicine  
Elective Year

**Nichelle Megowan**

Thousand Oaks CA  
BA, University Of Southern Ca '10  
Program: Doctor of Medicine  
Elective Year

**Nehali Mahesh Mehta**

BS, University of California- '13  
Program: Doctor of Medicine  
First Year Medical Student

**Sagar Devendra Mehta**

Orlando FL  
, '  
Program: Doctor of Medicine  
First Year Medical Student

**Zachary Isaac Meyer**

Melville NY  
BA, Washington University in '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Melissa Faye Meyer**

Wilmette IL  
BS, University of Michigan-An '12  
Program: Doctor of Medicine  
First Year Medical Student

**Cherise Meyerson**



Reseda CA  
BS, University of California- '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Jessica P Miller**

St. Louis MO  
BS, Washington University in '05  
Program: MSTP  
First Year Research

**Hannah Leigh Miller**

Elkridge MD  
BS, University of Maryland-Co '11  
Program: MSTP  
Second Year Medical Student

**Kelly Sue Milman**

Austin TX  
BS, Brown University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Jaspur Jiwon Min**

Saint Louis MO  
BA, Washington University in '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Aaron Joseph Mintz**

St. Louis MO  
BS, Stanford University '05  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
Barnes-Jewish Hospital  
St. Louis MO

**Carrie Laub Mintz**

St. Louis MO  
BA, Harvard University '05  
Program: Doctor of Medicine  
2013 Graduate  
Psychiatry  
Barnes-Jewish Hospital

St. Louis MO

**Shruti Mishra**

BS, California Institute of T '12

Program: Doctor of Medicine

Second Year Medical Student

**Anish Mitra**

BS, Stanford University '09

Program: MSTP

Second Year Research

**Marina Igorevna Mityul**

Jacksonville FL

BS, University Of Miami '10

Program: Doctor of Medicine

Elective Year

**Anand Mohapatra**

Folsom CA

BS, University of California- '12

Program: Doctor of Medicine

Second Year Medical Student

**Sergio Luis Molina**

Pharr TX

BS, Baylor University '11

Program: Doctor of Medicine

**Kelsey Ann Childs Moon**

Chesterfield MO

BS, Harding University Main C '12

Program: Doctor of Medicine

Second Year Medical Student

**Nathan Herling Moore**

Oklahoma City OK

BA, Univ of Texas at Austin '07

Program: Doctor of Medicine

2013 Graduate

Internal Medicine

Barnes-Jewish Hospital

St. Louis MO

**Hallie Faryn Morris**

Jacksonville FL

BA, Princeton University '10

Program: Doctor of Medicine  
Elective Year

**Marie Theresa Morris**

Little Rock AR  
BS, University of Arkansas Ma '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Anna Cates Moseley**

Springfield MO  
BA, Washington University in '12  
Program: Doctor of Medicine  
First Year Medical Student

**Emily Duke Moseley**

Springfield MO  
BA, Washington University in '12  
Program: Doctor of Medicine  
First Year Medical Student

**Lindsey Elizabeth Moses**

Madison WI  
BS, Washington University in '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Arnav Moudgil**

BS, Stanford University '10  
Program: MSTP  
First Year Medical Student

**Lincoln Muhoro**

St. Louis MO  
BA, Clark University '08  
Program: MSTP  
Second Year Research

**Bernard Mulvey**

St Louis MO  
BS, University of Wisconsin-M '13  
Program: Doctor of Medicine  
First Year Medical Student

**Nana-Aba Nduom**

Washington DC

BA, Yale University '08  
Program: Doctor of Medicine  
2013 Graduate  
Psychiatry  
University of Washington  
Seattle WA

**Kevin Andrew Neal**

Tallahassee FL  
BS, University Of Florida '09  
Program: Doctor of Medicine  
2013 Graduate  
University of Pittsburgh Medical Center  
Pittsburgh PA  
Diagnostic Radiology  
Barnes-Jewish Hospital  
St. Louis MO

**Olga Reine Neyman**

Duluth GA  
BS, Washington University in '13  
Program: MSTP  
First Year Medical Student

**Nhi Hoai Nguyen**

Lynnwood WA  
BS, Univ of Central Florida '07  
Program: Doctor of Medicine (5 Year)  
Research (Here)

**Alexander Thien An Nguyen**

Jacksonville FL  
BA, University Of Florida '09  
Program: Doctor of Medicine  
2013 Graduate  
Mercy Hospital  
St. Louis MO  
Ophthalmology  
Yale-New Haven Medical Center  
New Haven CT

**Miriam Shugufa Nojan**

Mission Viejo CA  
BS, University Of California- '09

Program: Doctor of Medicine  
Elective Year

**Kwadwo Asare Oduro Jr.**

St. Louis MO  
AB, Harvard University '04  
Program: MSTP  
2013 Graduate  
Pathology  
Massachusetts General Hospital  
Boston MA

**Landon Kyle Oetjen**

Paducah KY  
BS, Washington University in '12  
Program: MSTP  
Second Year Medical Student

