

2010

Washington University School of Medicine bulletin, 2010

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BULLETIN OF WASHINGTON UNIVERSITY

St. Louis, Missouri

School of Medicine

October 6, 2010

Calendar

Calendar 2010-11

2010

June

- 18** Friday: Clinic orientation for new third-year students.
- 21** Monday: Academic year begins for third- and fourth-year classes.
- 25** Friday: Deadline for registration and initial payment of tuition for the third- and fourth-year classes.

July

- 4** Sunday: Independence Day holiday begins at 5 p.m.
- 5** Monday: Independence Day observance.

August

- 10** Tuesday: Orientation, matriculation and initial fee payment for the first-year class.
- 16** Monday: Academic year begins for the first- and second-year classes.
- 20** Friday: Deadline for registration and initial payment of tuition for the second-year class.

September

- 5** Sunday: Labor Day holiday begins at 5 p.m.
- 6** Monday: Labor Day observance.

November

- 24** Wednesday: Thanksgiving Day holiday begins at 5 p.m.
- 25** Thursday: Thanksgiving Day observance.
- 26** Friday: Holiday for all classes.

December

- 17** Friday: Winter recess begins at 5 p.m. for all classes.

2011

January

- 3** Monday: Classes resume for all students.
- 7** Friday: Deadline for payment of the balance of tuition for all classes.
- 16** Sunday: Martin Luther King Jr. Day holiday begins at 5 p.m.
- 17** Monday: Martin Luther King Jr. Day observance.

March

- 17** Thursday: Senior Match Day.
- 25** Friday: Spring break begins at 5 p.m. for first- and second-year classes.
- 31** Thursday: Spring break begins at 5 p.m. for first- and second-year classes.

April

- 4** Monday: Classes resume for all students.

May

- 8** Sunday: Academic year ends at 5 p.m. for graduating students.
- 13** Friday: Academic year ends at 5 p.m. for the second-year class.
- 20** Friday: Commencement.

- 27** Friday: Academic year ends at 5 p.m. for the first-year class.
- 29** Sunday: Memorial Day holiday begins at 5 p.m.
- 30** Monday: Memorial Day observance.

June

- 3** Friday: 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 2010-11

Final examinations for clinical clerkships are administered at the end of each clerkship. POM III follows the clerkship exams administered at the end of week 12 of each block. Exact date, time and location are announced by the coursemaster.

Weeks/Dates

- 1-4: June 21, 2010 – July 18, 2010
- 5-8: July 19, 2010 – August 15, 2010
- 9-12: August 16, 2010 – September 12, 2010
- 13-16: September 13, 2010 – October 10, 2010
- 17-20: October 11, 2010 – November 7, 2010
- 21-24: November 8, 2010 – December 5, 2010
- 25-28: December 6, 2010 – January 16, 2011 (Winter recess 5 p.m. December 17, 2010 – January 2, 2011)
- 29-32: January 17, 2011 – February 13, 2011
- 33-36: February 14, 2011 – March 13, 2011
- 37-40: March 14, 2011 – April 10, 2011
- 41-44: April 11, 2011 – May 8, 2011
- 45-48: May 9, 2011 – *June 3, 2011 (*clerkships only)

*Clinical clerkships end June 3, 2011, after Practice of Medicine III.

Admissions and Educational Program

Admissions and Educational Program

Mission Statement for Washington University

The mission of Washington University is the promotion of learning — learning by students and by faculty. Teaching, the transmission of knowledge, is central to our mission, as is research, the creation of new knowledge. Faculty composed of scholars, scientists, artists, and members of the learned professions serve society by teaching; by adding to the store of human art, understanding, and wisdom; and by providing direct services, such as health care.

Our goals are:

- to foster excellence in our teaching, research, scholarship, and service;
- to prepare students with the attitudes, skills, and habits of lifelong learning and with leadership skills, enabling them to be useful members of a global society; and
- to be an exemplary institution in our home community, St. Louis, as well as in the nation and in the world.

To this end we intend:

- to judge ourselves by the most demanding standards;
- to attract people of great ability from all types of backgrounds;
- to encourage faculty and students to be bold, independent, and creative thinkers;
- to provide the infrastructure to support teaching, research, scholarship, and service for the present and for future generations.

School of Medicine Mission and Vision Statements

Our Mission

Washington University School of Medicine will lead in advancing human health through outstanding clinical care, innovative research and the education of tomorrow's leaders in biomedicine.

Our Vision

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

- Cultivate excellence, collegiality, and diversity
- Attract the most talented people and enable their development
- Lead the evolution of change in biomedicine
- Enhance our intellectual and technological environment to foster exceptionally creative science and education
- Develop and maintain excellent clinical programs to provide outstanding care
- Observe the highest standards of ethics and integrity
- Apply advances in science and medicine to the betterment of humanity

Approved June 24, 2008 by the Executive Faculty

Objectives of the Educational Program for Medical Students

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, professional attitudes and personal commitments 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 graduating student will demonstrate the following:

- Knowledge of core concepts and principles of human biology.
- Knowledge of the scientific foundations of medicine and medical practice including disease pathogenesis and treatment, illness prevention and health maintenance.
- Proficiency in applying 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 clinical problem-solving.
- Knowledge of human behavior and an understanding of the impact of ethnic and cultural characteristics, socioeconomic factors, and other social factors on the practice of medicine.
- Proficiency in obtaining an appropriate medical history, performing a physical examination, and performing basic procedures necessary for the practice of medicine.
- Cognitive skills essential to the formulation of clinical questions, critical evaluation of scientific and clinical data, and effective application of this data to clinical problem-solving.
- Efficient and effective utilization of educational resources and proficiency in acquisition and assimilation of new information and practices.
- Recognition that there is uncertainty in clinical decision-making.
- Recognition that information and practices in clinical medicine can become obsolete and should be modified and refined based on new (evidence-based) information.
- Effective oral and written communication skills with patients and their families, members of the academic and medical communities and other members of the community at large.
- Commitment to provide compassionate care for all people.
- Dedication to inquiry and to life-long learning through self-education and self-assessment and active participation as teachers of patients, colleagues and members of the community.
- Appreciation of the essential role of biomedical research in the advancement of medicine and a commitment to the spirit of collaboration and support of basic science and clinical research efforts.
- Dedication to high standards of professional integrity and ethical behavior in clinical practice and biomedical research.

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.

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.

Faculty

The 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, 12 faculty members are among the fellows of the prestigious National Academy of Sciences; 30 belong to its Institute of Medicine. Seventeen Nobel laureates have been associated with the School of Medicine.

During fiscal year 2009, 134 members of the faculty held individual or career development awards: 87 from the National Institutes of Health, two from Abbott Laboratories, two from Allergan, Inc., one from the American Association of Plastic Surgeons, one from the American College of Gastroenterology, two from the American Diabetes Association, one from the AGA Foundation for Digestive Health and Nutrition, one from the American Geriatrics Society, ten from the American Heart Association, one from the American Roentgen Ray Society, one from the American Society of Clinical Oncology, one from the American Society of Hematology, one from the American Vascular Association, two from the Arthritis Foundation, one from Brown University, 10 from the Burroughs Wellcome Fund, one from the Centers for Disease Control, one from the Crohn's and Colitis Foundation, two from the Damon Runyon Cancer

Research Foundation, two from the Doris Duke Charitable Foundation, one from the Foundation for Anesthesia Education and Research, one from Hope Street Kids, two from the Howard Hughes Medical Institute, one from the International Association for the Study of Lung Cancer, one from the Juvenile Diabetes Research Foundation International, one from the Robert Wood Johnson Foundation, two from the W.M. Keck Foundation, one from the Knights Templar Eye Foundation, one from the Leukemia and Lymphoma Society, one from NARSAD, one from the National Science Foundation, two from the Pew Charitable Trust, one from Research to Prevent Blindness, Inc., three from the Thoracic Surgery Foundation, and one from an anonymous foundation.

The School of Medicine has 14 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 2009-10, the School employed 1,640 full-time, salaried faculty members in its 20 preclinical and clinical departments. The clinical departments are further strengthened by 1,343 part-time 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.

Students

The School of Medicine attracts a student body of exceptional quality. The 2009 entering class of 121 students was selected from a pool of 3,892 applicants. The School is a national institution with 46 states plus the District of Columbia and 21 countries represented in the current enrollment.

In 2010, the School conferred the MD degree upon 91 individuals. In addition, nine students received the MD/MA degrees, three students received the MD/MSCI degrees, and 12 students graduated with the MD/PhD degrees. Graduating students who participated in the 2010 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.

The student body of the School of Medicine numbers 604 medical students. Programs also are conducted for 645 students who are pursuing graduate degrees in communication sciences, clinical investigation, occupational therapy, physical therapy, psychiatric epidemiology or genetic epidemiology. The Division of Biology & Biomedical Sciences has extensive graduate training programs for 589 students seeking the Doctor of Philosophy degree in areas of Biochemistry, Computational and Systems Biology, Developmental 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.

Teaching Facilities

The 155-acre Washington University Medical Center, spread over portions of 15 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 financial impact of more than \$3.5 billion for the St. Louis area,

according to an economic model maintained by the St. Louis Regional Commerce and Growth Association. With more than 20,000 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, more than \$162 million has been expended on renovation and new construction. Capital improvements and strategic purchases have added approximately 1,000,000 square feet of space to the medical school during this same period. In the most recent fiscal year, more than \$106 million of capital improvements 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 more than \$130 million of capital 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) Four of the top five floors, totaling 215,000 square feet, are wet labs to support the five 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 will eventually occupy the first five floors, which are programmed for dietary services, cafeteria, 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. An 18,000-square-foot expansion of this facility, funded by an ARRA grant, is currently under way and will be completed in 2011.

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), an 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 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 Charles F. Knight Emergency Center. Services also are provided at Barnes-Jewish West County and Barnes-Jewish St. Peters hospitals 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 for 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.

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 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. The eight-level, 114,000-square-foot structure has capacity for more than 300,000 volumes. The biomedical resource collection includes 33 databases, over 4,600 full-text e-journals, 3,235 e-books and numerous selected web sites. The library also holds 4,500 print journals, 114,000 print books and 1,500 audiovisual items.

The library's Translational Research Support Division addresses the broader goals of translational biomedicine by providing information resources and expertise that contribute to basic research, health information outreach to consumers and the community, and the publication and dissemination of scientific information. The Division includes two bioinformaticists who provide instruction, consultation services, and support for specialized software and databases for the bioinformatics, genomic and basic science research community. The Division's public health librarian develops programs to foster consumer health literacy, seeking 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 Specialist to increase awareness among faculty of the issues and options for disseminating and storing scientific information as the digital age redefines standard publishing models.

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 811 archival collections, composed of 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 over 26,000 volumes 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 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 only adult teaching hospital of Washington University School of Medicine, ranked among the top five medical schools in the country. The Barnes-Jewish staff includes professional nurses, technicians, service and support personnel, plus more than 1,845 physicians and 863 residents, interns and fellows. Barnes-Jewish is licensed for 1,228 beds and in 2009 had 54,733 inpatient admissions, along with 83,997 emergency department visits. Barnes-Jewish Hospital is the first adult hospital in Missouri to receive Magnet recognition, the highest award given by the American Nurses Credentialing Center. Barnes-Jewish Hospital is consistently ranked on the "Honor Roll" of America's best hospitals by *U.S. News & World Report*.

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 is one of only eight hospitals on the prestigious *U.S. News & World Report* 2010 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 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 \$3.9 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.

Founded in 1914 as a place where teachers, hearing and speech professionals, and parents work together to help children who are deaf and hard of hearing, **CID – Central Institute for the Deaf** is an internationally recognized center for deaf education, preparing its students to participate and succeed in mainstream educational settings. CID teachers use the auditory-oral method to help deaf children learn to speak, listen 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 school children have come from 48 U.S. states and 28 other countries.

CID services include mainstream transitional assistance for students and families, in-service training for teachers, continuing education workshops for professionals and books, evaluations and curricula 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 world-renowned for its basic science, translational research, patient care and outreach. The Siteman Cancer Center, which holds more than \$165 million in extramural funding for cancer research, is organized into eight research programs (Cancer and Developmental Biology, Tumor Immunology, Hematopoietic Development and Malignancy, Cellular Proliferation, Oncologic Imaging, Prevention and Control, Translational and Clinical Research, Breast Cancer Research). The Siteman Cancer Center also provides 15 shared resource facilities to its more than 270 research members. Shared resource facilities include: Biologic Therapy Core Facility (formerly known as the GMP Facility); Biomedical Informatics Core; Biostatistics Core; Clinical Trials Core; Embryonic Stem Cell Core; Hereditary Cancer Core; High-Speed Cell Sorter Core; High Throughput Screening Core; Imaging Response Assessment Team (IRAT) Core; Molecular and Genomic Analysis Core; Proteomics Core; Small Animal Cancer Imaging Core; Health Behavior, Communication and Outreach Core; and Tissue Procurement Core. A Dissemination and Implementation shared resource is in development. Siteman is integrated with the Washington University Genome Center, the Institute for Public Health, and the Mallinckrodt Institute of Radiology. The Siteman Program for the Elimination of Cancer Disparities (PECaD), in partnership with the community, addresses racial, ethnic, socioeconomic and other disparities in cancer-related education, care and research.

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 \$471.9* million supported faculty research efforts at the School of Medicine during the fiscal year ending June 30, 2008. Substantial additional support was provided directly to faculty investigators by the Howard Hughes Medical Institute. Gifts and grants from private sources, including alumni, individuals, foundations, corporations and other organizations totaled nearly \$99 million from 10,536 entities.

* Number includes federal work study.

During the federal fiscal year ending Sept. 30, 2009, the School of Medicine received \$347.9 million from the National Institutes of Health, coming in 653 separate grants.

The many medical firsts at the School of Medicine include:

- Developed the first safe way to monitor production and clearance of the substance that forms brain plaques in Alzheimer's disease patients.
- Served as a major contributor on the international team that produced the finished human genome sequence.
- Generated cells that, when injected into the spinal cords of rats, reinsulate nerve axons and improve mobility.
- 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 a rating scale 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 first non-surgical procedure in the United States that restricts the size of the stomach to treat obesity.
- Assembled a novel online atlas of the folds of the human cerebral cortex and the role they play in brain function.
- Developed a cure for hepatitis B in cases diagnosed early.
- Created a surgical cure for atrial fibrillation.
- 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.
- Performed innovative larynx restoration surgery for the first time in the United States.
- Helped pioneer cochlear implant technology.
- Performed the world's first double-lung transplant.
- Pioneered the use of surgery and medication to lower eye pressure in glaucoma patients to prevent further vision loss.
- Grew embryonic animal tissue transplants into fully functional kidneys in an animal host.
- Found the gene that locks stem cells into making parts of the heart, a possible first step to rebuilding damaged hearts.
- Decoded the first complete DNA of a cancer patient and traced her disease — acute myelogenous leukemia — to its genetic roots.

Ongoing research includes:

- Leading a regional consortium in translating basic science discoveries into treatments for patients more quickly.

- Participating in the National Children's Study, the largest U.S. study of child and human health ever conducted.
- Identifying genetic variants that modify a person's cancer risk and response to cancer therapies.
- Seeking new ways to diagnose and treat stroke as part of a national network of state-of-the-art stroke treatment centers.
- Leading efforts to identify the roles of infectious agents in conditions prevalent in women.
- Addressing how the metabolic changes of diabetes lead to heart disease.
- Studying the link between protein misfolding and neurodegenerative disorders.
- Leading an international research collaboration to study inherited forms of Alzheimer's disease.
- Developing and using nanoparticles for molecular imaging and targeted drug delivery for cancer and clogged arteries.
- Imaging language areas in adult and pediatric brains to understand brain trauma, stroke, cancer and other neurological diseases.
- Studying the genetics of smoking and alcohol addiction.
- Developing and using new imaging tools to study how nerve cells form connections.
- Determining the mechanism by which antidepressant medications work in the brain.
- Exploring potential links between the tendency to be thin or overweight and the composition of microbes in the gut.
- Identifying anatomical and genetic markers of schizophrenia.
- Developing treatments to compensate for individual genetic traits that interfere with drug performance.
- Searching for clues in the brain and spinal cord that will allow physicians to diagnose Alzheimer's disease prior to the start of symptoms.
- Stimulating research, teaching and community engagement to improve population health through Washington University's new Institute for Public Health.

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 to learn more.

Curriculum

Table of Courses/Course Masters 2010-11

Liability Insurance

Lectureships and Visiting Professorships

Course Evaluations

Adviser System

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.

Table of Courses/Course Masters 2010-11

First Year

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

Course No./Course Title

M75 503 Cell and Organ Systems Biology
Paul C. Bridgman, PhD, 362-3449 (Histology)
Robert S. Wilkinson, PhD, 362-2300 (Physiology)

M05 501A Human Anatomy and Development
Glenn C. Conroy, PhD, 362-3397

M30 523 Immunology
Andrey S. Shaw, MD, 362-4614

M30 511 Medical Genetics
Susan Dutcher, MD, 362-3674

M30 526 Microbes and Pathogenesis
Henry V. Huang, PhD, 362-7059
Scott J. Hultgren, PhD, 362-7059

M15 502 Molecular Foundations of Medicine
Linda J. Pike, PhD, 362-9502

M35 554 Neural Sciences
David C. Van Essen, PhD, 362-7043
Timothy E. Holy, PhD, 362-0086
W. Thomas Thach, Jr., MD, 362-3538

M25 507 The Practice of Medicine I
Robert J. Rothbaum, MD, 362-3480
• Clinical Skills
Alan Glass, MD, 935-9626
• Ethics and Health Policy
Rebecca Dresser, JD, 454-7116
• Health Promotion/Disease Prevention
Julie McManemy, MD, MPH, 454-2341
• Interpreting Illness
Stephen S. Lefrak, MD, 454-7116
• Patient-Physician Communication
Anne Glowinski, MD, 286-2217
• Scientific Method of Clinical Medicine and Research
Jay F. Piccirillo, MD, 362-3480

2010-11 Selectives

M04 • General Selectives
 David Windus, MD, 362-7122

M04 • Medical Humanities
 Stephen S. Lefrak, MD, 454-7116

A selective is 10 clock hours in duration. 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, 362-8909

M25 614 Dermatology
David Sheinbein, MD, 454-8622

M35 632 Diseases of the Nervous System
Allyson Zazulia, MD, 362-7177

M55 660B Clinical Topics in Otolaryngology
Brian Nussenbaum, MD, 362-6599

M25 615A Endocrinology and Metabolism
William E. Clutter, MD, 362-8094

M25 620A Gastrointestinal and Liver Diseases/Nutrition
Deborah C. Rubin, MD, 362-9039

M25 625A Hematology and Oncology
Scot G. Hickman, MD, 289-6308

M25 605A Infectious Diseases
Nigar Kirmani, MD, 454-8214

M45 635B Obstetrics/Gynecology
D. Michael Nelson, MD, PhD, 362-1016

M60 665 Pathology
Erika C. Crouch, PhD, MD, 454-8462

M65 640 Pediatrics
Amanda Emke, MD, 454-6299
Erika Hayes, MD, 454-6299

M25 607 The Practice of Medicine II
Megan Wren, MD, 362-3480

- Clinical Skills
Alan Glass, MD, 935-9626
- Ethics and Health Policy
Rebecca S. Dresser, JD, 454-7116
- Health Promotion/Disease Prevention
Julie McManemy, MD, MPH, 454-2341
- Interpreting Illness
Stephen S. Lefrak, MD, 454-7116
- Medicine Patient Sessions
Alan Glass, MD, 935-9626
- Neurology Patient Sessions
Allyson Zazulia, MD, 362-6378
- Ophthalmology
Morton E. Smith, MD, 362-3480
- Patient-Physician Communication
Anne Glowinski, MD, 286-2217
- Radiology
Catherine Appleton, MD, 454-7405
- Scientific Method of Clinical Medicine and Research
Jay F. Piccirillo, MD, 362-7394

M70 670A Principles of Pharmacology
Tom Ellenberger, DVM, PhD, 362-0287

M85 676A Diseases of the Nervous System: Psychiatry
Melissa Harbit, MD, 362-2440

M25 612B Pulmonary Diseases
Michael B. Lippmann, MD, 289-6306

M25 613B Renal and Genitourinary Diseases
Stanley Misler, PhD, MD, 454-7719
Steven Cheng, MD, 362-7211

M25 606A Rheumatology
Leslie E. Kahl, MD, 454-7279

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, 362-8029

M25 710 Medicine Clerkship (12 weeks)
Thomas M. De Fer, MD, 362-8050

M35 720 Neurology Clerkship (4 weeks)
Robert Naismith, MD, 362-7177

M45 730 Obstetrics/Gynecology Clerkship (6 weeks)
Andrea P. Stephens, MD, 362-3126

M65 760 Pediatrics Clerkship (6 weeks)
Michele Marie Estabrook, MD, 454-6299
Lisa Moscoso, MD, PhD, 454-6299

M25 707 The Practice of Medicine III
Robert J. Rothbaum, MD, 454-2134
Megan E. Wren, MD, 362-8050

M85 770 Psychiatry Clerkship (4 weeks)
Dan Haupt, MD, 362-2469

Selective Clerkships: (choice of one block)

M25 714 Ambulatory: Emergency Medicine Clerkship (4 weeks)
Mark Levine, MD, 362-6743

M26 713 Ambulatory: Family Medicine Clerkship (4 weeks)
Walton Sumner II, MD, 454-8164

M85 771 Ambulatory: Psychiatry for Generalists Clerkship (4 weeks)
Dan Haupt, MD, 362-2469

M90 701 General Radiology Clerkship (4 weeks)
Matthew Parsons, MD, 362-5950
Michele Miller-Thomas, MD, 362-5950

M25 740 Dermatology Clerkship (4 weeks)
Lynn Cornelius, MD, 454-8622

M25 750 Geriatrics Clerkship (4 weeks)
David B. Carr, MD, 286-2706

M60 702 Laboratory Medicine Clerkship (4 weeks)
Charles S. Eby, MD, 362-3186

M25 730 Physical Medicine and Rehabilitation Clerkship (4 weeks)
Neringa Juknis, MD, 454-7757

M90 740 Radiation Oncology Clerkship (4 weeks)
Joseph R. Simpson, MD, PhD, 362-8567

M65 750 Surgical Pathology Clerkship (4 weeks)
Samir El-Mofty, MD, 362-2681

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.

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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.

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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.

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.

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.

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.

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.

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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 another CEC to evaluate both clinical years of instruction (i.e., CEC III = third and fourth years).

The Office of Medical Student Education (OMSE) oversees the course evaluation system, which is coordinated by Heather Hageman in OMSE, (314) 362-5433. The collected data are forwarded to the respective coursemasters, the Committee on Medical Education and the Academic Affairs Committee.

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Adviser System

Student academic advising occurs within two broad programs.

1. Clinical Advisers: First-year students select faculty advisers from a listing of volunteers who represent both basic science and clinical faculty. Each advisory group has three students from each of the four years of the curriculum. These groups meet on an informal basis, usually in the hospital setting. The students and faculty member explore mutually interesting topics which may include seeing patients, observing procedures, discussing health insurance or reading journal papers. The advisers serve as faculty contacts but do not have any formal academic advisory role.

Each first-year student is invited to join one of the three academic societies. Entering students are divided equally among the societies. Incoming first-year students and their faculty advisers share the same academic society.

2. Career (fourth-year) Advisers: Each third-year student selects a fourth-year adviser from a list of potential 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.

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.

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Degree Programs

Washington University School of Medicine offers several programs and combined degree programs: a regular four-year MD program, a five-year MD program, the combined MD/MA program, the combined MD/MSCI program and the combined MD/PhD program. MD students may also elect to complete the MPHS degree while enrolled in the MD program.

Doctor of Medicine (four-year program)

Doctor of Medicine (five-year program)

Doctor of Medicine and Master of Arts [MAMD](#)

Doctor of Medicine and Master of Science in Clinical Investigation

[Master of Population Health Sciences](#)

Doctor of Medicine and Doctor of Philosophy

The Washington University Graduate School of Arts & Sciences awards a doctoral degree offered by the Division of Biology and Biomedical Sciences.

Doctor of Philosophy

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 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 MA/MD 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.

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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), Doris Duke Foundation (clinical 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 MA/MD program administrator at (314) 747-6787 or visit the web site at mamd.wustl.edu for details.

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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. The MSCI program provides high-quality, multidisciplinary courses, mentorship and research training. The MSCI is available to postdoctoral scholars, junior faculty, and predoctoral students. 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, Biology & 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 intensive Predoctoral Interdisciplinary Clinical Research Training Program are also eligible. As the MSCI requirements are rigorous and are performed in addition to the doctoral degree requirements, interested students should contact the program coordinator or director before beginning their structured clinical research training program to ensure that the additional training meets the needs of the individual student, and that all requirements can be completed.

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Doctor of Medicine and Doctor of Philosophy

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 \$27,500 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, although 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 concurrently at the completion of the program.

Funding support commences when the student begins the program, either in June or at the beginning of the medical school year. Students matriculating in June undertake a research rotation with a faculty member of their choosing.

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 coursework requirements of the PhD program during the first two medical school years. The MSTP directorate meets with students individually to help them decide on an individualized curriculum and appropriate laboratory rotations. Lab rotations are executed over the summer.

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 or the School of Engineering 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 one-semester 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 36th 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 Systems Biology
Developmental Biology
Evolution, Ecology and Population Biology
Human and Statistical Genetics
Immunology
Molecular Biophysics
Molecular Cell Biology
Molecular Genetics and Genomics
Molecular Microbiology and Microbial Pathogenesis
Neurosciences
Plant Biology

Students may conduct research under any of the faculty affiliated with these programs or faculty in the Biomedical Engineering program. 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. Recent students have earned doctorates under special arrangements with the departments of Anthropology and Physics.

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 special 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
mstp@dbbs.wustl.edu
www.mstp.wustl.edu

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Master of Population Health Sciences

The Master of Population Health Sciences (MPHS), offered by the School of Medicine, is designed as a one-year, full-time degree program that meets the needs of clinicians seeking training in clinical research methods. Part-time study is also an option. Its quantitative curriculum emphasizes the role of epidemiology and biostatistics in approaching clinical effectiveness and outcomes research. Although there is no research component to the degree, an emphasis on applied course work allows for students to focus application of concepts in areas most relevant to their clinical careers including development of research study protocols, performing systematic reviews and designing epidemiologic studies. The degree program is also open to medical students. Additional information may be obtained at <http://www.mphs.wustl.edu>.

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Doctor of Philosophy

The Division of Biology and Biomedical Sciences offers doctoral programs in Biochemistry, Computational and Systems Biology, Developmental Biology, Evolution, Ecology and Population Biology, Human and Statistical Genetics, Immunology, Molecular Biophysics, Molecular Cell Biology, Molecular Genetics and

Genomics, Molecular Microbiology and Microbial Pathogenesis, Neurosciences, and Plant Biology. These educational activities are organized on an interdepartmental basis by the faculty of all clinical and preclinical departments of the School of Medicine, as well as the departments of Biology and Chemistry in the School of Arts & Sciences. All degrees are awarded through the Washington University Graduate School of Arts & Sciences. Additional information about division programs may be obtained by contacting:

Graduate Studies Office
Washington University School of Medicine
Campus Box 8226
660 S. Euclid Ave.
St. Louis, MO 63110-1093
(800) 852-9074
dbbs.wustl.edu

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Applying for Admission

For updated information, check our Admissions home page: medschool.wustl.edu/admissions.

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Admission Requirements for the Study of Medicine

Entrance requirements to the School of Medicine include:

1. Evidence of superior intellectual ability and scholastic achievement;
2. Completion of at least 90 semester hours of college courses in an approved college or university;
3. Completion of the Medical College Admission Test of the Association of American Medical Colleges; and
4. Evidence of character, 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 had at least the equivalent of one-year courses at the undergraduate level in physics and biology; to have studied mathematics through calculus, including integral equations and differential equations; and to have a background in 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.

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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.

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Application Procedure

General information for prospective medical students and how to apply can be found at <http://medschool.wustl.edu/admissions>.

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 www.aamc.org/students/amcas/. 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 \$65. 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 e-mail

(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 October 15. 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.

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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.

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Full-Tuition Scholarships

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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 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

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Financial Information

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Cost of Education

For the first-year class matriculant, tuition and estimated expenses for the 2010-11 academic year are listed below. Students who enter in 2010 will benefit from a tuition stabilization plan, which provides that their annual tuition of \$48,800 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 \$65,625. Allowances for entertainment, travel, clothing and other miscellaneous items must be added to this estimate.

Tuition (includes Student Health Service and Microscope Lending Plan): \$48,800
Books, supplies and instruments: \$2,090
Housing and food: \$10,452
Travel and personal: \$4,283

Student Health Service

The Student Health Service provides comprehensive health care, including hospitalization, for all full-time students in the School of Medicine upon completion of orientation. All full-time students are covered in the prepaid dental plan through Assurant Employee Benefits. Dental premium paid for by WUSM Student Health Service. Long-term group disability insurance is provided for medical students. All full-time students in the School of Medicine are covered by a \$10,000 life insurance benefit, with the option to convert to an individual portable policy prior to graduation.

Microscope Lending Plan

Microscopes that meet the technical requirements set by the faculty are provided at no additional charge to each student in the first- and second-year classes. The plan saves students the high cost of microscope purchase and makes available to them a superior quality instrument.

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Financial Assistance

The ability to finance a medical education at Washington University does not influence the student selection process. As all students accepted for admission have proven scholastic ability, financial assistance is awarded 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' and the applicant's U.S. Individual Income Tax Returns complete the data required for financial aid consideration.

While "permanent residents" of the United States are eligible for most federal financial aid programs, need-based financial aid from Washington 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 Stafford Loan program. All loans awarded by the committee are free of interest while a student is enrolled in the School. 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.

Full-Tuition 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 31 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
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
Justin J. Cordonnier, MD
John D. Davidson, MD
Louis P. Dehner, MD
Robert C. Drews, MD
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
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
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
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
Frederick D. Peterson, MD
Gordon W. Philpott, MD
Gary A. Ratkin, MD
Edward H. Reinhard, MD
Fred C. Reynolds, MD
William J. Ross, 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
Stuart Weiss, MD
Alison J. Whelan, MD

Distinguished Alumni Scholarship Program honorees 2010-11:

George E. Murphy, MD, '52
Will R. Ross, MD, '84, MPH
Joseph F. Ruwitch Jr., MD, '66
Llewellyn Sale Jr., MD, '40

Distinguished Faculty Scholars

The Distinguished Faculty Scholar Program provides merit-based scholarships (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

Full-tuition Distinguished Student Scholarships are awarded annually 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.

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' and the applicant's U.S. individual income tax returns complete the data required for financial aid consideration.

While "permanent residents" of the United States are eligible for most federal financial aid programs, need-based financial aid from Washington University is only awarded if the applicant and both 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 Stafford Loan program. All loans awarded by the committee are free of interest while a student is enrolled in the School. 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.

Standards for Satisfactory Academic Progress for Financial Aid Eligibility

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.

Scholarship Funds

Helen M. Aff-Drum Scholarship Fund. Established in 1988 to provide scholarship support to financially deserving medical students.

American Medical Association — Education and Research Foundation Medical Student Assistance Fund. Begun in 1983, donors' gifts supplement the Foundation's gift to support excellence and contribute to the Distinguished Student Scholarships and Distinguished Alumni Scholarships Program.

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. 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 who would be otherwise unable to obtain a medical education.

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 Fund. 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 2010 through the estate of Dr. Frederick Barry for medical student education.

The Dr. Joseph A. and Helene H. Bauer Scholarship Fund. Created in 1987 by Dr. and Mrs. Joseph A. Bauer to provide scholarship support to academically well-qualified and financially deserving medical students.

Albert G. Blanke, Jr. Endowed Scholarship Fund. Established by a generous gift in 1982, the fund provides scholarship assistance for deserving students in the School of Medicine.

Warren Bowersox, MD Scholarship. Established in 2005 by Mrs. Warren Bowersox in memory of her

husband, who was a member of the MD class of 1943-March, to support scholarships for first-year medical students.

Isabel Valle Brookings Scholarship Fund. 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.

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, MD 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 from China or Taiwan. Besides academic achievement, criteria include positive attitude and determination to succeed.

Class of 1945 Scholarship Fund. Established by the alumni from the class of 1945 in honor of their 45th reunion.

Class of 1954 Scholarship Fund 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 Fund. Established in 1996 by members of the class of 1956 in honor of their 40th reunion.

Class of 1959 Reunion Scholarship Fund. Established in 2008 by members of the Class of 1959 in honor of their 50th reunion.

Class of 1961 Scholarship Fund. Established in 2001 by the members of the class of 1961.

Class of 1964 Scholarship Fund. Established in 1993 by the alumni from the class of 1964 to support scholarships.

Class of 1968 Scholarship Fund. 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 Fund. Established in 1994 by members of the class of 1969 in honor of their 25th reunion.

Class of 1970 Scholarship Fund. Established in 1996 by members of the class of 1970 in honor of their 25th reunion.

Class of 1971 Scholarship Fund. Established in 1999 by members of the class of 1971 in honor of their 25th reunion.

Class of 1972 Scholarship Fund. Established in 1999 by members of the class of 1972 in honor of their 25th reunion.

Class of 1973 Scholarship Fund. Established in 2000 by members of the class of 1973 in honor of their

25th reunion.

Class of 1974 Scholarship Fund. Established in 2002 by members of the class of 1974 for their 25th reunion and to honor the memory of their classmate, Jonathan Mann.

Class of 1976 Scholarship Fund. Established in 2000 by members of the Class of 1976 in honor of their 25th reunion.

Class of 1978 Scholarship Fund. Established in 2002 by members of the class of 1978 in honor of their 25th reunion.

Class of 1979 Scholarship Fund. Established in 2003 by members of the Class of 1979 in honor of their 25th reunion.

Class of 1980 Scholarship Fund. Established in 2004 by members of the Class of 1980 in honor of their 25th reunion.

Class of 1982 Scholarship Fund. Established in 2006 by members of the Class of 1982 in honor of their 25th reunion.

Class of 1983 Scholarship Fund. Established in 2007 by members of the Class of 1983 in honor of their 25th reunion.

Grace Strong Coburn Scholarship Fund. Created in 1962 through the bequest of Mrs. Grace Strong Coburn for scholarships in the School of Medicine.

Jack W. Cole, MD Scholarship. Established in 2002 by Mrs. Ruth Kraft Cole, in memory of her late husband, a 1944 graduate of WUSM, and to recognize Dr. Cole's deep appreciation for the education he received. Preference will be given to a student pursuing a career in academic medicine.

T. Griswold Comstock Scholarships. Established under the will of Marilla E. Comstock for students who would otherwise be unable to obtain a medical education.

Clark and Mildred Cox Scholarship. Established in 1998 with a donation from the Clark Cox Trust for scholarships for women.

Arpad Csapo, MD Memorial Scholarship Fund. Established in 1982 by Elise Csapo in memory of her husband, and by his friends and colleagues to provide assistance for students who have shown promise in fields relating to reproductive medicine.

William H. and Elizabeth Gray Danforth Scholars Program. Established in 1998 in honor of Chancellor Danforth's retirement. The Scholar 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 Scholarship. Established by Joseph Davie, MD '68, and his family to support scholarships for deserving medical students.

Paul and Ruth 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 Fund. Created in 1964 to provide financial assistance to medical students.

Hazel B. Duncan Scholarship. This fund was established in 2003 through the bequest of Hazel B. Duncan, NU26.

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. Received in 1990 and given in memory of Dr. Fickel's uncle, W. H. Fickel, MD '12. Awards are made to students after their first year of study.

Carl Fisch Scholarship Fund. Created in memory of Dr. Fisch by his daughter, Marguerite F. Blackmer. Provides support to students who demonstrate financial need.

Flance Medical Scientist Traineeship. Established in honor of faculty member and alumnus I. Jerome Flance, MD '35 by the Harry Edison Foundation for support of a student in the Medical Scientist Training Program.

Ann Randolph Flipse, MD Scholarship Fund in the School of 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 Fund. Instituted in memory of a former clinical professor of pediatrics.

Helen H. Glaser Scholarship for Women Medical Students. Established in 1999 by Robert J. Glaser, MD, emeritus trustee and former faculty member, in memory of his wife, Helen H. Glaser, MD '47.

Anne T. and Carl Goetsch Scholarship. This fund was established in 2003 through the bequest of Dr. Anne T. Goetsch, MD '41, HS44, and Dr. Carl Goetsch, HS43, to support medical students.

Norman M. and Eleanor H. Gross Scholarship Fund. Established in 2001 through a bequest from Mr. Gross for financially needy medical students.

Paul H. and Lila L. Guttman Student Aid 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. 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 Dr. and Mrs. Holden to provide financial assistance to deserving students.

Dr. and Mrs. Charles Y. (Yueh-Gin Gung) Hu Scholarship Fund. Established in 2002 to provide a scholarship to a medical student of Chinese descent.

Dr. Grace Huse Memorial Fund. Provides scholarship awards for deserving Washington University medical students.

Justan Icks Scholarship. Established in 2008 by John Grayson, MD'57, to support students with high academic achievement.

Jackson Johnson Scholarship Fund. Provided through a bequest in 1930 from Jackson Johnson.

Dr. Lorraine A. Johnsrud Scholarship Fund. 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, 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 Fund. Established in 1969 by Mrs. Kettelkamp in memory of her husband, an alumnus of the School of Medicine.

M. Kenton King, MD Scholarship Fund. 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. At least one full-tuition scholarship is awarded annually on the basis of academic achievement and financial need.

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 and needy financially deserving medical students.

Alma Mavis Scholarship Fund. Created in 1988 under the will of Alma Mavis to assist students intending to practice family (general) medicine.

Eliza McMillan Scholarship Fund. Provides assistance to young women in any of several schools of the University to secure an education.

Medical Center 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 Miller Memorial Fund. Created in 1963 through the bequest of Roy B. Miller to provide scholarships for medical students and for post graduate students engaged in study and research in the medical sciences.

Warren Seward Miller and Dorothy Jackes Miller Endowed Scholarship Fund. Established in 2008 by Hildreth H. Spencer, PhD, in memory of her aunt and uncle, the Millers, with a preference for students pursuing the specialty of internal medicine.

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 and especially for those students with an aptitude and desire for the general practice in internal 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, including the counties of Madison, Jersey, Calhoun, Greene and Macoupin.

John and Ruth Musselman Medical Scholarship. Established in 1997 by the John & Ruth Musselman Medical Scholarship Trust to provide scholarships to deserving students.

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. The fund was established in 2003 by Mrs. Linda Osterkamp Desloge and Mrs. Lila Osterkamp Haberberger, in memory of their father, Dr. Roy W. Osterkamp, DE36. Preference will be given to a student pursuing a career in a medical field related to dental medicine.

Dr. Sidney F. and Dora K. Pakula Scholarship Fund. 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 Fund. Established in 1976 by the School of Medicine in honor of William B. Parker's 51 years of service to the School.

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.

Phi Beta Pi — Charles Ruggieri Scholarship Fund. Established in 1985 by the Washington University Alumni of the Phi Beta Pi medical fraternity to honor Charles Ruggieri and to assist deserving medical students enrolled in Washington University School of Medicine with the funding of their undergraduate medical education.

Philpott Family Scholarship Fund. Established in 1995 by the Philpott family to provide support for medical students with financial need and excellent academic achievement.

The George M. (MD '32) and George K. (MD '64) Powell Medical Student Scholarship Fund. Established in 1984 by Mrs. George M. Powell in grateful appreciation for the medical education provided to her husband and son by Washington University School of Medicine, which so positively affected the lives of the Powell families.

Henry and Louise Reller Scholarship. To be given to medical students in the name of the parents of Louise Reller.

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 the gift of Mrs. Joseph H. Roblee for students in the School of Medicine.

Thomas W. and Elizabeth J. Rucker Scholarship Fund. Created in 1956 under the will 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 who are doing research in endocrinology or the chemistry of metabolism.

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 Fund. Established to provide financial assistance to worthy students in the medical school.

Dr. David Schlessinger 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.

Scholars in Medicine Program. Established in 1999 with gifts from individual donors to create scholarships to support medical students in the name of the donor.

School of Medicine Scholarship Fund. Created in 1970 to provide financial assistance for medical students.

Edna Schrick, MD Scholarship Fund. Established in 1992 by Dr. Schrick to provide scholarship support to female medical students.

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 full-tuition 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, MD Scholarship Fund. Established in 2008 by Charlie Shaeffer (MD64) and his wife, Claire, for medical students, based on academic merit and/or financial need.

Dr. John B. Shapleigh Scholarship Fund. Established in 1926 with 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 to medical students from underrepresented minorities with preference given to African-American students.

Dr. Edward Hiroshi Shigeoka Scholarship Fund. Created in 1988 by Dorothy F. Shigeoka in memory of her husband, Dr. Edward Hiroshi Shigeoka, to help disadvantaged and deserving students pursue their careers in medicine.