**Ugochi C Okoroafor**

Gibsonia PA  
BS, U of Pittsburgh-Main '09  
Program: Doctor of Medicine  
2013 Graduate  
Orthopaedic Surgery  
St. Louis University School of Medicine  
St. Louis MO

**Emily Hunt Olfson**

St Louis MO  
BA, Oberlin College '10  
Program: MSTP  
Second Year Research

**Patrick David Olson**

St. Louis MO  
BS, University Of Nebraska At '09  
Program: MSTP  
Second Year Research

**Courtney Lynne Ondeck**

McMurray PA  
BS, Carnegie Mellon Univ. '08  
Program: Doctor of Medicine  
2013 Graduate  
North Shore Medical Center/Salem Hospital

Salem MA  
Ophthalmology  
University of California, San Diego  
San Diego CA

**Heather Nicole Orth**

Evergreen CO  
BA, University Of Colorado At '09  
Program: Doctor of Medicine  
Elective Year

**Inema Epere Orukari**

Richmond CA  
BS, San Jose State University '09  
Program: MSTP  
Second Year Medical Student

**Ashley Denise Osborne**

San Jose CA  
BS, University of California- '12  
Program: Doctor of Medicine  
First Year Medical Student

**Katelyn Andrea Ostendorf**

Zionsville IN  
BA, Rice University '10  
Program: Doctor of Medicine  
Elective Year

**Katherine Carol Altheide Ott**

Buhler KS  
BA, University of Pennsylvani '09  
Program: Doctor of Medicine  
Second Year Medical Student

**Bo Tyler Overschmidt**

BS, University of Missouri-Co '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Eric Michael Padegimas**

Manchester CT  
BA, Dartmouth College '09  
Program: Doctor of Medicine  
2013 Graduate  
Orthopaedic Surgery

Thomas Jefferson University Program  
Philadelphia PA

**Leena Vikas Padhye**

Lincoln NE  
BS, Duke University '10  
Program: Doctor of Medicine  
Elective Year

**Alexander G. Padovano**

Vernon Hills IL  
BS, Washington University in '13  
Program: Doctor of Medicine  
First Year Medical Student

**Kuang-Hung Pan**

Saint Louis MO  
BS, National Taiwan University '99  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Deng Pan**

BS, Johns Hopkins University '12  
Program: MSTP  
First Year Medical Student

**Kevin Woo Park**

Sunnyvale CA  
BA, Yale University '09  
Program: Doctor of Medicine (5 Year)  
Research (Here)

**Eugene Park**

Lake Zurich IL  
BS, Washington U in St Louis '11  
Program: MSTP  
First Year Research

**Bhuvic Patel**

Westborough MA  
BS, Brown University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Swapneel Jagdishchandra Patel**

Northridge CA  
BS, California State University '09

Program: MSTP  
First Year Research

**Tirth Patel**

Riverside CA  
BS, University Of California- '11  
Program: Master of Arts/Doctor of Medicine  
Master of Arts

**Keval Dipan Patel**

Livonia MI  
BS, University of Michigan-An '12  
Program: MSTP  
Second Year Medical Student

**Aalok Pankaj Patel**

Chicago IL  
BS, University of Illinois at '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Ima Paydar**

Memphis TN  
BA, Vanderbilt University '09  
Program: Doctor of Medicine  
2013 Graduate  
York Hospital Program  
York PA  
Radiation Oncology  
Georgetown University Hospital  
Washington DC

**David Richard Pearson**

Woodbury MN  
BA, Gustavus Adolphus College '09  
Program: Doctor of Medicine  
2013 Graduate  
University of Colorado  
Denver CO  
Dermatology  
University of Colorado  
Denver CO

**Chelsea Elizabeth Pearson**

Chesterfield MO



BA, Washington U in St. Louis '09  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
Barnes-Jewish Hospital  
St. Louis MO

**Philip Laurence Perez**

Bellingham WA  
BA, Harvard University '09  
Program: Doctor of Medicine  
Elective Year

**Lauren Elizabeth Perlin**

Novi MI  
BS, University of Michigan-An '10  
Program: Doctor of Medicine  
Elective Year

**Andrew Scott Perry**

Salt Lake City UT  
BS, The University of Utah '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Joseph Planer**

North Manchestere IN  
BA, Beloit College '05  
Program: MSTP  
Third Year Research

**Alan Solomon Plotzker**

Wilmington DE  
BA, University Of Pennsylvania '08  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Bree Ann Porcelli**

BA, New York University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Alvin Caldwell Powell**