Ernie Simms Scholarship Fund. Founded in 1984 by friends, colleagues and former students of Professor Simms in recognition of his contributions to scholarly research and teaching in the Department of Microbiology and Immunology.

Stanley B. Smith, MD Scholarship Fund. Established in 2001 in memory of Samuel and Dora Smith, Dr. Smith's parents, to support student scholarships.

Southern Medical Association Student Scholarship. Awarded to a third-year student in recognition of outstanding academic achievements of a physician-in-training.

Beulah B. Strickling Scholarship Fund. Established in 1960 with a bequest from Mrs. Beulah B. Strickling.

Marleah Hammond Strominger Scholarship. Established in 1971 by the family and friends of Marleah Hammond Strominger. The recipient shall be a motivated student with need for financial assistance and shall come from a disadvantaged background.

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. It was Dr. Terrill's hope that scholarship recipients would repay into the fund the amount of the award.

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.

Dr. Cornelia M. 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 Fund. Established by Frank Vellios, MD '46, in honor of his parents. Scholarships are awarded to deserving medical students with financial need.

Louis H. Waltke and Marie Waltke Memorial Fund for Medical Education. Created in 1984 to provide scholarships and fellowships at the School of Medicine.

Dr. George S. Wilson Scholarship Fund. Established in 1988 with the bequest of Dr. George S. Wilson to provide scholarship support to medical students.

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, M.D., 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, M.D., 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, M.D. 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.

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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 (7) 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.

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. Examples of the application of the refund policy may be requested from the Registrar's Office.

Assessing Academic Achievement and Professionalism

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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.

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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.

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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.

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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.

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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.

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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.

C. 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.

D. 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.

E. 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.

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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.

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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.

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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.

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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.

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St. Louis

The St. Louis area has more than 2.7 million residents, encompassing counties in both Missouri and Illinois. The area ranks high on many publications' "best cities" lists, and is an appealing destination for singles and families alike. St. Louis has a cost of living that ranks consistently lower than many comparable cities. For recreation, the arts, and great everyday living, St. Louis is a city of opportunities.

Any taste in housing, cuisine, lifestyle and leisure activities can be found in the greater St. Louis area. Attractive, affordable residential communities abound here, many of them within a two-mile radius of Washington University. The Central West End, University City and Clayton — all of which border Washington University — provide attractive housing and recreational opportunities. To the north, small shops, galleries and ethnic restaurants dot the main street of University City. Adjacent to the Washington University Medical Center and close to the Danforth Campus is the Central West End — trendy and restored to its late-19th century grandeur. To the west are the elegant homes and multifamily dwellings of Clayton. Those who come to St. Louis to be associated with the university can find reasonably priced apartments, condos and single-family homes, all in the immediate area. For those who desire a more suburban lifestyle, west St. Louis County is a growing area.

MetroLink, a light-rail line, runs from Lambert Airport through the downtown area and on to Illinois. A stop at the Medical Center makes this mode of transportation especially convenient for many medical school faculty, students and staff. Washington University's U-Pass program provides free Metro passes to

full-time students, benefits-eligible faculty and staff and full-time employees of qualified service providers who perform daily tasks.

Rising in front of a dramatic skyline, the Arch symbolizes St. Louis' role as the Gateway to the West. Today, as in the past, St. Louis is a prominent cultural and commercial city, linking the north and south, east and west, through its traditions and its view of the future. The Arch itself, designed by Eero Saarinen, is a remarkable sculptural achievement and an incredible engineering feat, worthy of its dramatic setting. It frames the commercial center of downtown and the Old Courthouse, where in 1847 Dred Scott argued his right to be a free man.

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 St. 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, Anheuser-Busch InBev, 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, Central Institute for the Deaf and St. Louis Children's Hospital. The medical center generates an annual financial impact of nearly \$3.5 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.

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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 \$550 to \$1,500 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, Campus Box 1016, 700 Rosedale Ave., St. Louis, MO 63112 or (314) 935-5092. You may also visit the web site at <http://ars.wustl.edu>. For information about Quadrangle Housing (Washington University-owned housing options), visit <http://liveonthecorner.com> and <http://www.offcampushousing.wustl.edu>.

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.

The rates for 2010-11 are:

Summer 2010 (May 22 – August 1)

Single Room: \$1,120
Large Single: \$1,375
Solo Suite: \$1,667
Double Room: \$750*
Double Suite: \$1,120*

School Year: Mid August-Mid May (Nine Months)

Single Room: \$3,740
Large Single: \$4,486
Solo Suite: \$5,449
Double Room: \$2,519*
Double Suite: \$3,740*

*Price per student

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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 wusmproserv.wustl.edu/. This information may be found under "Campus Crime Statistics 2006-2007-2008." 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) 362-4358.

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Parking and Transportation (U-Pass & WeCar)

Hourly, daily and permit parking is available in the 2200-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). There is also limited surface permit parking on the School of Medicine surface lots. The WUSM surface lots are in various locations around the Medical Campus with unreserved spaces on a first-come basis. School of Medicine surface parking permits are required Monday through Friday from 7 a.m. to 2 p.m. Surface permits are not required all day Saturday and Sunday and during the week between 2 p.m. and 7 a.m. 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 Olin Residence Hall, 4550 Scott Ave., Room 114.

If you are interested in carpooling, vanpooling, Metro passes or coupon books, please contact the School of Medicine's Transportation Services.

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>, contact Transportation Services at (314) 362-6824 or stop by our office in Olin Residence Hall, 4550 Scott Ave., Room 114.

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>. 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. Please note: until an employee ID is fully approved, you will not be able to apply for a U-PASS. This can take from a few days to a few weeks!

For those needing a car to run an errand or for overnight, we have a car-sharing program called WeCar. Located on Lot E (off McKinley behind Olin Residence Hall), a WeCar is available for use for only \$10/hour

(there is a separate rate for overnight use). Go to <http://www.WeCar.com/WUSTL>, print off the agreement and within 3-6 business days after membership approval, you will be issued your personal key fob and customer PIN number. Then go online and reserve a time!

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Bulletin Boards

Bulletin boards are on the wall outside the Admissions Office, on the first and second floors of the McDonnell Medical Sciences Building, on the first floor of Olin Residence Hall, and in the lounge on the ground floor of the Bernard Becker Medical Library. Please check these frequently.

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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.

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Mail

First-class student mail sent to the School of Medicine will be put in student mailboxes. This will most probably serve as a temporary mailing address and be used only 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

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Student Health Service

Director:	Karen S. Winters, MD
Information/Appointments:	(314) 362-3523
Billing/Benefits:	(314) 362-2346

For a complete description of benefits please visit <http://wusmhealth.wustl.edu/>.

The Student Health Service provides a complete service for full-time students registered in the School of Medicine. Services are provided through a self-funded program included in tuition costs. Services include

professional care by staff internists and counselors, with referrals to other consultants. Services are available by appointment on site at 4525 Scott Ave., Suite 3420, Monday through Friday from 8 a.m. to 4 p.m. The Health Service has implemented an after-hour coverage monitored by Dr. Winters. Students may call 362-3526 after hours for non-urgent care. All medications, diagnostic tests, X-rays and consultations ordered by the physicians are covered 100 percent with a small co-payment, in the absence of private insurance. In addition, the Health Service offers full major medical benefits including labor and delivery. Emergency care is available at the emergency department of Barnes-Jewish Hospital.

There is a maximum lifetime benefit per student of \$1,000,000. 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 School of Medicine also offers a dental, disability and life insurance policy to all full-time students registered in the medical and allied professional schools of the Medical Campus. The Student Health Service offers easy access to medical and psychiatric care so that physical and emotional problems will not interfere with university life. Subsequent medical care is provided as long as full-time enrollment is maintained in the School of Medicine.

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 within one year of matriculation and to show proof of immunity to measles (rubeola), rubella and mumps and a tetanus booster within 10 years. The Health Service tracks all immunizations during and prior to enrollment. Statements of Health for internships and practicums are provided.

Spouses, Dependents

Students frequently ask if they can purchase health coverage for their spouse and/or dependents through Student Health Services. Student Health Services is a benefit available to full-time students enrolled in the medical or allied professional schools only, and there is no provision for health coverage for spouse and/or dependents. For your convenience, Student Health has partnered with Destefano & Associates to assist your spouse/dependent with their insurance needs. For more information please contact Sharon Silver at (636) 230-2928. However, Student Health Services has arranged a few alternative options for you to review.

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 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. 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.

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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 hospital identification card clearly visible.

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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.

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.

Student Organized Community Clinic

As the number of uninsured citizens in America continues to rise, the Student Organized Community Clinic (SOCC) 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

Washington University Medical Center Housestaff Auxiliary (WUMCHA) 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 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 and information about membership and applications can be obtained by contacting Meg Porter at (314) 330-0838 or mporter@uwalumni.com, Courtney Yarbrough at (650) 759-1883 or courtneywyarbrough@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.

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Intramural Program

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, cross country, basketball, swimming, softball, and track and field 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.

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Primary Care Summer Preceptorship

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. Applications should be made to the Associate Dean for Student Affairs, Washington University School of Medicine, Campus Box 8077, 660 S. Euclid Ave., St. Louis, MO 63110.

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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 also are eligible. All research must be conducted at the School of Medicine. Students will be awarded a fellowship and stipend for a two-month program. Inquiries should be made to Medical Student Research Program, Koong-Nah Chung, PhD, Washington University School of Medicine, Campus Box 8107, 660 S. Euclid Ave., St. Louis, MO 63110, (314) 362-6844, chungk@wusm.wustl.edu.

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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.

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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 2009 recipient: Jessica C. Germino.

Alpha Omega Alpha Book Prize. Awarded to a member of the graduating class who has performed outstandingly for the entire medical course. The May 2010 recipient: Bradley John Carra.

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 2010 recipient: Cheryl Alyssa Mather.

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 2010 recipient: Zachary David Permutt.

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 2009 recipient: Tassy N. Hayden.

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 2009 recipient: John M. Gansner.

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 2010 recipients: Lauren Kali Biesbroeck, Carlie Rebecca Kennedy, Vanessa Ann Lewis, Jessica Lynn McAlister, Lina Nayak, and Kavitha Rajeswari Sivarman.

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 2009 recipient: Courtney M. Lehw.

Alexander Berg Prize. Awarded to the student presenting the best results in research in molecular microbiology. The May 2010 recipient: David Aaron Rosen.

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 2010 recipient: Richard Anthony

Schenkelberg, Jr.

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 2010 recipient: Meredith Ellen Pittman.

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 2009 Dr. Richard S. Brookings recipients: Bradley J. Carra, Brian F. Flaherty, and Jason A. Meyers. The May 2010 Dr. Richard S. Brookings recipient: Kimberly Meng Hsu. The November 2009 Robert Carter recipients: Lauren K. Biesbroeck, Carlie R. Kennedy, and Peng Lei. The May 2010 Robert Carter recipient: Ambrose Hon-Wai Wong.

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 2010 recipient: Iheoma Yvonne Nwaogu.

Kehar S. Chouke–George Gill Prize in Anatomy. Awarded annually to a first-year medical student who has demonstrated superior scholarship in Human Anatomy. The November 2009 recipient: James M. Essenberg.

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 2009 recipient: Matthew S. Painschab.

Class of 2003 Award is 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 2009 recipient: David M. Levine.

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 2009 recipient: Joseph Zenga.

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 2009 recipient: Stephen A. Currie.

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 2009 recipient: Andrea M. Giedinghagen.

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 2010 recipient: Brian Francis Flaherty.

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 2009 recipient: Katherine M. Bedigrew.

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 2010 recipient: Kimberly Meng Hsu.

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 2010 recipient: Anna Sorensen Graseck.

The Family Health Foundation of Missouri Scholarship Award. Awarded to the top graduating student entering the specialty of family medicine. The May 2010 recipient: Casey Kent McCullough.

George F. Gill Prize in Pediatrics. Awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics. The May 2010 recipient: Bryce Abram Mendelsohn.

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 2010 recipient: Jake Michael Chanin.

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 2010 recipient: Manjool Manoj Shah.

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 2010 recipient: Rebecca Cappel Hendrickson.

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 2010 recipient: Casey Kent McCullough.

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 2009 recipient: Jared D. Miller.

Dr. John Esben Kirk Scholastic Award. Established in 1975 and awarded to a graduating student of high scholastic standing. The May 2010 recipients: Brian Francis Flaherty and Jason Alan Meyers.

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 2010 recipients: Jacqueline Leigh Anderson and Rebecca Cappel Hendrickson.

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 2010 recipient: Carlie Rebecca Kennedy.

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 2010 recipient: Zena Hassan.

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 2009 recipient: Esther Y. H. Hsiao.

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 2010 recipient: Ana Kadkhodayan.

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 2009 recipient: Melinda Y. Wu.

McGraw-Hill/Lange Medical Student Book Award. Awarded annually to medical students for high scholastic standing. The November 2009 recipients: Jessica L. McAlister and Kavitha R. Sivaraman.

Medical Center Alumni Scholarship Fund Prize. Given annually to students who have shown excellence in their work during the preceding year. The November 2009 recipient: Travis L. Shiba.

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 2010 recipients: Natalie Christine Battle (Medicine) and Oluwafunmi Onaopemipo Awonuga (Surgery.)

Merck Manual Awards. Given to three graduating medical students for scholastic achievement in medical studies. The May 2010 recipients: Peng Lei, Casey Kent McCullough, and Ira Hyman Schachar.

Missouri State Medical Association Award. Presented annually to honor School of Medicine graduates for outstanding achievement in the study of medicine. The May 2010 recipients: Alexander William Aleem, Gerald Johnstone Palagallo, and Manjool Manoj Shah.

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 2009 recipients: Kurt J. Hoffmeister and Tammy S. Shirley.

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 2009 recipient: Jaclyn M. Grentzer.

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 2010 recipient: Shadmehr Demehri.

The James L. O'Leary Neuroscience Prize. Awarded annually to a student who demonstrates the best accomplishment in the Neuroscience course. The November 2009 recipient: Amirali Modir Shanechi.

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 2009 recipient: Mark D. Mangano.

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 2009 recipients: Oloruntoyin O. Falola and Jason E. Turner.

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 2010 recipient: Meredith Ellen Pittman.

St. Louis Pediatric Society Senior Prize. Presented to the senior student showing the greatest promise in clinical pediatrics. The May 2010 recipient: Carolyn Marie Kienstra.

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 2009 recipient: Charles G. Rickert.

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 2010 recipient: Kavitha Rajeswari Sivaraman.

Dr. Margaret G. Smith Award. Given to a woman medical student for outstanding achievement in the first two years of medical school. The November 2009 recipient: Smith Ann M. Rasmussen.

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 2010 recipient: Ambrose Hon-Wai Wong.

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 2010 recipient: Anna Sorensen Graseck.

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 2009 recipient: Nicole M. Cresalia.

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 2010 recipient: John Michael Gansner.

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 2009 recipients: Elliott A. Karren and Jacquelyn M. Means.

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 2010 recipients: Dadrie Freda Baptiste and Jennifer Michelle Murphy

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 2010 recipient: Carrie Christine Coughlin.

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 2010 recipient: Seth-Emil Thomas Bartel.

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 2010 recipients: Brundha Balaraman and Anna Sorensen Graseck.

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 2010 recipient: Brundha Balaraman.

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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. The next federal election will occur on Tuesday, November 2, 2010. Registration forms will be available early in the Fall 2010 semester on the Medical Campus at the Student Affairs Office, Room 100, McDonnell Medical Sciences Building.

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/movote.asp>

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The Washington University Graduate

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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.

In order 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 very 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) where students can find information regarding 20 residency specialties. As the number of residencies may gradually decrease to closely approximate the number of graduates applying, 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 (2010) 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.

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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.

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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 through periodic courses, regularly scheduled conferences, and enduring materials 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 for delivery of quality patient care into the educational process.

Assist physicians' adaptation to changing health care delivery environments.

Support faculty development as postgraduate medical educators and leaders.

Improve health care outcomes.

Each year more than 150 symposia and more than 180 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 120,000 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.

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Medical Alumni and Development Programs

The Department of 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 May 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/Faculty, 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 Association membership.

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 to 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 those in the "Diamond+" years (all those classes who have celebrated their 60th 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.

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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>.

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Washington University School of Medicine 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.

A. Expectations for Students:

1. Take the exam during the originally scheduled time, excepting extenuating circumstances. Note the Committee on the Academic and Professional 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.”

2. Tardiness will not be excused except in extenuating circumstances.

3. Not share study materials, exchange information, collaborate or communicate with others during the

exam

4. Turn off and leave cell phones and other electronic devices in their bags.
5. Hand their exam to the proctor prior to leaving the room.

*Not applicable to take-home exams

B. Expectations for Faculty:

1. Exams should be proctored by a faculty member or a staff member comfortable with proctoring and exam administration guidelines.
2. Administration should be fair to all students:
3. 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.
4. Reasonable adjustments should be offered to students who require special accommodations, including a separate room or additional time. Course masters are notified of these students through the Associate Dean for Student Affairs.
5. If a student behaves inappropriately, the course master should notify the Associate Dean for Student Affairs immediately.
6. All requirements of students should be communicated to all students PRIOR to the start of the exam.

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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.

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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 two 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.

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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 ⁽¹⁾[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.

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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.

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POLICIES RELATED TO PROFESSIONALISM AND CONDUCT

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.
- 3. Respect for the ethnic and cultural diversity of classmates provides for a more nurturing environment for all.
 - a. Students should be aware that their classmates come from a wide variety of religious and ethnic backgrounds and that they will have differing lifestyles and viewpoints. This diversity is an important resource in our community, contributing to personal and professional growth of all.
 - b. Students should be sensitive to the importance of these issues and should seek opportunities to enhance appreciation of multiple cultures through dialog, educational opportunities, etc.
- 4. Students should be supportive of peers during difficult times in their personal and professional lives.
 - a. Students must appreciate that their peers may have issues in their personal or professional lives (e.g. family, medical, academic, or administrative problems) that may affect their interactions with others. In these circumstances, students should make every attempt to be sympathetic and to offer their support to those students.
- 5. Participation and teamwork enhances the educational experience.
 - a. The learning process is a partnership between students and faculty. Students should actively participate in this partnership by providing feedback to professors by way of evaluations and surveys.
 - b. Contributing to the overall functioning of the team maximizes both learning and patient care in the clinical setting.
- 6. Understanding the appropriate venues for feedback to house staff/fellows/faculty is critical to successfully resolving conflicts .
 - 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

7. Maintaining a professional relationship with teachers (including faculty/residents/fellows and TAs) is important, especially during times when these teachers are in a position to grade or evaluate the student.

a. Students should avoid behaviors that could potentially be construed as attempting to influence the faculty, for example running personal errands.

b. The University has specific codes and regulations regarding romantic relationships between a student and a teacher, including faculty/resident/fellows (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.

8. Patients should be treated as individuals in the context of their family, culture and community. Personal bias should be subordinated when possible to further the therapeutic relationship.

a. Use of offensive language or gestures is unacceptable.

b. At times, some religious beliefs will require the use of alternative care approaches.

c. Students, like practicing physicians, should not refuse to participate in the care of a patient with a communicable disease unless this represents a meaningful threat to the student's own health. In contrast, a student who is verbally or physically threatened by a patient may ask to be excused from care of that patient.

9. Students should treat hospital staff with appreciation and respect as they are vital members of the health care team.

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.

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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

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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.

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[Washington University School of Medicine Guidelines for Professional Conduct in Teacher/Learner Relationships](#)

I. 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 on sexual harassment above).
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.

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Washington University School of Medicine 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.

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POLICIES RELATED TO STUDENT RIGHTS, PROCEDURES, AND SERVICES

Policies for Students with Disabilities

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.

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University & Medical School 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

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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.

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Washington University Medical Campus Policy on HIV and HBV Infection

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.

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 class I activities (those involving no risk of transmission from infected health care workers to patients, such as routine physical examinations, dressing changes, intravenous line placement) and class II activities (those that involve the potential for transmission of HIV, HBV or HCV from infected health care workers to patients, such as invasive surgical procedures in which trauma to a health care worker is possible).

This policy is comprehensive, and a complete copy is available to any interested student through the Office for Student Affairs.

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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.

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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. Present Department of Defense policy governing all ROTC programs discriminates on the basis of sexual orientation; such discrimination is inconsistent with Washington University policy. 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.

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Student Constitution and Bylaws of the Washington University School of Medicine Medical Student Government

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.

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. For elections for 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. For elections for 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 during either the third or fourth year of medical school. 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.

2. Nominations: 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 the election. 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. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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 a Representative of MD/PhD Students. 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.

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Class Officers

Fourth-Year Class Officers

President
Jonathan Byrd

Medical Education Representative (MER)
Alex Edwards

Representative to the Organization of Student Representatives (OSR Rep)
Kal Clark

Representative to the Graduate Professional Council (GPC Rep)
Ameet Thaker

Third-Year Class Officers

President
Ryan Anderson

Medical Education Representative (MER)
David Levine

Representative to the Organization of Student Representatives (OSR Rep)
Elizabeth Davlantes

Representative to the Graduate Professional Council (GPC Rep)
Leisha Elmore

Second-Year Class Officers

President
Elaine Khoong

Medical Education Representative (MER)
Arun Ganti

Representative to the Organization of Student Representatives (OSR Rep)
Michael Verre

Representative to the Graduate Professional Council (GPC Rep)
Jared Wilkinson

First-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

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Departments

Departments

Department of Anatomy and Neurobiology

The structure of the human body is presented in two courses: Human Anatomy and Development, 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.

Courses

First Year

M35 554 NEURAL SCIENCES

Instructors: David C. Van Essen, PhD, 362-7043; Timothy E. Holy, PhD, 362-0086; W. Thomas Thach Jr., MD, 362-3538 (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 501A HUMAN ANATOMY AND DEVELOPMENT

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 non-medical 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. Pass/Fail. Contact Dr. Conroy one week prior to the start of the elective.

Enrollment limit per period: 14

Valid start weeks for 4-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: Self Study. Pass/Fail. Students should contact Dr. Conroy one week prior to the start of the elective. Students are required to attend each Anatomy session during the course of the elective.

Enrollment limit per period: 3

Valid start weeks for 4-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

Dora Angelaki, PhD, 2nd Floor East McDonnell Medical Sciences Building, 747-5529. Neural basis of motion perception and spatial orientation. Neural control of eye and head movements.

Nancy L. Baenziger, PhD, 9th Floor McDonnell Medical Sciences Building, 362-2817. Environmental stress impact on receptor signal transduction and neuronal connectivity in cellular models of Alzheimer's disease.

Paul Bridgman, PhD, 4th Floor McDonnell Medical Sciences Building, 362-3449. Cell biology of the developing nervous system.

Andreas Burkhalter, PhD, 4th Floor North Building, 362-4068. Organization and function of neuronal circuits in mouse visual cortex.

Harold Burton, PhD, 3rd Floor East McDonnell Medical Sciences Building, 362-3556. Cortical functional reorganization in response to sensory deprivation in blindness, unilateral deafness or cerebral palsy.

Valeria Cavalli, PhD, 4th Floor McDonnell Medical Sciences Building, 362-3540. Axonal transport and nerve regeneration.

James M. Cheverud, PhD, 3rd 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, 3rd Floor North Building, 362-3397. Comparative primate anatomy and human evolution.

J. David Dickman, PhD, Central Institute for the Deaf, 747-7221. Neural processing of motion detection, spatial orientation, and navigation.

David I. Gottlieb, PhD, 9th Floor McDonnell Medical Sciences Building, 362-2758. Embryonic stem cell models of neural development and disease.

Paul A. Gray, PhD, 9th Floor McDonnell Medical Sciences Building, 362-9063. Molecular development of

neural circuits underlying simple behavior.

Timothy E. Holy, PhD, 4th Floor North Building, 362-0086. Mammalian pheromones: neural mechanisms of action.

Arthur D. Loewy, PhD, 9th Floor McDonnell Medical Sciences Building, 362-3930. Analysis of brain circuits controlling cardiovascular functions.

Michael L. Nonet, PhD, 9th Floor McDonnell Medical Sciences Building, 747-1176. Molecular genetic analysis of synaptic development and function.

Karen L. O'Malley, PhD, 9th Floor McDonnell Medical Sciences Building, 362-7087. Molecular mechanisms underlying neurodegenerative processes. Signaling mechanisms associated with intracellular receptors.

Jane Phillips-Conroy, PhD, 3rd Floor North Building, 362-3396. Behavior, morphology and biology of living primate populations.

Camillo Padoa Schioppa, PhD, 3rd Floor East McDonnell Science Building, 362-3530. Neuronal bases of economic choice and decision making.

Narendrakumar Ramanan, PhD, 9th Floor McDonnell Medical Sciences Building, 362-0233. Transcriptional control of synaptic plasticity.

Lawrence B. Salkoff, PhD, 9th Floor McDonnell Medical Sciences Building, 362-3644. The roles of ion channels in neuronal long term excitability changes.

Paul J. Shaw, PhD, 9th Floor McDonnell Medical Sciences Building, 362-2703. Molecular genetics of sleep and circadian rhythms.

Lawrence H. Snyder, MD, PhD, 3rd Floor East McDonnell Medical Sciences Building, 747-3530. Computational and cognitive issues in cortical control of eye and arm movement: electrophysiology and imaging.

Paul H. Taghert, PhD, 9th Floor McDonnell Medical Sciences Building, 362-3641. Neurobiology of circadian rhythms. Regulation of neurotransmitter properties.

David C. Van Essen, PhD, 2nd Floor East McDonnell Medical Sciences Building, 362-7043. Organization, function, and development of primate cerebral cortex, especially in humans; generation and utilization of neuroinformatics tools for data mining.

Faculty

DAVID C VAN ESSEN, PHD Head of the Department of Anatomy and Neurobiology, Edison Professor of Neurobiology

DORA ANGELAKI, PHD, MS Alumni Endowed Professor of Neurobiology

NANCY L BAENZIGER, PHD Research Associate Professor of Neurobiology

DENNIS L BARBOUR, MD, PHD Assistant Professor of Neurobiology

KEVIN J. BLACK, MD Professor of Neurobiology

PAUL C BRIDGMAN, PHD, MS Professor of Neurobiology

ANDREAS H BURKHALTER, PHD, MS Professor of Neurobiology

HAROLD BURTON, PHD Professor of Neurobiology

VALERIA CAVALLI, PHD, MS Assistant Professor of Neurobiology

JAMES M CHEVERUD, PHD, MS Professor of Anatomy

THEODORE J CICERO, PHD, MS Professor of Neurobiology

GLENN C CONROY, PHD, M PHIL Professor of Anatomy

MAURIZIO CORBETTA, MD Professor of Neurobiology

J. DAVID DICKMAN, PHD, MS Professor of Neurobiology

KRIKOR T DIKRANIAN, MD, PHD Assistant Professor of Anatomy

GAMMON MARIE EARHART, PHD, MS Assistant Professor of Neurobiology

SUSAN M FITZPATRICK, PHD Adjunct Associate Professor of Neurobiology

ROBERT W GEREAU, PHD Professor of Neurobiology

URSULA W. GOODENOUGH, PHD, MA Associate Professor of Anatomy

DAVID I GOTTLIEB, PHD, MA Professor of Neurobiology

PAUL A. GRAY, PHD Assistant Professor of Neurobiology

TIMOTHY E. HOLY, PHD, MA Associate Professor of Neurobiology

TIMOTHY EVERETT HULLAR, MD Assistant Professor of Neurobiology

VLADIMIR JIVKOV KEFALOV, PHD Assistant Professor of Neurobiology

DANIEL KERSCHENSTEINER, PHD Assistant Professor of Neurobiology

ROBYN SUE KLEIN, MD, PHD, MS Associate Professor of Neurobiology

VITALY A KLYACHKO, PHD, MS Assistant Professor of Neurobiology

ERIC CLAUDE LEUTHARDT, MD Assistant 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

DAVID NORMAN MENTON, PHD Associate Professor Emeritus of Anatomy

DANIEL MORAN, PHD Assistant Professor of Neurobiology

JEFFREY J NEIL, MD, PHD Professor of Neurobiology

BRUCE L NOCK, PHD, MS Associate Professor of Neurobiology

MICHAEL L NONET, PHD Associate Professor of Neurobiology

KAREN LAUREL O'MALLEY, PHD, MS Professor of Neurobiology

CAMILLO PADOA-SCHIOPPA, PHD, MS 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, PHD, MA Professor of Anatomy
JOSEPH L PRICE, PHD Professor of Anatomy and Neurobiology
MARCUS E RAICHLE, MD Professor of Neurobiology
NARENDRAKUMAR RAMANAN, PHD, MS Assistant Professor of Neurobiology
KEITH M RICH, MD Professor of Neurobiology
JOSHUA BENNETT RUBIN, MD, PHD, MS Assistant Professor of Neurobiology
LAWRENCE B SALKOFF, PHD Professor of Neurobiology
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BRADLEY L SCHLAGGAR, MD, PHD Associate Professor of Neurobiology
PAUL JOSEPH SHAW, PHD, MA Assistant Professor of Neurobiology
LAWRENCE H SNYDER, MD, PHD, MS Associate Professor of Neurobiology
JOSEPH H STEINBACH, PHD Professor of Neurobiology
GINA M STORY, PHD Assistant Professor of Neurobiology
PAUL H TAGHERT, PHD Professor of Neurobiology
W. THOMAS THACH, JR, MD Professor of Neurobiology
KWEE L THIO, MD, PHD Assistant Professor of Neurobiology
KURT A THOROUGHMAN, PHD Associate Professor of Neurobiology
ROBERT LAWRENCE TYCHSEN, MD Professor of Neurobiology
MARK EDWARD WARCHOL, PHD Associate Professor of Neurobiology
RALF WESSEL, PHD, MS Assistant 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's Web Site

<http://thalamus.wustl.edu>

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; 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; Gina Story, 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.

Courses

Fourth Year

Electives

M10 805 ANESTHESIOLOGY

Instructor(s): Tom Davis, MD, 362-2351, davisto@wustl.edu

Location: Barnes-Jewish Hospital, South Campus; Department of Anesthesiology, Third Floor

Elective Contact: Gerri Neumann, 362-4449

Other Information: Please contact the department student secretary, Gerri Neumann, 362-4449, prior to the elective for specific instructions. Students should meet in the Clinical Simulation Center, 3rd floor Barnes-Jewish Hospital Service Building, 8:30 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.

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 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.

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, 362-2756 and Nirvik Pal, 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, 3rd Floor Barnes-Jewish Service Building, 8:30 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.

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: 5th 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 4-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, Laureen Hill, MD, Michael Avidan, MD, Eliot Fagley, MD, Mike Wall, MD and Adnan Sadiq, 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, 5th Floor Southwest Tower Physician Workroom, 6:30 a.m. first day of elective.
Enrollment limit per period: 3
Valid start weeks for 4-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. 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. An exciting teaching program will be prepared for the students. 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): Walter Boyle, MD, 747-3581, Course Master, Alex Evers, MD, Eliot Fagley, MD, Brian Fuller, MD, Richard Hotchkiss, MD, John Kirby, MD, John Mazuski, MD, Patricia Penkoske, MD, Adnan Sadiq, MD, Doug Schuerer, MD, Robert Southard, MD, George Tseng, MD, and Mike Wall, MD

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Barbara McKinney, 747-3581

Other Information: Students should meet in the 8400 Surgical Intensive Care Unit, 8th 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 4-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 10th Floor, Center for Advanced Medicine (CAM), 8 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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): René Tempelhoff, MD, 362-2330
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: René Tempelhoff, MD, 362-2330
Other Information: Students should meet on 3rd Floor Barnes-Jewish Hospital, South Campus, Department of Anesthesiology, 7 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-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 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, Pager 253-1033
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Swarup Varaday, MD, 362-6252, Pager 253-1033
Other Information: Students should report to 5400 Labor and Delivery, 7 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 2 or 4-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, Fellows
Patients seen/weekly: 20
On call/weekend responsibility: None (optional)

Faculty

ALEX S EVERS, MD Head of the Department of Anesthesiology, Henry E Mallinckrodt Professor of Anesthesiology

NABIL ABOUD, MD Instructor in Anesthesiology

SIRAJUDDIN AGHA, MBBS Assistant Professor of Anesthesiology

GUSTAV AKK, PHD Assistant Professor of Anesthesiology

MICHAEL SIMON AVIDAN, MBBCH Associate Professor of Anesthesiology

GEORGE RICHARD BENZINGER, III, MD, PHD Assistant Professor of Anesthesiology

LAILA M BOTTROS, MD Assistant Professor of Anesthesiology

WALTER A BOYLE, III, MD Professor of Anesthesiology

MEGAN ANN BROCKEL, MD Instructor in Anesthesiology
SCOTT D CAMPBELL, D SC, MHS Research Instructor in Anesthesiology
YUQING CAO, PHD Assistant Professor of Anesthesiology
LAURA FRANCESCA CAVALLONE, MD Assistant Professor of Anesthesiology
ZHOUFENG CHEN, PHD, MS Professor of Anesthesiology
ZIWEI CHEN, MBBS, PHD, MS Research Instructor in Anesthesiology
KELLY LYNNE CHILSON, MD Assistant Professor of Anesthesiology
ALBERT MURRAY COHEN, MD Assistant Professor of Anesthesiology
JENNIFER W COLE, MD Associate Professor of Anesthesiology
THOMAS E COX, MD Associate Professor of Anesthesiology
CHARLES M CROWDER, MD, PHD Associate Professor of Anesthesiology
BAKUL DAVE, MD Assistant Professor of Anesthesiology
VICTOR G DAVILA-ROMAN, MD Professor of Anesthesiology
THOMAS ALLEN DAVIS, MD Associate Professor of Anesthesiology
CHARL JOHAN DE WET, MBCHB Associate Professor of Anesthesiology
RYAN EDWARD DERBY, MD Instructor in Anesthesiology
GEORGE J DESPOTIS, MD Associate Professor of Anesthesiology
MICHAEL N DIRINGER, MD, MA Professor of Anesthesiology
NICOLE MARIE DURKO, DOST Instructor in Anesthesiology
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BEVERLY J. FIELD, PHD, M MUS, BA Assistant Professor of Anesthesiology
MITCHELL EVAN FINGERMAN, MD Assistant Professor of Anesthesiology (Pending Executive Faculty Approval)
DAVID ALAN FRIEDMAN, MD Instructor in Anesthesiology
BRIAN M FULLER, MD Assistant Professor of Anesthesiology
NARASIMHAN GAUTAM, PHD, MS Professor of Anesthesiology
ROBERT W GEREAU, PHD Professor of Anesthesiology
DANIEL PATRICK GILLEN, MD Assistant Professor of Anesthesiology
THOMAS JAMES GOBLIRSCH, MD Assistant Professor of Anesthesiology
CHRISTINE GOEPFERT, MD Instructor in Anesthesiology
JUDITH P GOLDEN, PHD, MA Research Assistant Professor of Anesthesiology
BARRY A GRAFF, MD Assistant Professor of Anesthesiology
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ROBERT E HEROLD, MD Assistant Professor of Anesthesiology
LAUREEN L HILL, MD Associate Professor of Anesthesiology
GARY E HIRSHBERG, MD Professor of Anesthesiology

BARBEL HOLTMANN, MD, BS Associate Professor of Anesthesiology

RICHARD S HOTCHKISS, MD Professor of Anesthesiology

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ROCCO HUNEKE, MD Instructor in Anesthesiology

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SELMA E.H.O. ISHAG, MD, PHD Assistant Professor of Anesthesiology

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RAINER KENTNER, MD Assistant Professor of Anesthesiology

EVAN DAVID KHARASCH, MD, PHD Russell and Mary Shelden Professor of Anesthesiology

SHAHRDAD KHODAMORADI, MD Assistant Professor of Anesthesiology

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CHAKRAPOL LATTANAND, MD Assistant Professor of Anesthesiology

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ANDREA JO PARSONS, MD Instructor in Anesthesiology

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MITCHELL R PLATIN, MD Assistant Professor of Anesthesiology

DEBRA D PULLEY, MD, MME Associate Professor of Anesthesiology _Part-time 50%)

CARLOS ANGEL PUYO, MD Instructor in Anesthesiology

LESLEY KATHRYN RAO, MD Instructor in Anesthesiology

RAHUL RASTOGI, MBBS Associate Professor of Anesthesiology

JEBADURAI RATNARAJ, MD Assistant Professor of Anesthesiology

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RAGHU P TERKONDA, MD Assistant Professor of Anesthesiology

JOSEPH M THORNHILL, MD Assistant Professor of Anesthesiology

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GEORGE S TSENG, MD Assistant Professor of Anesthesiology

ANDREA VANNUCCI, MD Assistant Professor of Anesthesiology

SWARUP VARADAY, MBBS Instructor in Anesthesiology

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ALEXANDER H YOUNG, MD Assistant Professor of Anesthesiology

XUHUI ZENG, PHD, MS Research Instructor in Anesthesiology

MEINHART H ZENK, PHD Adjunct Professor of Anesthesiology

YU ZHOU, PHD, MS Research Instructor in Anesthesiology

Department's Web Site

<http://www.anest.wustl.edu/>

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 (biochem.wustl.edu). 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 (Bio548), and Macromolecular Interactions (Bio5312) 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/courses/index.html.

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.

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 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. Non-medical students should register under L41 (Bio) 5319.

Second Year

M70 670A PRINCIPLES OF PHARMACOLOGY

Instructor: Tom Ellenberger, DVM, PhD, 362-0287

The purpose of this course is to provide basic information on the underlying principles that apply to pharmacology. Topics addressed include: mechanisms of receptor-mediated drug action, pharmacokinetics, drug metabolism, toxicology, developmental pharmacology and the autonomic nervous system. Students who have not completed the first year of the medical school curriculum must have permission from one of the coursemasters to enroll in this course.

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) 5224 MOLECULAR, CELL AND ORGAN SYSTEMS

L41 (Bio) 5312 MACROMOLECULAR INTERACTIONS

L41 (Bio) 5318 DNA REPAIR

L41 (Bio) 5326 MOLECULAR MEDICINE

L41 (Bio) 5357 CHEMISTRY AND PHYSICS OF BIOMOLECULES

L41 (Bio) 5476 MODELING BIOMOLECULAR SYSTEMS I

L41 (Bio) 5477 MODELING BIOMOLECULAR SYSTEMS II

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

Nathan Baker, PhD, 113 Center for Computational Biology, 362-2040. Computational biology: multi-scale modeling of biological process, biomolecular solvation, protein structure and dynamics.

Peter M.J. Burgers, PhD, 1st Floor South Building, 362-3872. Molecular biology of yeast chromosomal DNA replication and DNA repair.

Peter T. Chivers, PhD, 1st Floor South Building, 362-1496. The biochemistry of metalloregulation and metallophysiology.

Tom Ellenberger, DVM, PhD, 2nd Floor South Building, 362-0287. Structural biology of DNA repair and chemical genetics of DNA damage responses.

Elliot L. Elson, PhD, 2nd Floor McDonnell Medical Sciences Building, 362-3346. Cellular mechanics and cytoskeletal structure and function. Fluctuation spectroscopy.

William A. Frazier, PhD, 1st Floor South Building, 362-3348. CD47 as a regulator of integrins and nitric oxide signaling in vascular cells.

Carl Frieden, PhD, 2nd Floor McDonnell Medical Sciences Building, 362-3344. Protein folding, misfolding and aggregation using NMR and fluorescence methods. Proteins related to Alzheimer's Disease including A β and apoE4.

Eric A. Galburt, PhD, 2nd Floor McDonnell Medical Sciences Building, 362-0287. Cooperative transcription dynamics. Several subprojects that all lead toward the ability to perform single molecule fluorescent experiments of bacterial RNA polymerases. Techniques such as protein purification, fluorescent protein labeling and transcription assays will be learned and developed to generate fluorescently labeled RNA polymerases that can be tracked in an assay of cooperative effects during transcription.

Roberto Galletto, PhD, 2nd Floor McDonnell Medical Sciences Building, 362-4368. Mechanistic studies of DNA motor proteins and telomere binding proteins; single-molecule approaches.

Kathleen Hall, PhD, 2nd Floor North Building, 362-4196. RNA structure/function. RNA protein interactions. NMR spectroscopy.

Katherine A. Henzler-Widman, PhD, 2nd Floor North Building, 362-7183. Functional dynamics of integral membrane proteins using NMR spectroscopy structure and dynamics of small multidrug resistance transporter proteins.

Timothy M. Lohman, PhD, 2nd 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, 2201 Center for Computational Biology, 362-1567. Molecular recognition, protein engineering, signal transduction-GPCRs, two-component signaling as antibiotic target.

Linda J. Pike, PhD, 2nd Floor Cancer Research Building, 362-9502. EGF receptors and the role of lipid rafts in signal transduction.

Jay Ponder, PhD, 208 Center for Computational Biology, 362-4195. Computational modeling of protein structure and energetics. Protein engineering.

Faculty

THOMAS E ELLENBERGER, DVM, PHD Head of the Department of Biochemistry and Molecular Biophysics, Raymond H. Wittcoff Professor of Biochemistry and Molecular Biophysics

SAMUEL I ACHILEFU, PHD Professor of Biochemistry and Molecular Biophysics

GARY K ACKERS, PHD Professor Emeritus of Biochemistry and Molecular Biophysics

CAROLYN J ANDERSON, PHD Professor of Biochemistry and Molecular Biophysics

USHA P ANDLEY, PHD, MS Assistant Professor of Biochemistry and Molecular Biophysics

EDWIN ANTONY, PHD, MS Research Instructor in Biochemistry and Molecular Biophysics

WAYNE MORRIS BARNES, PHD Associate Professor of Biochemistry and Molecular Biophysics

ROBERT E. BLANKENSHIP, PHD Professor of Biochemistry and Molecular Biophysics

THOMAS J. BRETT, PHD Assistant Professor of Biochemistry and Molecular Biophysics

BARBARA I BROWN, PHD Professor Emerita of Biological Chemistry

DAVID HENRY BROWN, PHD Professor Emeritus of Biological Chemistry

PETER M BURGERS, PHD, MS Professor of Biochemistry and Molecular Biophysics

PETER TRISTRAM CHIVERS, PHD Assistant Professor of Biochemistry and Molecular Biophysics

SUDHA MAHAJAN COWSIK, PHD, MS Research Instructor in Biochemistry and Molecular Biophysics

ALLAN DOCTOR, MD Associate Professor of Biochemistry and Molecular Biophysics

GEORGE ROBERT DRYSDALE, PHD, MS Professor Emeritus of Biochemistry and Molecular Biophysics

SARAH C.R. ELGIN, PHD Professor of Biochemistry and Molecular Biophysics

ELLIOT L ELSON, PHD Alumni Endowed Professor of Biochemistry and Molecular Biophysics

WILLIAM A FRAZIER, III, PHD Professor of Biochemistry and Molecular Biophysics

DAVED H FREMONT, PHD Associate Professor of Biochemistry and Molecular Biophysics

CARL FRIEDEN, PHD Professor of Biochemistry and Molecular Biophysics

ERIC A GALBURT, PHD Assistant Professor of Biochemistry and Molecular Biophysics

ROBERTO GALLETTO, PHD, MS Assistant Professor of Biochemistry and Molecular Biophysics

GREGORY I GOLDBERG, PHD, MA Professor of Biochemistry and Molecular Biophysics

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EVAN DAVID KHARASCH, MD, PHD Professor of Biochemistry and Molecular Biophysics

STUART A KORNFELD, MD Professor of Biochemistry and Molecular Biophysics

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ANDRZEJ MODEST KREZEL, PHD, MS Research Professor of Biochemistry and Molecular Biophysics (Pending Executive Faculty Approval)

LINDA C KURZ, PHD, MA Research Associate Professor Emeritus of Biochemistry and Molecular Biophysics

ELLEN LI, MD, PHD Associate Professor of Biochemistry and Molecular Biophysics

TIMOTHY M LOHMAN, PHD Marvin A Brennecke Professor of Biological Chemistry in Biochemistry and Molecular Biophysics

ROBERT H MACH, PHD Professor of Biochemistry and Molecular Biophysics

PHILIP W MAJERUS, MD Professor of Biochemistry and Molecular Biophysics

JOHN E MAJORS, PHD Associate Professor of Biochemistry and Molecular Biophysics

GARLAND R MARSHALL, PHD Professor of Biochemistry and Molecular Biophysics

F. SCOTT MATHEWS, PHD Professor Emeritus of Biochemistry and Molecular Biophysics

STEPHEN M MOERLEIN, PHD, MA Associate Professor of Biochemistry and Molecular Biophysics

ROHIT V. PAPPU, PHD, MS Associate Professor of Biochemistry and Molecular Biophysics

LINDA J PIKE, PHD Professor of Biochemistry and Molecular Biophysics

JAY WILLIAM PONDER, PHD Associate Professor of Biochemistry and Molecular Biophysics

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SCOTT A WILDMAN, PHD, MS Research Assistant Professor of Biochemistry and Molecular Biophysics

YOUNAN XIA, PHD, MHS Professor of Biochemistry and Molecular Biophysics

Department's Web Site

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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, 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.

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; i.e., muscle, cardiovascular, renal, respiratory, gastrointestinal and endocrine. Limited space is available for non-medical students with instructor's permission. This course is cross-listed in the Department of Anatomy and Neurobiology.

Selectives

M04 537 CARDIOVASCULAR CONTROL MECHANISMS

Instructors: Jeff Gidday PhD, 286-2795; David Murray 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. 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, arrhythmias 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. A class-wide, follow up discussion and systematic review will follow the individual small group workshops.

M04 5667 MICROCIRCULATION

Instructor: Jeffrey M. Gidday, PhD, 286-2795

The homeostatic functions of the microcirculation include the active regulation of metabolite exchange with parenchymal cells, immune surveillance, and a multifaceted response to injury and disease. This elective provides an overview of the normal and abnormal cell biology and physiology of the microcirculation. Four sessions will be organized around conceptual presentations and laboratory demonstrations by the instructor, and two-part topic presentations by students following independent library research that focuses on basic physiology and clinically relevant pathophysiology. Basic physiology research topics might include: regulation of tissue blood flow and vascular tone, propagated vasodilation, hemodynamics and rheology of erythrocytes and leukocytes, cell biology of the endothelium, control of capillary permeability, and angiogenesis. Common disease entities involving microcirculatory dysfunction include: stroke and myocardial ischemia, diabetes, inflammation, tumor angiogenesis, retinopathy of prematurity, pulmonary edema, various autoimmune diseases, as well as the adaptive cardiovascular responses to exercise or high altitude. This selective is cross-listed in the Department of Neurological Surgery.

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, and it is now clear that many diseases, including epilepsy, diabetes, cardiac arrhythmias and cystic fibrosis result directly from inherited ion channel mutations. 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 Medical Sciences Building, 362-1668. Signaling mechanisms in cardiovascular and neurological disorders.

John Cooper, MD, PhD, 416 McDonnell Medical Sciences 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 Huettnner, 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, 3600 Cancer Research Building, 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, 425 McDonnell Medical Sciences Building, 362-6630. Ion channel biology. Multiple levels of analysis from the molecular basis of channel function to *in vivo* physiology and disease.

Helen Piwnicka-Worms, PhD, 554 McDonnell Medical Sciences Building, 362-6812. Cell cycle- and checkpoint-control in normal and cancer cells.

Paul Schlesinger, MD, 406 McDonnell Medical Sciences Building, 362-2223. Molecular mechanism of BCI-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, 514 McDonnell Medical Sciences Building, 362-3934. 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 Medical Sciences 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 Medical Sciences 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. Research in our group focuses on understanding genome surveillance and repair systems and how defects in these systems lead to cancer. A major effort in the lab is to investigate how cells maintain the integrity and stability of the genome when the most dangerous type of DNA damage, DNA double-strand breaks, occur in chromatin. We employ multiple experimental systems, including *Xenopus* egg extracts and human cells, to dissect the mechanisms and regulation of DNA surveillance and repair networks. In addition, we utilize a "laser scissors" technology in combination with advanced imaging tools to visualize the DNA damage response in individual cells. Currently, we are pursuing the following fundamental questions:

1. How do cells read the DNA damage signal? We investigate the molecular mechanisms by which proteins such as the Mre11-Rad50-NBS1 complex sense DNA double-strand breaks in chromatin. We also are seeking the nature of the chromatin domains flanking the DNA break ends and their role in promoting DNA damage sensing.
2. How do cells translate the DNA damage signal into downstream checkpoint response? Cells that experience DNA damage respond by activating a checkpoint which stops the cell cycle until the damage can be repaired. Activation of the atypical protein kinases ATM and ATR is key to the conversion of the

DNA damage signal into downstream checkpoint signaling events. We are extending our study on how the recognition and processing of DNA double-strand breaks lead to activation of these kinases and downstream cell signaling.

3. How do cells orchestrate various DNA damage signaling pathways in order to promote maintenance of genome stability? DNA double-strand breaks activate a plethora of cellular responses, such as checkpoint-mediated cell cycle arrest, DNA repair and transcriptional reprogramming. We investigate the functional interplays between these biological responses and the importance of coordination of these processes in preserving genome stability.

We are also interested in identifying and characterizing new components of the DNA surveillance and repair networks using genomics and proteomics tools. By understanding the basic mechanisms of genome maintenance, we hope to contribute to the understanding of the process of tumorigenesis and the development of new cancer therapeutics.

Faculty

PHILIP DAMIEN STAHL, PHD Edward Mallinckrodt Jr Professor of Cell Biology and Physiology, Head of Department of Cell Biology and Physiology

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GUOJUN BU, PHD Professor of Cell Biology and Physiology

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YORAM RUDY Professor of Cell Biology and Physiology

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CLAY F SEMENKOVICH, MD Professor of Cell Biology and Physiology
ROBERT M SENIOR, MD, MLA Professor of Cell Biology and Physiology
THOMAS H STEINBERG, MD Associate Professor of Cell Biology and Physiology
SHEILA STEWART-WIGGLESWORTH, PHD Assistant Professor of Cell Biology and Physiology
STEVEN M STRASBERG, MD Associate Professor of Cell Biology and Physiology
XIONG SU, PHD Assistant Professor of Cell Biology and Physiology
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JASON DEAN WEBER, PHD Associate Professor of Cell Biology and Physiology
KATHERINE N WEILBAECHER, MD Associate Professor of Cell Biology and Physiology
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THOMAS A WOOLSEY, MD Professor of Physiology
KEVIN E YARASHESKI, PHD, MA Professor of Cell Biology and Physiology
ZHONGSHENG YOU, PHD, MS Assistant Professor of Cell Biology and Physiology
HAIXIA ZHANG, MD, PHD, MS Research Instructor in Cell Biology and Physiology

Department's Web Site

<http://www.cellbiology.wustl.edu/>

Edward Mallinckrodt Department of Developmental Biology

The principal research activities of the Department of Developmental Biology are focused on the profoundly complex challenge of attaining a mechanistic understanding of embryogenesis, encompassing the earliest developmental processes in the embryo, organogenesis, stem cell biology, organism and cellular physiology, 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 where recent literature and ongoing research are discussed.

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, 3rd Floor McDonnell Medical Sciences Building, 362-2556. Secretion, targeting and structure-function of the human placental and pituitary glycoprotein hormones.

Douglas F. Covey, PhD, 3rd Floor McDonnell Medical Sciences Building, 362-1726. Medicinal chemistry of steroids.

Aaron DiAntonio, MD, PhD, 333 McDonnell Medical Sciences Building, 362-9925. Synaptic growth and regeneration in *Drosophila* and mouse.

Gregory A. Grant, PhD, 4th Floor Biotechnology Center, 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. Notch Biology and disease, and vertebrate organogenesis. Students will participate in studies addressing the role of Notch in disease using mouse models of kidney disease (Alagille Syndrome, Congenital Anomalies of the Kidney and Urinary Tract (CAKUT), Renal Hypodysplasia (RHD) and papillary renal carcinomas (PRCC); skin abnormalities (alopecia, cancer, ectopic dermatitis) and their link to cancer and asthmas. We also use High Throughput Screening to methodically look for integration of Notch with other signaling pathways.

Kerry Kornfeld, MD, PhD, 3rd Floor Cancer Research Building, 747-1480. Signal transduction during development. Zinc metabolism. Aging.

Kristen Kroll, PhD, Room 320 McDonnell Medical 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 Medical Sciences Building, 362-7036. Biology of adult stem cells; gut development and morphogenesis.

Jeanne M. Nerbonne, PhD, 3rd Floor McDonnell Medical Sciences 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, 3rd Floor South Building, 362-3908. Fibroblast Growth Factor signaling pathway regulation of development and regeneration in the inner ear, lung, heart, and skeletal system. Intracellular FGF regulation of neuronal excitability. Otopetrin gene family function in the vestibular system and brown fat.

John H. Russell, PhD, 3rd Floor McDonnell Medical Sciences Building, 362-2558. Mechanisms of lymphocyte-mediated inflammation and pathogenesis in the central nervous system.

Faculty

LILIANNA SOLNICA-KREZEL, PHD, MS Professor of Developmental Biology, Head of the Department of Developmental Biology

RAJENDRA APTE, MD, PHD Assistant Professor of Developmental Biology

THOMAS J BARANSKI, MD, PHD Associate Professor of Developmental Biology

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ZHOUFENG CHEN, PHD, MS Associate Professor of Developmental Biology

RICHARD A CHOLE, MD, PHD Professor of Developmental Biology

DOUGLAS FLOYD COVEY, PHD, MA Professor of Pharmacology in Developmental Biology

PETER A. CRAWFORD, MD, PHD Assistant Professor of Developmental Biology

CHARLES M CROWDER, MD, PHD Associate Professor of Developmental Biology

NICHOLAS O DAVIDSON, MBBS Professor of Developmental Biology

AARON DIANTONIO, MD, PHD, M PHIL Professor of Developmental Biology

ALEX S EVERS, MD Professor of Developmental Biology

JEFFREY I GORDON, MD Professor of Developmental Biology

GREGORY ALAN GRANT, PHD Professor of Developmental Biology

RICHARD WARREN GROSS, MD, PHD Professor of Developmental Biology

ROBERT O HEUCKEROOTH, MD, PHD Professor of Developmental Biology

DAVID MICHAEL HOLTZMAN, MD Professor of Developmental Biology

RICHARD S HOTCHKISS, MD Professor of Developmental Biology

JAMES J HSIEH, MD, PHD Associate Professor of Developmental Biology

F. EDMUND HUNTER, JR, PHD Professor Emeritus of Molecular Biology and Pharmacology

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DAVID R PIWNICA-WORMS, MD, PHD Professor of Developmental Biology

DEBORAH C RUBIN, MD Professor of Developmental Biology

DAVID RUDNICK, MD, PHD Assistant Professor of Developmental Biology

JOHN HALL RUSSELL, PHD Professor of Developmental Biology

SCOTT SAUNDERS, MD, PHD Associate Professor of Developmental Biology

ATSUSHI SAWADA, PHD Research Instructor in Developmental Biology

JEAN E. SCHAFFER, MD Professor of Developmental Biology

ALAN L SCHWARTZ, MD, PHD Professor of Developmental Biology

DIANE S SEPICH, PHD Research Assistant Professor of Developmental Biology (Pending Executive Faculty Approval)

THADDEUS S. STAPPENBECK, MD, PHD Assistant Professor of Developmental Biology

KAMESWARAN SURENDRAN, PHD Instructor in Developmental Biology

DWIGHT A TOWLER, MD, PHD Professor of Developmental Biology

MICHAEL J WELCH, PHD, MA Professor of Developmental Biology

DAVID B WILSON, MD, PHD Associate Professor of Developmental Biology

Department's Web Site

<http://molecool.wustl.edu/>

James S. McDonnell Department of Genetics

The Department of Genetics is at the forefront in developing new methods for high throughput analysis of the human genome and for identifying and isolating genes responsible for a range of human phenotypes, Mendelian traits and common/complex diseases. The department supports a broad program of preclinical and graduate instruction in genetics, with research opportunities ranging from established experimental organisms to humans, and from molecular genetics to population genetics.

A significant portion of the first-year course in basic medical sciences is devoted to human and clinical genetics, with emphasis on the impact of new genetic technologies on 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.

The Department of Genetics offers a broad range of training in virtually all major areas of modern genetics. Numbered among the faculty are world leaders in genetic mapping, new methods of DNA manipulation, cloning and sequencing, computational biology, developmental genetics, neurogenetics, human and statistical genetics, and population and evolutionary genetics. Research opportunities with experimental organisms include genetic studies with zebrafish, fruit flies, nematodes, yeast, bacteria and the alga *Chlamydomonas*.

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.

Courses

First Year

M30 511 MEDICAL GENETICS

For full description, see Department of Pediatrics.

Fourth Year

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, 362-3690. Genetic epidemiology. Application and evaluation of statistical methods for the genetic analysis of complex human traits. Emphasis is on quantitative traits, especially cardiovascular disease, obesity and cancer.

Anne Bowcock, PhD, 331 Biotechnology Center, 747-3261. Molecular genetics of human disease.

Barak Cohen, PhD, Room 5509, 4444 Forest Park, 362-3674. Functional genomics in yeast. Gene regulatory networks, complex trait genetics, synthetic biology studies of cis-regulation.

Susan K. Dutcher, PhD, 875 McDonnell Medical Sciences 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, 747-1808. Population and evolutionary genetics, evolution of gene regulation in yeast, human evolution.

James Havranek, PhD, 822 McDonnell Medical Sciences 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 Medical Sciences 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.

Michael Lovett, PhD, 331 Biotechnology Center, 747-3261. The molecular basis of human genetic diseases, cDNA and expression profiling technologies. Systems biology of vertebrate craniofacial morphogenesis, inner ear development and hearing loss.

Elaine Mardis, PhD, Room 4122, 4444 Forest Park, 286-1805. Technology development for second-generation DNA sequencing with an emphasis on methods and applications development. Non-human primate genomics.

Rob Mitra, PhD, Room 4184, 4444 Forest Park, 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.

Michael A. Province, PhD, Suite 6318, 4444 Forest Park, 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 Center, 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 Medical Sciences 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, 812A McDonnell Medical Sciences 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, 747-5534. Computational biology of protein-DNA interactions, RNA folding, gene and promoter finding. Biochemical analysis of DNA-protein interactions and gene regulation.

George Weinstock, PhD, Room 4121, 4444 Forest Park, 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, 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.

Faculty

JEFFREY D MILBRANDT, MD, PHD Head of the Dept of Genetics, Professor of Genetics

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ALISON GOATE, PHD Professor of Genetics

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CHI GU, PHD, MS Associate Professor of Genetics
DAVID H GUTMANN, MD, PHD, MS Professor of Genetics
TED H HANSEN, PHD, MS Professor of Genetics
JAMES J HAVRANEK, PHD Assistant Professor of Genetics
ANDREW C HEATH, PHD Associate Professor of Genetics
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GEORGE BROOKS JOHNSON, PHD, MA Professor of Genetics
STEPHEN L JOHNSON, PHD Associate Professor of Genetics
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TIMOTHY J LEY, MD Professor of Genetics
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ROBI D. MITRA, PHD Assistant Professor of Genetics
ROSALIND J NEUMAN, PHD, MA Research Professor of Genetics
MICHAEL A PROVINCE, PHD, MA Professor of Genetics
DABEERU C RAO, PHD, MS Professor of Biostatistics in Genetics
JOHN P RICE, PHD, MA Professor of Genetics
JANNETTE RUSCH, PHD Research Instructor in Genetics
NANCY L. SACCONI, PHD, MS Assistant Professor of Genetics
LAWRENCE B SALKOFF, PHD Professor of Genetics
MARK STEVEN SANDS, PHD Professor of Genetics
YO SASAKI, PHD, MS Research Instructor in Pathology and Immunology
STANLEY A SAWYER, PHD, MA Professor of Genetics
BARBARA ANNA SCHAAL, PHD, MS Professor of Genetics
TIM B SCHEDL, PHD Professor of Genetics
ALAN SHIELS, PHD Professor of Genetics
JAMES B SKEATH, PHD Associate Professor of Genetics
GARY D STORMO, PHD, MA Professor of Genetics, Joseph Erlanger Professor
BRIAN K SUAREZ, PHD, MA Associate Professor of Genetics
ALAN ROBERT TEMPLETON, PHD, MA Professor of Genetics
MICHAEL H. TOMASSON, MD Associate Professor of Genetics
MATTHEW JOHN WALTER, MD Assistant Professor of Genetics
TING WANG, PHD, MS Assistant Professor of Genetics
MICHAEL PETER WHYTE, MD Professor of Genetics
MARY KAYE WOJCZYNSKI, PHD Research Instructor in Genetics
MING YOU, MD, PHD Professor of Genetics
QUNYUAN ZHANG, PHD, MS Research Assistant Professor of Genetics
WEIXIONG ZHANG, PHD, ME, MS Professor of Genetics

Department's Web Site

<http://www.genetics.wustl.edu/>

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, Kenneth S. Polonsky, MD
(Chairman, Department of Medicine)

Veterans Administration Medical Center, Scot G. Hickman, 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
Dwight A. Towler, MD, PhD, 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

Infectious Diseases (Clinical)
Victoria J. Fraser, 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, Interim 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.

Courses

First Year

M25 507 THE PRACTICE OF MEDICINE I

Instructor: Robert J. Rothbaum, MD, 286-2546

This course employs a variety of teaching techniques, instructors and venues. Some, like lectures, will be familiar. Others, such as one-on-one interviews in the hospital, will be new. Some course material is easily formatted into solid blocks, such as the teaching of statistical methods. Other content streams throughout the course, like interviewing techniques and history interpretation. Particular areas may be stimulating and rewarding, and other areas may seem overemphasized. As with patients, each of you comes with a unique past and active history, previously formed interests, and individual goals. Your prior contacts and personal experiences in science or medicine also influence you. It is impossible to account for all of these unique features, so we designed the course to accommodate a variety of learning interests and styles. Some will resonate with you; others may not. We hope to provide an opportunity for you to hone the skills that you already possess and acquire new skills necessary and important to the practice of medicine.

What are the educational goals of POM I?

Students will learn:

1. To perform a complete history and physical examination with thoroughness, accuracy, sensitivity and compassion.
2. To communicate effectively, efficiently and compassionately with patients, families and other health professionals.

3. To describe and analyze the statistical methodology of clinical studies and apply the results to individuals and groups of patients.
4. To identify and investigate ethical, cultural, socioeconomic and political factors relevant to medical interactions.
5. To examine and analyze personal and professional competencies, limitations and behaviors.

How do we accomplish these goals?

1. Experiential learning is the educational paradigm. 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. Lectures are at a minimum.
 - 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 physician and WUMS IV mentors, standardized patient experiences with videotape review, physicians' offices, patient and family homes with and without home care professionals, city clinics, intensive care units, emergency rooms and clinical suite practice area.

Selectives

M04 500G PUBLIC SPEAKING FOR MEDICAL STUDENTS

Instructor: Thomas M. De Fer, MD, 747-4366

Invariably, all medical students have to speak in front of an audience at some point in their career. Whether they are giving an informal presentation to classmates, speaking about their research at a national conference, or presenting a patient to an attending; the ability to effectively and professionally communicate information is one of the key skills all medical students must possess. In order to be successful in each of these environments, students must have a strong background in both basic public speaking skills and the effective use of PowerPoint presentations. Through this course students will have the opportunity to develop and hone their public speaking skills through interactive exercises, PowerPoint instruction and personalized feedback facilitated by faculty members and professional public speaking coaches. This course serves as an excellent opportunity for student of all abilities and backgrounds to improve their communication skills and develop added confidence in preparation for future academic and clinical pursuits. It is important for the student to note that this is a participatory class; therefore, attendance is particularly important. While illness and emergencies arise, attendance will otherwise be a requirement for successful completion of the course. Teaching objectives include: 1) To independently advance the public confidence, vocal impact, physical presence and overall communication skills of each individual student participating in the course; and 2) To teach effective use of PowerPoint and other graphic aids when presenting scientific and medical information.

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 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 elective" experience (with no additional credit) could sign up for more in-depth clown training in which the skills of makeup application, costuming, juggling and slapstick would be offered. The latter

would be limited to 4-6 students per semester because of the time needed to develop a clown character.

M04 514 CARDIOVASCULAR BIOPHYSICS

Instructor: Sándor J. Kovács, PhD, MD, 454-8146

This elective is intended for students with a background in the physical sciences: physics, mathematics, engineering, computer sciences and comparable fields. Topics covered vary according to the interest of the staff and the clinical spectrum encountered during the course of the elective. Included are quantitative cardiovascular physiology and pathophysiology, nonlinear dynamics and its application to physiology, biophysics, ultrasonics, biomechanics and biomedical engineering. The focus of the elective is the application of quantitative mathematical and engineering principles to solve real problems encountered in clinical practice. Participation in weekly seminars and familiarity with selected topics of current research are included. This course is offered in alternate years (2010-11).

M04 516H PATIENT, PHYSICIAN AND DRAMA

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

In this selective students will interact with theatre professionals in short dramas that are centered about medical themes. The goal will be to achieve a level of performance of the drama as well as an understanding of the issues portrayed. Importantly the students will learn how to effectively convey emotion and information in manner most likely to be received by patients.

M04 520H ART AND MEDICINE

Instructor: Peter G. Tuteur, MD, 454-8763

This course is designed for students to develop observational skills through viewing works of art. Structured visual analysis will be a primary tool used to improve ability to recognize and scrutinize visual cues. Initially, the images viewed will be selected to contain specific components conducive to developing these skills. Students will view multiple works of art and share observations in group discussion. How individuals attach meaning to visual images will be discussed. Through a series of themed sessions, students will view works of art relating to health and health status, social and economic status, depiction of healers/health workers and portrayal of the human body. Sessions will be held at the Saint Louis Art Museum; students will use both the main galleries and special study rooms to view works. 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.

M04 528H TERMINAL ILLNESS AND DEATH

Instructor: Ellen F. Binder, MD,

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 viewing of videotapes and interviews with practitioners and/or patients and will rely heavily on student participation. Students are required to spend a half-day (or part of a day) making rounds with a nurse from the BJC Hospice Program.

M04 5302 FRONTIERS IN LEUKEMIA, 747-4437

Instructor: Timothy Graubert

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 are all physician-scientists actively engaged in these areas of research.

M04 533 TROPICAL MEDICINE

Instructor: Daniel E. Goldberg, MD, 362-1514

Washington University School of Medicine has several faculty members who are actively researching diseases specific to developing countries. This elective is designed to bring these individuals together, in an informal discussion forum with students, to highlight the problems particular to geographical

medicine. The elective will cover issues including eradication, prevention and treatment, immunology and vaccine development, as well as descriptions of the different disease syndromes. This selective is cross-listed in the Department of Molecular Microbiology.

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).

M04 582H PHILOSOPHY OF MEDICINE

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

M04 587Z INTRODUCTION TO PRIMARY CARE GERIATRICS

Instructor: Walton Sumner, II, MD, 454-8164

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, Anne Glowinski, MD, Jay F. Piccirillo, MD, Rebecca S. Dresser, JD, Stephen S. Lefrak, MD, Julie K. McManemy, MD, MPH

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, Case Development, Communication, Ethics and Health Policy, Health Promotion/Disease Prevention, Interpreting Illness, Ophthalmology, Patient Sessions, Radiology and Scientific Methods. The learning objectives for each section of POM II emphasize topics and skills used in all fields of medicine, and the majority of the course work will be taught in small groups or through clinical experiences. 83

clock hours.

M25 605A INFECTIOUS DISEASES AND MEDICAL MICROBIOLOGY

Instructor: Nigar Kirmani, MD, 454-8217

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: Leslie E. Kahl, MD, 454-7279

The rheumatology pathophysiology course begins with an overview of the structure, function and physiology of the normal joint. The pathophysiology of both localized joint disorders such as osteoarthritis and infectious arthritis are presented, along with systemic inflammatory disorders including rheumatoid arthritis, lupus and vasculitis. Diagnosis, pharmacologic management and rehabilitation of these conditions are included. In small group sessions, students interview patients and observe the characteristic physical findings of these disorders.

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

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: Stanley Misler, PhD, MD, 454-7719, 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

Family Medicine Site Director: Walton Sumner, MD, 454-8164

VA Site Director: Scot G. Hickman, MD, 289-6308

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 John Cochran Veterans Administration Medical Center. For the outpatient rotations, students are placed with community-based internal medicine or family practice physicians. 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: Robert J. Rothbaum, MD, 454-2134

Clerkship Coordinators: Melody Damico, 362- 3480

Objectives:

1. To review challenges and dilemmas in clinical medicine
2. To examine clinical experiences from a variety of perspectives

In this course, themes and topics introduced in POM I and II are revisited and refocused on the students' ongoing clinical experiences. The course consists of quarterly sessions focused on common clinical challenges and experiences. 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 and plans are detailed in the week or two prior to each session.

Recent Topics Include:

1. How do I get the most out of a clinical rotation?
2. Diagnostic errors: What happens and why?
3. Clinical Challenges: Uncovering Abuse
4. Humor and Laughter in Medicine

Topics and plans are detailed in the week or two prior to each session.

Date: After the shelf exam at the end of each 12-week block

Time: Lunch begins at 12:30 p.m.

Session runs from 1 to 2:30 p.m.

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 five 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 a slit lamp 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, students will begin primarily evaluating non-emergent patients in the emergency department (EM 2) and Urgent Care 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 presentation during a shift, 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: Walton Sumner II, MD, 454-8164

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: David B. Carr, MD, 286-2706

The primary goal of the four-week clerkship in Geriatrics is to provide an opportunity for students to gain proficiency in the principles of geriatric evaluation, including the medical, psychological, social and functional assessments of older adults. Direct, hands-on experience with patients is a major feature of the clerkship. Students are expected to participate in the evaluation of three to five patients per week, in a variety of settings including the hospital consult service, geriatric palliative care, geriatric rehabilitation, long-term care and the outpatient geriatric assessment center. Students will also participate in the Alzheimer's Disease Research Center, hospice and geropsychiatry rounds and attend geriatric conferences while on the rotation.

Students are assigned to a variety of attendings to enhance the experience. There is no night call or call on weekends. Participation on the hospital consult service will occur depending on volume. The day normally begins at 8 a.m. and is usually finished by 5 p.m. There will be time to read the detailed syllabus/bibliography. Students will be asked to present a brief topic of their choice at the end of the rotation and demonstrate knowledge of the geriatric screens and assessments.

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: Christine McIntosh, 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 six/period for Weeks 1, 5, 9; two/period for Weeks 13, 17, 21; and one/period for Weeks 25, 29, 33, 37, and 41.

Valid start weeks for 4-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, Leslie Kahl, MD, and Prabha Ranganathan, 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: 1

Valid start weeks for 4-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. An extensive collection of self-study materials, including reprints, textbooks, slides and CD-ROM discs is available.

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): Scot Hickman, MD, 289-6308

Location: St. Louis Veterans Affairs Medical Center

Elective Contact: Scot Hickman, 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: Limit three/period for Weeks 1, 5, 9; one/period for Weeks 13, 17, 21, 25, 29, 33, 37, and 41.

Valid start weeks for 4-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 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 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 2 and 4-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 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, 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): David Carr, MD, 286-2700, press option 1

Location: Washington University, Health Key Building, Third floor, Room 360

Elective Contact: David Carr, MD, 286-2700, press option 1

Other Information: Meet at the Division of Geriatrics office, Health Key Building, 4488 Forest Park Blvd., Suite 201, 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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 research and clinical conferences in geriatric medicine, memory and aging, geropsychiatry, 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): Mark Thoeke, MD, and Caroline Kahle, MD, 362-1700

Location: Room 16304, 16th Floor, West Pavilion, Division of Hospital Medicine Administrative Office

Elective Contact: Mary Russell, 362-1700

Other Information: Students should meet in the Division of Hospital Medicine office, Room 16304, 8 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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 all 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: Group of four hospitalist attending

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: Wohl Clinic

Elective Contact: Mary Hummert, 747-4156

Other Information: Contact Emergency Medicine Division office at 747-4156 for scheduling one week

prior to the rotation.

Enrollment limit per period: 6

Valid start weeks for 4-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 are offered the opportunity to ride with EMS, though this is optional and not required or evaluated. Students desiring a letter of recommendation from Larry Lewis, MD, 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 a total of five days off of 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 one month 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): Ibrahim Saeed, MD, 747-3625, David Schwartz, MD, Arthur Halle, MD, Sudhir Jain, MD, Benico Barzilai, MD, Keith Mankowitz, MD, and Joshua Stolker, MD

Location: 13th Floor, Northwest Tower

Elective Contact: Ibrahim Saeed, MD, 747-3625

Other Information: Students meet on the 13th Floor, Northwest Tower, 9 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 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 75%, Outpatient 15%, 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: Christine McIntosh, 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 two/period for Weeks 1, 5, 9, 13, 17, and 21 and one/period for Weeks 25, 29, 33, 37, and 41.

Valid start weeks for 4-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, 2nd Floor, VA Hospital

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.

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, 13th Floor Northwest Tower, 8 a.m. first day of elective or page the EP Fellow at 424-4680. 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.

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 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.

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: Students should contact the Dermatology office (454-8622) prior to first day for room assignment.

Enrollment limit per period: 4

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 Third Year Dermatology Clerkship. Students are limited to taking either one or the other — NOT BOTH. Students are also limited to taking either M25 830/Dermatology or M25 831/Pediatric Dermatology 4th year electives-NOT BOTH.

Student time distribution: Inpatient 25%, Outpatient 50%, Conferences/Lectures 25%; Specialty Care 100%

Major teaching responsibility: Course Master for rotation, private attending and senior resident

Patients seen/weekly: 25-50

On call/weekend responsibility: None

M25 831 PEDIATRIC DERMATOLOGY

Instructor(s): Susan J. Bayliss, MD, 454-2714

Location: 3N48 Children's Hospital

Elective Contact: Rosemarie Brannan, 454-8622

Other Information: Call 454-2714 prior to first day of elective. Reporting time is 7:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This clinical rotation will be available to students interested in dermatology, pediatrics or both. Students will follow the dermatology rotation (M25 830) with an emphasis on pediatric dermatology by attending pediatric dermatology clinics, seeing consults, etc. Enthusiastic students will have an opportunity to write up a case report if they wish, but need to notify Bayliss before the course. Students can take either this elective or M25 830/Dermatology — NOT BOTH.

Student time distribution: Inpatient 1%, Outpatient 74%, Conferences/ Lectures 25%; Subspecialty Care 100%

Major teaching responsibility: Single attending

Patients seen/weekly: 50-100

On call/weekend responsibility: None

M25 836 CLINICAL GASTROENTEROLOGY AND HEPATOLOGY

Instructor: Gregory Sayk, MD, MPH, 454-8201

Location: Barnes-Jewish Hospital, East Pavilion

Elective Contact: Mauricio Lisker-Melman, MD, 454-8141

Other Information: Students meet in the Digestive Disease Clinical Center, street level East Pavilion, Barnes-Jewish Hospital, 8 a.m. first day of elective.

Enrollment limit per period: 4

Valid start weeks for 4-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, 362-1700

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Mary Russell, 362-1707

Other Information: Students should meet in the Division of Hospital Medicine office, Room 16304, 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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 844 HEMATOLOGY AND HEMOSTASIS

Instructor(s): Philip Majerus, MD, Morey Blinder, MD, and Stuart Kornfeld, MD, 362-8801
Location: 8441 Clinical Sciences Research Building
Elective Contact: Morey Blinder, MD, 362-8857
Other Information: Students meet in Barnes-Jewish Hospital North, 7900 Nursing Division, 8 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.

Activities planned include work-up of patients at Barnes-Jewish Hospital under the supervision of the hematology fellow and staff consultant; attendance at clinical rounds three to five hours weekly; participation in outpatient clinics; experience in various procedures, especially blood and bone marrow morphology and in interpretation of coagulation tests. Weekly 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, Reina Villareal, MD, and Dwight Towler, MD, PhD
Location: Barnes-Jewish Hospital
Elective Contact: Michael Whyte, MD, 872-8305
Other Information: Please contact Whyte a week before elective for instruction and meeting location.
Enrollment limit per period: 2
Valid start weeks for 4-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 of disorders of bone and mineral metabolism, their etiology and pathogenesis, and to expose him/her to current concepts of therapy. The student will see patients at Barnes-Jewish Hospital, St. Louis Children's 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 noninvasive methods for measuring bone mass in the diagnosis and management of skeletal diseases also will be stressed.

While students rotate through the Division of Bone and Mineral Metabolism, they will be asked to participate in the weekly divisional conferences. Faculty and medical students will present interesting cases for discussion or the students can present a pertinent topic they have researched during their

rotation presenting the recent medical literature on topics related to bone metabolism, bone densitometry and patient care issues involving osteoporosis, metabolic bone disease, Paget's disease, congenital bone diseases or other topics encountered during their clinical experience.

Responsibilities: Shriners Hospital Wednesday a.m./p.m. (Whyte); CAM BMD teaching service, Thursday; Bone Research Conference Friday 9 a.m. Brown Room; Bone Health Case Conference, 7101 Steinberg conference room, North Campus, Friday 11 a.m. or 3 p.m.
Student time distribution: Inpatient 5%, Outpatient 80%, Conferences/Lectures 15%; Subspecialty Care 100%
Major teaching responsibility: Attendings
Patients seen/weekly: ~20
On call/weekend responsibility: None

M25 850 HEMATOLOGY AND ONCOLOGY IV

Instructor(s): Scot Hickman, MD, Vorachart Auethavekiat, MD, David Kuperman, MD, and Daniel Morgensztern, MD, 289-6308
Location: John Cochran VA Hospital
Elective Contact: Scot Hickman, MD, 289-6308
Other Information: Students should contact Hickman prior to first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The student will have major inpatient and outpatient exposure to the management of the following: non-small cell and small cell lung cancer, carcinoma of the colon, prostate cancer, anemia, lymphoma and leukemia. A wide variety of more esoteric tumors and hematological pathology may be encountered. In addition to diagnosis, staging and management, general oncological topics such as pain management, hypercalcemia of malignancy and malignant effusions will be discussed. The weekly schedule includes morphology sessions, multidisciplinary conferences and tutorial sessions with the student alone, which will require prior literature review.

Student time distribution: Inpatient 25%, Outpatient 70%, Conferences/Lectures 5%; Primary Care 25%, Subspecialty Care 75%
Major teaching responsibility: Attendings and some fellow teaching input as well
Patients seen/weekly: 25
On call/weekend responsibility: None

M25 856 INFECTIOUS DISEASE: CARE OF HIV-INFECTED PATIENTS

Instructor(s): Turner Overton, MD, 747-1929
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 Overton one week prior to the start of rotation. Students report to the ID Clinic/ACTU, Storz Building, 4570 Children's Place, 9 a.m. first day of elective.
Enrollment limit per period: 4
Valid start weeks for 4-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 maternal-HIV clinic, pediatric and adolescent HIV clinics, and several adult HIV clinics, along with participation in community-wide social service meetings, home visits and exposure to the Retrovirus laboratory and 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 65%, Conferences/Lectures 15%,
Other 20%; Subspecialty Care 100%
Major teaching responsibility: Attendings listed above as course instructors
Patients seen/weekly: 20

On call/weekend responsibility: None

M25 857 CLINICAL INFECTIOUS DISEASE INPATIENT CONSULT

Instructor(s): Victoria Fraser, MD, 454-8214

Location: Barnes-Jewish Hospital, North Campus

Elective Contact: Cindy Waterman, 454-8214

Other Information: Students should contact Cindy Waterman at 454-8214 first morning of elective.

Enrollment limit per period: 8

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Study of patients with infectious diseases. 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 are covered including opportunistic infections, community-acquired acute and chronic infections, and hospital-acquired infections.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Single attending and fellow

Patients seen/weekly: 15 new consults

On call/weekend responsibility: None

M25 861 ONCOLOGY-INPATIENT

Instructor(s): Alex Denes, MD, 362-4803

Location: Division 7900, 7th Floor CAM

Elective Contact: Helen Black, 747-5677

Other Information: Students meet on the 7th Floor CAM, POD B, Medical Oncology Outpatient Area, 8 a.m. first day of elective.

Enrollment limit per period: 6 students per block, on average one per attending

Valid start weeks for 4-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 bedside 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, 362-5677

Location: North Campus, 7900 Inpatient Floor

Elective Contact: Helen Black, 362-5677

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 subinterns 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: Denes and Roshal
Patients seen/weekly: 50
On call/weekend responsibility: One-in-four call

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 (8th Floor Barnes-Jewish Hospital, North Campus), 8 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-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): Marin Kollef, MD, 454-8764
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Rebecca Light, 454-8764
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 4-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, 362-5800, mdans@dom.wustl.edu

Location: 3320 Suite, Kingshighway Building, North Campus

Elective Contact: Maria Dans, MD, 362-5800, mdans@dom.wustl.edu

Other Information: Please e-mail coursemaster 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 4-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 will also be opportunities to work with the BJC Hospice Team and the St. Louis Children's Hospital WINGS program.

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 and make home visits with hospice care providers. 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 75%, Outpatient 15%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings (Maria Dans, MD, Bernie Shore, MD, Elliot Gellman, 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: 8th Floor Southwest Tower, Barnes-Jewish South Campus

Elective Contact: Karen Muehlhauser, 362-7617

Other Information: Students meet on 8th Floor Southwest Tower, Barnes-Jewish South Campus, 8:15 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.