Greensboro NC  
BA, Columbia University in NY '10  
Program: Doctor of Medicine

Clinical Clerkship Year

**Niall Prendergast**

Norwich VT

BA, Harvard University '09

Program: Doctor of Medicine

Elective Year

**Sarah Campbell Proehl**

Pleasantville NY

BS, Massachusetts Institute '09

Program: Doctor of Medicine

2013 Graduate

Obstetrics and Gynecology

University of California, San Diego Medical Center

San Diego CA

**Chi Lun Pui**

Houston TX

BS, University Of Texas At Au '09

Program: Master of Arts/Doctor of Medicine

Master of Arts

**Vaishnavi Purusothaman**

Orlando FL

BS, University Of Florida '10

Program: Master of Arts/Doctor of Medicine

Clinical Clerkship Year

**Owen Li Qi**

San Diego CA

BS, Washington University in '12

Program: Doctor of Medicine

Second Year Medical Student

**David Augustus Qualls**

Oviedo FL

BS, University of Florida '12

Program: Doctor of Medicine

**Saravanan Raju**

BA, Northwestern University '11

Program: MSTP

First Year Research

**Kara Nichole Ramsey**

Frankfort IL  
BS, University of Illinois at '08  
Program: Doctor of Medicine  
Second Year Medical Student

**Ran Ran**

BH, McMaster University '09  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine  
Oregon Health & Science University  
Portland OR

**Mahil Rao**

Saint Louis MO  
BA, Johns Hopkins University '01  
Program: MSTP  
Elective Year

**Yuan James Rao**

Glen Allen VA  
BS, Virginia Commonwealth U '09  
Program: Doctor of Medicine  
2013 Graduate  
Mercy Hospital  
St. Louis MO  
Radiation Oncology  
Barnes-Jewish Hospital  
St. Louis MO

**Valary Terenzoni Raup**

Broomfield CO  
BA, University Of Colorado At '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Kelsey Anne Rebehn**

BS, Saint Lawrence University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Jennifer Ann Reeves**

Tulsa OK  
BA, Washington U in St. Louis '09

Program: Doctor of Medicine  
2013 Graduate  
Obstetrics and Gynecology  
University of Missouri - Kansas City  
Kansas City MO

**Samuel Wayne Reinhardt**

Eagan MN  
BS, Yale University '10  
Program: Doctor of Medicine  
Elective Year

**Amanda Hart Reis**

St. Louis MO  
BA, Middlebury College '13  
Program: Doctor of Medicine  
First Year Medical Student

**Arvind Rengarajan**

Cupertino CA  
BS, University Of California- '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Arith Ruth Selda Reyes**

BA, University of Pennsylvani '12  
Program: Doctor of Medicine  
First Year Medical Student

**Matthew Kevin Riddle**

Ashland KY  
BA, Asbury College '09  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine  
University Hospital  
Cincinnati OH

**Max Sebastian Riley**

Saint Louis MO  
BA, University of Pennsylvani '12  
Program: Doctor of Medicine  
First Year Medical Student

**Ryan P Rimer**

Las Vegas NV

BS, University of Nevada '07  
Program: Doctor of Medicine  
Elective Year

**Gregory Louis Rippberger**

Sharon MA  
BA, Washington University in '12  
Program: MSTP  
Second Year Medical Student

**Ana Gabrielle Rivera**

BA, Harvard University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Michelle Lauren Robinette**

Destin FL  
BS, University of Michigan-An '11  
Program: MSTP  
First Year Research

**Jocelyn Maria Rodriguez**

San Francisco CA  
BS, Yale University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Brandon Louis Rogalski**

Mount Pleasant SC  
BA, Washington University in '12  
Program: Doctor of Medicine  
First Year Medical Student

**Erin Kerr Romberg**

Shoreview MN  
BA, Oberlin College '08  
Program: Doctor of Medicine  
2013 Graduate  
Virginia Mason Medical Center  
Seattle WA  
Diagnostic Radiology  
Barnes-Jewish Hospital  
St. Louis MO

**Alexander Bernard Rose**

St. Louis MO

BA, Washington University in '10  
Program: MD/MPHS  
Clinical Clerkship Year

**Max Samuel Wedlan Rosen**

Washington DC  
BA, Washington University in '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Elizabeth Dyer Rosenberg**

St. Louis MO  
BS, Tufts University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Mikhail Roubakha**

BH, University of Western Ont '13  
Program: Doctor of Medicine  
First Year Medical Student

**David Morton Rubins**

St Louis Park MN  
BS, University Of Wisconsin-M '09  
Program: Doctor of Medicine  
Elective Year

**Aaron Samuel Rudin**

Saint Louis MO  
BS, University Of California- '07  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Aaron Jacob Russell**

Oroville CA  
BS, University of California- '12  
Program: Doctor of Medicine  
Second Year Medical Student

**David Aaron Russler-Germain**

Potomac MD  
BS, Stanford University '09  
Program: MSTP  
Third Year Research

**Emilie Veronica Russler-Germain**

St. Louis MO

BS, Stanford University '10  
Program: MSTP  
Second Year Medical Student

**Tammy Sue Ruth**

St. Louis MO  
BA, Washington U in St. Louis '07  
Program: Doctor of Medicine  
2013 Graduate  
Pediatrics  
Navy Medical Center  
San Diego CA

**Gina Nicole Sacks**

Nashville TN  
BS, University of North Carol '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Joshua Michael Saef**

Grand Junction CO  
BS, University Of Miami '09  
Program: Doctor of Medicine  
Elective Year

**Puneet Kaur Chawla Sahota**

Chesterfield MO  
BA, Northwestern U '02  
Program: MSTP  
2013 Graduate  
Psychiatry  
Hospital of the University of Pennsylvania  
Philadelphia PA

**Tarek Salih**

Cheyenne WY  
BS, University Of Wyoming '09  
Program: MSTP  
First Year Research

**Rabia Salman**

Melbourne FL  
BA, New York University '09  
Program: Doctor of Medicine

Elective Year

**Christelle Desiree Kouessieu Samen**

BS, University Of Maryland-Ba '11

Program: MSTP

Second Year Medical Student

**Paul Joseph Scheel III.**

Ellicott City MD

BS, University of Notre Dame '12

Program: Doctor of Medicine

Second Year Medical Student

**Allison Page Schelble**

Brookfield WI

BA, Washington University in '13

Program: Doctor of Medicine

First Year Medical Student

**Ellen Catherine Schill**

Alexandria VA

BA, Univ of Virginia - Main '09

Program: MSTP

Third Year Research

**Matthew Robert Schill**

Fort Dodge IA

BS, University of Iowa '09

Program: Doctor of Medicine

2013 Graduate

General Surgery

Barnes-Jewish Hospital

St. Louis MO

**Gregory Vincent Schimizzi**

Wilmington NC

BS, UNC Chapel Hill '09

Program: MSTP

Second Year Research

**Morgan Brooke Schoer**

Marion IN

BA, Washington University in '13

Program: Doctor of Medicine

First Year Medical Student

**Michael J Scott**



EastFallowfield PA  
BS, West Chester University O '10  
Program: Doctor of Medicine  
Elective Year

**Nicholas Richard Scott-Wittenborn**

BA, Carleton College '10  
Program: Doctor of Medicine  
First Year Medical Student

**Abraham Segura**

Pasadena TX  
BS, Rice University '11  
Program: Doctor of Medicine  
First Year Medical Student

**Daniel Nathan Seitz**

South Bend IN  
BS, Indiana Wesleyan Univ '09  
Program: Doctor of Medicine  
2013 Graduate  
Emergency Medicine  
Indiana University School of Medicine  
Indianapolis IN

**Nicholas Paul Semenkovich**

St. Louis MO  
BS, Massachusetts Institute O '09  
Program: MSTP  
Third Year Research

**Vikram Aditya Shankar**

Cincinnati OH  
BS, Ohio State University-Mai '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Susan Qi Shen**

Ames IA  
BS, California Inst of Tech '09  
Program: MSTP  
Third Year Research

**Tony Sicheng Shen**

BA, Harvard University '12  
Program: Doctor of Medicine

First Year Medical Student

**Ching-Chieh Shen**

BA, Swarthmore College '11  
Program: Doctor of Medicine  
First Year Medical Student

**Nicole Jimin Shin**

St. Louis MO  
BA, Washington University in '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Joshua Sarfaty Siegel**

Bryn Mawr PA  
BA, Washington University in '10  
Program: MSTP  
First Year Research

**Alejandro Francisco Siller, Jr.**

St Louis MO  
BS, Rice University '10  
Program: Doctor of Medicine  
Second Year Medical Student

**Shawgi Abbas Silver**

Shoreline WA  
BA, Whitman College '05  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Drew Benjamin Sinha**

Portland OR  
BS, Washington University in '13  
Program: MSTP  
First Year Medical Student

**Stephanie Lynn Skala**

Saint Louis MO  
BS, University Of California- '09  
Program: Doctor of Medicine  
Elective Year

**Tara Rachelle Skebba**

Cedarburg WI  
BA, Rice University '09  
Program: Doctor of Medicine

2013 Graduate  
General Surgery  
Barnes-Jewish Hospital  
St. Louis MO

**Scott Andrew Skillington**

Colo Spgs CO  
BA, University of Colorado at '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Michael Joseph Slade**

St. Louis MO  
BA, University of Georgia '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Katherine Hollister Smith**

Baton Rouge LA  
BS, Louisiana State Univ & Ag '10  
Program: Master of Arts/Doctor of Medicine  
Clinical Clerkship Year

**Sarah Elizabeth Smith**

Hopkinton MA  
BA, University of Pennsylvania '12  
Program: MSTP  
Second Year Medical Student

**Michael Engel Snavelly**

BA, Macalester College '12  
Program: MSTP  
First Year Medical Student

**Benjamin David Solomon**

Rockville MD  
BA, Cornell University '09  
Program: MSTP  
Third Year Research

**Avik Som**

Houston TX  
BS, Johns Hopkins University '11  
Program: MSTP  
First Year Research

**Joseph B Song**

Suwannee GA  
BS, Emory University '09  
Program: Master of Arts/Doctor of Medicine  
Elective Year

**Wilbur Madison Song**

Saint Louis MO  
BS, Washington University in '13  
Program: MSTP  
First Year Medical Student

**Jordan Taylor Standlee**

Mukilteo WA  
BA, University of Washington '13  
Program: Doctor of Medicine  
First Year Medical Student