In general, the 4-week rotation will be divided into two weeks general endocrinology and two 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 20%, Outpatient 70%, 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: Michael McKenzie, 362-5654

Other Information: Students meet on the 7th 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 4-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 (e.g. randomized studies showing that after surgery, chemotherapy will reduce the risk of recurrence from a particular cancer with a particular regimen). By spending time with clinicians, students will learn how to identify hereditary syndromes, use drugs for symptom relief and also learn how radiographic and laboratory tests allow oncologists to care for patients.

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 880 PULMONARY MEDICINE-BARNES-JEWISH HOSPITAL

Instructor(s): Daniel Rosenbluth, MD, and staff, 454-8762

Location: 5th Floor Kingshighway Building, North Campus

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 4-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): Carlos Daughaday, MD, 289-6306

Location: John Cochran VA Hospital

Elective Contact: Carlos Daughaday, 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 4-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 883 TRANSFUSION MEDICINE

Instructor(s): Douglas Lublin, MD, PhD, 747-0687

Location: Barnes-Jewish Hospital

Elective Contact: Mary Madden, 747-0687

Other Information: Students should discuss their rotation with Lublin and staff in advance. Students should meet the team at the Center for Pheresis on the 4th floor of the CAM at 9:30 a.m. first day of the elective. Contact resident on beeper 424-1154 if you have questions.

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.

This elective is designed to introduce the student to the clinical aspects of blood banking and transfusion medicine. The four-week elective will consist of regular didactic sessions with senior staff, teaching conferences and participation in daily clinical rounds. The student will develop clinical skills in areas related to transfusion practice, blood conservation and evaluation of transfusion reactions. Complex hematologic diseases such as the coagulopathies and diseases that require pheresis will serve to instruct in current clinical practice along with evolving applications of interventional hematology, such as photopheresis and peripheral stem cell harvest for marrow transplantation.

Student time distribution: For July, November and March: Inpatient 30%, Outpatient 30%,

Conferences/Lectures 40%; For remainder of year: Inpatient 40%, Outpatient 40%,

Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: 40-60

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 4-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: 1st Floor, Wohl Hospital

Elective Contact: Bradley Evanoff, MD, MPH, 454-8638

Other Information: Students should meet at 1st Floor, Wohl Hospital, 9 a.m. first day of elective.

Enrollment limit per period: 1 (2, by special arrangement)

Valid start weeks for 4-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 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: 0

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@im.wustl.edu

Other Information: Students should arrive at Washington University Heart Care Institute in Rolla, 1050 W. 10th Street, Suite 500, Rolla MO 65401 at 8 a.m. the first day of elective, and will be escorted to the unit where the instructor is rounding.

Enrollment limit per period: 1

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 25, 29, 33, and 37.

Clinical cardiology with some internal medicine in a rural setting. Inpatient and outpatient 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): Aubrey R. Morrison, MBBS, 362-7211
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 a.m. first day of elective. Ask for the Renal Fellow on the Consult Service.
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 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 two attendings and two renal fellows.

Student time distribution: Inpatient 80%, Outpatient 10%, Conferences/Lectures 10%; Primary Care 20%, Subspecialty Care 80%
Major teaching responsibility: Two 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, 454-7377
Location: 15th Floor, Northwest Tower
Elective Contact: Kristy Smith, 454-7377
Other Information: Students meet Kristy Smith in the Allergy and Immunology division office, 15th Floor, Northwest Tower, 8 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 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

M80 809 AMBULATORY CARE-JACQUELINE MARITZ LUNG CENTER

Instructor(s): Daniel Rosenbluth, MD, 454-8762
Location: Barnes-Jewish Hospital, North Campus, Lung Center, 8th Floor CAM
Elective Contact: Lisa Wetzel, 454-8762

Other Information: Students meet in the Lung Center, 8th Floor CAM, Barnes-Jewish Hospital, North Campus, 8 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-week blocks are: Weeks 17, 21, 25, 29, 33, 37, and 41.

The Jacqueline Maritz Lung Center houses the ambulatory care activities of the Divisions of Pulmonary Medicine, Thoracic Surgery, and Allergy/Immunology, as well as the pulmonary function laboratory. The student will rotate through (1) both general pulmonary and subspecialty clinics in Pulmonary Medicine (cystic fibrosis, transplantation, emphysema, etc.), (2) Thoracic Surgery clinic, (3) Allergy/ Immunology clinic, and (4) interpretation of pulmonary function tests. Chest imaging is also emphasized in the evaluation process. The rotation can be streamlined to meet areas of emphasis desired by individual students.

Student time distribution: Outpatient 100%, Conferences/Lectures 3-5/week; Primary Care 15%, Subspecialty Care: 85%

Major teaching responsibility: Multiple attendings

Patients seen/weekly: >20

On call/weekend responsibility: None

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, 10th Floor Clinical Sciences Research Building, 362-8391. A clinical research elective is offered in evaluation of patients with complement deficiency states and complex rheumatic disease syndromes.

Roberto Civitelli, MD, 502-3 Yalem and 7th Floor Steinberg Building, North Campus, 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 United States, likely affecting a quarter of the population. We have generated genetically manipulated mouse strains that offer insights into the mechanisms of hepatic steatosis. The student would work as part of a team, designing and conducting experiments that will test hypotheses concerning the mechanisms and consequences of hepatic steatosis. These studies will primarily involve mouse genetics, examining the expression of candidate genes under a variety of nutritional and pharmacologic settings that modulate hepatic lipid

metabolism. In addition we are using microarrays to study the spectrum of genetic changes that may predict the extent of hepatic lipid accumulation in patients with steatohepatitis. Our goal is to test hypotheses using mouse genetics and to extend these studies to examine the same pathways in humans with NAFLD. Our second area of interest concerns the genetic pathways involved in colorectal cancer, the second leading cause of cancer-related deaths. We have developed a novel strain of mice in which the dominant effects of mutations in the APC tumor suppressor gene have been abrogated through deletion of an RNA binding protein, apobec-1. This deletion has a major effect on the expression of cox-2, abrogating the increase in expression seen in human colonic adenomas and wild type mouse intestinal adenomas. These findings suggest that apobec-1 is a genetic modifier of colon cancer development. We will study the importance of apobec-1 expression in human colon cancer specimens and continue our murine genetic studies of this novel pathway for modulating colon cancer development and progression.

Thomas M. DeFer, MD, tdefer@dom.wustl.edu, 6604 Wohl Hospital Building, 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, MBBCH, 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 10 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 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 Ave., 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.

John O. Holloszy, MD, 2nd Floor West Building, 362-3506. The research in our laboratory deals with the roles of exercise in the prevention and reversal of abdominal obesity, insulin resistance and diabetes. Much of our research is directed to elucidation of the mechanisms by which exercise activates glucose transport and enhances insulin sensitivity in muscle. Our current research is focused on the signaling pathways by which exercise activates glucose transport and enhances insulin sensitivity in muscle.

Keith A. Hruska, MD, 5th Floor McDonnell Pediatric Research Building, 286-2772. The research in the laboratory focuses on new therapies for chronic kidney disease, osteoarthritis and their complications. The mechanisms of action of these therapies for nephropathy, vascular calcification and renal bone disease are being analyzed, as are mechanisms enabling cartilage transplantation.

Robyn S. Klein, MD, PhD, 7273 McDonnell Pediatric Research Building, 286-2140. Co-localization of chemokine and glutamate receptors in cultured neurons. The student will join a neuroimmunology laboratory engaged in understanding the role of neuronal chemokine receptors in glutamate signaling. The project will entail using immunohistochemical techniques and confocal microscopy to co-localize chemokine and glutamate receptors on a variety of subtypes of neurons that have been grown *in vitro*.

Stuart A. Kornfeld, MD, 8th Floor Clinical Sciences Research Building, 362-8803. Synthesis, processing and sorting of glycoproteins, including lysosomal enzymes. Intracellular protein trafficking.

Sandor J. Kovacs, PhD, MD, 4428 Kingshighway Building, 454-8097. 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, 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 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 and carcinogenesis. 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 the stroma in the stem cell niche is another topic of investigation. The student will

have the opportunity to learn basic molecular biology and physiology as it relates to small intestinal growth, development and function. Examples of techniques that are used in these studies include small animal surgery (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, 8th 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.

Stanley Misler, MD, PhD, 815 Yalem Research 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, 747-5585 or Michelle Roberts, robertsm@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.

John W. Newcomer, MD, 4412 Renard Hospital, 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 patients with schizophrenia. Students will have an opportunity to focus on a particular project of interest.

Richard E. Ostlund, MD, 8804 Wohl Hospital Building, 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.

Curtis A. Parvin, PhD, Room 2435 Kingshighway Building, Barnes-Jewish Hospital, North Campus, 454-8436. The application of biostatistical theory to data analysis issues in laboratory medicine, with particular emphasis on statistical approaches to characterizing the performance and quality of laboratory tests.

M. Alan Permutt, MD, 5th Floor Wohl Hospital, 362-8680 or 249-8683. Studies are being conducted to define the genetic susceptibility to diabetes in humans and experimental animal models. Lab methods include DNA sequencing, genotyping genetic variants in genomic DNA, creation of transgenic animals and characterization of expression levels in various tissues through analysis of RNA and protein. Another important activity is the elucidation of mechanisms involved in pancreatic islet beta cell failure to produce insulin in type 2 diabetes. Here we study insulinoma cells in culture, isolated islets and mice created to overexpress or eliminate critical genes involved in insulin production and secretion.

Katherine Ponder, MD, 8818 Cancer 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, 8th 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, Suite 402, Bank of America Building, 4625 Lindell Blvd. (Lindell and Euclid), 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, such as 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.

Thomas H. Steinberg, MD, 7105 McDonnell Pediatric Research Building, 362-9218. We study cell-cell communication mediated by gap junction proteins and P2 (purinergic) receptors. Specific models include bone cells (osteoblasts and osteoclasts), pancreatic islet cells and macrophages. In addition we are investigating the mechanisms by which gap junction proteins and P2 receptors are involved in the coordination of calcium signaling among cells.

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, 8th Floor Southwest 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 Building, 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 Building, 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 atra*, *Epicoccum nigrum* and several pollens including those from white oak and *Parthenium hysterophorus*, a newly recognized allergen.

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LAWRENCE R SCHACHT, MD Instructor in Clinical Medicine
JEAN E. SCHAFFER, MD Virginia Minnich Distinguished Professor of Medicine
RICHARD O. SCHAMP, MD Instructor in Clinical Medicine
KENNETH B SCHECHTMAN, PHD, MA, MS Research Associate Professor of Medicine
MARK SCHEPERLE, MD Instructor in Clinical Medicine
ALVIN K SCHERGEN, MD Instructor in Clinical Medicine
JOEL D. SCHILLING, MD, PHD Instructor in Medicine
TANIA L SCHMID, MD Instructor in Clinical Medicine
ROBERT JAY SCHNEIDER, MD Assistant Professor of Clinical Medicine
GUSTAV SCHONFELD, MD Samuel E Schechter Professor of Medicine
MARIO SCHOOTMAN, PHD, MS Associate Professor of Medicine
MARK ANDREW SCHROEDER, MD Research Instructor in 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, MD, PHD Professor of Clinical Medicine, Adjunct Professor of Medicine

DAVID B SCHWARTZ, MD, PHD, MA Associate Professor of Medicine

MITCHELL G SCOTT, PHD, MS Clinical Research Assistant Professor of Medicine

LYNNE M SEACORD, MD Assistant Professor of Medicine

SUSUMU SEINO, MD, PHD Adjunct Professor of Medicine

DAVID SELTZER, MD Assistant Professor of Emergency Medicine in Medicine

JAY R SELTZER, MD Assistant Professor of Clinical Medicine

CLAY F SEMENKOVICH, MD Herbert S Gasser Professor, 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

ATUL S SHAH Instructor in Clinical Medicine

ANISA SHAKER, MD Instructor in Medicine

WILLIAM D SHANNON, PHD, MS Associate Professor of Biostatistics in Medicine

JIAN-SU SHAO, MD Research Instructor in Medicine

JOHN B SHAPLEIGH, II, MD Instructor in Clinical 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 Instructor in Medicine

MOUNIR M SHENOUDA Instructor in Clinical Medicine

ADRIAN SHIFREN, MBBCH Instructor in Medicine

DEBORAH R SHIPLEY, MD Instructor in Emergency Medicine in Medicine (Pending Dean's Approval)

JAHANSOUZ SHOKRI Instructor in Clinical Medicine

BERNARD L SHORE, MD Professor of Clinical Medicine

ROBERT B SHUMAN, MD Associate Professor of Clinical Medicine

SHERRY E SHUMAN, MD Associate Professor of Clinical Medicine

LABROS SIDOSSIS, PHD, MA, MS Adjunct Research Associate Professor of Medicine

ANDREW M SIEDLECKI, MD Instructor in Medicine

BARRY ALAN SIEGEL, MD Professor of Medicine

CHRISTINE A SIGMAN, MD Instructor in Clinical Medicine

JULIE MARTHA SILVERSTEIN, MD Instructor in Medicine

RANDY B SILVERSTEIN, MD Instructor in Clinical Medicine

DAVID R SINACORE, PHD, MHS 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

GURCHARAN J SINGH, MD Instructor in Clinical Medicine

JASVINDAR SINGH, MD Associate Professor of Medicine

JAMES C SISK, MD Associate Professor Emeritus of Clinical Medicine (Dermatology)

CARLY LYNN SKAMRA, MD Instructor in Clinical Medicine

DONALD A SKOR, MD Professor of Clinical Medicine

EDUARDO SLATOPOLSKY, MD Joseph Friedman Professor of Renal Diseases in Medicine

RAYMOND P SMITH, MD Instructor in Clinical Medicine

TIMOTHY ROBERT SMITH, MD Instructor in Clinical Medicine

TIMOTHY W. SMITH, MD, PHD Associate Professor of Medicine

ALLEN D SOFFER, MD Instructor in Clinical Medicine

RAND WASHBURN SOMMER, MD Associate Professor of Clinical Medicine

STEVEN M. SORSCHER, MD Assistant Professor of Medicine

PABLO SOTO, MD Assistant Professor of Medicine

HANI CHARLES SOUDAH, MD, PHD Assistant Professor of Clinical Medicine

WILLIAM F SOUTHWORTH, MD Assistant Professor of Clinical Medicine

JEFFREY ANDREW SPARKS, MD Instructor in Medicine

MICHAEL L SPEARMAN, MD Instructor in Clinical Medicine

JOHN SPERTUS Adjunct Professor of Medicine

ALAN R SPIVACK, MD Assistant Professor of Clinical Medicine

ERIK CHRISTIAN STABELL, MD Instructor in Clinical Medicine

PAUL M STEIN, MD Professor of Clinical Medicine

PHYLLIS K STEIN, PHD, M ED Research Associate Professor of Medicine

RICHARD IAN STEIN, PHD Research Assistant Professor of Medicine

THOMAS H STEINBERG, MD Associate 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 Assistant Professor of Medicine

KEITH EVAN STOCKERL-GOLDSTEIN, MD Associate Professor of Medicine

JAMES ANDREW STOKES, MD Instructor in Clinical Medicine

BRADLEY P STONER, MD, PHD, MA Associate Professor of Medicine

GREGORY A STORCH, MD Professor of Medicine

STEPHEN P STORFER, MD Instructor in Clinical Medicine

CRISTINA STRONG, PHD Assistant Professor of Medicine (Dermatology) (Pending Executive Faculty Approval)

XIONG SU, PHD Assistant Professor of Medicine

HAMSA SUBRAMANIAN Instructor in Clinical Medicine

JANAKIRAMAN SUBRAMANIAN, MBBS, M PH Instructor in Medicine

SHELBY A SULLIVAN, MD Instructor in Medicine

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 Instructor in Medicine

RUDEE SUWANNASRI, MD Instructor in Clinical Medicine

BRIDGETTE B SVANCAREK, MD Instructor in Emergency Medicine in Medicine (Pending Dean's Approval)

ELZBIETA ANNA SWIETLICKI, PHD, MS Research Instructor in Medicine

BENJAMIN R TAN, MD Associate Professor of Medicine

DAVID TAN, MD Assistant Professor of Emergency Medicine in Medicine

KONGSAK TANPHAICHITR, MD Professor of Clinical Medicine

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WANDA T TERRELL, MD Associate Professor of Clinical Medicine

SHILPA THAKUR Instructor in Clinical Medicine

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JEFFREY P TILLINGHAST, MD Associate Professor of Clinical Medicine

GARRY S TOBIN, MD Associate Professor of Medicine

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GEOFFREY L UY, MD, MA Assistant Professor of Medicine

ALBERT LEE VAN AMBURG, III, MD Assistant Professor of Clinical Medicine

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EMMANUEL A VENKATESAN Assistant Professor of Clinical Medicine

RAVI VIJ, MBBS Associate Professor of Medicine

ANITHA VIJAYAN, MD Associate Professor of Medicine

DENNIS T VILLAREAL, MD Adjunct Associate Professor of Medicine

HERBERT W VIRGIN, IV, MD, PHD Professor of Medicine

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DAVID A WALLS, MD Instructor in Clinical Medicine

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JEAN S WANG, MD, PHD Assistant Professor of Medicine

LAWRENCE L. WANG, MD, PHD Instructor in Clinical Medicine (Dermatology)

XUEWEN WANG, PHD, MS Research Assistant Professor of Medicine (Pending Executive Faculty Approval)

ANDREA WANG-GILLAM, MD Assistant Professor of Medicine

DAVID K. WARREN, MD, MPH Associate Professor of Medicine

ANDRZEJ J. WASIAK, MD, PHD Assistant Professor of Clinical Medicine

SCOTT P WASSERSTROM, MD, MA Instructor in Clinical Medicine

AMY L. WATERMAN, PHD, MA Assistant Professor of Medicine

JASON DEAN WEBER, PHD Associate Professor of Medicine

H. JAMES WEDNER, MD Professor of Medicine

KEVIN D WEIKART, MD Instructor in Clinical Medicine

GARY J WEIL, MD Professor of Medicine

KATHERINE N WEILBAECHER, MD Associate Professor of Medicine

CARLA JOY WEINHEIMER, MS Research Assistant Professor of Medicine

LEONARD B WEINSTOCK, MD Associate Professor of Clinical Medicine

STEVEN JAY WEINTRAUB, MD, MS Instructor in Medicine

EDMOND WEISBART Assistant Professor of Clinical Medicine

ALAN N WEISS, MD Professor of Medicine

EDWARD P WEISS, PHD, MS Adjunct Research Assistant Professor of Medicine

PETER DOUGLAS WEISS, MD Instructor in Clinical Medicine

JOHN SUTTON WELCH, MD, PHD Research Instructor in Medicine

ALVIN S WENNEKER, MD Professor of Clinical Medicine
PETER WESTERVELT, MD, PHD Associate Professor of Medicine
DARREN E WETHERS, MD Instructor in Clinical Medicine
ALISON J WHELAN, MD Professor of Medicine
NEIL HARRIS WHITE, MD Professor of Medicine
PATRICK WHITE, MD Instructor in Medicine
MICHAEL PETER WHYTE, MD Professor of Medicine
BURTON M WICE, PHD Research Associate Professor of Medicine
CYNTHIA A WICHELMAN, MD Assistant Professor of Emergency Medicine in Medicine
SAMUEL A WICKLINE, MD Professor of Medicine
JOHN F WIEDNER, MD Instructor in Clinical Medicine
DEBORAH A WIENSKI, MD Instructor in Clinical Medicine
TANYA M WILDES, MD Instructor in Medicine
DENISE WILFLEY, PHD Professor of Medicine
CAROLINE G WILKER, MD Instructor in Clinical Medicine
CONSUELO WILKINS, MD, MS Associate Professor of Medicine
MICHAEL P WILLIAMS, PHD Adjunct Instructor in Medicine
MONIQUE MARIE WILLIAMS, MD Assistant Professor of Medicine
NANCY J WILLIAMS, MD Instructor in Clinical Medicine
WENDELL WILLIAMS, MD Instructor in Clinical Medicine
GEORGE A WILLIAMS, III, MD, MA Assistant Professor of Clinical Medicine
R. JEROME WILLIAMS, JR, MD Associate Professor of Clinical Medicine
CHRISTINE E WILMSEN CRAIG, MD Instructor in Clinical Medicine
MONITA ELAINE WILSON, PHD, MS Research Associate Professor of Medicine
PATRICK H WIN Instructor in Clinical Medicine
DAVID WILLIAM WINDUS, MD Professor of Medicine
KAREN WINTERS, MD Assistant Professor of Medicine
KEITH FREDERIC WOELTJE, MD, PHD Professor of Medicine
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GERALD WOLFF, MD Assistant Professor of Clinical Medicine
NATHAN E WOLINS, PHD Research Instructor in Medicine
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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 Instructor in Medicine
HONG XIAN, PHD, MS Research Associate Professor of Medicine
YAN XIE, MD, MS Research Instructor in Medicine
KATHRYN AYAKO YAMADA, PHD Research Professor of Medicine
KEVIN E YARASHESKI, PHD, MA Professor of Medicine

FRANK C-P YIN, MD, PHD, MS Professor of Medicine
JAERYOUNG YOON, MD Instructor in Clinical Medicine
ZHONGSHENG YOU, PHD, MS 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 Instructor in Clinical Medicine
JOEL ZEFFREN Instructor in Clinical Medicine
YONG ZHANG, MD, PHD, MS Research Instructor in Medicine
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DEBORAH ZIMMERMAN, MD Instructor in Clinical Medicine
ANDREW A ZISKIND, MD, MBA Professor of Medicine
GARY R ZUCKERMAN, DOST Associate Professor of Medicine
JOHN MICHAEL ZYLKA, MD, PHD, MBA, MS Instructor in Clinical Medicine

Department's Web Site

<http://internalmed.wustl.edu/>

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. 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.

Courses

First Year

M30 526 MICROBES AND PATHOGENESIS

Instructor: Henry V. Huang, PhD, 362-2755

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 symptomatology and pathophysiology.

Selectives

M04 533 TROPICAL MEDICINE

Instructor: Daniel E. Goldberg, MD, PhD, 362-1514

This elective is designed to bring faculty members actively researching diseases specific to developing countries together with students in an informal discussion forum. The course will highlight the problems particular to tropical medicine including pathogenesis, eradication, prevention and treatment. This selective is cross-listed in Department of Medicine.

Fourth Year

Electives

At present, the primary enrollees in the following courses are students working for a Ph.D. 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. 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, 10th 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.

Douglas E. Berg, PhD, 8th 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, 9th 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.

Keril Blight, PhD, 9th Floor McDonnell Pediatric Research Building, 286-0065. Molecular Biology of Hepatitis C Virus. We are studying the molecular mechanisms of HCV replication and the determinants of the virus-host interaction.

Michael Caparon, PhD, 10th 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, 7th Floor, McDonnell Pediatric Research Building, 362-2842. The research in our laboratory focuses on the interface between viral pathogenesis and the host immune response. Three globally important mosquito-borne RNA viruses are studied, the West Nile encephalitis and Dengue hemorrhagic fever viruses, and hepatitis C virus. Studies with Dengue virus (DV) have focused on

identifying the host and viral factors that modulate the severity of an infection. Another direction for the laboratory is the investigation of the pathogenesis of West Nile virus infection (WNV) and the immune system response that prevents dissemination in the central nervous system. By infecting genetically and functionally immunodeficient mice with WNV, cells and molecules of the immune system are identified that are essential to the resolution of viral infection. A more recent avenue of interest in our laboratory is identifying the structural basis of antibody neutralization of hepatitis C virus. Overall, our studies straddle the interface between viral pathogenesis and the host immune response.

Tamara L. Doering, MD, PhD, 10th Floor, McDonnell Pediatric Research Building, 747-5597. The Doering lab studies the opportunistic fungal pathogen, *Cryptococcus neoformans*. Focus is on synthesis of the main virulence factor of this organism, its polysaccharide capsule, with the dual motivations of elucidating basic biology and identifying potential drug targets. Current approaches include those of biochemistry, cell and molecular biology, and genetics; a new emphasis is on high-throughput approaches to host-pathogen interactions.

M. Wayne Flye, MD, PhD, 5108 Queeny Tower, 362-7145. Biochemical and gene regulation of local and systemic immune responses by the environment and cells of the liver and gastrointestinal tract with particular attention to the Kupffer cell.

Daniel Goldberg, MD, PhD, 9th Floor, McDonnell Pediatric Research Building, 362-1514. Biochemistry of malaria.

Eduardo A. Groisman, PhD, 8th Floor, McDonnell Pediatric Research Building, 362-3692. Signal transduction and regulation of gene expression. Molecular biology of bacteria-host interactions. Evolutionary origins of virulence.

David B. Haslam, MD, 6th 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.

Henry Huang, PhD, 8th Floor, McDonnell Pediatric Research Building, 362-2755. RNA virus evolution. Molecular biology of alphaviruses. Alphavirus gene expression vectors. Antiviral drug design.

Scott Hultgren, PhD, 10th Floor, McDonnell Pediatric Research Building, 362-6772. We use a multidisciplinary approach to study the molecular basis of gram positive and gram negative bacterial urinary tract infections; delineating bacterial virulence mechanisms and host defense responses which determine the outcome of infection. One major focus of the lab is on the assembly of bacterial fibers important in disease including adhesive pili formed through the chaperone/usher pathway and bacterial amyloid (curli) formation by the nucleation/precipitation pathway. We are also studying the role of biofilms in disease and investigating vaccine and drug targets for the treatment of disease.

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.

Robert Schreiber, PhD, Room 7749, 7th 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 α /b and IFN γ .

L. David Sibley, PhD, 9th Floor, McDonnell Pediatric Research Building, 362-8873. We are studying the intracellular survival mechanisms of protozoan parasites. Current approaches include high-resolution real-time microscopy, genetic mapping and genomic analyses.

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.

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, 10th 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, 8th 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.

Faculty

STEPHEN M BEVERLEY, PHD Head of the Department of Molecular Microbiology, Marvin A Brennecke Professor of Molecular Microbiology

JOHN PATTERSON ATKINSON, MD Professor of Molecular Microbiology

WANDY L. BEATTY, PHD Research Assistant Professor of Molecular Microbiology

DOUGLAS E BERG, PHD Alumni Professor of Molecular Microbiology

KERIL J. BLIGHT, PHD Assistant Professor of Molecular Microbiology

TAMARA L. BRENT, MD, PHD Associate Professor of Molecular Microbiology

MICHAEL G CAPARON, JR., PHD Professor of Molecular Microbiology

SWAINE L CHEN, MD, PHD Research Instructor in Molecular Microbiology

SUSAN E CULLEN, PHD Adjunct Professor of Molecular Microbiology

MICHAEL DIAMOND, MD, PHD Professor of Molecular Microbiology

DEBORAH E DOBSON, PHD Research Associate Professor of Molecular Microbiology

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WILLIAM MICHAEL DUNNE, JR., PHD Professor of Molecular Microbiology

JULIAN B FLEISCHMAN, PHD Associate Professor Emeritus of Molecular Microbiology

M. WAYNE FLYE, MD, PHD, MA Professor of Molecular Microbiology

DANIEL E GOLDBERG, MD, PHD Professor of Molecular Microbiology

EDUARDO GROISMAN, PHD, MS Howard Hughes Medical Institute Investigator in Molecular Microbiology, Professor of Molecular Microbiology

DENNIS E HALLAHAN, MD Professor of Molecular Microbiology

DAVID B HASLAM, MD Associate 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

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SONDRA SCHLESINGER, PHD Professor Emerita of Molecular Microbiology

ROBERT D SCHREIBER, PHD Professor of Molecular Microbiology

LAURENCE DAVID SIBLEY, PHD Professor of Molecular Microbiology

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JOSEPH PAUL VOGEL, PHD Associate Professor of Molecular Microbiology

DAVID WANG, PHD Assistant Professor of Molecular Microbiology

GARY J WEIL, MD Professor of Molecular Microbiology

RICHARD K WILSON, PHD Professor of Molecular Microbiology

DONG YU, PHD Assistant Professor of Molecular Microbiology

Department's Web Site

<http://www.microbiology.wustl.edu/>

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 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

The 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.

The 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.

The 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 include:

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; 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: Justin M. Brown, MD

Pituitary Surgery: Michael R. Chicoine, MD; Ralph G. Dacey Jr., MD; Gregory J. Zipfel, MD

Spinal Neurosurgery: 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

Courses

First Year

Selectives

M04 5667 MICROCIRCULATION

Instructor: Jeffrey M. Gidday, PhD, 286-2795

The homeostatic functions of the microcirculation include the active regulation of metabolite exchange with parenchymal cells, immune surveillance and a multifaceted response to injury and disease. This elective provides an overview of the normal and abnormal cell biology and physiology of the microcirculation. Four sessions will be organized around conceptual presentations and laboratory demonstrations by the instructor, and two-part topic presentations by students following independent library research that focuses on basic physiology and clinically relevant pathophysiology. Basic physiology research topics might include: regulation of tissue blood flow and vascular tone, propagated vasodilation, hemodynamics and rheology of erythrocytes and leukocytes, cell biology of the endothelium, control of capillary permeability and angiogenesis. Common disease entities involving microcirculatory dysfunction include: stroke and myocardial ischemia, diabetes, inflammation, tumor

angiogenesis, sickle cell anemia, retinopathy of prematurity, pulmonary edema, various autoimmune diseases, as well as the adaptive cardiovascular responses to exercise or high altitude. (This selective is cross-listed in the Department of Cell Biology and Physiology.)

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.

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: David Limbrick, MD, PhD, 454-2810

Location: McMillan Hospital Building

Elective Contact: David Limbrick, MD, PhD, 454-2810

Other Information: Students should contact instructor prior to the first day of the elective.

Enrollment limit per period: 7

Valid start weeks for 4-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 60%; Outpatient 30%, 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, 5th Floor McMillan Hospital Building, 362-4313. The biology of brain tumors. Many aspects of brain tumor biology are under study including the anti-tumoral effects of lipopolysaccharide using rodent models of brain tumors and cell cultures of human tumor specimens obtained from the operating room. Further characterization of laboratory models of brain tumors are in progress with correlations being made between biological activity of brain tumors in culture and the clinical behavior of these tumors in patients as recorded in a patient database.

Ralph G. Dacey Jr., MD, 5th Floor McMillan Hospital Building, 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, 5th Floor McMillan Hospital Building, 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, MD, 286-2795. Research in our laboratory is aimed at elucidating the mechanisms responsible for the promotion of robust neuronal and vascular protection against ischemic injury in CNS tissues (a phenotype called "ischemic tolerance") in response to sublethal hypoxic "preconditioning" stress. (See Gidday, *Nat. Neurosci. Rev.* 7: 437,2006). Our current focus is on vascular mechanisms of ischemic tolerance and anti-inflammatory responses that may underlie it. We also investigate the molecular mechanisms of vascular dysfunction in brain and retina in response to ischemia. Our studies employ videomicroscopic methods in transgenic mice and other animals to directly visualize oxidative (oxygen and nitrogen radicals), inflammatory (polymorphonuclear leukocytes), and proteolytic (matrix metalloproteinases and neutrophilic proteases) injury processes in the CNS microcirculation. Cerebral and retinal endothelial cell cultures are also used concomitantly as in vitro models of microvascular injury and protection.

Robert L. Grubb, Jr., MD, 5th Floor McMillan Hospital Building, 362-3567. Research on cerebral circulation and metabolism, utilizing short-lived cyclotron-produced isotopes of oxygen, carbon and nitrogen is performed in humans. Positron emission tomography is used to measure cerebral circulation and metabolism in patients with severe head injuries, intra-cerebral hemorrhages and atherosclerotic carotid artery occlusive disease. Opportunities exist for the application of computer systems to biological modeling and data processing.

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, 5th Floor McMillan Hospital Building, 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, 5th Floor McMillan Hospital Building, 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, 5th floor McMillan Hospital Building, 747-8871. Our cerebrovascular research laboratory has two main interests: (1) Examining the pathophysiologic effects of amyloid- β 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.

Faculty

RALPH G DACEY, JR, MD Head of the Department of Neurological Surgery, Henry G and Edith R Schwartz Professor of Neurological Surgery

KEITH HAPP BRIDWELL, MD Professor of Neurological Surgery

JUSTIN M BROWN, MD Assistant Professor of Neurological Surgery

JACOB M BUCHOWSKI, MD, MS Assistant Professor of Neurological Surgery

ANDREAS H BURKHALTER, PHD, MS Associate Professor of Neurobiology in Neurological Surgery

MICHAEL R CHICOINE, MD Associate Professor of Neurological Surgery

WILLIAM S COXE, MD Professor Emeritus of Neurological Surgery

DEWITTE T CROSS, III, MD Professor of Neurological Surgery

COLIN PIETER DERDEYN, MD Professor of Neurological Surgery

HANS H DIETRICH, PHD, MS Assistant Professor of Neurological Surgery

MICHAEL N DIRINGER, MD, MA Professor of Neurological Surgery

JOSHUA L DOWLING, MD Associate Professor of Neurological Surgery

ROBERT E DRZYMALA, PHD Associate Professor of Neurological Surgery

JACK R. ENGSBERG, PHD, MS Associate Professor of Neurological Surgery

MOKHTAR H GADO, MBBCH, MS 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, MD, PHD, MS Professor of Neurological Surgery

BYUNG HEE HAN, PHD Research Assistant Professor of Neurological Surgery (Pending Executive Faculty Approval)

MATTHEW A HOWARD Adjunct Assistant Professor of Neurological Surgery

LAWRENCE G LENKE, MD Professor of Neurological Surgery

JEFFREY R. LEONARD, MD, BS Associate Professor of Neurological Surgery

ERIC CLAUDE LEUTHARDT, MD Assistant Professor of Neurological Surgery

DAVID D LIMBRICK, JR, MD, PHD Assistant 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)

KEITH M RICH, MD Professor of Neurological Surgery

K. DANIEL RIEW, MD Professor of Neurological Surgery

PAUL SANTIAGO, MD Assistant Professor of Neurological Surgery

MATTHEW D SMYTH, MD Associate Professor of Neurological Surgery

TODD J. STEWART, MD Associate Professor of Neurological Surgery

RENE TEMPELHOFF, MD Professor of Neurological Surgery

RICHARD D WETZEL, PHD, MDI 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 Associate Professor of Neurological Surgery

LIYA YUAN, PHD, MS Research Instructor in Neurological Surgery

YANLI ZHU, MD, MS Research Instructor in Neurological Surgery

GREGORY JOSEPH ZIPFEL, MD Assistant Professor of Neurological Surgery

Department's Web Site

<http://neurosurgery.wustl.edu/>

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. In the second year, the Department of Neurology presents the course in Diseases of the Nervous System in conjunction with the Departments of Pathology, Neurosurgery 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 epilepsy, electrophysiology, EMG, sleep medicine, cerebrovascular disease and stroke, neuroimmunology, neurological critical care, neuromuscular disease, neuropsychology and movement disorders.

Three divisions exist within the Department of Neurology: the Division of Adult Neurology, the Division of Pediatric and Developmental Neurology and the Division of Neuropsychology.

Division of Neuropsychology: Steven E. Petersen, PhD (division director), Francis Miezin, BS, MS, Bradley Schlaggar, MD, PhD, Gordon L. Shulman, PhD

Division of Pediatric and Developmental Neurology: Michael Noetzel, MD (division director), Janice Brunstrom, MD, Anne Connolly, MD, W. Edwin Dodson, MD, Paul Golumbek, MD, PhD, Chris Gurnett, MD, PhD, David Gutmann, MD, Soe Mar, MD, Jeffrey Neil, MD, PhD, Arthur Prenskey, MD, Bradley Schlaggar, MD, PhD, K. Liu Lin Thio, MD, PhD, Jean H. Thurston, MD, Michael Wong, MD, PhD, Kelvin A. Yamada, MD, John Zempel, MD, PhD, Craig Zaidman, MD

In addition, several sections of faculty members are established for specialized research and teaching purposes. They include:

Aging and Dementia Section: John C. Morris, MD (section head), David A. Balota, PhD, Randall Bateman, MD, Carolyn Baum, PhD, Virginia D. Buckles, PhD, David Carr, MD, Mary A. Coats, BSN, Janet

M. Duchek, PhD, Dorothy F. Edwards, PhD, James E. Galvin, MD, Alison M. Goate, D.Phil, David M. Holtzman, MD (department chair), Terri L. Hosto, MSW, Eugene M. Johnson, Jr., PhD, Pamela Millsap, MSN, Anne Fagan Niven, PhD, Yvette I. Sheline, MD, B. Joy Snider, MD, PhD, Martha Storandt, PhD, Christy Tomlinson, MSN, Nigel Cairns, PhD, MRCPATH.

Hope Center for Neurological Disorders: Allison Goate, D.Phil (director), Randall Bateman, MD, David Brody, MD, PhD, Janice E. Brunstrom, MD, Maurizio Corbetta, MD, Anne Cross, MD, Ralph G. Dacey Jr., MD, Anne Fagan Niven, PhD, James E. Galvin, MD, MSc, Jeffrey M. Gidday, PhD, Mark P. Goldberg, MD, David I. Gottlieb, PhD, David M. Holtzman, MD (department chairman), Krzysztof Hyrc, PhD, Mark F. Jacquin, PhD, Eugene M. Johnson Jr., PhD, Jin-Moo Lee, MD, PhD, Jeffrey D. Milbrandt, MD, PhD, Jeffrey J. Neil, MD, PhD, Joel S. Perlmutter, MD, Anneliese M. Schaefer, PhD, Christian Sheline, PhD, B. Joy Snider, MD, PhD, Liu-Lin Thio, MD, PhD, Michael Wong, MD, PhD, Jian Xu, PhD, Kelvin A. Yamada, MD

Cerebrovascular Disease Section: Jin-Moo Lee, MD, PhD (section head), Mark P. Goldberg, MD (co-head), Janice E. Brunstrom, MD, David Carpenter, MD, Maurizio Corbetta, MD, Colin P. Derdeyn, MD, Michael N. Diringer, MD, Dorothy F. Edwards, PhD, Robert Fucetola, PhD, David M. Holtzman, MD (department chair), Jeffrey J. Neil, MD, PhD, Michael J. Noetzel, MD, Marcus E. Raichle, MD, Bradley L. Schlaggar, MD, PhD, Renee Van Stavern, MD, Kelvin A. Yamada, MD, Allyson Zazulia, MD

Clinical Neurophysiology Section: Muhammad T. Al-Lozi, MD, R. Edward Hogan, MD, (section heads), Anne M. Connolly, MD, Stephen P. Duntley, MD, Lawrence Eisenman, MD, PhD, Christina Gurnett, MD, PhD, Glenn Lopate, MD, Liu Lin Thio, MD, PhD, Michael Wong, MD, PhD, Kelvin A. Yamada, MD, John Zempel, MD, PhD

Adult/Pediatric Epilepsy and Sleep Section: Stephen Duntley, MD (section co-head), Edward R. Hogan, MD (section co-head), Michael Noetzel, MD (section co-head), Lawrence Eisenman, MD, PhD, W. Edwin Dodson, MD, Christina Gurnett, MD, PhD, Jean Holowach-Thurston, MD, Jay Piccirillo, MD, Simya Rashid, DO, Liu Lin Thio, MD, PhD, Michael Wong, MD, PhD, Kelvin Yamada, MD, John Zempel, MD, PhD, Beth Ward, MD

Neuroimaging Section: Jin-Moo Lee, MD, PhD (section head), Kevin Black, MD, Maurizio Corbetta, MD, Colin P. Derdeyn, MD, Francis Miezin, MS, Jeffrey J. Neil, MD, PhD, Joel S. Perlmutter, MD, Steven E. Petersen, PhD, Bradley Schlaggar, MD, PhD, Gordon L. Shulman, PhD, Tom O. Videen, PhD, Allyson Zazulia, MD

Movement Disorders Section: Joel S. Perlmutter, MD (section head), Kevin J. Black, MD, Susan Criswell, MD, Gammon Earhart, PhD, Tamara Hershey, PhD, William M. Landau, MD, Brad A. Racette, MD, Bradley L. Schlaggar, MD, PhD, Samer Tabbal, MD, W. Thomas Thach Jr., MD, Morvarid Karimi, MD, Paul Kotzbauer, MD, PhD

Neuroimmunology Section: D. Anne Cross, MD (section head), Becky J. Parks, MD, Robert T. Naismith, MD, Laura Piccio, MD, PhD, Gregory Wu, MD

Neurological Critical Care Section: Michael N. Diringer, MD (section head/director—NNICU), Rajat Dhar, MD, Rael Sundy, MD

Neuromuscular Diseases Section: Alan Pestronk, MD (section head), Muhammad T. Al-Lozi, MD, Bob Baloh, MD, Anne M. Connolly, MD, Julaine M. Florence, PT, DPT, Paul Golumbek, MD, PhD, Glenn Lopate, MD, Timothy Miller, MD, PhD, Chris Weihl, MD, PhD

Stroke and Brain Injury Recovery Section: Maurizio Corbetta, MD (section head), David Brody, MD, Robert Fucetola, PhD, Thy Huskey, MD, Nicole Schwarze, PhD

Spinal Cord Injury Recovery Section: Oksana Volshteyn, MD (section head), Neringa Juknis, MD, Rimma Ruvinskaya, MD

General Neurology Section: Sylvia Awadalla, MD (section head), William Landau, MD, Todd Schwedt, MD, Renee Van Stavern, 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 Departments of Neurology, Pediatric Neurology, Neurosurgery, Neuro ICU, Radiology, Pathology 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.

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, 362-7177

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 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: Robert Naismith, MD, 362-7177

Location: Barnes-Jewish Hospital and Emergency Rooms

Elective Contact: Michelle Aubuchon, 362-7177

Other Information: Students should page neurology consult resident, 8 a.m. first day of elective. Obtain pager number in advance from Michelle Aubuchon, 362-7177.

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.

The student will evaluate patients with neurological manifestations of medical, surgical and psychiatric diseases and participate in their care 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: Robert Naismith, MD, 362-7177

Location: 11400 Barnes-Jewish Hospital

Elective Contact: Michelle Aubuchon, 362-7177

Other Information: Students should report to 11400 Barnes-Jewish, 7 a.m. first day of elective.

Enrollment limit per period: 1

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 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 6th night

M35 830 NEURO-ONCOLOGY

Instructor: David H. Gutmann, MD, PhD, 362-7379

Location: Suite C, 6th Floor, Center for Advanced Medicine (CAM)

Elective Contact: David H. Gutmann, MD, PhD, 362-7379

Other Information: Students should report to Suite C, 6th Floor, Center for Advanced Medicine (CAM), 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: John C. Morris, MD, and James E. Galvin, MD, MPH, Barbara Kuntemeier (coordinator)
286-2882
Location: 4488 Forest Park Avenue (two-story brick building at intersection with Taylor)
Elective Contact: John C. Morris, MD, and James E. Galvin, MD, MPH, Barbara Kuntemeier (coordinator)
286-2882
Other Information: Contact Barbara Kuntemeier prior to first day of elective to set up orientation.
Students should report to the Memory and Aging Project, Suite 101, 4488 Forest Park Avenue (corner of Taylor and Forest Park), 8:30 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-week blocks are: 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 & 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: Michael Noetzel, MD, 454-6042
Location: 12th Floor, Suite 1260 Northwest Tower
Elective Contact: Lori Nichols, nicholsl@neuro.wustl.edu
Other Information: Students report to Dr. Noetzel or designated pediatric neurology attending on the 12th floor, St. Louis Children's Hospital (inpatient service) or 2nd Floor, Suite D, St. Louis Children's Hospital (consultation service), 8:30 a.m. first day of elective.
Enrollment limit per period: 1 (Inpatient); 1 (Consultation Office Service)
Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

We offer two senior electives: (1) On our Inpatient Elective the student participates as a full member of the neurology ward team and is directly responsible for a proportion of patients on the service under the direction of the senior pediatric neurology resident. The student may take night call every third or fourth night, during which time s/he is responsible for the medical care of the entire ward, as well as for emergency admissions under supervision of a pediatric resident. Formal teaching rounds with the attending pediatric neurologist are held three times a week, and informal teaching rounds are held daily with the senior residents. (2) On our Outpatient Elective the student will attend daily outpatient clinics,

during which time s/he will be able to evaluate outpatient problems under faculty guidance. There are pediatric neurology clinics five days a week, in addition to teaching conferences. This elective allows students to see many new and return patients in a tutorial type of setting since patients are immediately reviewed with senior faculty.

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: Inpatient: Every fourth night; Outpatient: None

M35 861 NEUROLOGY/NEUROSURGERY ICU

Instructor: 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 4-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: Edward Hogan, MD, 362-3944 and Liu Lin Thio, MD, PhD, 454-6120

Location: 12th Floor Northwest Tower

Elective Contact: Donna Theiss, 362-7845, theissd@neuro.wustl.edu

Other Information: Students should meet on the 12th Floor, Northwest Tower, 9 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 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. Students will obtain a history and perform a physical exam on outpatients and inpatients and submit some notes for evaluation. They will also present one 15-30 minute talk on a topic relevant to epilepsy.

Student time distribution: Inpatient 40%, Outpatient 40%,

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 AND MULTIPLE SCLEROSIS

Instructor(s): Becky Parks, MD

Location: 3rd Floor McMillan

Elective Contact: Nanette Bladdick, 362-3307

Other Information: Contact Dr. Parks to arrange time to report on first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-week blocks are: Weeks 5, 13, 17, 21, 29, 33, 37, and 41.

Students will have the opportunity to interview and examine new and follow-up patients with multiple sclerosis and other immunological conditions of the central nervous system at the neurology clinic at the CAM, as well as patients receiving infusions in the Minor Procedure Center. They will learn the differential diagnosis of and method of evaluating patients with, or thought to have, multiple sclerosis and will assist in filling out the necessary forms required for testing. They will learn about evaluation and treatment of spasticity, neurogenic bladder, fatigue, cognitive dysfunction, and depression. Students will follow the daily progress of patients admitted to the hospital.

This elective will familiarize the student with the treatments for MS: immune-modulating, immunosuppressive, and symptomatic. The student will also become very familiar with interpretation of abnormal brain MRI.

Third-year medical students rotating as part of a core rotation will be expected to attend the required conferences for third-year students. Students choosing this elective to gain additional experience in the field of neurology will be expected to attend Neurology Grand Rounds on Friday morning. Students with particular interest in the basic aspects of neuro-immunology may be invited to attend a journal club with Anne Cross, MD.

Student time distribution: Inpatient 10%, Outpatient 80%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Becky Parks, MD

Patients seen/weekly: 20

On call/weekend responsibility: None

M80 807 PHYSICAL MEDICINE AND REHABILITATION

Instructor: Neringa Juknis, MD, 454-7757, juknisn@neuro.wustl.edu

Location: Suite 2304, Rehabilitation Division, Neurology Department, 4444 Forest Park

Elective Contact: Donna Barbier, 454-7757, barbierd@neuro.wustl.edu

Other Information: Students report to Suite 2304, Rehabilitation Division, Neurology Department, 4444 Forest Park, 8 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 4-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. A 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 principals 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. The student will gain clinical skills in evaluating and management of functional impairments. Students will be expected to participate in daily rounds on inpatient rehabilitation units with the clinical care team, follow 3-5 patients, attend multidisciplinary team conferences and family meetings, attend outpatient rehabilitation clinics in spinal cord, stroke, traumatic brain injury, and amputee. Teaching and supervision is provided by the physiatry and neurology faculty of the Division of Rehabilitation. Rehabilitation and neurology residents are involved in student teaching as well. Students are required to participate in didactic teaching conferences within the PM&R residency.

This rotation is particularly useful for students considering careers in rehabilitation, neurology, geriatrics, primary care, neurosurgery, or any other field that will require experience in the evaluation and management of patients with physical impairment and disabilities.

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)

Randall Bateman, MD, 107 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.

David B. Clifford, MD, 747-8423. Clinical treatment of neurologic manifestations of AIDS, including peripheral neuropathy, AIDS Dementia, and progressive multifocal leukoencephalopathy. Quantitative virologic correlations are a particular area of concentration with current studies.

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, 3rd Floor, McMillan Hospital Building, 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.

Marc Diamond, MD, 305 Biotechnology Center, 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.

Mark P. Goldberg, MD, 201 Biotechnology Center (Hope Center for Neurological Disorders), 362-3258. Web-based neurology education. The student will select a topic and target audience, then develop web-based materials to teach the topic. Completed projects will appear on the Internet Stroke Center web site (www.strokecenter.org) or the education web site of the Department of Neurology. Target audiences may include medical students, patients or family members, or allied health professionals. Most

topics will be related to stroke or neuro-imaging. Web development skills are welcome but NOT required.

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, 2nd 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 are also using PET to investigate cerebral mitochondrial metabolism in people with PD and HD to determine whether defects in oxidative phosphorylation contribute to the pathophysiology of these conditions. In people with PD, we develop and apply MR and PET methods for objective measures of disease severity. These measures enhance our genetic studies of 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.

Finally, we investigate the relationship between blood flow responses in the brain with electrophysiological responses done in the same animals. These animal studies provide insights into the basic mechanisms of many of the studies that we subsequently apply to humans.

Brad A. Racette, MD, 4th Floor, McMillan Hospital Building, 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, 2nd 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 Center, 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, 3rd Floor, McMillan Hospital Building, 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.

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, MD, PHD, MS Assistant Professor of Neurology

SYLVIA AWADALLA, MD Professor of Neurology

ROBERT H BALOH, MD, PHD Assistant Professor of Neurology

DAVID ANTHONY BALOTA, PHD, MA Professor of Neurology

JANET MARIE BALOTA, PHD, MA Assistant Professor of Neurology

RANDALL JOHN BATEMAN, MD Assistant Professor of Neurology

M. CAROLYN BAUM, PHD, MA Professor of Neurology (Occupational Therapy)

MAX PRELY BENZAQUEN Instructor in Clinical Neurology

CHRISTINE R. BERG, PHD, MS Assistant Professor of Neurology

LEONARD BERG, MD Professor Emeritus of Neurology

MARY ELLEN BERTRAND, MD Assistant Professor of Neurology

REBECCA L BIRKENMEIER, MS Instructor in Neurology

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JOSEPH T BLACK, MD Professor of Clinical Neurology

KEVIN J. BLACK, MD Professor of Neurology

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ALEXANDRE CARTER, MD, PHD Assistant Professor of Neurology

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BILLIE RUTH CLARK, PHD Assistant Professor of Neurology

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DARLA M DARBY, DOST Assistant Professor of Neurology (Pending Executive Faculty Approval)

RACHEL S DARKEN, MD, PHD Assistant Professor of Neurology (Pending Executive Faculty Approval)

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COLIN PIETER DERDEYN, MD Professor of Neurology

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RAJAT DHAR, MD Assistant Professor of Neurology

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HERBERT E ROSENBAUM, MD Professor Emeritus of Neurology

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MARTHA STORANDT, PHD Professor of Neurology (Psychology)

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IN SOOK SUNWOO, MD Instructor Emerita in Neurology

SAMER D TABBAL, MD Associate Professor of Neurology

SANDRA L TATE, MD Instructor in Clinical Neurology

W. THOMAS THACH, JR, MD Professor of Neurology

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RENEE BAILEY VAN STAVERN, MD Associate Professor of Neurology
ARUN S. VARADHACHARY, MD, PHD Instructor in Neurology (Pending Dean's Approval)
EDWARD F VASTOLA, MD Professor Emeritus of Neurology
TOM O VIDEEN, PHD Research Professor of Neurology
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STUART WEISS, MD Professor of Clinical Neurology
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MICHAEL WONG, MD, PHD Associate Professor of Neurology
THOMAS A WOOLSEY, MD George H and Ethel R Bishop Scholar in Neuroscience in Neurology, Professor of Experimental Neurology
ALLISON WRIGHT WILLIS, MD Assistant Professor of Neurology
GREGORY FREDERI WU, MD, PHD Assistant Professor of Neurology
CHENGJIE XIONG, PHD, MS Associate Professor of Neurology
KELVIN A YAMADA, MD Professor of Neurology
CRAIG MITCHELL ZAIDMAN, MD Assistant Professor of Neurology
ALLYSON R ZAZULIA, MD Associate Professor of Neurology
JOHN M ZEMPEL, MD, PHD Assistant Professor of Neurology
GREGORY JOSEPH ZIPFEL, MD Assistant Professor of Neurology

Department's Web Site

<http://www.neuro.wustl.edu/>

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, 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: David M. Stamilio, MD

Reproductive Endocrinology and Infertility: Randall R. Odem, MD

Gynecology: Jeffrey F. Peipert, MD, MPH

Uro-Gynecology: L. Lewis Wall, MD, PhD

Research: Kelle H. Moley, MD (Basic Research), Jeffrey F. Peipert, MD, MPH (Clinical Research)

Medical Education: Jeffrey F. Peipert, MD, MPH

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 sub-internship in the listed clinical subspecialties or a research elective.

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 neoplasms.

Third Year

M45 730 OB/GYN CLERKSHIP

Instructor: Andrea L.P. Stephens, MD, 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 is the focus of the curriculum. Opportunity for supervised active participation is emphasized in outpatient clinics, routine and high-risk obstetrics, care of the infertile and oncology patient (including surgical case management). Students are assigned as clinical clerks to rotations at Barnes-Jewish Hospital and area clinics. Faculty, house staff and nurse practitioners provide teaching for this rotation. Students participate in all teaching

conferences offered by the Department, and core curriculum topics are presented in a seminar series and in small group sessions with faculty preceptors.

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: Andrea L.P. Stephens, MD, 362-1016

Location: Room 311, 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 4-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

Instructors: Randall Odem, MD, Arnold Bullock, MD, Amber Cooper, MD, Emily Jungheim, MD, Sarah Keller, MD, Susan Lanzendorf, PhD, Kelle Moley, MD, and Valerie Ratts, MD, 286-2421

Location: 4444 Forest Park Avenue, Suite 3100

Elective Contact: Randall Odem, MD, 286-2421

Other Information: Students report to Dr. Odem first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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, fellow and residents

Patients seen/weekly: 75

On call/weekend responsibility: None

M45 830 GYN ONCOLOGY SUBINTERNSHIP

Instructor: 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, 4th Floor Maternity Hospital, 9 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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%; Primary Care 20%, Subspecialty Care 80%

Major teaching responsibility: Attendings, fellows, and residents

Patients seen/weekly: 40

On call/weekend responsibility: Weekend rounds

M45 840 MATERNAL-FETAL MEDICINE SUBINTERNSHIP

Instructor: David Stamilio, MD, 362-8895

Location: Maternity Hospital, Barnes- Jewish Hospital, South Campus

Elective Contact: Jennifer Haring, 747-1347

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. Stamillio for instructions. Enrollment limit per period: 1, unless cleared by course master.

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Sub-interns will participate in the antepartum management of high-risk hospitalized patients as well as complicated 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. An opportunity for intense labor and delivery experience with the Night Team is also encouraged. Students will spend time observing both genetic counseling and 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 60%, Outpatient 35%, Conferences/Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: Inpatient: 20; Outpatient: 20

On call/weekend responsibility: Overnight/weekend call optional — student self-scheduled

M45 843 MATERNAL-FETAL MED OUTPATIENT CARE SUB-I

Instructor: David Stamilio, MD, 362-8895

Location: 5th Floor, Center for Advanced Medicine, Ob/Gyn office

Elective Contact: Jennifer Haring, 747-1347

Other Information: Students report to the 5th Floor, Center for Advanced Medicine, Ob/Gyn office, 8 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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 outpatient setting. The student will evaluate patients from different backgrounds, including prepregnancy consultations, prenatal care consultations and initial visits. The student will also see return patients to experience the continuity of prenatal care. Students will participate in antenatal testing and learn some basic ultrasonography skills. Students will spend time with geneticists and experience counseling of a variety of genetic conditions. In

addition they will spend time on the ultrasound unit(s) 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 PowerPoint and on a topic of their choice, inspired by a patient-related clinical condition that piqued their interest during the block. In addition, the student will have the option to take overnight call, or call in the Pregnancy Assessment Center in order to gain more hands-on experience 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

Patients seen/weekly: 40

On call/weekend responsibility: Not required, overnight call available to enhance experience

M45 856 OB/GYN ULTRASOUND-GENETICS

Instructor: Jeffrey Dicke, MD, 454-8135

Location: The Women's Health Center, 5th floor, Center for Advanced Medicine and The Center for Women's Wellness, 4th 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 2-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 learn the principles and techniques of noninvasive screening for fetal disorders, observe the performance of invasive prenatal diagnostic procedures, and learn the standards and guidelines for performance of the antepartum obstetrical ultrasound examination and female pelvic examination. The student will also gain experience in pedigree analysis and familial risk factor assessment working with genetic counselors. 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

M10 823 OBSTETRICAL ANESTHESIA

Instructor: Swarup Varaday, MD, 362-6252

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Swarup Varaday, MD, 362-6252

Other Information: Students should report to 5400 Labor and Delivery, 7 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 2- or 4-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)

M65 833 SPECIAL TOPICS IN REPRODUCTIVE HEALTH

Instructor(s): Tessa Madden, MD, 747-6495

Location: Division of Clinical Research, 4533 Clayton Ave, 2nd 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.

Enrollment limit per period: 1

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 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

Research

(M45 900)

Jenifer E. Allsworth, PhD, Jeffrey F. Peipert, MD, PhD, Gina M. Secura, PhD, 4533 Clayton Avenue, 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.

Irving Boime, PhD, 319-320 McDonnell Medical Sciences Building, 362-2556. Our laboratory is concerned with the biosynthesis of the gonadotropin hormones in the placenta and pituitary. Specifically, these interests can be divided into two general categories: (1) Structure-function studies that deal with the determinants for secretion, sorting and biological activity of these hormones. Such work includes the design of analogs for potential clinical use. (2) Factors governing expression of several placental and pituitary hormone genes. The approaches to these problems involve the use of site-directed mutagenesis and transgenic animals.

Kelle H. Moley, MD, Indira Mysorekar, PhD, and Joan Riley, PhD, 780 McDonnell Medical Sciences Building, 362-2022. In this six-week elective, students will have the opportunity to immerse themselves in bench research in reproductive science. The three PI's willing to take students are Drs. Kelle Moley, Joan Riley 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. The Mysorekar lab studies (1) the dynamics of tissue regeneration in the adult mammalian urinary bladder using a multipronged genetic/molecular/cellular approach; (2) cellular and hormonal mechanisms governing pathogenesis of a common infectious disease in women, namely recurrent urinary tract infections (UTIs); (3) 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.

Faculty

GEORGE ANDREW MACONES, MD, MS Mitchell and Elaine Yanow Professor of Obstetrics and Gynecology, Head of the Department of Obstetrics and Gynecology

JENIFER ELIZABE ALLSWORTH, PHD Assistant Professor of Obstetrics and Gynecology

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HAIFAA TAWIFIQ YOUNIS, MD Instructor in Clinical Obstetrics and Gynecology
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ISRAEL ZIGHELBOIM, MD Assistant Professor of Obstetrics and Gynecology
DARRYL THOMAS ZINCK Instructor in Clinical Obstetrics and Gynecology

Department's Web Site

<http://www.obgyn.wustl.edu/>

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 e-mail) 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, four-week clinical or research electives are offered.

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.
Morton E. Smith, MD; staff

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 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. All third-year students must complete the "Case Studies in Ophthalmology for Medical Students" and attend the periodic "feedback/oral exam" session with Morton E. Smith, MD, staff.

Fourth Year

Electives

M50 801 OPHTHALMOLOGY

Instructor: Morton E. Smith, MD, 747-5559 or 362-5722

Location: McMillan Hospital Building, Room 114, Barnes-Jewish Hospital, South Campus

Elective Contact: Morton E. Smith, MD, 747-5559 or Mary Hitt, 362-5722

Other Information: All students interested in this senior elective must meet with Dr. Morton E. Smith in March of year WUMS III.

Enrollment limit per period: 8

Valid start weeks are: June 1, 2010 – June 25, 2010 and August 2, 2010 – August 27, 2010

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 to presentation of patients to the director of that particular service.

Several cases must be presented to 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 to 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. Morton E. 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 to Dr. Smith, 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: 1 night per week (until 11 p.m.)

Research

(M50 900)

Usha P. Andley, PhD, 1114-C McMillan Hospital Building, 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.

Rajendra S. Apte, MD, PhD, 702 McMillan Hospital Building, 747-5262. My laboratory is interested in examining how the innate immune system influences retinal or choroidal neovascularization that is seen in a number of blinding eye diseases such as diabetic retinopathy, age-related macular degeneration and retinopathy of prematurity. I am also involved in a number of clinical research trials investigating potential therapeutic agents for retinal diseases.

Steven Bassnett, PhD, 1114 McMillan Hospital Building, 362-1604. We are using advanced microscopic techniques to elucidate the cellular basis of accommodation and presbyopia.

David C. Beebe, PhD, 101C McMillan Hospital Building, 362-1621. My laboratory is interested in the molecular and cellular mechanisms that regulate the development of the eye and the mechanisms responsible for the formation of maturity-onset cataracts. We recently suggested that changes that occur in the eye with aging (especially degeneration of the vitreous body) cause the lens to be exposed to higher levels of oxygen. Our data implicate oxygen toxicity as a major cause of the most common type of age-related cataracts. We have recently shown that the high levels of ascorbate (vitamin C) that are present in the vitreous body protect the lens by reacting with oxygen. One or two clinically-related projects are available to confirm and extend these observations.

Milam A. Brantley Jr., MD, PhD, 625 McMillan Hospital Building, 747-5606. Our basic science research is investigating neurotrophic factors that support retinal cell survival as potential therapy for patients with retinal degeneration. Our clinical science studies look at the genetic basis of age-related macular

degeneration (AMD) and examine genetic variants associated with AMD susceptibility as well as the pharmacogenetic relationship between such variants and AMD treatment response.

Shiming Chen, PhD, 618 McMillan Hospital Building, 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 Hospital Building, 362-9278. I am using the segregation of eye specific regions in the mouse lateral geniculate nucleus as a model system to examine the cellular mechanisms that underlie activity dependent competition and synaptic remodeling in the developing visual system. Mechanisms involved in this kind of competition may be related to the pathophysiology of amblyopia, or "lazy eye," in children. (1) Developmental Neurobiology. (2) Synaptic plasticity.

Thomas A. Ferguson, PhD, 1207 McMillan Hospital Building, 362-3745. Cellular and molecular regulation of the ocular immune response. Immunological basis of age-related macular degeneration (AMD).

Mae Gordon, PhD, 1125 Shriners Building, 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.

J. William Harbour, MD, 706 McMillan Hospital Building, 362-3315. Tumorigenesis and regulation of cell growth, treatment of ocular tumors.

Didier Hodzic, PhD, 620 McMillan Hospital Building, 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 Hospital Building, 362-0403. TGF β 1-related corneal dystrophies, corneal epithelial stem cells, corneal wound healing. Transforming growth factor-beta inducible protein (TGF β 1, also known as bIGH3 or keratoepithelin, KE) is a constituent of the extracellular matrix (ECM) responsible for cell adhesion. Several autosomal dominant corneal dystrophies are attributed to more than 30 missense mutations of the TGF β 1 gene in 5q31 in humans. These dystrophies are found to have abnormal stromal deposits and related poor epithelial adhesions with resultant painful corneal erosions. Corneal transplantation is often needed to restore corneal clarity. Our working hypothesis is that formation of those untoward protein aggregates is caused by either conformational misfolding of TGF β 1 proteins due to missense mutations and/or accumulation of dysregulated TGF β 1 proteins. This lab is

investigating the biophysical properties of native and mutant TGFb1 proteins. Amyloid fibrils formed by differentially degraded native and mutant proteins are also being studied. Synthetic peptides will be used to identify the amyloidogenic mechanisms. Novel therapeutic strategies, such as small interfering RNAs (siRNA) or methylated peptides (meptide), to mitigate the untoward TGFb1 aggregation are also being investigated. The goals of this lab are to elucidate the pathogenesis of abnormal protein aggregations in TGFb1-related corneal dystrophies and to formulate potential therapeutic strategies.

Vladimir Kefalov, PhD, 1007 McMillan Hospital Building, 362-4376. We derive most of our information about the world through our visual system by means of rod and cone photoreceptors. The human retina has one type of rod for dim light vision and three types of cone cells that allow color discrimination. Despite the similarities in their morphology and mechanism of light detection, rods and cones have distinct functional properties. Rods are extremely sensitive (they can detect a single photon of light!) and thus are perfectly suited for dim light conditions. They saturate in moderate light, however, and are not able to respond to light through most of the day. Cones, on the other hand, are 30-100 times less sensitive than rods and do not respond to light in dim light conditions (this is why we don't see colors at night). However, cones are capable of adapting to an extremely wide range of light conditions, rendering them perfectly suited as our daytime photoreceptors. 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:

- 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.
- 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.
- Effects of aging on rod photoreceptor structure and function. This project is funded by a grant from the International Retina Research Foundation.

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.

Steven M. Kymes, PhD, 4547 Clayton Ave., 747-4612. Economic evaluation studies including cost-effectiveness and cost-benefit analysis of treatment and prevention of disease and public health interventions. Develop tools to assist patients in deciding by alternate therapies by improving understanding concerning the way in which the risks and benefits of treatment options align with their own values. Improve methods to assess patient reported measures of quality of life.

Peter Lukasiewicz, PhD, 1003C McMillan Hospital Building, 362-4284. Neurobiology of the healthy and diseased vertebrate retina.

Nathan Ravi, MD, PhD, 623 McMillan Hospital Building, 747-4458. Development of biomaterials for ophthalmic applications.

Alan Shiels, PhD, 1128 McMillan Hospital Building, 362-1637, shiels@vision.wustl.edu. Genetic eye disease. (1) Cataract and glaucoma. (2) Eye movement disorders.

Larry Tychsen, MD, 2S89 Eye Clinic, St. Louis Children's Hospital, 454-6026. Pediatric Ophthalmology: (1) Development of the visual brain and eye alignment. (2) Visual cortex development, ocular alignment, strabismus.

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Department's Web Site

<http://ophthalmology.wustl.edu/>

Department of Orthopaedic Surgery

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) Diseases and Injuries of the Spine
- 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 and bone and mineral physiology.

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)

The following Washington University School of Medicine full-time attending staff mentors are eligible to have students rotate with them during the rotation:

- 1) Martin Boyer (Hand)
- 2) Charles Goldfarb (Hand)
- 3) Ryan Calfee (Hand)

- 4) Matthew Matava (Sports Surgery)
- 5) Mark Halstead (Sports Medicine)
- 6) Heidi Prather and Devyani Hunt (Physical Medicine and Rehabilitation)
- 7) John Metzler and Adam Labore (Physical Medicine and Rehabilitation)
- 8) Eric Gordon (Pediatric Orthopaedic Surgery)
- 9) Gary Miller (VA Orthopaedic Surgery Service)
- 10) John Clohisy (Joint Reconstruction)
- 11) Richard Brasington and Kathy Diemer (Rheumatology Bone and Mineral)
- 12) Jacob Buchowski (Spine)
- 13) Paul Santiago (Neurosurgery Spine)
- 14) Douglas McDonald (Orthopaedic Oncology)
- 15) Leesa Galatz (Shoulder and Elbow)
- 16) Jay Keener (Shoulder and Elbow)

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 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 ORTHOPAEDICS SPINE AND SPORTS SURGERY

Instructor: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Robert Brophy, MD

Patients seen/weekly: Varies

On call/weekend responsibility: Varies — generally one weekend call every two weeks

M95 840 ORTHOPAEDIC SURGERY — FOOT/ANKLE

Instructor: Jeremy J. McCormick, MD, 514-3584

Location: Washington University Orthopedics — Chesterfield

Elective Contact: Kathy Jones, 747-2813, jones.k@wustl.edu or Melissa Tsvirko, 514-3584

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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 840B ORTHOPAEDIC SURGERY — FOOT/ANKLE

Instructor: Sandra Klein, MD, 514-3566

Location: Washington University Orthopedics — Chesterfield

Elective Contact: Kathy Jones, 747-2813, jones.k@wustl.edu or Melissa Tsvirko, 514-3584

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: Ryan 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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

Patients seen/weekly: 50+

On call/weekend responsibility: Varies — generally one weekend call every two weeks

M95 845B ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY

Instructor: Charles Goldfarb, MD, and Paul Manske, 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: 50+

On call/weekend responsibility: Varies — generally one weekend call every two weeks

M95 845C ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY

Instructor: Richard H. Gelberman, MD, 747-2543

Location: Washington University/Barnes-Jewish Hospital, Washington University Orthopedics — Chesterfield

Elective Contact: Kathy Jones, 747-2813, 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 4-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, MD

Patients seen/weekly: Varies

On call/weekend responsibility: Varies — generally one weekend call every two weeks

M95 846A ORTHOPAEDIC TRAUMA

Instructor: William Ricci, MD, 747-2811

Location: Washington University/Barnes-Jewish Hospital

Elective Contact: Kathy Jones, 747-2813, 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 4-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. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated orthopaedic conferences, and participation in ongoing research projects.

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 846B ORTHOPAEDIC TRAUMA

Instructor: Michael Gardner, MD, 747-2523

Location: Washington University/Barnes-Jewish Hospital

Elective Contact: Kathy Jones, 747-2813, 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 4-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. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated orthopaedic conferences and participation in ongoing research projects.

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 848A ORTHOPAEDIC PEDIATRIC SURGERY

Instructor: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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, participation 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: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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, participation 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: 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

Other Information: Students should contact Kathy Jones prior to the first day of the elective.

Enrollment limit per period: 1

Valid start weeks for 4-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, participation 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 855D RECONSTRUCTIVE AND JOINT PRESERVATION SURGERY

Instructor: James Keeney, MD, 747-2523

Location: Washington University/Barnes-Jewish Hospital, Washington University Orthopedics — Chesterfield

Elective Contact: Kathy Jones, 747-2813, 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 4-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, participation 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 859 ORTHOPAEDIC ONCOLOGY

Instructor: Douglas J. McDonald, MD, 747-2563
Location: Washington University/Barnes-Jewish Hospital
Elective Contact: Kathy Jones, 747-2813, 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 4-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, MD
Patients seen/weekly: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks

M95 8991 ORTHOPAEDIC SURGERY EXTERNSHIP (Visiting Students Only)

Instructors: 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
Other Information: Students meet in the Education Office, 8 a.m. first day of the elective.
Enrollment limit per period: Varies
Valid start weeks for 4-week blocks are flexible beginning Monday, June 21, 2010 through Monday, April 11, 2011.

Students rotate on Orthopaedic Services for two- or four-week blocks. Students typically participate in two weeks of hand and upper extremity surgery with Martin Boyer, MD, and two weeks of sports medicine with Rick Wright, MD. Two weeks on another clinical rotation may also be selected. Please contact the Orthopaedics Education Office for further information. E-mail address: orthosurg@wudosis.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 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
Kate Keeler, MD
Jay Keener, MD
Lawrence G. Lenke, MD
Scott J. Luhmann, MD
Matthew J. Matava, MD
William Ricci, MD
Linda Sandell, PhD
Perry Schoenecker, MD
Matt Silva, PhD
Stavros Thomopoulos, PhD
Rick Wright, MD
Ken Yamaguchi, MD

Faculty

RICHARD H GELBERMAN, MD Fred C Reynolds Professor of Orthopaedic Surgery, Head of the Department of Orthopaedic Surgery

YOUSEF ABU-AMER, PHD, MS 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 Asa C. and Dorothy W. Jones Distinguished Professor of Orthopaedic Surgery

ROBERT HENRY BROPHY, IV, MD, MS, BS Assistant Professor of Orthopaedic Surgery

JACOB M BUCHOWSKI, MD, MS Assistant Professor of Orthopaedic Surgery

CHERYL ANN CALDWELL, DPT, MHS Assistant Professor of Orthopaedic Surgery

RYAN PATRICK CALFEE, 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, DPT, MA Assistant Professor of Orthopaedic Surgery

SYLVIA LIN CZUPPON, MS Instructor in Orthopaedic Surgery

ROBERT H DEUSINGER, PHD, MS Associate Professor of Orthopaedic Surgery

MATTHEW BARRETT DOBBS, MD Associate Professor of Orthopaedic Surgery

JACK R. ENGSBERG, PHD, MS Associate Professor of Orthopaedic Surgery

ROBERTA FACCIO, PHD Associate Professor of Orthopaedic Surgery

LEESA GALATZ, MD Associate Professor of Orthopaedic Surgery

MICHAEL J GARDNER, MD Assistant 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 Associate Professor of Orthopaedic Surgery

CHRISTINA A. GURNETT, MD, PHD Assistant Professor of Orthopaedic Surgery

MARK E. HALSTEAD, MD Assistant Professor of Orthopaedic Surgery

MARY KENT HASTINGS, DPT, MS Assistant Professor of Orthopaedic Surgery

MARCIE HARRIS HAYES, DPT, MS Assistant Professor of Orthopaedic Surgery

DAMON JOSEPH LO HAYS, MD Instructor in Clinical Orthopaedic Surgery

GREGORY WILLIAM HOLTZMAN, DPT, MS Assistant Professor of Orthopaedic Surgery

DEVYANI M. HUNT, MD Assistant Professor of Orthopaedic Surgery

RENEE A. IVENS, DPT, MHS Assistant Professor of Orthopaedic Surgery

JEFFREY E JOHNSON, MD Associate Professor of Orthopaedic Surgery

KATHRYN A. KEELER, MD Assistant Professor of Orthopaedic Surgery

JAY DONOVAN KEENER, MD Assistant Professor of Orthopaedic Surgery

JAMES A KEENEY, MD Assistant Professor of Orthopaedic Surgery

LYNNETTE C KHOO-SUMMERS, DPT, MS Assistant Professor of Orthopaedic Surgery

ROBERT S KRAMER, MD Instructor in Clinical Orthopaedic Surgery

ROBERT E KUHLMAN, MD Assistant Professor Emeritus of Clinical Orthopaedic Surgery

ADAM J. LABORE, MD Assistant Professor of Orthopaedic Surgery

ROBERT CRAIG LANDER, MD Instructor in Clinical Orthopaedic Surgery

W. EDWARD LANSCH, MD Instructor in Clinical Orthopaedic Surgery

LAWRENCE G LENKE, MD Jerome J. Gilden M.D. Professor of Orthopaedic Surgery

SCOTT J LUHMANN, MD Associate Professor of Orthopaedic Surgery

CHARLES IRWIN MANNIS, MD Instructor in Clinical Orthopaedic Surgery

PAUL R MANSKE, MD Professor of Orthopaedic Surgery

NICOLAS CLAY MARTIN Instructor in Clinical Orthopaedic Surgery

MATTHEW J MATAVA, MD Associate 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

DEBRA ANN MCDONNELL, DPT, MS, AS Assistant Professor of Orthopaedic Surgery

MARY KATE MCDONNELL, DPT, MHS Assistant Professor of Orthopaedic Surgery

JOHN P METZLER, MD Assistant Professor of Orthopaedic Surgery

GARY ARTHUR MILLER, MD Associate Professor of Orthopaedic Surgery

MARVIN R MISHKIN, MD Assistant Professor of Clinical Orthopaedic Surgery

ALAN H MORRIS, MD Instructor in Clinical Orthopaedic Surgery

RYAN M. NUNLEY, MD Assistant Professor of Orthopaedic Surgery

MARGARET MARY OAKLEY, MD Instructor in Clinical 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 Associate 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, PHD, MS Mildred B Simon Research Professor of Orthopaedic Surgery
PAUL SANTIAGO, MD Assistant Professor of Orthopaedic Surgery
PERRY LEE SCHOENECKER, MD Professor of Orthopaedic Surgery
JOHN JOSEPH SHERIDAN, MD Instructor in Clinical Orthopaedic Surgery
MATTHEW J SILVA, PHD, ME Professor of Orthopaedic Surgery
MATTHEW VERNON SMITH, MD Assistant Professor of Orthopaedic Surgery
NANCY BLOOM SMITH, DPT, MS, BS Assistant Professor of Orthopaedic Surgery
TODD J. STEWART, MD Associate Professor of Orthopaedic Surgery
JAMES W STRICKLAND, MD Visiting Professor of Orthopaedic Surgery
CHI-TSAI TANG, MD Instructor in Orthopaedic Surgery
STAVROS THOMOPOULOS, PHD, MS Associate Professor of Orthopaedic Surgery
STACY LYNNE TYLKA, DPT, MS Assistant Professor of Orthopaedic Surgery
LINDA R VAN DILLEN, PHD, MS Associate Professor of Orthopaedic Surgery
MICHAEL D WEISS Assistant Professor of Clinical Orthopaedic Surgery
PAMELA M. WENDL, DPT, MS Assistant Professor of Orthopaedic Surgery
NEILL MARSHALL WRIGHT, MD Associate Professor of Orthopaedic Surgery
RICK WAYNE WRIGHT, MD Professor of Orthopaedic Surgery
KEN YAMAGUCHI, MD, MS Sam and Marilyn Fox Distinguished Professor of Orthopaedic Surgery
LUKAS P ZEBALA, MD Assistant Professor of Orthopaedic Surgery

Department's Web Site

<http://www.ortho.wustl.edu/>

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 Veterans Administration Medical Center 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.

Central Institute for the Deaf at Washington University School of Medicine

An alliance that began as a trusted handshake in 1931 became a formal affiliation in September 2003, when, after decades of working together, Washington University School of Medicine entered into an historic agreement with nearby Central Institute for the Deaf (CID) — one of the world's leading education and research centers for hearing disorders. This affiliation transferred CID's graduate training program, hearing research programs and adult audiology clinic, along with its state-of-the art, 66,000-square-foot campus and research facilities, into the School of Medicine. These programs became known collectively as CID at Washington University School of Medicine.

The graduate degree programs in audiology, deaf education, and speech and hearing sciences moved into the School of Medicine's newly formed Program in Audiology and Communication Sciences (PACS). The research and clinical programs moved into the Department of Otolaryngology, under the direction of Richard A. Chole, M.D., Ph.D., continuing to advance CID's mission to help people with hearing loss and strengthening the research efforts in the fields of hearing and deafness of one of the largest otolaryngology departments in the world. Work also continues in the Harold W. Siebens Hearing Research Center, which houses the Fay and Carl Simons Center for Biology of Hearing and Deafness and the Center for Childhood Deafness and Adult Aural Rehabilitation.

The Spencer T. Olin Hearing Clinic remained on the CID campus as part of the Department of Otolaryngology's Division of Adult Audiology. CID continued its affiliation with the programs by providing faculty and practicum sites as well as collaborating on applied research studies involving children with hearing loss. The CID at Washington University School of Medicine programs share the CID campus.

Courses

First Year

OTOLARYNGOLOGY CLINICAL SKILLS

Instructor: Joel A. Goebel, MD, 747-0553

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 airway obstruction, 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: Joel Goebel, MD, FACS, 747-0553

Location: 9916 McMillan Hospital Building

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 4-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: Joel Goebel, MD, FACS, 747-0553

Location: 9916 McMillan Hospital Building

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 2-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: 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 2- or 4-week duration.

Valid start weeks for 2-week or 4-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 subspecialty/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: Michael Valente, PhD, 362-7489

Location: 11th 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 4-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: Joel Goebel, MD, FACS, 747-0553

Location: 9th Floor McMillan Hospital Building

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 4-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: 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 Hospital Building, 747-0553, prior to the start of this elective.

Enrollment limit per period: 1

Valid start weeks for 4-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 Specialized Research Facility, 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 multi-unit recordings, electrical brain stimulation, computational methods, pharmacology and behavioral studies. Our main lines of research are: 1-Signal transformations carried out by 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 Hospital Building, 747-3665, faddisb@wustl.edu. Mechanisms of Middle/Inner Ear Damage. Our lab is interested in the cellular and molecular mechanisms associated with cell injury and tissue destruction in the middle and inner ears. We are currently studying the ability of nitric oxide to activate osteoclastic bone resorption, commonly seen in such middle ear diseases as cholesteatoma and chronic otitis media. We are interested in the roles of specific isoforms of nitric oxide synthase and possible interactions between them. Another focus in the lab is the study of cellular mechanisms of noise-induced hearing loss and how this can be exacerbated by simultaneous exposure to environmental toxins such as common workplace chemicals. Again, nitric oxide may play a key role in this injury because of the variety of NOS isoforms present in these tissues.

A wide variety of techniques are employed to gain a broad understanding of these disease processes at molecular, cellular and organismal levels. We use real-time RT-PCR and in situ hybridization to study changes in gene expression, cell and organ culture models to assess injury models in more controlled environments, histological techniques for routine light and electron microscopy, western blotting and immunofluorescence to examine protein and structural changes within cells and tissues, and auditory brainstem response thresholds to correlate hearing sensitivity to specific cellular and molecular challenges.

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 Hospital Building, 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, outcomes in treatment for vestibular neuritis, evaluation of tactile stimulation for balance and oculomotor control and investigation of lingual stimulation for sensory substitution in bilateral vestibular loss patients.

Timothy E. Hullar, MD, 2235 Central Institute for the Deaf Research 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 Hospital Building, 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 include the follow-up and evaluation of newborn hearing screening programs, progression of hearing loss in children and evaluation of unilateral hearing loss. Other projects of the student's choosing that would utilize these research techniques may also be pursued.

J. Gail Neely, MD, FACS, 9902 McMillan Hospital Building, 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 spreadsheet and statistical applications in order to quantitatively define outcomes during treatments of disorders of the facial nerve.

Kevin K. Ohlemiller, PhD, 205 Central Institute for the Deaf Research Building, 747-7179, 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.

Faculty

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Department's Web Site

<http://ent.wustl.edu/>

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 (with Peter A. Humphrey, MD, PhD, as chief and John D. Pfeifer, MD, PhD, as associate chief, Laboratory and Genomic Medicine (headed by Jack H. Ladenson, 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.