**Miriam Bathia Steinberg**

Miami FL  
BS, Washington University in '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Lindsey Katherine Steinberg**

Springfield MO  
BA, Washington University in '13  
Program: MSTP  
First Year Medical Student

**Rachel H Steinhorn**

Chicago IL  
BH, Bard College '10  
Program: Doctor of Medicine (5 Year)  
Clinical Clerkship Year

**Allison Steinmetz**

woodbridge CT  
BS, Yale University '10  
Program: Doctor of Medicine  
Elective Year

**Jeffrey Gei-Hun Stepan**

Fremont CA  
BS, St. John's University-NY '08  
Program: MSCI/MD  
Elective Year

**Abby Ling-Lee Stephens**

St. Louis MO  
BS, Washington U in St. Louis '09  
Program: Doctor of Medicine  
2013 Graduate  
St. Mary's Health Center  
St. Louis MO  
Physical Medicine & Rehabilitation  
McGaw Medical Center of Northwestern University  
Chicago IL

**Rachel Aviva Stern**

Morristown NJ  
BA, Tufts University '13  
Program: Doctor of Medicine  
First Year Medical Student

**Jennifer Ann Stevens**

St. Louis MO  
BS, Washington University in '13  
Program: MSTP  
First Year Medical Student

**Amanda Michelle Stewart**

Springfield OH  
BS, University Of Toledo '09  
Program: Doctor of Medicine  
2013 Graduate  
Obstetrics and Gynecology  
University of California, San Diego Medical Center  
San Diego CA

**Christopher Luke Stockburger**

Fort Collins CO  
BA, U of Colorado at Boulder '09  
Program: Doctor of Medicine  
2013 Graduate  
Orthopaedic Surgery  
Barnes-Jewish Hospital  
St. Louis MO

**Geoffrey Evan Stoker**

Holden MA  
BS, Boston College '09

Program: Doctor of Medicine (5 Year)  
Elective Year

**Marshall Channing Strother**

Potomac MD  
BA, Washington U in St. Louis '10  
Program: Doctor of Medicine  
Elective Year

**Sathish Subramanian**

BA, Univ of Pennsylvania '08  
Program: MSTP  
Third Year Research

**Sanaa Hasan Suharwardy**

Danville CA  
BA, U of CA - Los Angeles '09  
Program: Doctor of Medicine  
2013 Graduate  
Obstetrics and Gynecology  
Stanford University Program  
Stanford CA

**Jessica Yee-Tyng Sun**

Fremont CA  
BS, University Of California- '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Sam Qiancheng Sun**

BS, Franklin W. Olin College '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Varun Sundaram**

Muncie IN  
BA, Washington U in St. Louis '09  
Program: Doctor of Medicine  
2013 Graduate  
University of Texas Southwestern Medical School  
Dallas TX  
Urology  
Univeristy of Texas Southwestern Medical School  
Dallas TX

**Abby Tzy-Ming Sung**

San Marino CA  
BA, Washington University in '12  
Program: Doctor of Medicine  
First Year Medical Student

**Erin Colleen Swor**

Beverly Hills MI  
BS, University of Michigan-An '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Rukayat Mayowa Taiwo**

BA, Reed College '12  
Program: Doctor of Medicine  
First Year Medical Student

**Wen Hui Tan**

Henderson NV  
BS, Massachusetts Institute O '09  
Program: Doctor of Medicine  
2013 Graduate  
General Surgery  
Barnes-Jewish Hospital  
St. Louis MO

**Alisa Sansanee Tanakit**

BS, University of California- '12  
Program: Doctor of Medicine  
First Year Medical Student

**Jie Tang**

Sammamish WA  
BS, Univ of Pennsylvania '09  
Program: Doctor of Medicine  
2013 Graduate  
Pediatrics  
Children's Hospital  
Philadelphia PA

**Michael Edward Tang**

Columbus OH  
BS, Ohio State University-Mai '10  
Program: Doctor of Medicine  
Elective Year

**Mengxuan Tang**

St. Louis MO

BA, Princeton University '13

Program: Doctor of Medicine

First Year Medical Student

**Diandian Tang**

BS, Emory University '13

Program: Doctor of Medicine

First Year Medical Student

**Stephanie Teja**

Alameda CA

BA, University of California- '12

Program: Doctor of Medicine

First Year Medical Student

**Stephanie Rose Thomas**

Rochester MN

BA, Carleton College '09

Program: Doctor of Medicine

Elective Year

**Ariel Star Thomas**

st louis MO

BS, University of Georgia '12

Program: Doctor of Medicine

Second Year Medical Student

**Russell Edward Thompson**

PIEDMONT CA

BS, Harvey Mudd College '12

Program: MSTP

Second Year Medical Student

**Vivian Tien**

Saratoga CA

BA, University Of Chicago '09

Program: Doctor of Medicine

Clinical Clerkship Year

**Ethan Marc Tobias**

N. Bellmore NY

BS, Brown University '12

Program: Doctor of Medicine

First Year Medical Student



**Jennifer Lynne Travieso**

Saint Louis MO

BS, University Of Texas At Au '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Jennifer Lee Troyer**