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; Kenneth Murphy, MD, PhD., 747-4237; 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 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 session 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 will be 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: 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 4-week blocks are: 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: 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 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-week blocks are: 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 a.m. 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: Anne Lind, MD, 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: Phyllis Huettner, MD, 362-0118
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Phyllis Huettner, MD, 362-0118
Other Information: Students report to Dr. Huettner's office, 300S Peters Building, Barnes-Jewish Hospital, South Campus, 9 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-week blocks are: 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, MD, and staff, 362-2681
Location: Division of Surgical Pathology, Third Floor Peters Building, Barnes-Jewish Hospital, South

Campus

Elective Contact: Samir El-Mofty, MD, 362-2681, elmofty@wustl.edu

Other Information: See the Pathology web site for detailed orientation and introductory information (<http://pathimm.wustl.edu/>). Please call or e-mail Dr. Samir El-Mofty at least one week prior to the elective to discuss individual goals and interests.

Enrollment limit per period: In order to permit maximum interaction with the surgical pathology staff and house staff, the elective is limited to three students per four-week block. For the initial round of scheduling the available slots are allotted to accommodate two fourth-year students and one third-year student during the first three blocks and then one fourth-year student and two third-year students in the remaining blocks. 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 allow. The daily schedule for students begins at 8 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: 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 a.m. first day of elective.

Enrollment limit per period: 2

Valid start weeks for 4-week blocks are: 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 860 CLINICAL LABORATORY MEDICINE — BARNES-JEWISH HOSPITAL

Instructor: Charles Eby, MD, 362-3186

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Jenny Adams, 362-3110

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 4-week blocks are: 13, 17, 21, 29, 33, 37, and 41.

This elective is designed to teach the student how clinical assays are used in the diagnosis of disease and how the tests are actually performed in the clinical laboratory. 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 regular 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, cardiac enzyme and serum protein electrophoresis patterns; appropriate use of blood component therapy and indications for therapeutic apheresis; and identification of infectious organisms. Students will be given the opportunity to present and lead 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

M25 883 TRANSFUSION MEDICINE

Instructor: Douglas Lublin, MD, PhD, 747-0687

Location: Barnes-Jewish Hospital

Elective Contact: Mary Madden, 747-0687

Other Information: Students should discuss their rotation with Dr. Lublin and staff in advance. Students should meet the team at the Center for Pheresis on the fourth floor of the CAM at 9:30 a.m. first day of the elective. Contact resident on beeper 424-1154 if you have questions.

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.

This elective is designed to introduce the student to the clinical aspects of blood banking and transfusion medicine. The four-week elective will consist of regular didactic sessions with senior staff, teaching conferences, and participation in daily clinical rounds. The student will develop clinical skills in areas related to transfusion practice, blood conservation, and evaluation of transfusion reactions. Complex hematologic diseases such as the coagulopathies and diseases that require pheresis will serve to instruct in current clinical practice along with evolving applications of interventional hematology, such as photopheresis and peripheral stem cell harvest for marrow transplantation.

Student time distribution: For July, November and March: Inpatient 30%, Outpatient 30%,

Conferences/Lectures 40%; For remainder of year: Inpatient 40%, Outpatient 40%,

Conferences/Lectures 20%; Subspecialty Care 100%

Major teaching responsibility: Attendings

Patients seen/weekly: 40-60

On call/weekend responsibility: None

Research

(M60 900)

Paul M. Allen, PhD, Eighth Floor, BRB, 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 β -cell compensation in response to insulin resistance in Type 2 diabetes. β -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 β -cell mass. Our studies have identified lipoprotein lipase in β -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 β -cell mitochondrial dysfunction in Type 2 diabetes.

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.

Robert E. Schmidt, MD, PhD, 3720 West Building, 362-7429. Areas of research interest in this laboratory include: (1) the development and characterization of an experimental model of diabetic autonomic neuropathy in several mouse models (2) human sympathetic nervous system in aging and diabetes; (3) susceptibility of subpopulations of sympathetic neurons to experimental injury; (4) the role of oxidative stress in the pathogenesis of experimental diabetic autonomic and age-related neuropathy; (5) treatment with novel therapeutic agent.

Robert D. Schreiber, PhD, Eighth Floor, BRB, 362-8747. Tumor Immunology and Cancer Immunoediting. Research on cytokine signal transduction and definition of the molecular roles of interferon-gamma, tumor necrosis factor and interleukin-10 in promoting host responses to tumors and microbial pathogens.

Andrey S. Shaw, MD, Eighth Floor, BRB, 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. Studies focus on the role of phospholipase A2 (PLA2) enzymes in the regulation of insulin secretion from pancreatic islet beta cells. A novel PLA2 that does not require calcium ions has been cloned from rat and human islets that appears to participate in beta cell secretion and proliferation. Further studies of the role of this enzyme in these processes, its post translational modifications, and its interactions with other proteins involve molecular biologic manipulation of expression of the enzyme in cultured beta cells and intact mice. Mass spectrometric characterization of complex lipids and proteins 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.

Faculty

HERBERT W VIRGIN, IV, MD, PHD Mallinckrodt Professor of Pathology and Immunology, Head of the Department of Pathology and Immunology

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Department's Web Site

<http://www.pathology.wustl.edu/>

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.

Courses

First Year

M30 511 MEDICAL GENETICS

Instructor: Alison J. Whelan, MD, 362-7800

This course focuses on the fundamentals of genetics including the basic structure of genes, gene expression and regulation, patterns of inheritance, types of mutations, the consequences of mutations, and molecular diagnostic strategies. Discussion includes the structure of DNA and its means of replication, the organization and packaging of eukaryotic genomes, chromatin structure and the nucleosome, 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, and how these concepts can be applied to an understanding of medical genetics through discussion of principles of Mendelian genetics, the molecular basis for various inborn errors of metabolism, their diagnosis and prenatal screening, and the genetics of cancer. Ethical issues raised in diagnostic and prognostic efforts are also discussed. This course is referenced in Department of Genetics and is cross-listed with L41 (Bio) 550.

Selectives

M04 526 NEW DISEASES, NEW PATHOGENS

For full description, see Department of Molecular Microbiology.

Second Year

Students are introduced to pediatrics and to the faculty through a series of lectures and symposia designed to acquaint them with the concepts of human growth and development and the effects of age and maturity on reactions to injury and disease. The unique aspects of the physical examination of the infant and child are presented in the Introduction to Clinical Medicine course. Members of the faculty are active participants in the second-year Pathophysiology course.

Third Year

M65 760 PEDIATRICS CLERKSHIP

Instructors: Lisa Moscoso, MD, Michelle Estabrook, 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 SUBINTERSHIP — ST. LOUIS CHILDREN'S HOSPITAL

Instructors: Douglas Carlson, MD, and 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 their designated floor on their first day at 7:50 a.m.

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.

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 and 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

Instructors: Leonard B. Bacharier, MD, Robert C. Strunk, MD, Gordon Bloomberg, MD, Caroline Horner, MD, and Avraham Beigelman, 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 4-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. 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.

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 811 PEDIATRIC CRITICAL CARE MEDICINE

Instructors: Jennifer Duncan, MD, duncan_j@kids.wustl.edu, 454-2527

Location: St. Louis Children's Hospital

Elective Contact: Tracey Erdman, 454-2527

Other Information: Students report to the PICU, 7th Floor St. Louis Children's Hospital, 7:15 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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

Instructors: David Balzer, MD, and Susan Foerster, MD, 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 (7th Floor), 8 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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

Instructors: Angela Sharkey, MD, George Van Hare, MD, Dave Balzer, MD, Charles Canter, MD, Susan Foerster, MD, Mark Grady, MD, Patrick Jay, MD, Mark Johnson, MD, Caroline Lee, MD, Mark Levin, MD, Joshua Murphy, MD, Jennifer Silva, MD, and Gautam Singh, MD, 454-6095

Location: St. Louis Children's Hospital

Elective Contact: Angela Sharkey, MD, 454-6095

Other Information: Students report to 8th Floor Northwest Tower, Division of Cardiology, Kim Broome, 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 4-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: 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 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-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: 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 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-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 4 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., 2nd floor
Elective Contact: Tessa Madden, MD, 747-6495
Other Information: Students should contact Dr. Madden a week prior to the beginning of the rotation, e-mail: madden@wustl.edu.
Enrollment limit per period: 1
Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 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

Instructors: 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 4-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 AND NUTRITION

Instructor: Robert Rothbaum, MD, 454-6173

Location: Gastroenterology Clinical Offices, 9th Floor, Northwest Tower

Elective Contact: Sherri Austin, 454-6173, austin_sh@kids.wustl.edu

Other Information: Students should contact Sherri Austin at least one week in advance of first day of elective for further information.

Enrollment limit per period: 1

Valid start weeks for 4-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: 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: 130 (entire division), students see a subset (most interesting/instructive cases)

On call/weekend responsibility: None

M65 840 PEDIATRIC INFECTIOUS DISEASES

Instructors: 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: Gregory Storch, MD, 454-2261

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 4-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, a weekly pediatric infectious diseases research conference, and a monthly journal club.

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: David M. Jaffe, MD, 454-2341

Location: St. Louis Children's Hospital

Elective Contact: Carol Heller, 454-2341

Other Information: Students report to Room 9150 Northwest Tower, 8:30 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.

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 p.m.) or an evening shift (3 p.m.-11 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

Instructors: Neil H. White, MD, Abby Hollander, MD, Bess Marshall, MD, Rebecca Green, MD, PhD, Paul Hruz, MD, PhD, Ana Maria Arbelaez, MD, and Lori Wagner, MD, 286-2761

Location: St. Louis Children's Hospital

Elective Contact: Angie Genovese, 286-2761

Other Information: Student has the option to extend elective. Students report to Endocrinology and Diabetes Office, 9th Floor Northwest Tower, 8:30 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.

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

Instructors: Thomas Ferkol Jr., MD, Robert C. Strunk, MD, Leonard Bacharier, MD, Avraham Beigelman, MD, Albert Faro, MD, Kay Horner, MD, James Kemp, MD, Anand Patel, MD, Katherine Rivera-Spoljaric, MD, and 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 4-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 in infants and children. Pediatric referrals will be seen in both an inpatient and outpatient setting. Goals include: (1) to learn the importance of the physical exam using inspection, percussion and auscultation; (2) indications and interpretation of diagnostic tests, such as chest imaging, blood gas measurements, polysomnography, pulmonary function testing, and bronchoscopy with biopsy and lavage; (3) therapeutic interventions. Unique aspects of this rotation include a broad exposure to children with congenital lung defects, asthma, cystic fibrosis, primary ciliary dyskinesia, interstitial lung disease, and end-stage cardiopulmonary diseases referred for lung transplantation. Weekly didactic sessions as well as divisional clinical conferences are other opportunities for the trainee to develop 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: Aaron Hamvas, MD, 454-6148

Location: 8th Floor Northwest Tower

Elective Contact: Tammy Cecena, 454-6148

Other Information: Students should report to Dr. Hamvas's office by appointment the afternoon (or the Friday) prior to the beginning of the rotation for orientation.

Enrollment limit per period: 3

Valid start weeks for 4-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 Neonatal Intensive Care Unit at St. Louis Children's Hospital also will have the opportunity to become involved in the transport of acutely ill infants, while those on 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: Joan Rosenbaum, MD, 454-6148

Location: Suite 8130, 8th floor Northwest Tower

Elective Contact: Jimene Springer, 454-6148

Other Information: Students report to Suite 8130, 8th floor Northwest Tower at 9 a.m. first day of elective

Enrollment limit per period: 2 or 3

Valid start weeks for 4-week block is: 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 50%, Conferences/Reading 50%; Subspecialty Care 100%

Major teaching responsibility: Joan Rosenbaum, MD

Patients seen/weekly: Estimated — 12

On call/weekend responsibility: None

M65 875 PEDIATRIC RENAL DISEASE

Instructors: Keith A. Hruska, MD, Anne M. Beck, MD, S. Paul Hmiel, MD, PhD, and Sun-Young Ahn, MD, 454-6043

Location: St. Louis Children's Hospital

Elective Contact: Keith A. Hruska, MD, 454-6043

Other Information: Students report to Lynne Strain, 454-2261, 9th Floor Northwest Tower, Conference Room 9C, 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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

Instructors: Stuart C. Sweet, MD, and Albert Faro, MD, 454-2214

Location: St. Louis Children's Hospital

Elective Contact: Kim Tinsely, 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 4-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 transplant 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, such as flexible bronchoscopy with biopsies, the histopathology of infection and graft rejection, and the complexities of immunosuppression will all be explored. Weekly transplant meetings with our multidisciplinary team, as well as didactic/psychosocial and ethical and divisional care meetings will all be available. Our patient referral base is worldwide, and the primary cardiopulmonary disease states include: cystic fibrosis, pulmonary hypertension, complex congenital heart 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): Angela Sharkey, 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. 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 2 or 4-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

M25 831 PEDIATRIC DERMATOLOGY

Instructor: Susan J. Bayliss, MD, 454-2714

Location: 3N48 Children's Hospital

Elective Contact: Rosemarie Brannan, 454-8622

Other Information: Call 454-2714 prior to first day of elective. Reporting time is 7:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This clinical rotation will be available to students interested in dermatology, pediatrics or both. Students will follow the dermatology rotation (M25 830) with an emphasis on pediatric dermatology by attending pediatric dermatology clinics, seeing consults, etc. Enthusiastic students will have an opportunity to write up a case report if they wish, but need to notify Dr. Bayliss before the course. Students can take either this elective or M25 830 — not both.

Student time distribution: Inpatient 1%, Outpatient 74%, Conferences/Lectures 25%; Subspecialty Care 100%

Major teaching responsibility: Single attending

Patients seen/weekly: 50-100

On call/weekend responsibility: None

Research

(M65 900)

Ana Maria Arbelaez, MD, 10th 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, 8th Floor, Northwest Tower, Division of Cardiology, 454-6095. Single-center and multicenter clinical studies and trials in pediatric cardiomyopathy, heart failure and heart transplantation.

F. Sessions Cole, MD, and Aaron Hamvas, MD, 8th Floor, Northwest Tower and 5th floor, McDonnell Pediatric Research Building, 454-6148. Using population-based data bases 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).

Michael R. DeBaun, MD, MPH, 454-4177. Research interests include: (1) clinical investigation of the natural history of stroke in sickle cell disease; and (2) genotype/phenotype analysis in pediatric syndromes associated with cancer.

Allan Doctor, MD, 5th Floor, McDonnell Pediatric Research Building, 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/>.

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 efficacy of potential decolonization measures. We are also interested in the effectiveness of these measures when performed by an entire household versus measures directed at the index patient alone in pediatric patients presenting with a CA-MRSA skin or soft tissue infection. Our lab also explores 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, 5th Floor, McDonnell Pediatric Research Building, 286-2772. The research in the laboratory focuses on chronic kidney disease (CKD) and its complications of renal osteodystrophy, vascular calcification. The lab has discovered important new pathologic mechanisms of disease leading to vascular calcification through hyperphosphatemia. Translation 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, 3rd 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 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. Our goals are to uncover new avenues for the development of interventions that will prevent and treat Gram-negative infections of the urinary tract, gastrointestinal tract and central nervous system.

Terrie Inder, MD, 10th 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 complemented 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, 4S50 St. Louis Children's Hospital, 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 6108, McDonnell Pediatric Research Building, 286-2136. Our laboratory investigates the molecular mechanisms underlying T cell signaling and trafficking using mouse models. We hope to identify molecules critical for host defense against infectious organisms. Our focus is currently on an actin-binding protein called L-plastin, which is required for normal T 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, 10th 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, Max Q. Arens, PhD, Richard S. Buller, PhD, and staff, 2N52 St. Louis Children's Hospital, 454-6079. Rapid diagnosis of viral and other unconventional infections. The Diagnostic Virology Laboratory is studying the use of the polymerase chain reaction and oligonucleotide sequencing for the diagnosis of infections caused by viruses and other unconventional pathogens, and the detection of resistance to antimicrobial agents. Detection of undiscovered pathogens in another area of interest.

Robert C. Strunk, MD, 10th 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 (cholangitis, diarrhea), nutrition (especially the nutritional consequences of cystic fibrosis), 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, 9th Floor, Northwest Tower, 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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ROBERT CAROLIN MCKINSTRY, III, MD, PHD, MS Professor of Pediatrics

JULIE K MCMANEMY, MD, M PH Instructor in Pediatrics

WILLIAM A MCMANUS, MD Instructor in Pediatrics

ROBERT PAUL MECHAM, PHD Professor of Pediatrics

NALINI K MEHTA Instructor in Clinical Pediatrics

P ARAVINDAKSHA MENON Instructor in Clinical Pediatrics

SARAH J. MERMELSTEIN, MD Instructor in Pediatrics

MARY SHAUGHNESS MEYER Instructor in Clinical Pediatrics

PETER HOWARD MICHELSON, MD, MS Associate Professor of Pediatrics (Pending Executive Faculty Approval)

JOHN NEAL MIDDELKAMP, MD Lecturer in Pediatrics , Professor Emeritus of Pediatrics

JENNY LYNN MIELE Instructor in Clinical Pediatrics

AARON SAMUEL MILLER, MD, MS Instructor in Pediatrics

DONNA C MILLER, MD Instructor in Clinical Pediatrics

SUZANNE LEE MILLER, MD Instructor in Clinical Pediatrics

SHAKIR MOHAMED, MD, BS Instructor in Pediatrics

CHRISTOPHER MOLITOR Instructor in Clinical Pediatrics

GAIL LYNN MOOLSINTONG, MD Instructor in Clinical Pediatrics

DARLENE A. MOORE, MD Instructor in Clinical Pediatrics

MARY R MORGAN, MD Instructor in Clinical Pediatrics

SHARON CELESTE MORLEY, MD, PHD Instructor in Pediatrics

DANIEL R. MORRA Instructor in Clinical Pediatrics

LISA MAE MOSCOSO, MD, PHD Assistant Professor of Pediatrics

JANET GWEN MUELLER, MD Instructor in Clinical Pediatrics

MARGARET M MUELLER Instructor in Clinical Pediatrics

JARED T. MUENZER, MD Instructor in Pediatrics

STEVEN MUETH Instructor in Clinical Pediatrics

MANOHARA MUNIMUDDAPPA Instructor in Clinical Pediatrics

JOSHUA J MURPHY, MD Assistant Professor of Pediatrics

KEVIN J MURPHY, MD Professor of Clinical 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

HELEN E NASH, MD Professor Emerita of Clinical Pediatrics

HOMER E NASH, JR, MD Professor of Clinical Pediatrics

JEFFREY J NEIL, MD, PHD Professor of Pediatrics

APRIL ERWIN NESIN Instructor in Clinical Pediatrics

KHAI NGO, MD Instructor in Clinical Pediatrics

ELLEN MARGARET NICASTRO Instructor in Clinical Pediatrics

RAMZI T NICOLAS Adjunct Instructor in Pediatrics

MICHAEL JUSTIN NOETZEL, MD Professor of Pediatrics

DAVID CRAIG NORMAN, MD Instructor in Clinical Pediatrics

KAREN K NORTON, MD Assistant Professor of Clinical Pediatrics

JEROME H O'NEIL, JR, MD Instructor in Clinical Pediatrics

AUDREY R ODOM, MD, PHD Instructor in Pediatrics

JUSTIN O OGBEVDEN, MBBS Instructor in Clinical Pediatrics

CHRISTINE L OHLEMEYER, MD Associate Professor of Clinical Pediatrics

PHINEAS PHILLIP OREN, MD Assistant Professor of Pediatrics

VALERIE ORRICO Instructor in Clinical Pediatrics

RACHEL C. ORSCHELN, MD Assistant Professor of Pediatrics

IRMA I ORTIZ-ARROYO, MD Instructor in Clinical Pediatrics

ALISON H OSWALD Instructor in Clinical Pediatrics

NATALIA L PACIORKOWSKI, MD, PHD Instructor in Pediatrics

JENNIFER ANN PANASCI Instructor in Clinical Pediatrics

TAE SUNG PARK, MD Professor of Pediatrics

ROBERT T PASCHALL, MD, MA Associate Professor of Pediatrics

ANAND C PATEL, MD Assistant Professor of Pediatrics

DONNA T PERDAN, MD Instructor in Clinical Pediatrics

MARIA ISABEL PEREZ CANDAL, MD Instructor in Pediatrics

FREDERICK D PETERSON, MD Professor of Clinical Pediatrics

JOSE A PINEDA SOTO, MD Assistant Professor of Pediatrics

CHRISTOPHER JAM PINGEL, MD Instructor in Pediatrics

DANIEL S PLAX, MD Instructor in Clinical Pediatrics

KATHRYN L. PLAX, MD Associate Professor of Pediatrics

STEVEN I PLAX, MD Professor Emeritus of Clinical Pediatrics

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PETER J PUTNAM, MD Instructor in Clinical Pediatrics

JENNA M PUTZEL Instructor in Clinical Pediatrics

ROBERT LOUIS QUAAS, MD, BS 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 RASHET, MD Instructor in Clinical Pediatrics

SHERYL S REAM, MD Instructor in Clinical Pediatrics

NEIL F. REBBE, MD, PHS Instructor in Clinical Pediatrics

TIMOTHY REED Instructor in Clinical Pediatrics

PHILLIP D REICHERT Instructor in Clinical Pediatrics

CATHERINE R REMUS, MD, MSN Instructor in Clinical Pediatrics

GEORGE H REZABEK, DOST Instructor in Clinical Pediatrics

EDWARD K RHEE, MD Adjunct Assistant Professor of Pediatrics

JOAN K. RILEY, PHD Assistant Professor of Pediatrics

KATHERINE RIVERA-SPOLJARIC, MD, MS Assistant Professor of Pediatrics

WILLIAM L. RIVES, MD, MS Instructor in Pediatrics

JANIS B ROBINSON, MD, MA Associate Professor of Clinical Pediatrics

SANDEEP ROHATGI, MD Instructor in Clinical Pediatrics

JAMES R ROHRBAUGH, MD Associate Professor of Clinical Pediatrics

JOAN LEE ROSENBAUM, MD, MS Professor of Pediatrics

ISABEL L ROSENBLOOM, MD Assistant 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, MD, PHD, MS Assistant Professor of Pediatrics

CHRISTINA M RUBY, MD Instructor in Clinical Pediatrics

MARTIN D RUDLOFF, MD Assistant Professor of Clinical Pediatrics

DAVID RUDNICK, MD, PHD Assistant Professor of Pediatrics

DANIEL G. RUDOLPH, MD Instructor in Clinical Pediatrics

YORAM RUDY Professor of Pediatrics

DIANE MARY RUP, MD, MA Instructor in Clinical Pediatrics

LISA A RYAN Instructor in Clinical Pediatrics

GRETCHEN A SANDER, MD Instructor in Clinical Pediatrics

HEIDI L SANDIGE, MD, MA Instructor in Pediatrics

LEENA L. SASTRY, MD Instructor in Pediatrics

DIANA M SATER-ROUKOZ Instructor in Clinical Pediatrics

GEORGE SATO, MD Professor of Clinical Pediatrics

RICHARD WILLIAM SATO, MD Assistant Professor of Clinical Pediatrics

SCOTT SAUNDERS, MD, PHD 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 Instructor in Clinical Pediatrics

BRADLEY L SCHLAGGAR, MD, PHD Associate Professor of Pediatrics

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PURVI SHAH, MD Instructor in Pediatrics

RACHEL E. SHAKOFSKY, MD Instructor in Pediatrics

LARRY J SHAPIRO, MD Spencer T and Ann W Olin Distinguished Professor of Pediatrics

ANGELA M. SHARKEY, MD Professor of Pediatrics

ELEANOR MARIA SHAW, MD Assistant Professor of Clinical Pediatrics

SHALINI SHENOY, MBBS, MD Associate Professor of Pediatrics

ROSS WILLIAM SHEPHERD, MBBS, MD Adjunct Professor of Pediatrics

WARREN G SHERMAN, MD Professor of Clinical Pediatrics

MARWAN SHINAWI, MD Assistant Professor of Pediatrics

MIN-YI KATHERIN SHIUE, MD Instructor in Clinical Pediatrics

MICHAEL SHOYKHET, MD, PHD Instructor in Pediatrics

MARILYN J SIEGEL, MD Professor of Radiology in Pediatrics

JENNIFER N SILVA, MD Instructor in Pediatrics

CONNIE DARLENE SIMMONS Instructor in Clinical Pediatrics

PAUL S SIMONS, MD Associate Professor of Pediatrics

GAUTAM K SINGH, MBBS, MD Associate Professor of Pediatrics

CARL JEFFREY SIPPEL, MD, PHD Assistant Professor of Clinical Pediatrics

HAROLD B SITRIN, MD Assistant Professor of Clinical Pediatrics

ALAN JOSEPH SKOULTCHI, MD, MS Instructor in Clinical Pediatrics

CARL HUGH SMITH, MD Professor Emeritus of Pediatrics

JOSHUA C SMITH Instructor in Clinical Pediatrics

MATTHEW D SMYTH, MD Associate Professor of Pediatrics

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CRAIG A SPIEGEL, MD Instructor in Clinical Pediatrics

MYTHILI SRINIVASAN, MD, PHD, MS Instructor in Pediatrics

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NORMAN P STEELE, MD Instructor in Clinical Pediatrics

RANDALL S STERKEL, MD Instructor in Clinical Pediatrics

ANITA R STIFFELMAN, MD Associate Professor of Clinical Pediatrics

GREGORY A STORCH, MD Ruth L. Siteman Professor of Pediatrics

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SUSAN KAY STRECKER, DPT, MA Assistant Professor of Pediatrics

M. ANNE STREET, MD, MA 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

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AMANDA SWEETLAND Instructor in Clinical Pediatrics

SUSAN C. SYLVIA Instructor in Clinical Pediatrics

PHILLIP IRWIN TARR, MD Melvin E Carnahan Professor of Pediatrics

JESSIE L TERNBERG, MD, PHD Professor Emeritus of Surgery in Pediatrics

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BRADLEY TERRILL THACH, MD Professor of Pediatrics

STEPHEN THIERAUF Instructor in Clinical Pediatrics

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YUMIRLE PADRON TURMELLE, MD, AA Assistant Professor of Pediatrics

SARAH ANN TYCAST, 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 Instructor in Pediatrics

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JEAN V WAGNER Instructor in Clinical Pediatrics

LORI F WAGNER, MD Instructor in Pediatrics

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NEIL HARRIS WHITE, MD 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 CHRISTIN WILLING, MD, D SC, MS Professor of Pediatrics

DAVID B WILSON, MD, PHD Associate Professor of Pediatrics

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PATRICIA ANN WOLFF, MD Professor of Clinical Pediatrics

MICHAEL WONG, MD, PHD Associate Professor of Pediatrics

MICHELLE WONG, MD Instructor in Pediatrics

GERALD WOOL, MD Associate Professor of Clinical Pediatrics

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HAYLEY WURZEL Instructor in Clinical Pediatrics

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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 BUENV YU, JR, MD, M PH, MHS Assistant Professor of Pediatrics (Pending Executive Faculty Approval)

CRAIG MITCHELL ZAIDMAN, MD Assistant Professor of Pediatrics

JOHN M ZEMPEL, MD, PHD Assistant Professor of Pediatrics

AMY CHRISTINE ZIMMERMANN, MD Instructor in Clinical Pediatrics

ANDREW C. ZUCKERMAN Instructor in Clinical Pediatrics

Department's Web Site

<http://peds.wustl.edu/>

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.

Courses

Second Year

M85 676A DISEASES OF THE NERVOUS SYSTEM: PSYCHIATRY

Instructor: Melissa A. Swallow 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: Dan W. Haupt, MD, 362-2469

Up to 11 students spend four weeks on the inpatient psychiatry service of either Barnes-Jewish Hospital or Metropolitan St. Louis Psychiatric Center. At either site, students evaluate and treat patients under the supervision of house staff and an attending physician, 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 www.psychiatry.wustl.edu/c/Education/MedicalStudent.aspx for current details or to review the goals of the clerkship.

M85 771 AMBULATORY CLERKSHIP: PSYCHIATRY FOR GENERALISTS

Instructor: Dan W. Haupt, MD, 362-2469

Up to four students may elect to pursue their ambulatory medicine selective through the Department of Psychiatry. Students submit a written review of a relevant clinical topic of their choice and participate in clinical duties. Students will be assigned to one of the following clinical options: Barnes-Jewish Hospital adult psychiatry clinic and community psychiatry, psychiatry consultation service, BJC Behavioral Health or child psychiatry clinic. As of this writing, there is no night call at any site. See <http://www.psychiatry.wustl.edu/c/education/medstudent/OptionsInPsych.aspx> for further details.

Fourth Year

Electives

M85 805 PSYCHIATRY CONSULT SERVICE

Instructor: Dan Haupt, MD, 362-2465

Location: Renard 4410, South Campus

Elective Contact: Dan Haupt, MD, 362-2465

Other Information: Students should page the consult team at 848-2402, 8 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.

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: Keith Garcia, MD, PhD, 362-1222
Location: Wohl Clinic and community sites
Elective Contact: Keith Garcia, MD, PhD, 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 4-week blocks are: Weeks 13 and 17.

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 and ER patients. The patients present with a wide variety of psychological and interpersonal problems, as encountered in an everyday office practice of an internist or general practice specialist. In this setting, the student will have the opportunity to learn a variety of treatment techniques under supervision. Students completing the clerkship have indicated their enjoyment of the opportunity for independent patient management.

Student time distribution: Outpatient/ER 80%, Conferences/Lectures 20%; Subspecialty Care 100%
Major teaching responsibility: Attendings and residents
Patients seen/weekly: 20
On call/weekend responsibility: None

M85 811 OUTPATIENT SHADOWING AND READING ELECTIVE

Instructor: Richard W. Hudgens, MD, 286-1712
Location: 24 S. Kingshighway, Psychiatry Clinic
Elective Contact: Christina Lickel, 286-1712
Other Information: Report to 24 S. Kingshighway, Psychiatry Clinic 1 p.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-week blocks are: Weeks 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

Student will chose a reading topic relevant to psychiatry. Student will shadow Dr. Hudgens on inpatient rounds and sit in with Dr. Hudgens during outpatient clinic hours.

Student time distribution: 100% Outpatient; 100% Subspecialty Care
Major teaching responsibility: Coursemaster
Patients seen/weekly: 40
On call/weekend responsibility: None

M85 831 ELECTROCONVULSIVE THERAPY (ECT)

Instructors: Michael Jarvis, PhD, MD, and ECT staff, 362-1816
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Michael Jarvis, PhD, MD, 362-1816
Other Information: Students should call Dr. Jarvis prior to scheduling the elective.
Enrollment limit per period: 1
Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

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 ECT. 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 ECT.

Student time distribution: Inpatient 80%, Outpatient 15%, Conferences/ Lectures 5%; Subspecialty Care 100%

Major teaching responsibility: Michael Jarvis, PhD, MD

Patients seen/weekly: 20

On call/weekend responsibility: Saturday morning

M85 836 CLINICAL PSYCHIATRY — INPATIENT PSYCHIATRIC SERVICE

Instructor: 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 4-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: 5-7

On call/weekend responsibility: Every fifth night

M85 840 CHILD PSYCHIATRY

Instructor: 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 4-week blocks are: Weeks 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This elective in child psychiatry utilizes the Child Psychiatry Outpatient Clinic at St. Louis Children's Hospital. It provides experience in age-appropriate diagnostic and treatment methods in children and adolescents. Experience is also provided on the Consultation Service of St. Louis Children's Hospital. 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: Dan Haupt, MD, 362-2465
Location: Room 4480, Renard Building
Elective Contact: Tammie Repko, 362-2469
Other Information: Report to Room 4410 Renard Building, 9 a.m. first day of elective
Enrollment limit per period: 3
Coordinate with coursemaster to verify availability.

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. Haupt and Marty Clarke, PA, 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: Dan Haupt, MD, (coursemaster)
Patients seen/weekly: 12
On call/weekend responsibility: None

M85 880 SCHIZOPHRENIA PRECURSORS AND PRODROMAL STATES

Instructor: Angela M. Reiersen, MD, 747-6793
Location: Dr. Reiersen's office, Suite 1153-Room B, East Building
Elective Contact: Angela M. Reiersen, MD, 747-6793
Other Information: Students report to Dr. Reiersen's office, Suite 1153-Room B, East Building, 9:30 a.m. first day of elective.
Enrollment limit per period: 1
Valid start weeks for 4-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 Clinic," 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 and developmental abnormalities, this rotation would also help trainees integrate information regarding the continuity between childhood development and adult psychopathology. Trainee would observe all aspects of First Contact Clinic evaluation (including semi-structured diagnostic interviews and cognitive testing) and meet weekly with the supervising attending for discussion of cases and required weekly readings. Trainee would also be required to write a literature review on a topic relevant to the rotation.

Student time distribution: Outpatient 10%, Conferences/Lectures 90%; Subspecialty Care 100%
Major teaching responsibility: Coursemaster and/or psychiatry attending
Patients seen/weekly: 1
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@matlock.wustl.edu. Genetics of brain function and behavior. This research elective is intended for students interested in biological psychology, psychophysiology, psychopharmacology of drugs of abuse, and behavior genetics. Dr. Anokhin is conducting experimental studies with human volunteers, including twins, in order to better understand biobehavioral mechanisms

underlying vulnerability to addiction, as well as possible mediators of genetic risk, such as behavioral disinhibition and negative affect. An ongoing longitudinal study of adolescent twins explores genetic influences on brain activity and autonomic measures related to inhibitory control of behavior and processing of emotional information. Young adult twins are assessed using quantitative electroencephalogram (EEG) and event-related brain potentials (ERPs) recording during a variety of behavioral tasks. In addition, extensive information is obtained using diagnostic interviews and questionnaires administered to twins and their parents, and blood samples are taken for genotyping. Another longitudinal twin study is concerned with substance use and other behaviors in high school and college students. Other studies look at acute effects of cigarette smoking or moderate dose of alcohol on brain function and performance. Interested students will be able to learn a variety of methods used in these studies, such as the recording and analysis of digital EEG, cognitive ERPs, 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 with human subjects; (3) analysis of existing data from alcohol and smoking challenge experiments; (4) designing and piloting new behavioral tests. Qualifications: Reliability and responsibility, ability to commit specified amount of time per week and work on schedule (can be negotiated on an individual basis), PC experience and willingness to obtain short training and certification in ethical issues related to human studies.

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 Hospital, 362-3492. This research elective will focus on analyzing data from high-risk studies of addiction. Substance-dependent individuals were recruited from chemical dependency treatment centers and their relatives were interviewed. Students will have the opportunity to examine family and environmental factors that place some at risk for developing alcohol and other substance dependence and protect others from the development of these disorders.

Kevin J. Black, MD, 4408 Renard Hospital, 362-2469, E-mail: Kevin@wustl.edu. Students will participate in ongoing neuroimaging studies of 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 for examples of past research.

Linda B. Cottler, PhD, MPH, Parc Frontenac Building, 286-2252. Our grants are community-based and focus on female drug users, female offenders and impaired professionals. We also have a national study of 10- to 18-year-olds from 10 cities recruited through entertainment venues to assess stimulant use in addition to a study of college-age and older adults who use prescription opioids, stimulants and sedatives to assess misuse, abuse and dependence. EPRG is also involved in community-based studies to understand the health needs and concerns of out of treatment City residents to refer them to medical and social agencies as well as research opportunities at WU. The group is also studying barriers to research participation, especially among persons who use illicit drugs, with a focus on IRB staff and PIs. The EPRG has numerous studies of out of treatment persons for secondary data analysis with carefully characterized risk behaviors and diagnostic syndromes. Other opportunities include pre- and post-doctoral training for NIDA drug abuse epidemiology, services and prevention research as well as the development of interviews that assess psychiatric and substance use disorders, and environmental risk factors for such disorders.

Linda B. Cottler, PhD, MPH, Arpana Agrawal, PhD, Laura J. Bierut, MD, Kelly Botteron, MD, Kathleen Bucholz, PhD, MPE, Catina Callahan O'Leary, PhD, C. Robert Cloninger, MD, Karen Dodson, Nuri Farber, MD, Anne Glowinski, MD, MPE, Rick Grucza, PhD, MPE, Gitry Heydebrand, PhD, Barry Hong, PhD, Michael Lynskey, PhD, Rumi Price, PhD, Angela Reiersen, MD, MPE, Ed Spitznagel, PhD, Catherine Striley, PhD,

ACSW, MPE, Melissa Swallow Harbit, MD, 40 N. Kingshighway, Suite 4, 286-2252. (1) Introduction to General Epidemiology. Epidemiology is the study of health and disease in the population. This course, while introducing epidemiologic methods and classic medical studies, teaches the core competencies of epidemiology according to the American Association of Public Health; (2) Instruments of Psychiatric Diagnoses and Assessment. Introduction to commonly used interviews, both structured and semi-structured, and questionnaire developed since 1940 for the diagnosis of specific psychiatric disorders in children and adults; (3) Drug Epidemiology Seminar I: Recent Trends in Drug Epidemiology. Speaker series with topics determined each year to cover important emerging and ongoing research in addiction epidemiology; (4) General Epidemiology Seminar II: Recent Trends and Progress in Substance Use and Psychiatric Epidemiology. Speaker series with topics determined each year to cover important emerging and ongoing research in substance use and psychiatric epidemiology; (5) Psychiatric and Drug Abuse Epidemiology Seminar III: PostDoc Presentations. Prepares students for independent research presentations through presenting and critiquing each other's work with faculty guidance; (6) Landmarks in Psychiatric Epidemiology. A review of the major studies in psychiatric epidemiology, describing methods and results, from the 1920s to the present; (7) Applied Statistics for Behavioral Scientists. Instruction designed for those behavioral researchers who want to expand their knowledge of practical methods in statistics, with an emphasis on statistical and epidemiological concepts, applications, practical hints, and a hands-on approach to data, and using SAS; (8) Behavioral Research Methods covers research methods, study design, assessment development, personnel management, IRB issues and other methodological challenges. It also covers the principles for best practices. This course uses examples from currently funded research in the areas of prescription drugs, criminal justice, human trafficking, alcohol and substance abuse, HIV/AIDS, community-based research and other public health concerns to illustrate best approaches to the design and conduct of behavioral research in real time.

Alison Goate, DPhil, 9th Floor, Barnes-Jewish Hospital 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.

John W. Newcomer, MD, 4412 Renard Hospital, 362-5939. Translational research in psychiatry, including clinical trials focused on the role of NMDA glutamate receptors in regulating risk for psychiatric symptoms, pain, clinical memory research, and research concerning the effect of psychotropic medications on the regulation of body weight, glucose and lipid metabolism, and other cardiometabolic biomarkers. This elective offers the student a broad exposure to clinical research protocols relevant to mental disorders, including protocols in patients with schizophrenia. Students will have an opportunity to focus on a particular project of interest.

Rumi Kato Price, PhD, MPE, 4560 Clayton Rd., Central Institute for the Deaf Building, 286-2282. The student will work closely with Dr. Price on ongoing research projects in substance abuse, psychiatric epidemiology and human-genome epidemiology. The current projects include: a 30-year longitudinal study of the impact of drug abuse and war trauma; a focused study on protective factors mitigating suicidal risk; an epidemiologic study of post-traumatic stress disorder with embedded virtual reality exposure experiments; human-genome epidemiology studies focusing on models for substance abuse and psychiatric disorder comorbidity, admixture, and on translational research to integrate genetic findings to reduce disparities in substance abuse; and epidemiologic applications of highly-flexible computational techniques to identify interactions of risk and protective factors.

Yvette Sheline, MD, 1115 Renard Hospital, 2204 East Building, 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.

NOTE TO STUDENTS: There are always a number of research projects in the Department of Psychiatry.

For additional information contact Dr. Rubin, 362-2462.

Faculty

CHARLES F ZORUMSKI, MD Samuel B. Guze Professor of Psychiatry, Head of the Department of Psychiatry

ARPANA AGRAWAL, PHD Assistant Professor of Psychiatry

AQEEB AHMAD Instructor in Clinical Psychiatry

DALE J ANDERSON, MD Instructor in Clinical Psychiatry

RICHARD H ANDERSON, MD, PHD, MS Instructor in Clinical Psychiatry

ANDREY P ANOKHIN, PHD, MS Associate Professor of Psychiatry

E. JAMES ANTHONY, MD, PHD, MS Professor Emeritus of Psychiatry (Child Psychiatry)

SCOTT J ARBAUGH, MD Instructor in Clinical Psychiatry

AHMAD BEHESHTI ARDEKANI, MD Assistant Professor of Clinical Psychiatry

MICHAEL ROMAN BANTON, MD Instructor in Clinical Psychiatry (Child Psychiatry)

DEANNA BARCH, PHD, MA Assistant Professor of Psychology in Psychiatry

RONALD BEACH, MD Instructor in Clinical Psychiatry

ANDREW CURRY BELDEN, MS Research Instructor in Psychiatry

SAVITA BHAT, MS Instructor in Clinical Psychiatry

LAURA J BIERUT, MD Professor of Psychiatry

MONICA E. BISHOP Instructor in Psychiatry

KEVIN J. BLACK, MD Professor of Psychiatry

KELLY N BOTTERON, MD Professor of Psychiatry (Child Psychiatry)

GARY BOXER, MD Associate Professor of Psychiatry (Child Psychiatry)

SUSAN KATHLEEN BOYER, MD Instructor in Clinical Psychiatry

ALLYSON BOYLE, MD Instructor in Clinical Psychiatry

ROBERT HARRY BRADY, MD Instructor in Clinical Psychiatry (Child Psychiatry), Adjunct Instructor in Psychiatry (Child Psychiatry)

PETER ANTHONY BRAWER Instructor in Clinical Psychiatry

STEVEN E. BRUCE, PHD, MA Visiting Assistant Professor of Psychiatry

KATHLEEN K BUCHOLZ, PHD, MS 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, PHD, MSN Adjunct Instructor in Psychiatry

ROBERT MICHAEL CARNEY, PHD, MS Professor of Psychiatry

PATRICIA A CAVAZOS-REHG, PHD Research Assistant Professor of Psychiatry

LI-SHIUN CHEN, MD, PHS, M PH Instructor in Psychiatry

ZHOUFENG CHEN, PHD, MS Associate Professor of Psychiatry

VESELIN M. CHORBOV, PHD, MS Research Instructor in Psychiatry

THEODORE J CICERO, PHD, MS Vice Chairman for Research, Department of Psychiatry, Professor of Neuropharmacology in

Psychiatry

WILLIAM W CLENDENIN, MD Assistant Professor of Clinical Psychiatry
C. ROBERT CLONINGER, MD Wallace Renard Professor of Psychiatry
SCOTT ELLIOTT COLOGNE, MD Instructor in Clinical 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
JUAN C CORVALAN, MD Assistant Professor Emeritus of Clinical Psychiatry
LINDA B COTTLER, PHD, M PH Professor of Epidemiology in Psychiatry
CATHERINE E. CREELEY, PHD, MA Research Instructor in Psychiatry
ALEJANDRO M DATUIN, MD, AA 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)
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JAMES EARL EDWARDS, MD Assistant Professor of Clinical Psychiatry (Child Psychiatry)
SETH A EISEN, MD, MS Professor of Psychiatry
ELISE M FALLUCCO, MD Instructor in Psychiatry (Child Psychiatry)
NURI BRADFORD FARBER, MD Associate Professor of Psychiatry
BEVERLY J. FIELD, PHD, M MUS, BA Assistant Professor of Psychiatry
CYNTHIA FLORIN, MD Instructor in Clinical Psychiatry
ERIN R FOSTER Instructor in Psychiatry
KENNETH E FREEDLAND, PHD, MA Professor of Psychiatry
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JAMES B SMITH, MD Associate Professor Emeritus of Clinical Psychiatry
STACEY L SMITH, MD Assistant Professor of Clinical Psychiatry
WAYNE A STILLINGS, MD Assistant Professor of Clinical Psychiatry
CATHERINE STRILEY Research Assistant Professor of Psychiatry
BRIAN K SUAREZ, PHD, MA Professor of Psychiatry
YUN JU SUNG, PHD Research Assistant Professor of Psychiatry
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)
DRAGAN M SVRAKIC, MD, PHD Professor of Psychiatry
MINI TANDON, MD Instructor in Psychiatry (Child)
ALEXANDRE TODOROV, PHD, M ED Research Professor of Psychiatry
KAZUHIRO TOKUDA Research Instructor in Psychiatry
DOROTHY J. VAN BUREN, PSYD Research Assistant Professor of Psychiatry
MICHELE VAN EERDEWEGH, MD Instructor in Clinical Psychiatry
JEFFREY A. VANDER KOOL, MD Instructor in Clinical Psychiatry
GARRY M. VICKAR Instructor in Clinical Psychiatry
SARA WALKER, MD Instructor in Clinical Psychiatry
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DAVID F WOZNIAK, PHD, MA Research Professor of Psychiatry
CHRISTOPHER WUERTZ, MD Assistant Professor of Clinical Psychiatry
LUIS H ZAYAS, PHD, MA, MS Professor of Psychiatry

Department's Web Site

<http://www.psychiatry.wustl.edu/>

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 years. 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 (Cerroband) 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 radiation therapy, including CT, PET and MRI scanning
- implementation of novel respiratory gating algorithms
- development of biomarkers of DNA repair capacity of tumors

The Department of Radiation Oncology currently occupies a large, attractive and convenient clinical facility on the ground floor 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.

Courses

Third Year

M90 740 Radiation Oncology Clerkship

Instructor: Joseph R. Simpson, MD, PhD, FACR, 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 entirely within the Barnes-Jewish Hospital/Siteman Cancer Center complex. 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, neuro-oncology and ENT) pertaining to their rotation schedule.

Instructional materials are available for students on the rotation. (Students are NOT expected to purchase any curricular materials for the clerkship.) Student performance will be evaluated by faculty members who supervise the student over the course of the four-week clerkship.

Fourth Year

Elective

M90 840 CLINICAL RADIATION ONCOLOGY

Instructor: Joseph Simpson, MD, PhD, 362-8567

Location: Center for Advanced Medicine, Lower Level

Elective Contact: Joseph Simpson, MD, PhD, 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 4-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)

Joseph Deasy, PhD, Radiation Oncology, Division of Bioinformatics, 362-8610. Broad range of opportunities for investigation in: (1) computer applications in data analysis and information systems; and (2) clinical outcome analysis projects.

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.

Faculty

DENNIS E HALLAHAN, MD Elizabeth H and James S McDonnell III Distinguished Professor of Medicine, Head of the Department of Radiation Oncology

KATHY BAGLAN Instructor in Clinical Radiation Oncology

CHARLES D BLOCH, PHD, MS Associate Professor of Radiation Oncology (Pending Executive Faculty Approval)

WALTER R BOSCH, PHS, MS Research Associate Professor of Radiation Oncology

JEFFREY D BRADLEY, MD S. Lee Kling Associate Professor of Radiation Oncology

RYAN SCOTT BRAME, PHD, MS Assistant Professor of Radiation Oncology

JOSEPH O. DEASY, PHD Professor of Radiation Oncology

VENKATA RAO DEVINENI, MD Associate Professor of Clinical Radiation Oncology

ROBERT E DRZYMALA, PHD Associate Professor of Radiation Oncology

JACQUELINE ESTHAPPAN, PHD Assistant Professor of Radiation Oncology

SEYMOUR FOX, PHD, MS Instructor in Radiation Oncology

JOSE L GARCIA, MS Instructor in Radiation Oncology

HIRAM ALBERTO GAY, MD Assistant Professor of Radiation Oncology

SREEKRISHNA M GODDU, PHD, MS Assistant Professor of Radiation Oncology

SUSANA GONZALO HERVAS, PHD Assistant Professor of Radiation Oncology

PERRY W GRIGSBY, MD, MBA, MS Professor of Radiation Oncology

LANNIS E HALL-DANIELS, MD, M PH Assistant Professor of Clinical Radiation Oncology

YANLE HU, PHD, MS Assistant Professor of Radiation Oncology (Pending Executive Faculty Approval)

ENRIQUE WILMAR IZAGUIRRE, PHD, MS Assistant Professor of Radiation Oncology

JERRY JEFF JABOIN, MD, PHD Assistant Professor of Radiation Oncology (Pending Executive Faculty Approval)

ERIC E. KLEIN, PHD, MS Professor of Radiation Oncology

ANDREI LASZLO, PHD, MS Associate Professor of Radiation Oncology

HUA LI, PHD Instructor in Radiation Oncology

HUI LI, PHD, MS Assistant Professor of Radiation Oncology

HSIU-SAN LIN, MD, PHD Professor Emeritus of Radiation Oncology

MUHAMMAD SALEEM MAHMOOD, MD Instructor in Clinical Radiation Oncology

DAVID B MANSUR, MD Associate Professor of Radiation Oncology

JOHN W MATTHEWS, D SC, MEE Research Assistant Professor of Radiation Oncology

JEFF MICHAEL MICHALSKI, MD, MBA Professor of Radiation Oncology, Vice Chairman of Radiation Oncology

KEVIN LAWRENCE MOORE, PHD, MS Instructor in Radiation Oncology

SASA MUTIC, MS Associate Professor of Radiation Oncology

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OSCAR D. NORTON, MD Instructor in Clinical Radiation Oncology

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Department's Web Site

<http://radonc.wustl.edu/>

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

The Institute occupies more than 400,000 total square feet, comprising its own 13-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. 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, MRI, angiography); 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. Orthopaedic 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. The diagnostic radiology facilities at Barnes-Jewish Hospital north offer state-of-the-art equipment and a staff of talented specialists in abdominal and thoracic imaging, MRI, CT, nuclear medicine 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, 15 MR scanners (including an 11.7-Tesla research scanner), 12 high-end ultrasound machines plus seven portable units, nine interventional radiology systems, six digital chest units, 10 computer radiography units, three 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 12th floors of the Institute.

In 2003, Washington University and the School of Medicine launched BioMed 21, a strategic plan for developing a multidisciplinary approach to basic and clinical research. Mallinckrodt Institute's 75-plus years of imaging experience will be evident in BioMed 21's Center for Biological Imaging, where biological imaging will progress from focusing on gross anatomy to the delicate molecular interactions that underlie cellular and general processes.

Courses

Catherine Appleton, MD; Coordinator of Radiology Medical Student Education; 454-7405; appletonc@mir.wustl.edu

Second Year

Coursemaster: Catherine Appleton, MD; 454-7405; appletonc@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, miller-thomas@mir.wustl.edu, Matthew Parsons, MD, 362-5950, parsonsm@mir.wustl.edu

Contact Person: Melissa Varner, Radiology Staff Library, 362-5139, 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: Michelle Miller-Thomas, MD, 362-5949 and Matthew Parsons, MD, 362-5950

Location: Radiology Staff Library (First floor Mallinckrodt Tower, Room 117)

Elective Contact: Missy Varner, 362-5139

Other Information: Students meet in Mini-Scarpellino, 1st Floor Mallinckrodt Institute of Radiology Building, 8 a.m. first day of elective.

Enrollment limit per period: 5

Valid start weeks for 4-week blocks are: Weeks 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This four-week introductory radiology elective will be offered to third- and fourth-year medical students. Each student will rotate through four of the following radiology services; Emergency Department, Mammography, Pediatrics, Chest, Abdominal Imaging, Musculoskeletal, Neuroradiology, Interventional Radiology and Nuclear Medicine. Weekly rotations will be assigned after a preference list is made by the student. The primary course objective is to familiarize students with the scope of diagnostic 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 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. From noon to 1 p.m., the student will attend the daily department-wide conference and then return to the reading room. At 3 p.m., students will convene with a radiology resident who will present a didactic lecture on a scheduled topic. During the elective, four interesting cases, one per week, should be identified and presented in PowerPoint format on Fridays at 3 p.m. Students will select two of their case presentations for submission to a digital teaching file.

Students will keep a logbook of good cases seen daily in order to provide a foundation for further reading, as well as an opportunity for clinical or radiologic follow-up of good 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., fourth-year student going into neurosurgery may spend up to four 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 and case presentations. In lieu of these sessions, the student will develop an independent study project to be completed by the end of the rotation. 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. No honors will be awarded if a student is absent for more than five days of the rotation.

Student time distribution: Inpatient 40%, Outpatient 30%, Conferences/ Lectures 30%; Subspecialty Care 100%

Major teaching responsibility: Attendings, fellows and residents

Patients seen/weekly: N/A

On call/weekend responsibility: None

M90 820 CLINICAL NUCLEAR MEDICINE

Instructor: 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 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-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, inpatient general Nuclear Medicine, PET, Pediatric, and Cardiac Nuclear Medicine. The recommended schedule will be to spend weeks 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 inpatient 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 to 9:30 a.m. From noon to 1 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: 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 4-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, 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, noninvasive techniques can be devised to study neuronal activity, tissue perfusion, water mobility (diffusion), and neuronal fiber pathways in the human brain. The goals of Dr. Conturo's research lab are to develop and apply MR imaging techniques for quantitative imaging of cerebral perfusion, brain function, water diffusion and neuronal fiber pathways. These techniques utilize the MR signal effects of exogenous bolus-injected contrast agents, endogenous hemoglobin and microscopic water diffusion. Long-term goals are to apply these methodologies toward imaging and understanding tissue structure, function and physiology in the brain and other organs in normal and abnormal conditions. The approaches that are used in this

laboratory cover a broad range of areas, including MRI physics, MRI pulse sequence development, theoretical derivations, computer simulations, image-processing, computer graphics, custom contrast agent design and synthesis, phantom studies, animal models, human studies, clinical patient studies and comparison with other imaging modalities.

Farrokh Dehdashti, MD, Nuclear Medicine PET Facility, 10th Floor, Mallinckrodt Institute of Radiology, 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 α ,17 α [(R)-1'- α -furylmethylidene)dioxy]-19-norpregn-4-ene-3,20 dione (FFNP); (2) Imaging cell proliferation with FLT-PET (the major goal of this project is to assess if tumor FLT uptake before therapy or the change in tumor FLT uptake early after the start of therapy is predictive of response to therapy in patients with cervical or lung cancer); (3) PET 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; (4) PET assessment of tumor hypoxia using ⁶⁴Cu-ATSM in patients with cervical cancer (the major goal of this project is to predict prognosis); (5) 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; (6) FDG-PET/CT study in indeterminate thyroid nodules to determine the role of PET in predicting malignancy.

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 noninvasively by MRI using novel contrast agents and acquisition schemes. In addition, techniques are being developed to permit MR-guided interventions on the coronary arteries. This undertaking includes the development of novel guide-wire tracking and catheter tracking schemes using both passive and active approaches. Finally, to permit assessments of myocardial oxygenation and thus, perfusion, techniques are being developed to permit BOLD imaging the myocardium. Another path of the research is to determine how this perfusional-metabolic-functional relation is altered by normal life changes and then determine how disease states alter the relationship. For example, both PET and echocardiography are being used to characterize the age- and gender-related changes on myocardial perfusion, substrate metabolism and function. To study the relationship in disease states, similar studies are being performed in patients with diabetes and obesity. A third path to determine the mechanisms responsible for these changes in this metabolic-functional relation and identify potential interventions that may reverse or ameliorate them. In this regard, similar imaging studies are being performed to determine the importance of nitric oxide and the PPAR α system in defining this metabolic-functional relation.

Mark A. Mintun, MD, Suite 3354, East Building, 362-3316/362-6965. Positron Emission Tomography (PET). We use positron emission tomography (PET) in human subjects as a tool in the investigation of two distinct areas: The first area of research involves the study of the metabolic needs of the brain during neural work. While cerebral blood flow (CBF) augmentation is considered to be a hallmark of intensified neural activity, recent data from our laboratory have shown that in healthy human subjects the CBF response to physiological stimulation is not altered by stepped hypoglycemia or hypoxia and is driven by factors other than local requirements in glucose or oxygen. Theoretical modeling of oxygen delivery to human brain and actual measurements in healthy humans showed that adequate tissue levels of oxygen could be maintained without the need for increased CBF or oxygen delivery. Brain oxygen utilization increases during continuous physiological stimulation. The time course and magnitude of these changes suggest that the energy demands of neuronal activation are initially met predominantly by increased glycolysis whereas continued neuronal activation eventually requires increased oxidative metabolism. We suggest that the redox potential of the neural cells (NADH/NAD⁺ or lactate/pyruvate ratio) is an important sensor of blood flow need. This hypothesis was supported by the data obtained in animals and humans with CBF activation studies with lactate and pyruvate injections.

A second area of our research involves the use of PET to study the biology of depression treatment as well as other related neuropsychiatric diseases. The current interest in the laboratory is the use of serotonergic measures to probe the changes in brain receptor function during treatment of depression with different antidepressant drugs. We have previously shown with PET that the serotonin system in untreated depressed patients has decreased responsiveness to pharmacological challenge. Recently we have shown that, using the highly selective radioligand [18F]-altanserin to image serotonin-2A receptors *in vivo*, depressed patients have substantially decreased serotonin-2A receptors in the hippocampus compared to normal control subjects. The effect of antidepressant treatment on receptor density is being studied in order to study the responsiveness and down-regulation of this system. Other ongoing research has focused on the biology of addiction and involves the imaging of dopamine receptors in the basal ganglia, measuring the release of dopamine after pharmacologic challenges, and the measure of GABA-A receptors in different patient populations.

Stephen M. Moerlein, PharmD, PhD, 4th Floor, Clinical Sciences Research 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 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, 3rd 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, 2nd 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.

Michael J. Welch, PhD, 4th Floor, Clinical Sciences Research Building, 362-8435. Short-lived positron emitting radionuclides such as carbon-11 and fluorine-18 can be used to trace physiologic and pharmacologic processes in humans. Tracers are being developed to probe brain receptors, tumor receptors, and enzyme systems.

Bruce R. Whiting, PhD, Room 3352, East Building, 362-6965. Quantitative Computed Tomography (CT). By developing accurate models of the physics of CT image acquisition and incorporating these models into image reconstruction algorithms, improved quantitative information can be obtained from clinical CT images. Applications include 3D localization of cochlear implants, protocols to minimize CT radiation dose, brachytherapy dose planning, and monitoring bone regrowth in hip implant revision surgery. There are opportunities for computer programming and algorithm development, experimental data collection, conducting observer studies and analyzing clinical patient data.

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SUSAN M LANGHORST, PHD, ME Assistant Professor of Radiology
SUZANNE ELIZABE LAPI, PHD, MS Assistant Professor of Radiology
LINDA J LARSON-PRIOR, PHD, MA Research Associate Professor of Radiology
DANIEL JOSEPH LEARY, JR, MD Assistant Professor of Clinical Radiology
HYERAN LEE, PHD Instructor in Radiology
JIN-MOO LEE, MD, PHD Associate Professor of Radiology
ROBERT G LEVITT, MD Associate Professor of Radiology
MICHAEL FU-YEN LIN, MD, MS Assistant Professor of Radiology

DAVID NEIL LOY, MD, PHD Instructor in Radiology
PHILIP A LUDBROOK, MBBS Professor of Radiology
ROBERT H MACH, PHD Professor of Radiology
NAGANATHAN B MANI, MBBS, MS Assistant Professor of Radiology
DANIEL SCOTT MARCUS, PHD, BS Assistant Professor of Radiology
JOANNE MARKHAM, MS Research Associate Professor of Radiology
BEN R MAYES, JR, MD Assistant Professor of Clinical Radiology
WILLIAM H MCALISTER, MD Professor of Radiology
MARK P. MCAVOY, PHD, MEE Research Assistant Professor of Radiology
JONATHAN E MCCONATHY, MD, PHD Assistant Professor of Radiology
KATHLEEN BLYTH MCDERMOTT, PHD, MA Research Assistant Professor of Radiology
ROBERT CAROLIN MCKINSTRY, III, MD, PHD, MS Professor of Radiology
CHRISTINE ONSY MENIAS, MD Associate Professor of Radiology
MARY ANN MIDDLETON, MD Assistant Professor of Radiology
WILLIAM D MIDDLETON, MD Professor of Radiology
FRANCIS M MIEZIN, MS Research Associate Professor of Radiology
MICHELLE M MILLER-THOMAS, MD Assistant Professor of Radiology
STEPHEN M MOERLEIN, PHD, MA Associate Professor of Radiology
BARBARA S MONSEES, MD Professor of Radiology
STEPHEN M MOORE, MEE Research Assistant Professor of Radiology
CHRISTOPHER J MORAN, MD Professor of Radiology
MICHAEL JEFFREY MUELLER, PHD, MHS Professor of Radiology
VAMSI R. NARRA, MD Associate Professor of Radiology
JEFFREY J NEIL, MD, PHD Professor of Radiology
JOHN HART NIEMEYER, MD Instructor in Clinical Radiology
DANIEL BAVO NISSMAN, MD, MA Instructor in Radiology
JOSEPH A. O'SULLIVAN, PHD, MEE Associate Professor of Radiology
GARY H OMELL, MD Assistant Professor of Clinical Radiology
IBRAHIM ALPAY OZCAN, D SC, ME, MEE Research Assistant Professor of 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 Vice Chair for Diagnostic Radiology in Radiology, Professor of Radiology
THOMAS KURT PILGRAM, PHD, MA Instructor in Radiology
DAVID R PIWNICA-WORMS, MD, PHD Professor of Radiology
DAVID GERARD POLITTE, D SC, MEE Research Instructor in Radiology

FRED W PRIOR, PHD, MA Research Associate Professor of Radiology
JAMES D QUIRK, PHD, MA Research Instructor in Radiology
EDWARD FLOYD RAGSDALE, MD Instructor in Clinical Radiology
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BUCK EDWARD ROGERS, PHD, MA Associate Professor of Radiology
HENRY D ROYAL, MD Professor of Radiology
BRIAN G RUBIN, MD Associate Professor of Radiology
DAVID A RUBIN, MD Professor of Radiology
YORAM RUDY Research Professor of Radiology
NAEL E. A. SAAD, MBBCH Assistant Professor of Radiology
STUART STEVEN SAGEL, MD Professor of Radiology
ROBERT F SCHEIBLE, MD Assistant Professor of Clinical Radiology
BRADLEY L SCHLAGGAR, MD, PHD Associate Professor of Radiology
SALLY J SCHWARZ, MS Research Associate Professor of Radiology
JANICE SEMENKOVICH, MD Associate Professor of Radiology
GARY D SHACKELFORD, MD Professor Emeritus of Radiology
AKASH SHARMA, MD Assistant Professor of Radiology
ASEEM SHARMA, MBBS Assistant Professor of Radiology
VIJAY SHARMA, PHD, MS Associate Professor of Radiology
JOSHUA S SHIMONY, MD, PHD Assistant Professor of Radiology
KOORESH ISAAC SHOGHI, PHD, MS Assistant Professor of Radiology
MONICA SHOKEEN, PHD, MBA Instructor in Radiology
HUI HUA SHU, MD Instructor in Radiology
GREGORIO A SICARD, MD Professor of Radiology
BARRY ALAN SIEGEL, MD Vice Chair for Nuclear Medicine in Radiology, Professor of Radiology
CARY LYNN SIEGEL, MD Associate Professor of Radiology
MARILYN J SIEGEL, MD Professor of Radiology
CELETTE SUGG SKINNER, PHD, MA Adjunct Assistant Professor of Radiology
ABRAHAM Z SNYDER, MD, PHD Research Professor of Radiology
STEVEN LEE SOLOMON, MD Assistant Professor of Clinical Radiology
SHENG-KWEI SONG, PHD, MS Associate Professor of Radiology
PABLO SOTO, MD Assistant Professor of Radiology
WILLIAM MARSHAL SPEES, PHD Research Instructor in Radiology
ROBERT M STEINER, MD Instructor in Radiology
YI SU, PHD Instructor in Radiology
NOAH SUSMAN, MD Professor Emeritus of Clinical Radiology

ANGELA WEN-HUI TAI, MD Instructor in Radiology

YUAN-CHUAN TAI, PHD, MEE Associate Professor of Radiology

CHANDRAKANT TAILOR, MD Assistant Professor of Clinical Radiology

LAWRENCE R TARBOX, PHD, AA Research Assistant Professor of Radiology

SHARLENE A TEEFEY, MD Professor of Radiology

ROBERT W THOMPSON, MD Professor of Radiology

ALAN JAMES TIEFENBRUNN, MD Assistant Professor of Radiology

JERRY TOBLER, MD, PHD Instructor in Clinical Radiology

ZHUDE TU, PHD, MS Assistant Professor of Radiology

SURESH VEDANTHAM, MD Professor of Radiology

TOM O VIDEEN, PHD Research Professor of Radiology

ANDREI G VLASSENKO, MD, PHD Research Assistant Professor of Radiology

KATIE DIEU THU VO, MD, BS Associate Professor of Radiology

THADDEUS JUDE WADAS, PHD, MS Instructor in Radiology

JEROLD W WALLIS, MD, MS Associate Professor of Radiology

LIHONG WANG, PHD, MS Professor of Radiology

MICHAEL J WELCH, PHD, MA Professor of Radiology

DANIEL EDWARD WESSELL, MD, PHD, MEE, MS Assistant Professor of Radiology

PHILIP J WEYMAN, MD Associate Professor of Clinical Radiology

BRUCE R WHITING, PHD, MS Research Assistant Professor of Radiology

KIMBERLY N WIELE, MD Assistant Professor of Radiology

FRANZ J WIPPOLD, II, MD Professor of Radiology

PAMELA K WOODARD, MD Professor of Radiology

JASON C. WOODS, PHD, MA Assistant Professor of Radiology

YOUNAN XIA, PHD, MHS Professor of Radiology

JINBIN XU, PHD, ME Research Instructor in Radiology

MAI XU, MD, PHD, MS Research Instructor in Radiology

DMITRIY A YABLONSKIY, D SC, MS, PHD Professor of Radiology

JEFFREY M. ZACKS, PHD, MA Associate Professor of Radiology

ALLYSON R ZAZULIA, MD Associate Professor of Radiology

CHENBO ZENG, PHD Research Instructor in Radiology

SHIYING ZHAO, PHD, MME Adjunct Associate Professor of Radiology

JIE ZHENG, PHD, MS Assistant Professor of Radiology

DONG ZHOU, PHD, MS Research Instructor in Radiology

DEQUAN ZOU, D SC, ME, MS Research Associate Professor of Radiology

DARRYL ADAM ZUCKERMAN, MD Assistant Professor of Radiology

Department's Web Site

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.

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 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 biweekly 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 818 SURGICAL NIGHT FLOAT AND ER SUBINTERNSHIP

Instructors: John Kirby, MD, and L. Michael Brunt, MD

Location: ER

Elective Contact: Jackie Fleming, 362-8029

Other Information: Student should contact instructor prior to 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.

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 segments of two weeks each — 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 863 ACTING INTERNSHIP, SURGICAL ONCOLOGY AND ENDOCRINE SURGERY

Instructors: Timothy Eberlein, MD, Jeffrey Moley, MD, Rebecca Aft, MD, William Gillanders, MD, and Julie Margenthaler, MD

Location: 11th Floor Northwest Tower

Elective Contact: Jackie Fleming, 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 4-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, GI 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 Jackie Fleming 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 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 879 ACTING INTERNSHIP, HEPATOBILIARY PANCREATIC SURGERY

Instructors: Steven Strasberg, MD, William Hawkins, MD, and David Linehan, MD, 362-7147

Location: 11th Floor, Northwest Tower

Elective Contact: Jackie Fleming, 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 on this service (based on availability).

Enrollment limit per period: 1

Valid start weeks for 4-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 Jackie Fleming 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 814 ACTING INTERNSHIP, TRAUMA SERVICE

Instructors: Bradley Freeman, MD, John Kirby, MD, Douglas Schuerer, MD, John Mazuski, MD, Robert Southard, MD, and Alicia Kieninger, 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 4-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 Jackie Fleming 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 893 ACTING INTERNSHIP, MINIMALLY INVASIVE SURGERY

Instructors: L. Michael Brunt, MD, and Brent Matthews, MD, 454-7194

Location: 11th Floor, Northwest Tower

Elective Contact: Student should contact Dr. Brunt at 454-7194 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 4-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 Jackie Fleming 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: None

M95 871 ACTING INTERNSHIP, VASCULAR SURGERY

Instructors: Gregorio Sicard, MD, Brian Rubin, MD, M. Wayne Flye, MD, Eric Choi, MD, Patrick Geraghty, MD, and Luis Sanchez, MD, 362-7841

Location: 5103 Queeny Tower

Elective Contact: Students should contact Debbie Swap in Dr. Sicard's office prior to the start of this rotation at 362-7841.

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 4-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 Jackie Fleming 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 862 ACTING INTERNSHIP, COLON AND RECTAL SURGERY

Instructors: James W. Fleshman, MD, Elisa Birnbaum, MD, Anne Lin, MD, Steve Hunt, 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 4-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 891 ORGAN TRANSPLANTATION

Instructors: Surendra Shenoy, MD, PhD, 362-4338, Martin Jendrisak, MD, 362-5701, William Chapman, MD, 362-7792, Niraj Desai, MD, 747-1393, Majella Doyle, MD, 362-2880, Jeffrey Lowell, MD, 362-2820, Jason Wellen, MD, 362-2840, and Christopher Anderson, 362-2880

Location: Barnes-Jewish Hospital

Elective Contact: Dr. Shenoy's secretary (362-4338)

Other Information: Student should contact instructor if interested in scheduling 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.

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 820 CARDIOTHORACIC SURGERY

Instructors: Jennifer Lawton, MD, Michael Avidan, MBBCH, Traves Crabtree, MD, Ralph Damiano, MD, Sanjiv Gandhi, MD, Charles B. Huddleston, MD, Dan Kreisel, MD, PhD, Sasha Krupnick, MD, Bryan Meyers, MD, Nader Moazami, MD, Marc Moon, MD, Michael K. Pasque, MD, G. Alexander Patterson, MD, I-wen Wang, MD, PhD, Charl DeWet, MD, Hersh Maniar, MD, Varun Puri, MD, and Lauren Hill, MD

Location: 3106 Queeny Tower

Elective Contact: Jennifer Lawton, MD (secretary Beverly Wolff, 362-2821)

Other Information: Students should contact Beverly Wolff at 362-2821 prior to the first day of elective.

Students should report to 3106 Queeny Tower, 7 a.m. first day of elective.

Enrollment limit per period: 3

Valid start weeks for 4-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, 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 and gastroscopy and will 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

Instructors: Susan E. Mackinnon, MD, Gregory Borschel, MD, Keith E. Brandt, MD, Alex Kane, MD, Terence Myckatyn, MD, Thomas Tung, MD, Albert Woo, MD, and Ida Fox, MD

Location: 11th Floor, Northwest Tower

Elective Contact: Alex Kane, MD, 454-4894

Other Information: Students should meet on the 11th Floor, Northwest Tower, 8:30 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.

The period on plastic surgery may either be spent as a clinical clerkship or conducting a basic laboratory 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 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.

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: Recommended

M95 831 PLASTIC SURGERY AMBULATORY CARE

Instructors: Susan E. Mackinnon, MD, Keith E. Brandt, MD, Alex Kane, MD, Terence Myckatyn, MD, Ida Fox, MD, and Thomas Tung, MD

Location: 11th Floor, Northwest Tower

Elective Contact: Alex Kane, MD, 454-4894

Other Information: Students should meet on the 11th Floor, Northwest Tower, 8:30 a.m. first day of elective.

Enrollment limit per period: 1

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The period on plastic surgery ambulatory care will focus on outpatient management of hand fractures, nerve injuries, facial traumas, wound healing/repair, pediatric injury, skin lesions, and general outpatient plastic surgery. This rotation will focus on teaching outpatient management, radiology related duties, casting and splinting.

Student time distribution: Outpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%

Major teaching responsibility: Attendings and residents

Patients seen/weekly: 150

On call/weekend responsibility: Recommended

M95 850 UROLOGY

Instructor: 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 4-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 four days per week.

Student time distribution: Inpatient 80%, Outpatient 10%, 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 880 PEDIATRIC SURGERY

Instructors: Patrick Dillon, MD, Martin Keller, MD, Jacqueline Saito, MD, Brad Segura, MD, and Brad Warner, MD

Location: 5S60 St. Louis Children's Hospital

Elective Contact: Brad Warner, MD, 454-6066

Other Information: Students should report at 8:30 a.m. on the first day of the rotation. Call Dr. Warner's office for location.

Enrollment limit per period: 1

Valid start weeks for 4-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 864 ETHICAL CHALLENGES IN SURGERY AND MEDICINE

Instructors: Ira J. Kodner, MD, 454-7177

Location: 14th Floor, Queeny Tower, Suite 14102

Elective Contact: Students should contact Dr. Kodner at ijkodner@aol.com or Kodner@wudosis.wustl.edu prior to the first day of the elective.

Other Information: Coordinate time to report first day of elective with Liz Nordike 454-7183 or nordikel@wudosis.wustl.edu

Enrollment limit per period: 2

Valid start weeks for 4-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 33, 37, and 41.

This elective will involve exploration of the ethical challenges discussed during four years of presentations at the monthly "Surgery/Ethics/Pizza Rounds" conducted by the Department of Surgery at Washington University School of Medicine and the WU Center for the Study of Ethics and Human Values. The readings, discussions and conclusions will be guided by Washington University and Barnes Jewish Hospital ethicists and will result in a finished manuscript to be published, with the student as co-author, in the journal *Surgery*. This elective provides the opportunity to work closely with the faculty in surgery and ethics and to participate in the many activities within the School, the Center and Barnes-Jewish Hospital. It should appeal to any in the medical system interested in the ethical and humanitarian challenges facing medicine and society in general.

Student time distribution: Conferences/Lectures 100%

Major teaching responsibility: Ira J. Kodner, MD

Patients seen/weekly: N/A

On call/weekend responsibility: None

M10 820 CRITICAL CARE

Instructors: Walter Boyle, MD, 747-3581, Course Master; Alex Evers, MD, Eliot Fagley, MD, Brian Fuller, MD, Richard Hotchkiss, MD, John Kirby, MD, John Mazuski, MD, Patricia Penkoske, MD, Adnan Sadiq, MD, Doug Schuerer, MD, Robert Southard, MD, George Tseng, MD, and Mike Wall, MD

Location: Barnes-Jewish Hospital, South Campus

Enrollment limit per period: 4

Valid start weeks for 4-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 noninvasive 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
Elective Contact: Barbara McKinney, 747-3581

Other Information: Students should meet in the 8400 Surgical Intensive Care Unit, 8th Floor of Barnes-Jewish Hospital, 7:30 a.m. on the first day of the elective.

Research

(M95 900)

L. Michael Brunt, MD, 3503 Kingshighway Building, Barnes-Jewish Hospital, North Campus, 454-7194. 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 evaluating new biomechanical tissue prostheses for use in laparoscopic hiatal hernia 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 Ave., 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.

Susan E. Mackinnon, MD, 660 S. Euclid Ave., Box 8238, 362-4586. Plastic surgery research laboratories. Minimum rotation length: six weeks. The research rotation can be conducted in the plastic surgery laboratories under the direction of Drs. Kane, Borschel, Tung, Myckatyn, Fox or Mackinnon. 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.

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.

Faculty

TIMOTHY J EBERLEIN, MD, MA Head of the Department of Surgery, Bixby Professor of Surgery (General Surgery)

REBECCA L AFT, MD, PHD Associate Professor of Surgery (General Surgery)

CHRISTOPHER D ANDERSON, MD Assistant Professor of Surgery (General Surgery)

DOROTHY A ANDRIOLE, MD Associate Professor of Surgery (General Surgery)

GERALD L ANDRIOLE, MD Robert Killian Royce, M.D. Distinguished Professor of Urologic Surgery

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Department's Web Site

<http://www.surgery.wustl.edu/>

Alvin J. Siteman Cancer Center

Introduction

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 and for a 240-mile radius. Siteman is world-renowned for its basic science, translational and prevention and control research. Siteman enhances, promotes and supports interactions among the 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 \$165 million in extramural funding for cancer research and is organized into eight research programs (Cancer and Developmental Biology, Tumor Immunology, Hematopoietic Development and Malignancy, Cellular Proliferation, Oncologic Imaging, Prevention and Control, Translational and Clinical Research, Breast Cancer Research). Siteman also provides 15 shared resource facilities to its more than 270 research members. Shared resource facilities include: Biologic Therapy Core Facility (formerly known as the GMP Facility); Biomedical Informatics Core; Biostatistics Core; Clinical Trials Core; Embryonic Stem Cell Core; Hereditary Cancer Core; High-Speed Cell Sorter Core; High Throughput Screening Core; Imaging Response Assessment Team (IRAT) Core; Molecular and Genomic Analysis Core; Proteomics Core; Small Animal Cancer Imaging Core; Health Behavior, Communication and Outreach Core; and Tissue Procurement Core. A Dissemination and Implementation shared resource is in development. Siteman is integrated with the Washington University Genome Center, the Institute for Public Health and the Mallinckrodt Institute of Radiology. Siteman's Program for the Elimination of Cancer Disparities (PECaD) partners with the St. Louis community and collaborators from across the country, using education and screening strategies to reduce differences in access to cancer diagnosis, care, prevention and education/training based on race, ethnicity, socioeconomic or other status.

The Siteman Cancer Center provides numerous opportunities in cancer research education and training through seminars, conferences, courses and research opportunities. Individuals are encouraged to contact Siteman at (800) 600-3606 or via the web site, **www.siteman.wustl.edu**, for more information. A few educational opportunities are listed below.

Siteman Basic Science Seminar Series

Siteman sponsors a campuswide seminar series for basic cancer biology topics on the first Thursday of each month at 3 p.m. at the Eric P. Newman Education Center. Speaker information can be found on the Siteman web site at **www.siteman.wustl.edu**. Attendance is open.

Research Program Specific Activities

All of the Siteman Cancer Center research programs have regular internal seminars or work-in-progress discussion groups, and these frequently involve students and postdocs.

- The Cancer and Developmental Biology Program runs a monthly laboratory research presentation seminar, which meets on the third Tuesday of the month at noon. Contact David M. Ornitz, MD, PhD, for more information.
- The Tumor Immunology Program utilizes the long-standing Immunology Seminar Series sponsored by the Department of Pathology and Immunology on Mondays in the Eric P. Newman Education Center. The program also hosts a monthly Translational Tumor Immunology meeting on Monday evening. There are also dedicated sessions allotted to the topics of Tumor Immunology. Contact Robert D. Schreiber, PhD, for more information.
- The Hematopoietic Development and Malignancy Program convenes a weekly journal club to review primary and published data. About three-fourths of the presentations are in a journal club format, with

the remainder from participating laboratories. Current literature regarding hematopoiesis and current trials in gene therapy are presented and critically reviewed. Contact Dan Link, MD, or Peter Westervelt, MD, PhD, for more information.

- The Cellular Proliferation Program sponsors a weekly seminar series titled "Signaling/Cell Cycle." Each academic year, up to six speakers from outside the medical school are invited to present their current work. On weeks alternating with invited speakers, graduate students and postdoctoral research fellows working in the laboratories of our members present their research. Contact Helen M. Piwnica-Worms, PhD, for more information.
- The Marilyn Fixman Clinical Cancer Conference is held on the third Wednesday of each month in the Steinberg Amphitheater on the Barnes-Jewish Hospital north campus. Speakers at this conference present a disease-based clinical topic at each session. Contact the Siteman administration office at (314) 454-8439 for the schedule.
- The Prevention and Control Program has multiple regular research group meetings in nicotine dependence and smoking cessation, early detection, cancer communication and intervention research and psychosocial factors. Contact Mario Schootman, PhD, or Matthew Kreuter, PhD, for more information.
- The Breast Research Program has multiple regular research group meetings and regular seminars and discussions, including one prevention and control-focused talk per month. Contact Matthew Ellis, MBBCh, PhD, for more information.
- The DNA Metabolism and Repair Program has ongoing seminars and external speakers. Contact Barry Sleckman, MD, PhD, or Tom Ellenberger, DVM, PhD, for more information.
- There are more than 15 weekly/biweekly disease-based clinical conferences, and these can be found on the Siteman web site.

Cancer Biology Special Emphasis Pathway

The Siteman Cancer Center launched a special emphasis pathway as part of the Division of Biology and Biomedical Sciences graduate program in 2002. Siteman sponsors six to seven total (new and continuing) students per year in the program, which focuses on multidisciplinary cancer biology research. The pathway includes participation in a cancer biology course each spring (two different courses alternating each year), the Siteman basic science seminar series, work-in-progress interlab meetings, and journal clubs with at least one of the five Siteman basic research programs. For more information on this program, contact Lee Ratner, MD, PhD.

Faculty

Timothy J Eberlein Director, Alvin J. Siteman Cancer Center; Spencer T. and Ann W. Olin Distinguished Professor; and Bixby Professor and Chairman, Department of Surgery, Washington University School of Medicine

John F DiPersio Deputy Director, Alvin J. Siteman Cancer Center; Virginia E. and Samuel J. Golman Endowed Professor of Oncology; and Chief, Division of Oncology, Washington University School of Medicine

Jeffrey F Moley Associate Director of Translational and Clinical Investigation, Alvin J. Siteman Cancer Center; Professor of Surgery; and Chief, Section of Endocrine and Oncologic Surgery, Washington University School of Medicine

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Teaching and Research Divisions and Programs

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Division of Biostatistics

The Division of Biostatistics engages in research, biostatistical consultation and training activities. Interested students may pursue intensive studies through programs and individual courses offered by the division. In addition to the core research program of the division, its research activities include 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. At the initiative of other departments, the division also offers additional short courses in biostatistics. The division participates actively in both predoctoral and postdoctoral training.