Evansville IN

BS, Indiana Univ-Bloomington '09

Program: Doctor of Medicine

2013 Graduate

Obstetrics and Gynecology

Barnes-Jewish Hospital

St. Louis MO

**Shaw-Wei David Tsen**

Chandler AZ

BS, Johns Hopkins University '08

Program: MSTP

Third Year Research

**Grace Taeheuy Um**

CHARLOTTE NC

BS, Stanford University '10

Program: Doctor of Medicine

Clinical Clerkship Year

**Punit Akshaya Vachharajani**

Saint Louis MO

BA, Washington University in '12

Program: Doctor of Medicine

Second Year Medical Student

**Padmaja Sravya Vajapeyajula**

Centerville OH

BS, Ohio State University-Mai '12

Program: Doctor of Medicine

Second Year Medical Student

**Chetan Venkata Vakkalagadda**

San Jose CA

BA, Washington University in '13

Program: Doctor of Medicine

First Year Medical Student

**Mark C Valentine**

St Louis MO

BS, Brigham Young University '08

Program: MSTP

Second Year Research

**Manouela Vesselinova Valtcheva**

Alpharetta GA

BS, University Of Georgia '10

Program: MSTP

Second Year Research

**Samantha Lynn Van Hove**

Elgin MN

BS, University Of Minnesota-T '09

Program: MSTP

First Year Research

**Dorothy van Oppen**

Seattle WA

BA, Carleton College '09

Program: Doctor of Medicine

2013 Graduate

Anesthesiology

New York Presbyterian Hospital-Columbia

New York NY

**James Thomas Vandenberg**

grand rapids MI

BS, University of Michigan-An '11

Program: Doctor of Medicine

Second Year Medical Student

**Rahul Mahendra Varman**

Omaha NC

BS, Emory University '12

Program: Doctor of Medicine

Research (Here)

**Stephanie Margaret Velloze**

Avon Lake OH

BA, Case Western Reserve Univ '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Daniel Joseph Verbaro**

BS, Drexel University '12  
Program: MSTP  
Second Year Medical Student

**Vivek Verma**

Wexford PA  
BS, University Of Pittsburgh '08  
Program: Doctor of Medicine  
2013 Graduate  
University of Pittsburgh Medical Center  
Pittsburgh PA  
Radiation Oncology  
University of Nebraska  
Omaha NE

**Michael C Verre**

Niles IL  
BA, Washington U in St. Louis '08  
Program: Doctor of Medicine (5 Year)  
Elective Year

**Nicholas Wesley Vryhof**

Palos Park IL  
BS, Calvin College '13  
Program: Doctor of Medicine  
First Year Medical Student

**Ross Robert Vyhmeister**

Saint Louis MO  
BS, Walla Walla University '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Julia Alexandra Wagner**

BS, McGill University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Katharine Abraham Walz**

Coralville IA  
BS, Iowa State University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Betsy Peixi Wan**

Irvine CA  
BA, Washington U in St. Louis '09  
Program: Doctor of Medicine  
2013 Graduate  
Family Medicine  
St. Louis University School of Medicine  
St. Louis MO

**Xinyu Wang**

Winchester MA  
BS, Harvard University '09  
Program: MSTP  
Third Year Research

**Yi Wang**

Kenmore WA  
BS, Massachusetts Institute o '09  
Program: Doctor of Medicine  
2013 Graduate  
Pediatrics  
Baylor College of Medicine  
Houston TX

**YunZu Michele Wang**

Arcadia CA  
BS, U of CA - Los Angeles '09  
Program: Doctor of Medicine  
2013 Graduate  
Pediatrics  
University of California, San Diego Medical Center  
San Diego CA

**Stephanie Zi Wang**

Lilburn GA  
BS, Massachusetts Institute O '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Annie Zhili Wang**

Northbrook IL  
BS, University Of Illinois At '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Pengcheng Wang**

Albany CA  
BS, California Institute of T '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Robert Sibö Wang**

Holmdel NJ  
BA, Washington University in '13  
Program: Doctor of Medicine  
First Year Medical Student

**June Ariella Wang**

BA, Dartmouth College '12  
Program: Doctor of Medicine  
First Year Medical Student

**Jonathan Randolph Weese**

Eagle ID  
BS, College of Idah '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Daniel Martin Weisel**

St. Louis MO  
BA, University of Southern Ca '13  
Program: Doctor of Medicine  
First Year Medical Student

**Austin James Wesevich**

Fair Oaks Ranch TX  
BA, Washington University in '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Lauren Elisabeth Wessel**

Houston TX  
BS, Duke University '09  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Krista Renee Whitney**

Olathe KS  
BA, Washington U in St. Louis '09  
Program: Doctor of Medicine  
2013 Graduate  
Pediatrics

University of Texas Southwestern Medical School  
Dallas TX

**Christian Mark Wichterman**

Springfield IL  
BA, Washington University in '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Georgia Wilke**

Saint Louis MO  
BA, University Of Chicago '09  
Program: MSTP  
First Year Research

**Jared Daniel Wilkinson**

Indianapolis IN  
BS, Purdue University-Main '09  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
University of Michigan Hospitals  
Ann Arbor MI

**Sandra Gisela Williams**

St. Louis MO  
BS, Univ of Chicago '06  
Program: MSTP  
Clinical Clerkship Year

**Michael Brent Wilson**

Saint Louis MO  
BS, Brigham Young University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Jacob Samuel Witt**

Saint Louis MO  
BA, Washington University in '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Robert David Wojahn**

St Louis MO  
BS, Northwestern University '09  
Program: Doctor of Medicine

2013 Graduate  
Orthopaedic Surgery  
Barnes-Jewish Hospital  
St. Louis MO

**Morgan Bernard Wolfe, Jr**

Mandeville LA  
BS, Georgia Institute Of Tech '09  
Program: Doctor of Medicine  
2013 Graduate  
Obstetrics and Gynecology  
Barnes-Jewish Hospital  
St. Louis MO

**Maxim Wolfson**

Chesterfield MO  
BS, Washington University in '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Sarah Betrework Wondmeneh**

BS, University of Toronto '12  
Program: Doctor of Medicine  
First Year Medical Student

**Kristine Shannon Wong**

Hockessin DE  
BA, University Of Pennsylvani '10  
Program: Doctor of Medicine  
Elective Year

**Angelica Wong**

Brooklyn NY  
BS, University Of Chicago '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Jonathan Owen Wright**

Creve Coeur MO  
BS, Brigham Young University '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Melissa Anderson Wright**

BS, Duke University '10  
Program: Doctor of Medicine

Elective Year

**Xiaodi Wu**

BA, Harvard University '09

Program: MSTP

Third Year Research

**Francis Shoudee Wu**

East Greenwich RI

BA, Washington University in '13

Program: Doctor of Medicine

First Year Medical Student

**Yuewei Wu-Feinberg**

Shrewsbury MA

BS, University Of Chicago '09

Program: Master of Arts/Doctor of Medicine

Elective Year

**Qi Xiao**

St. Louis MO

BS, Washington University in '12

Program: Doctor of Medicine

Second Year Medical Student

**Daphne Ying Xiao**

Boxborough MA

BA, Harvard University '11

Program: Doctor of Medicine

Second Year Medical Student

**Wen Zhu Xu**

Sugar Land TX

BS, Rice University '12

Program: Doctor of Medicine

Second Year Medical Student

**Amy Zheng Xu**

Union City CA

BS, Duke University '12

Program: Doctor of Medicine

Second Year Medical Student

**Lauren Margaret Yang**

St. Louis MO



BA, Cornell University '10  
Program: Doctor of Medicine  
Elective Year

**Zao Yang**

Atlanta GA  
BS, University Of Georgia '10  
Program: Doctor of Medicine  
Elective Year

**Lu Morgan Yang**

College Station TX  
BS, Rice University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Michael Yang**

Mountainside NJ  
BA, Washington University in '13  
Program: Doctor of Medicine  
First Year Medical Student

**Nai Chien Yeat**

BA, Williams College '13  
Program: Doctor of Medicine  
First Year Medical Student

**Peter Hou Yu Yen**

Arcadia CA  
BA, Washington University in '10  
Program: Doctor of Medicine  
Elective Year

**Debra Wendy Yen**

Fremont CA  
BS, Washington University in '13  
Program: Doctor of Medicine  
First Year Medical Student

**David Qianli Ying**

Miami FL  
BS, Massachusetts Institute O '09  
Program: Doctor of Medicine  
2013 Graduate  
Internal Medicine  
Jackson Memorial Hospital

Miami FL

**Christine C Yokoyama**

St Louis MO

BA, Harvard University '04

Program: MSTP

Third Year Research

**Mitsukuni Yoshida**

Clayton MO

BS, Cornell University '09

Program: MSTP

Second Year Medical Student

**Erica Paige Young**

Sharon MA

BS, Massachusetts Institute O '09

Program: Doctor of Medicine

2013 Graduate

Internal Medicine

Yale-New Haven Hospital

New Haven CT

**Andrew Lee Young**

St. Louis MO

BA, Washington University in '07

Program: MSTP

Second Year Research

**Nicholas Scott Yozamp**

Saint Cloud MN

BA, Washington University in '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Faye Hwa-Young Yu**

Saipan MP

BA, Dartmouth College '09

Program: Doctor of Medicine

Clinical Clerkship Year

**Jenny Lijun Yu**

Cupertino CA

BA, Northwestern University-E '12

Program: Doctor of Medicine

Second Year Medical Student

**Lulu Yu**

Houston TX

BA, Washington University in '13

Program: Doctor of Medicine

First Year Medical Student

**Kevin Zheng Yuan**

Chesterfield MO

BS, Washington University in '10

Program: Doctor of Medicine

Elective Year

**Mahjabeen Parween Yucekul**

AA, Bellevue College '12

Program: Doctor of Medicine

**Sonia Yuen**

Syosset NY

BA, Dartmouth College '11

Program: Doctor of Medicine

Clinical Clerkship Year

**Emily Susan Zantow**

BH, Vanderbilt University '11

Program: Doctor of Medicine

Clinical Clerkship Year

**May Meishu Zhang**

Thousand Oaks CA

BA, Harvard University '10

Program: Doctor of Medicine

Elective Year

**William Zhang**

BS, Duke University '13

Program: MSTP

First Year Medical Student

**Lily Yili Zhang**

BS, University of Michigan-An '13

Program: Doctor of Medicine

First Year Medical Student

**Yi Zhao**

Boca Raton FL

BA, University Of Chicago '08

Program: MSTP  
Second Year Research

**Peter Chen Zhao**

Marietta GA  
BS, Emory University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Johnny Zhao**

Austin TX  
BA, Duke University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Lida Zheng**

Westborough MA  
BS, Cornell University '11  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Daisy Zhou**

San Diego CA  
BA, Princeton University '12  
Program: Doctor of Medicine  
Second Year Medical Student

**Tina Tianyi Zhu**

St. Louis MO  
BA, Northwestern University-E '11  
Program: Doctor of Medicine  
Second Year Medical Student

**Lawrence Richard Zieske**

Union City CA  
BA, Stanford University '05  
Program: Doctor of Medicine (5 Year)  
Clinical Clerkship Year

**James Zou**

St. Louis MO  
BA, University of Pennsylvania '13  
Program: Doctor of Medicine  
First Year Medical Student

**Alexander Zozula**

Saint Louis MO

AB, Princeton University '10  
Program: Doctor of Medicine  
Clinical Clerkship Year

**Emma Zubovic**

Des Moines IA  
BA, Middlebury College '10  
Program: Doctor of Medicine  
Second Year Medical Student

## Class Officers

### Fourth-Year Class Officers

President

Philip Perez

Medical Education Representative (MER)

Akshay Ganju

Representative to the Organization of Student Representatives (OSR Rep)

Rob Klemisch

Representative to the Graduate Professional Council (GPC Rep)

Tammi Cooks

### Third-Year Class Officers

President

Gregory Ebersole

Medical Education Representative (MER)

Austin Wesevich

Representative to the Organization of Student Representatives (OSR Rep)

Shelley Forbes

Representative to the Graduate Professional Council (GPC Rep)

Amelia Lucisano

### Second-Year Class Officers

President

Anand Mohapatra

Medical Education Representative (MER)

Francis Deng

Representative to the Organization of Student Representatives (OSR Rep)  
Agnes Dardas

Representative to the Graduate Professional Council (GPC Rep)  
Miranda Lindburg

## First-Year Class Officers

President  
Miriam Ben Abdallah

Medical Education Representative (MER)  
Chad Donahue

Representative to the Organization of Student Representatives (OSR Rep)  
Mikhail Roubakha

Representative to the Graduate Professional Council (GPC Rep)  
Ashley Osborne

# Summary of Students in the School of Medicine

## 2012-13

### **Doctor of Medicine and Doctor of Philosophy Degrees**

Graduating Class: 20

Third-Year Class: 21

Seventh-Year Research: 3

Sixth-Year Research: 1

Fifth-Year Research: 8

Fourth-Year Research: 21

Third-Year Research: 22

Second-Year Research: 19

First-Year Research: 25

Second-Year Class: 27

First-Year Class: 24

### **Doctor of Medicine and Master of Arts Degrees**

Graduating Class: 3

Trainees: 6

### **Doctor of Medicine and Master of Science in Clinical Investigation Degrees**

Graduating Class: 2

### **Doctor of Medicine and Master of Population Health Sciences Degrees**

Graduating Class: 1

**Doctor of Medicine Degree**

Graduating Class: 94

Five-Year Research Program: 3

Third-Year Class: 102

Second-Year Class: 97

First-Year Class: 99

**Doctor of Physical Therapy Degree**

Graduating Class: 83

Second-Year Class: 79

First-Year Class: 83

Part-Time Students: 29

**Doctor of Occupational Therapy Degree**

Graduating Class: 20

Third-Year Class: 26

Second-Year Class: 11

First-Year Class: 9

**Doctor of Audiology**

Graduating Class: 13

Third-Year Class: 12

Second-Year Class: 12

First-Year Class: 16

**Master of Science in Occupational Therapy Degree**

Graduating Class: 66

Second-Year Class: 75

First-Year Class: 67

**Master of Science in Population Health Sciences**

Second-Year Class: 3

First-Year Class: 10

**Master of Science in Genetic Epidemiology**

First-Year Class: 1

Certificate/SCND: 5

**Master of Science in Biostatistics**

Second-Year Class: 6

First-Year Class: 17

**Master of Science in Deaf Education**

Graduating Class: 11

First-Year Class: 8

**Master of Science in Clinical Investigation**

Graduating Class: 25

First-Year Class: 24

Certificate: 1  
SCND: 40

**Total: 1,350**

## Staff

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## WU Directory

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