Research activities of the division span a wide range of topics dealing with a number of disorders of considerable public health importance 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 Medical Center. The present core research program of the division deals with genetic epidemiology, especially as it relates to cardiovascular 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 temporal trends in the degree of genetic and environmental effects; and multivariate associations among multiple risk factors. Timely theoretical issues also are addressed, such as the sampling of families through patients and statistical properties of methods of data analysis. Most recent research also emphasizes gene-gene and gene-environment interactions.

Present 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); important collaborative studies through support roles as Biostatistics Cores on the Alzheimer's Disease Research Center, the Adult Children's Study, Healthy Aging and Senile Dementia (HASD), 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, and Childhood Obesity Treatment. We also have a significant role on studies that focus on 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) 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.

The Division of Biostatistics specializes in genetic epidemiology and promotes predoctoral, doctoral and postdoctoral training in this discipline. Genetic epidemiology 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. Genetic epidemiology 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 genetic epidemiologic 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 genetic epidemiology abound.

Training Programs

Summer Institute for Training in Biostatistics (SIBS) with a concentration on Biostatistics Research in Disease and Genetic Epidemiology (BRIDGE) is a six-week residential summer training program in biostatistics, sponsored by the National Heart, Lung and Blood Institute (NHLBI) and the National Center for Research Resources (NRCC), for quantitatively-oriented undergraduates and beginning graduate students who are interested in the biological and health sciences. SIBS-BRIDGE at WUSM has a concentration on statistical genetics/genetic epidemiology, and bioinformatics. Our goal is to demonstrate that biostatistics is useful and important for modern biomedical research, and that doing biostatistical research can also be exciting and fun! Available for summers 2010, 2011 and 2012.

Summer Institute Program to Increase Diversity (SIPID) in 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 2010 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 web site at <http://www.biostat.wustl.edu/sipid/index.html> or contact the program administrator at sipid-ge@wubios.wustl.edu.

Graduate Studies

The Division of Biostatistics sponsors (with the Departments of Genetics and Psychiatry as cosponsors) graduate study leading to a Master of Science (MS) degree and to the Certificate in Genetic Epidemiology. The Division also co-sponsors with the Division of Biology and Biomedical Sciences a PhD program in Human and Statistical Genetics, which offers a multidisciplinary approach to preparing future scientists with analytical/statistical, computational and human genetic methods for the study of human disease. For further information on the PhD program, see <http://dbbs.wustl.edu>.

Genetic Epidemiology Masters of Science (GEMS) Program (M21)

The Genetic Epidemiology Masters of Science (GEMS) 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.

Master of Science Degree (Computational and Clinical Tracks)

The core faculty for this multidisciplinary MS program comes from 15 departments/divisions in the School of Medicine. The GEMS degree program is sponsored by the Division of Biostatistics and cosponsored by the departments of Genetics and Psychiatry and includes world-renowned scientific leaders in their respective areas. D.C. Rao, PhD, director of the Division of Biostatistics and the GEMS program director, is one of the founding fathers of the field. The four-semester, summer-to-summer (13-14 months), 35-credit-hour GEMS program is designed to prepare students to work at the interface of genetics, biostatistics, epidemiology and computing. The program has two distinct tracks that encompass training

for both graduate students and clinical investigators. See <http://www.biostat.wustl.edu/gems/> for details.

Certificate in Genetic Epidemiology

We offer a Certificate in Genetic Epidemiology, which is earned after successful completion (with a minimum of a "B" average) of five core courses plus labs (14 credit hours) that are normally offered to master's candidates in Genetic Epidemiology. To earn the certificate, these courses may be taken over one or two years:

M21 503	Statistical Computing with SAS (summer)
M21 515	Fundamentals of Genetic Epidemiology (summer)
M21 550	Introduction to Bioinformatics (summer)
M21 560	Biostatistics I (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 from the quantitative or biological sciences, and possibly at different points in their careers: undergraduates with quantitative sciences (e.g., mathematics through calculus plus one semester of statistics) and/or biological sciences (at least through Principles of Biology II and a basic course in Genetics or equivalent) background; physician scientists and other clinical investigators, particularly postdoctoral fellows; people with terminal degrees in other (related) disciplines who seek to gain expertise in genetic epidemiology; current employees of pharmaceutical and biotechnology companies seeking additional training and formal credentials in the field. 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 GEMS 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.

Further Information

See our web site, <http://www.biostat.wustl.edu/gems>, contact the program manager at (314) 362-1052 or send an e-mail to gems@wubios.wustl.edu, or write to:

The GEMS Program
Division of Biostatistics
Campus Box 8067
660 S. Euclid Ave.
St. Louis, MO 63110-1093
Telephone: (314) 362-1052
Fax: (314) 362-2693

Registration Instructions

All students will register with the program manager in Genetic Epidemiology, gems@wubios.wustl.edu. Before registering, current Washington University students must obtain appropriate consent from their division or department. Students outside the GEMS program wishing to enroll in individual courses must have permission of the course master.

Academic Calendar

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

Courses

M21 501 SELECTED TOPICS IN MODERN BIOSTATISTICS

Department: Division of Biostatistics

Course master: C. Charles Gu

Credit Hours: 3 units

Frequency: Summers of 2010, 2011 and 2012

An intensive six-week summer course, designed as a survey course that gives broad exposure to the basic concepts, methodology and application of select topics in modern biostatistics, with a concentration in genetic epidemiology and bioinformatics. Current topics will be discussed in six major areas organized by week: principles of modern biostatistics, basics of epidemiology and clinical trials, longitudinal and survival data analysis, fundamentals of genetic epidemiology, introduction to bioinformatics, and a primer of pharmacogenetics. Students will hear from expert biostatisticians in their fields about challenging, real-world questions, then focus on selected important concepts and methods, analyze case studies, and participate in guided reading and group discussions of publications in biostatistics and bioinformatics research. Prerequisites: Math 3200 Elementary to Intermediate Statistics and Data Analysis at WU or the equivalent. Open only to students admitted to the SIBS Program sponsored by NHLBI and NRCC.

Contact the SIBS program administrator for details, to register, or to obtain the required permission of the course master: sibs@wubios.wustl.edu or telephone (314) 362-3950.

M21 502 SUMMER PRACTICUM IN BIOSTATISTICS

Department: Division of Biostatistics

Course master: C. Charles Gu

Credit Hours: 3 units

Frequency: Summers of 2010, 2011, and 2012

Companion course of M21 501: Selected Topics in Modern Biostatistics. All activities are designed around the six weekly topics of the didactic course: principles of modern biostatistics, basics of epidemiology and clinical trials, longitudinal and survival data analysis, fundamentals of genetic epidemiology, introduction to bioinformatics, and primer of pharmacogenetics. This practicum reinforces the concepts and methods to which the students are exposed in M21 501, by solving real-life problems using actual datasets. Students will gain authentic experiences of a career biostatistician through a series of practical activities, including computer labs using real datasets, discussion groups for guided reading of publications, student projects and presentations and summer seminars. Qualified students with advanced experience and strong interest in pursuing a career in biostatistics research will be considered for internship opportunities. Prerequisites: Same as for M21 501 Selected Topics in Modern Biostatistics and simultaneous enrollment therein. Open only to students admitted to the SIBS Program sponsored by NHLBI and NRCC.

Contact the SIBS program administrator for details, to register, or to obtain the required permission of the course master: sibs@wubios.wustl.edu or telephone (314) 362-3950.

M21 503 STATISTICAL COMPUTING WITH SAS®

Department: Division of Biostatistics

Course masters: Jingqin (Rosy) Luo (Section 1); Karen Schwander (Section 2)

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 strongly encouraged to take the Math/Statistics Workshop offered free of charge immediately prior to this course in early July.

Contact the GEMS program manager for details and for the required permission of the course master: gems@wubios.wustl.edu or (314) 362-052.

M21 515 FUNDAMENTALS OF GENETIC EPIDEMIOLOGY

Department: Division of Biostatistics

Course masters: Treva Rice and YunJu 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 Math/Statistics Workshop and especially 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 GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

M21 550 INTRODUCTION TO BIOINFORMATICS

Department: Division of Biostatistics

Course masters: C. Charles Gu and Gary Stormo

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 acquire understanding of mathematical algorithms in genome sequence analysis (alignment analysis, gene finding/predicting), gene expression microarray (genechip) analysis, and of the impact of recent developments 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 Math/Statistics Workshop and 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 GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

M21 5483 HUMAN LINKAGE AND ASSOCIATION ANALYSIS

Department: Department of Genetics

Course masters: 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 based studies), QQ and Manhattan plots, whole genome association analysis; population stratification; Quantitative Trait Analysis; measured genotypes and variance components. Hands-on computer lab experience doing parametric linkage analysis with the program LINKAGE, model free linkage analyses with Genhunter 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 GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

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 practical experience with SAS®.

Participants are strongly encouraged to participate in the Math/Statistics and Computing/UNIX Workshops 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 GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

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 to obtain the required the required permission of the course master, contact the GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

M21 599 DIRECTED INDEPENDENT STUDY

Department: Division of Biostatistics

Course master: D.C. Rao

Credit Hours: maximum 6 units

Frequency: Every semester

A faculty member will work with the student in specific areas related to the student's primary needs.

Permission of the course master required. Credit: variable, maximum 6 units.

M21 600 MENTORED RESEARCH

Department: Division of Biostatistics

Course Master: D.C. Rao

Credit Hours: 6 units standard, maximum 12 units

Frequency: Every spring and summer (TBA)

Student undertakes supervised research in a mentor's lab. The goal is to acquire important research and presentation skills. A written manuscript of publishable quality based on the research and prepared in the format of an actual scientific publication must be submitted and presented to a select audience. The process begins in the fall with "mentor workshops," in which prospective mentors present research ongoing in their labs so that students can select a research mentor and topic before the semester ends. Intensive literature reading is expected in the break between fall and spring semesters. Class meets regularly starting in spring (where students present their progress updates) and builds up intensity through summer, culminating in final presentations in summer (late July and early August, or even earlier if required). Permission of the course master required.

M21 616 EPIDEMIOLOGY, CLINICAL TRIALS, STUDY DESIGN AND MANAGEMENT

Department: Division of Biostatistics

Course masters: J. Philip Miller and Gina D'Angelo

Credit Hours: 3 units

Frequency: Every spring

Description: Learn critical study design issues, optimal study designs, cost-benefit analysis, power analysis, study management issues (protocols, data entry, data flow, database management, QC), special considerations for multicenter studies, human studies, principles and issues in designing linkage and association studies, and ethical, legal and social issues concerning human studies. Prerequisite: M21 560 Biostatistics I and M21 570 Biostatistics II offered in fall semester.

For details, to register and to receive the required permission of the course master, contact the GEMS program manager: gems@wubios.wustl.edu or telephone (314) 362-1052.

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 is designed to give the students computational experience with the latest statistical genetics methods and concepts, so that they will be able to computationally implement the method(s)/model(s) developed as part of their thesis. Concentrating on the applications of genomics and SAS computing, it deals with creating efficient new bioinformatic tools to interface with some of the latest, most important genetic epidemiological analysis software, as well as how to derive, design and implement new statistical genetics models. The course also includes didactic instruction on haplotype estimation and modeling of relationship to phenotype, LD mapping, DNA pooling analysis methods, analysis approaches in pharmacogenomics (with an emphasis on possible genomic role in drug response heterogeneity), and epistasis (GxG) and GxE interactions; data mining methods, including clustering, recursive partitioning, boosting and random forests; and fundamentals of meta-analysis, importance sampling, permutation tests and empirical p-values, as well as the design of monte-carlo simulation experiments. Prerequisite:

M21 560 Biostatistics I. Permission of the course master required: (314) 362-1052.

Link to Genetic Epidemiology Masters of Science

Faculty

DABEERU C RAO, PHD, MS Director of the Division of Biostatistics, Professor of Biostatistics

INGRID B BORECKI, PHD, MS Associate Professor of Biostatistics

LING CHEN, PHD, MPH, MS Research Instructor in Biostatistics

ROBERT CULVERHOUSE, PHD, MA Assistant Professor of Biostatistics

GINA MARIE D'ANGELO, PHD Assistant Professor of Biostatistics

MICHAEL R DEBAUN, MD, MPH, MS Professor of Biostatistics

FENG GAO, PHD Research Assistant Professor of Biostatistics

MAE ETSUKO GORDON, PHD, MS Professor of Biostatistics

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STANLEY A SAWYER, PHD, MA Professor of Biostatistics

KENNETH B SCHECHTMAN, PHD, MA, MS Associate Professor of Biostatistics

WILLIAM D SHANNON, PHD, MS Associate Professor of Biostatistics

GANG SHI, D SC Research Instructor in Biostatistics

EDWARD LAWRENCE SPITZNAGEL, JR, PHD, MS Professor of Biostatistics

YUN JU SUNG, PHD Research Assistant Professor of Biostatistics

CHENGJIE XIONG, PHD, MS Associate Professor of Biostatistics

YAN YAN, MD, PHD, MHS Research Associate Professor of Biostatistics

Link to Division of Biostatistics Web Site

<http://www.biostat.wustl.edu/>

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 given in the spring semester of 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.

Link to Web Site

<http://pohim.wustl.edu/>

Other Courses

M04 582-01 ALZHEIMER'S DISEASE IN THE CLINIC AND THE LAB

Instructors: John C. Morris, MD, and other faculty affiliated with the Alzheimer's Disease Research Center, Department of Neurology. For information, contact Barbara Kuntemeier at 286-2882 or kuntemeierb@abraxas.wustl.edu.

Alzheimer's disease (AD) affects more than 5 million Americans today, and this number will increase substantially as our population ages. The cost of caring for AD patients has been estimated at over \$148 billion annually. 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 overview of the most exciting areas of AD clinical and basic 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, as well as opportunities to observe patients and families in an active neurology memory disorder clinic, participate in neuropathology evaluations of demented individuals, and interact with investigators from the fields of molecular genetics, cell biology and neuropathology.

Graduate Programs

Graduate Programs

Audiology and Communication Sciences

The Program in Audiology and Communication Sciences (PACS) provides advanced 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 clinical services and research programs operated by the Department of Otolaryngology.

Doctor of Audiology (AuD)

The four-year graduate program in audiology trains students to become independent clinicians and leads to the Doctor of Audiology (Au.D.) degree. The program is designed to provide students with the knowledge and skills that reflect the latest advances in evaluation and treatment of hearing conditions. Students gradually progress from classroom-based instruction to clinical practice in audiology. The first three years provide students with the foundation for practice, with students gaining knowledge and skills in the basic and applied sciences, evaluation and diagnosis practices across the lifespan, hearing and balance disorders, professional issues and ethics, statistics and research methods, and clinical observation and practice. The fourth year is spent in a full-time clinical externship.

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 graduate program in deaf education offers one- and two-year programs that prepare students to become classroom teachers of hearing-impaired children and that lead to the Master of Science in Deaf Education (MSDE) degree. The programs promote the oral philosophy — that deaf and hearing-impaired children can learn to listen and talk — and prepare teachers to help children develop their spoken and written language skills. For very young children, language and speech concepts are conveyed in a variety of settings and generally involve working closely with parents, families and other caregivers. For older children, language and speech are taught in a classroom setting in concert with conventional academic subjects normally taught in kindergarten through the elementary grades.

Students proceed from broadly-based classroom instruction and observation to progressively more specialized course work and practice teaching experiences. Introductory course work provides the foundation for practice. Students gain knowledge in the basic and applied sciences, curriculum and instructional methods. Advanced course work provides training in evaluation techniques, manual communication, intervention strategies, counseling techniques, research methods and practice teaching experiences.

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, B-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 focus of the interdisciplinary program in Speech and Hearing Sciences (PhD) is to prepare future researchers and academicians in the field of speech and hearing sciences. Students generally work

one-on-one with faculty researchers during their studies. Training builds upon the student's basic knowledge of aspects of the fields that pertain to speech, language and hearing and emphasizes research and teaching experiences.

The Speech and Hearing Sciences Program is operated by the Program in Audiology and Communication Sciences (PACS) and administered through the Graduate School of Arts & Sciences.

Contact Information

Further information 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
E-mail: pacs@wusm.wustl.edu
Web: **pacs.wustl.edu**

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

J. David Dickman, PhD
University of Wyoming, 1985

Jill B. Firszt, PhD
University of Illinois, 1998

Keiko Hirose, MD
Harvard Medical School, 1993

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
Washington University, 2009

Timothy E. Hullar, MD
Harvard University, 1996

Rosalie M. Uchanski, PhD
Massachusetts Institute of Technology, 1988

Instructors

Lynda C. Berkowitz, MS
Washington University, 1983

Carl D. Bohl, DSc
University of Cincinnati, 1973

Christine M. Clark, MA
Maryville University, 1999

Christine H. Gustus, MS
Washington University, 1975

Barbara A. Lanfer, MAEd
University of Missouri-St. Louis, 1998

E. Tracy Mishler, AuD
Arizona School of Health Sciences, 2007

T.K. Parthasarathy, PhD
University of Texas-Dallas, 1987

Lisa G. Potts, PhD
Washington University, 2006

Mary A. Shortal, MS
Washington University, 1976

Karen S. Stein, MS
Washington University, 1974

Julia L. West, MS
Washington University, 1995

Lecturers

A.U. Bankaitis, PhD
University of Cincinnati, 1995

Carol E. Bergmann, AuD
Arizona School of Health Sciences, 2003

Elizabeth A. Elliott, MAT
Webster University, 2004

Michelle A. Grempe, MSDE
Washington University, 2006

Dave A. Harris, PhD
University of Cincinnati, 2005

Stanton C. Jones, AuD
Salus University, 2006

Roanne K. Karzon, PhD
Washington University, 1982

Christina M. Koehler, MSSH
Washington University, 2000

Karen R. Kupper, MSSH
Washington University, 1979

Robert J. Mareing, AuD
Pennsylvania College of Optometry, 2003

Jean S. Moog, MS
Washington University, 1964

Kimberly K. Ott, MS
Southern Illinois University – Edwardsville, 1981

Amanda J. Ortmann, MSSH
Washington University, 2003

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

Professors Emeritus

Ira J. Hirsh, PhD
David P. Pascoe, PhD

Link to Web Site

<http://pacs.wustl.edu>

Biology and Biomedical Sciences

The Division of Biology and Biomedical Sciences, 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 Molecular Biology and Pharmacology; 10 clinical departments — Anesthesiology, Medicine, Neurology and Neurological Surgery, Obstetrics and Gynecology, Ophthalmology and Visual Sciences, Otolaryngology, Pediatrics, Psychiatry, 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 400 faculty are affiliated with one or more of 12 broad training programs: Biochemistry, Computational and Systems Biology, Developmental Biology, Evolution Ecology and Population Biology, Human and Statistical Genetics, Immunology, Computational and Molecular Biophysics, 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 180 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 web site at 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, Missouri 63110-1093 (e-mail: 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 web site.)

Students admitted to the graduate programs are guaranteed full stipend and tuition support contingent upon satisfactory performance. The stipend for the 2010-11 academic year will be \$27,500 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.

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. Faculty members in charge of courses and their departmental affiliations are shown at the end of each course description.

L41 (Bio) 501 Human Anatomy and Development

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) 5051 Foundations in Immunology

Instructor: Kenneth M. Murphy, MD, PhD, 362-2009

Designed for graduate students and medical students as an in-depth introduction to immunology. Topics: antibody structure and genetics, B and T cell receptor structure and recognition, major histocompatibility complex and antigen processing, cytokine signalling and regulation of the immune response, innate immunity, humoral and cellular effector mechanisms. Discussion group will meet once a week, on Thursdays from 10 a.m. to noon. Prerequisite: Introductory Biochemistry and/or Genetics helpful. Permission of instructor. This course is referenced in the Department of Pathology and Immunology. 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: John A. Cooper, MD, PhD, 362-3964

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 Biol 334 and L41 Biol 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) 5069 Expanding the Central Dogma: Detours Between Genome and Proteome

Instructor: Heather True, PhD, 362-3934

How many genes are in the genome? That number is only the beginning of the story leading to a regulated, functional proteome. Recent discoveries suggest that the production and regulation of a functional proteome is quite complex. Several emerging themes may serve to regulate transcription and translation in ways we hadn't considered. In this course we will take a look at these exciting new discoveries and recent twists on existing knowledge that increase our understanding of how the cell responds to internal and environmental changes. Prereqs: Nucleic Acids. Credit: 2 units.

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: Robert W. Mercer, PhD, 362-6924

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) 5132 Cytoskeleton Discussion Group

Instructor: John Cooper, MD, PhD, 362-3964

Weekly presentations of recent literature and research, with each participant presenting once per semester. Opportunity for students to discuss the context, implications and future directions for research. Prerequisite: L41 (Bio) 5068 or undergraduate course in cell biology. This is referenced in the Department of Cell Biology and Physiology. 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) 5145 Nanomedicine Applications

Instructor: Samuel Wickline, MD, 454-8635

Biomedical applications of nanotechnology. This course is intended to survey the field of nanobiomedicine in a lecture format given by invited experts. Topics will range from multimodality imaging to targeted therapeutics to molecular diagnostics. Benefits and toxicities will be presented and the translational aspects of commercialization of nanosystems for medical use will be covered.

L41 (Bio) 5146 Principles and Applications of Biological Imaging

Instructor: Joseph P. Culver, PhD, 747-1341

Principles and Applications of Biological Imaging will introduce the interdisciplinary nature of the imaging sciences and conduct a comprehensive survey of the array of interrelated topics that define biological imaging. The course will cover the basics of the optical, magnetic resonance, CT, SPECT and PET imaging modalities, and microscopy, while focusing on applications of imaging to different disease states, such as oncology, neurology, cardiology and pulmonary diseases. Prerequisite: One year each of Biology, Chemistry, Physics and Calculus. Credit: 3 units.

L41 (Bio) 5147 Contrast Agents for Biological Imaging

Instructor: Carolyn J. Anderson, PhD, 362-8427

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) 5149 High Throughput, High Content, Assay Development, Screening and Target Validation — Principle and Practice

Instructor: Raphael Kopan, PhD, 747-5520

The objective of our course is to introduce students to the world of automation-based discovery science. We will discuss the power of this approach, its constraints and their practical solutions. Specifically, we will introduce the class to the range of available assay tool kits (detection modalities), and the principles that apply towards assay development, library selection (compound, RNAi) and the translation of benchtop methods to automated platforms. We will also discuss sources of error and statistical tools for analyzing large datasets, the hit validation process and lead optimization. Along the way, we will hear from individual investigators describing their own academic or industry screens and critique the growing literature describing results born from high throughput/high content approaches. We realize that high throughput screening raises philosophical issues such as the merit of discovery science vs. hypothesis-driven research, big science, the role of technology in opening new fields of research, etc. We encourage the students to engage with us in these debates while covering the nuts and bolts of high throughput experiments. Prereqs: Sound foundation in at least one of: biochemistry, cell biology, developmental biology, microbiology, virology, statistics or computational biology. Credit variable, max 3 units.

L41 (Bio) 5161 Lymphoid Organogenesis

Instructors: Kenneth Murphy, MD, PhD, 362-2009, Kyunghye Choi, PhD, 362-8716, Thaddeus Stappenbeck, MD, PhD, 362-4214

This course will cover the topic of the role of cytokines and innate immune cells in orchestrating the development of important lymphoid structures that form the physical scaffold for the unfolding immune response. The roles of TNF family member, molecular addressins and integrins will be covered in the development of lymph node structures. The regulation of cellular trafficking and the basis of chemokine actions will be covered. The development of tertiary lymphoid organs and associated vascular structures will be covered in terms of their ontogeny and their role in infections and in tumor metastasis.

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) 5196 Special Emphasis Pathway in Cancer Biology

Instructor: David Wilson, MD, PhD, 286-2834

This course is designed to present pre- and postdoctoral trainees with an organized educational format to explore major contemporary topics in cancer biology. The elective will provide an integrated view of cancer research including basic science, translational science, and clinical investigation. Approximately 60 minutes will be devoted to a didactic presentation by a faculty member with interaction by the participants. The remaining 30 minutes will be used to discuss a pivotal research paper from this field, preselected by the faculty member. Outside reading (30-60 min/week) will be required. Credit: 2 units.

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) 5261 Molecular Mechanisms of Immunological Diseases

Instructor: Wayne Yokoyama, MD, 362-9075

Advanced immunology students will be exposed to human diseases that appear to have an immunological basis. In addition to lectures and evaluation of recent clinical and relevant basic immunology literature, an emphasis will be placed on direct encounters with patients and pathologic material when feasible, providing students with a human aspect to discussions of immune pathogenesis. Diseases covered will include those with known causes such as AIDS and autoimmune disorders such as systemic lupus erythematosus and rheumatoid arthritis for which a molecular basis is not fully understood. Other areas may include asthma and tissue transplantation, where effector mechanisms are better characterized. Since most of these disorders have no cure or are imperfect clinical entities, the class will discuss research areas that may be fruitful and lead to improved diagnosis and treatment. Prerequisite: Foundations of Immunology or permission of instructor.

L41 (Bio) 5264 Pillars of Immunology

Instructors: Paul M. Allen, PhD, 362-8758, Kenneth M. Murphy, MD, PhD, 362-2009, Robert D. Schreiber, PhD, 362-8747

Selected topics in immunology will be covered in depth from the primary literature. These topics will cover all of the seminal studies upon which modern immunology is based. One topic will be discussed per week, which will be introduced by the instructor, followed by the students presenting the papers. There will be a mid-term and final exam. Prerequisite: Bio 5051 Foundations in Immunology. Credit 2 units.

L41 (Bio) 5272 Advanced Topics in Immunology

Instructor: Wojciech A. Swat, PhD, 747-8889

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

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: Michael Lovett, PhD, 747-3265

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) 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) 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) 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: Jay Ponder, PhD, 362-4195

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) 5394 Metagenomics of Microbial Ecosystems

Instructor: Jeremy Buhler, PhD, 935-6180

This course introduces students to key questions, approaches, and computational tools used to study the properties of microbial communities in their various habitats. Complex microbial ecosystems are found in a variety of terrestrial and oceanic environments as well as in the various body habitats of metazoan species including humans. These ecosystems, which are composed largely of microbial species that have never been cultured in a lab, are laboratories for the study of genome evolution (eco-genomics), ecological principles and myriad biotransformations. In particular, many animals, including humans, have evolved to live with and benefit from the commensal microbial communities in their GI tracts. The study of microbial ecosystems gives rise to the field of metagenomics — the acquisition, identification and functional and evolutionary analysis of the combined genomic sequences of a diverse population of organisms. Metagenomic analyses must contend with many challenges, including a high volume of genomic sequence data, fragmentary and incomplete sequences, and genomic heterogeneity of sampled organisms. To tackle these challenges, we must bring to bear computational tools that apply models of sequence evolution to interpret metagenomic sequence data. These interpretations form a basis for further investigation and hypothesis testing. Course content will include an overview of questions and major results in metagenomic research, along with an introduction to the experimental protocols and computational tools, models and algorithms of metagenomic analysis. The class will have two 1.5-hour meetings per week for 14 weeks. Enrollment is limited to 25 students. Prerequisites: Graduate standing or permission of instructor. Some basic knowledge of biology is recommended. Students should know or be prepared to learn basic Python scripting to carry out some course assignments. Credit: 3 units.

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: Keril Blight, PhD, 286-0065; Jeffrey Henderson, MD, PhD, 362-8065

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

Instructors: Stuart A. Kornfeld, MD, 362-8803; Philip W. Majerus, MD, 362-8801

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) 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) 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) 5467 Light Microscopy and Optical Imaging

Instructor: Dennis L. Barbour, MD, PhD, 935-7548

Recent advances in optics, microscopy and probe design have led to a dramatic expansion of options for measuring structural and functional features of biological tissue with light. Course topics include the basic physics underlying vital light microscopy, use of voltage-sensitive and calcium-sensitive fluorescent probes, multiphoton and confocal imaging and image acquisition/processing. Special emphasis is placed on imaging neural tissue and live preparations. Students will read current literature and devise a research project based upon an imaging technology. Prerequisite: Math 233, Phys 118A, Bio 3050 or permission of instructor. Credit: 3 units. Same as home course E72 BME 504.

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: Samuel A. Wickline, MD, 454-5539

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) 5476 Modeling Biomolecular Systems I

Instructor: Jay W. Ponder, PhD, 362-4195

This course covers the applications of computer modeling and simulation to problems involving biological macromolecules. Lectures will discuss the theory and algorithms underlying a variety of simulation techniques. Laboratory exercises and a student project will provide experience with software currently used in the field. Topics examined in detail include: computational tools, molecular visualization, simulation methodology, force field methods, optimization, experimental design, QSAR, scoring and screening of ligands, docking, structure databases, and refinement and prediction of structures.

Prerequisite: basic background in biochemistry and physical chemistry; ability to write simple computer programs in any language. Credit: 3 units. Same as E62 BME 530.

L41 (Bio) 5477 Modeling Biomolecular Systems II

Instructor:

This course is a continuation of BME 530/Bio 5476 covering additional topics in computer modeling and simulation. The lectures will cover the theory and underlying algorithms, while the laboratories and term project will provide the students with hands-on experience in using various software packages. Topics will include: statistical mechanics concepts in molecular simulations; algorithms for molecular dynamics, stochastic dynamics and Monte Carlo simulations; free energy calculations; electrostatics and continuum solvation methods; hybrid QM/MM calculations; multi-scale modeling. Prerequisite: A background in biochemistry and physical chemistry. Credit: 3 units. Same as home course E62 BME 540.

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) 5485 Human Linkage and Association Analysis Computer Lab

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

Hands-on 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 family-based and case-control association analyses with UNPHASED and SAS. The methods and exercises are coordinated with the lectures of M21 5483, and students are expected to understand underlying assumptions and limitations and the basic calculations performed by these computer programs. The registration/grade option of "Audit" is not available.

Available only with concurrent registration in M21 5483. Required of all GEMS Computational Track MS candidates. GEMS Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. Credit: 1 unit. Same as M21 GEMS 5485.

L41 (Bio) 5488 Genomics

Instructors: Barak A. Cohen, PhD, 362-3674, Robi D. Mitra, PhD, 362-2751

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: Michael Lovett, PhD, 747-3265

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: Alison J. Whelan, MD, 362-8050

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) 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, Anatomy and Neurobiology, 362-3363

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:

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) 5651 Neural Systems

Instructor: David Dickman, PhD, 747-7221

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: Kurt A. Thoroughman, PhD, 935-9094

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) 5682 Foundations in Biological Neural Computation

Instructor: Kurt Thoroughman, PhD, 935- 9094

This course meets with E62 BME 572/L41 Biol 5657, Biological Neural Computation. Students in this Foundations course will not design and implement an independent modeling project. Instead they will complete directed simulation of classic models in computational and theoretical neuroscience. Graduate students in psychology or neuroscience who are in the Cognitive, Computational, and Systems Neuroscience pathway can take either this 2-credit Foundations course or the 3-credit full course to satisfy pathway requirements for a computational course. Prerequisites: Multivariate calculus and either biological or psychological foundations of neuroscience. Credit: 2 units.

L41 (Bio) 5691 Mathematics and Statistics of Experimental Neuroscience

Instructor: Kurt A. Thoroughman, PhD, 935-9094

This course will be open to the WU brain science community; first- and second-year graduate students are especially welcome. Each session will include a math or stat primer; a discussion led by a guest

scientist who will detail how the daily technique is used in experimental work; and a laboratory where students will work together to implement the technique on real data. Topics will include hypothesis testing and experimental design; resampling and bootstrapping; multivariate analysis; and applications appropriate for cellular and molecular, systems, imaging, and behavioral neuroscience. Prerequisites: Some calculus; some laboratory experience in neuroscience. Credit: 2 units.

L41 (Bio) 572 Seminar in Plant Biology

Instructor: Tuan-Hua Ho, PhD, 935-4632

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: Ellen Damschen, PhD, 935-9106

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: P. Mick Richardson, PhD, 577-5176

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) 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) 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.

Link to Web Site

<http://dbbs.wustl.edu>

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.

Courses

BME 471 Bioelectrical Phenomena
 BME 477 Biomedical Measurements — Theory and Applications
 BME 501 Graduate Seminar
 BME 502 Cardiovascular MRI — From Physics to Clinical Application
 BME 503A Cell and Organ Systems Biology
 BME 504 Light Microscopy and Optical Imaging
 BME 505 Advanced MRI and Molecular Imaging Techniques Journal Club
 BME 506 Seminar in Imaging Science and Engineering
 BME 5068 Fundamentals of Molecular Cell Biology
 BME 507 Practicum in Imaging Science and Engineering
 BME 511 Biotechnology Techniques for Engineers
 BME 521 Kinetics of Receptor-mediated Processes
 BME 523 Biomaterials Science
 BME 5231 Biomaterials Science: Polymer Physics
 BME 524 Tissue Engineering
 BME 525 Engineering Aspects of Biotechnology
 BME 527 Design of Artificial Organs
 BME 525 Engineering Aspects of Biotechnology
 BME 530 Molecular Cell Biology for Engineers
 BME 5329 Mathematical Methods for Biophysics and Biochemistry
 BME 533 Biomedical Signal Processing
 BME 537 Computational Molecular Biology
 BME 540 Modeling Biomolecular Systems II
 BME 5494 Quantitative Cardiovascular Physiology
 BME 557 Cellular and Subcellular Biomechanics
 BME 558 Biological Transport
 BME 559 Intermediate Biomechanics
 BME 560A Biomechanics
 BME 5610 Principles of Protein Structure
 BME 562 Mechanics of Growth and Development
 BME 5620 Protein Function and Interactions
 BME 563 Orthopedic Biomechanics — Bones and Joints
 BME 564 Orthopedic Biomechanics — Cartilage/Tendon
 BME 5641 Computational Neuroscience
 BME 566 Cardiac Electrophysiology
 BME 567 Cardiac Mechanics
 BME 568 Cardiovascular Dynamics
 BME 572 Biological Neural Computation
 BME 573 Applied Bioelectricity
 BME 573A Applied Bioelectricity
 BME 5901 Integrative Cardiac Electrophysiology
 BME 5902 Cellular Neurophysiology
 BME 5903 Physical Methods for Biomedical Scientists
 BME 5904 Nanostructured Surfaces and Materials and Their Applications in Biomedical Research
 BME 590K Nonlinear Elasticity in Biomechanics
 BME 590L Engineering Aspects of Biotechnology
 BME 591 Biomedical Optics I: Principals
 BME 5911 Cardiovascular Biophysics Journal Club
 BME 592 Biomedical Optics II — Imaging

For additional related courses, see the Bulletin of the School of Engineering & Applied Science.

Faculty

Professor and Chairman of Department

Frank Chi-Pong Yin, PhD/MD
University of California, San Diego, 1970; MD, 1973

Professors Emeriti

Salvatore P. Sutera, PhD
California Institute of Technology, 1960

Full-time Professors

Igor R. Efimov, PhD
Moscow Institute of Science and Technology, 1992

Yoram Rudy, PhD
Case Western Reserve University, 1978

Larry A. Taber, PhD
Stanford University, 1979

Lihong Wang, PhD
Rice University, 1992

Younan Xia, PhD
Harvard University, 1996

Full-time Associate Professors

Jianmin Cui, PhD
State University of New York Stony Brook, 1992

Donald L. Elbert, PhD
University of Texas, Austin, 1997

Daniel W. Moran, PhD
Arizona State University, 1994

Rohit V. Pappu, PhD
Tufts University, 1996

Shelly E. Sakiyama-Elbert, PhD
California Institute of Technology, 2000

Jin-Yu Shao, PhD
Duke University, 1997

Kurt A. Thoroughman, PhD
The Johns Hopkins University, 1999

Full-time Assistant Professors

Dennis L. Barbour, MD, PhD
The Johns Hopkins University, 2003

Vitaly Klyachko, PhD
University of Wisconsin, 2002

Baranidharan Raman, PhD
Texas A & M University, 2005

Affiliate Professors

Samuel Achilefu, PhD
University of Nancy, France, 1991

Dora Angelaki, PhD
University of Minnesota, 1991

R. Martin Arthur, PhD
University of Pennsylvania, 1968

Kyongtae T. Bae, PhD
University of Pennsylvania, 1988; MD, University of Chicago, 1992

Nathan A. Baker, PhD
University of California, San Diego, 2001

Philip V. Bayly, PhD
Duke University, 1993

John P. Boineau, MD
Duke University, 1959

Michael R. Brent, PhD
Massachusetts Institute of Technology, 1991

Paul C. Bridgman, PhD
Purdue University, 1980

Andreas H. Burkhalter, PhD
University of Zurich, 1977

Thomas E. Conturo, MD, PhD
Vanderbilt University, 1989

Joseph Culver, PhD
University of Pennsylvania, 1987

Elliot L. Elson, PhD
Stanford University, 1966

Jack Engsberg, PhD
University of Wisconsin, 1973

William A. Frazier III, PhD
Washington University, 1973

Anthony French, MD/PhD

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

Eric Galburt, PhD
University of Washington

Mark P. Goldberg, MD
Columbia University, 1984

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

James E. Huettner, PhD
Harvard University, 1987

Enrique Izaguirre, PhD
Drexel University, 1997

Joseph W. Klaesner, PhD
Vanderbilt University, 1995

Sándor J. Kovács, PhD, MD
California Institute of Technology, 1977; MD, University of Miami, 1979

Gregory M. Lanza, PhD
University of Georgia, 1981

Eric Leuthardt, MD
University of Pennsylvania, 1999

Daniel A. Low, PhD
Indiana University, 1988

Garland R. Marshall, PhD
Rockefeller University, 1966

Robert P. Mecham, PhD
Boston University, 1976

James G. Miller, PhD
Washington University, 1969

Mark A. Mintun, MD
Washington University, 1981

Stanley Misler, PhD, MD
New York University, 1976; MD, 1978

Robi Mitra, PhD
Massachusetts Institute of Technology, 2000

Michael J. Mueller, PhD
Washington University, 1992

Jeanne Nerbonne, PhD
Georgetown University, 1978

Colin G. Nichols, PhD
Leeds University, 1985

Joseph A. O'Sullivan, PhD
University of Notre Dame, 1986

Parag J. Parikh, MD
Washington University, 2001

Michael K. Pasque, MD
University of Oklahoma, 1978

Steven E. Petersen, PhD
California Institute of Technology, 1982

Jay W. Ponder, PhD
Harvard University, 1984

Marcus E. Raichle, MD
University of Washington, 1964

William D. Richard, PhD
University of Missouri, Rolla, 1988

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

Alan R. Templeton, PhD
University of Michigan, 1972

W. Thomas Thach Jr., MD
Harvard University, 1964

Stavros Thomopoulos, PhD
University of Michigan, 2001

David C. Van Essen, PhD
Harvard University, 1971

Michael J. Welch, PhD
University of London, 1965

M. Victor Wickerhauser, PhD
Yale University, 1985

Samuel A. Wickline, MD
University of Hawaii, 1980

Robert S. Wilkinson, PhD
University of Texas, Austin

Thomas A. Woolsey, MD
The Johns Hopkins University, 1969

Dequan Zou, DSc
Washington University, 1993

Adjunct Faculty

Robert Calcaterra, DSc
Washington University

Shelton Caruthers, PhD
Vanderbilt University, 1996

Sorin Vaduva, MBA
Washington University

Research Professors

Jingyi Chen, PhD
University of Washington, 2006

Jack R. Engsberg, PhD
University of Iowa, 1985

Vadim Fedorov, PhD
Moscow State University, 1999

Leonid Livshitz, PhD
Technion, 2002

Konstantin Maslov, PhD
Moscow State University, 1993

Ali Nekouzadeh, PhD
Washington University, 2005

Richard B. Schuessler, PhD
Clemson University, 1977

Jingyi Shi, PhD
State University of New York at Stony Brook, 1994

DeQuan Zou, DSc
Washington University, 1993

Link to Web Site

<http://bme.wustl.edu/graduateprograms/Pages/default.aspx>

Clinical Investigation

Overview

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. The MSCI is available to postdoctoral scholars and junior faculty within the medicine and allied health professions who are enrolled in established clinical research training programs. The MSCI is available to postdoctoral scholars, junior faculty, and predoctoral students. 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, Biology & 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 intensive Predoctoral Interdisciplinary Clinical Research Training Program are also eligible.

Program Requirements

The MSCI requires the following core curriculum in clinical investigation:

Designing Outcomes and Clinical Research

3 credits, course #513, Fall Semester, Wednesdays 3:30–5:45 p.m., course dates TBA, Brian Gage, MD, MSc, coursemaster

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.

Introduction to Statistics for Clinical Investigation

3 credits, course #522, Fall Semester, Thursdays 4:30–7 p.m., course dates TBA, Sarah Boslaugh, PhD, coursemaster

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.

Intermediate Statistics for the Health Sciences

3 credits, course #524, Spring Semester, Thursdays 4-6:30 p.m., course dates TBA, Sarah Boslaugh, PhD, coursemaster

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

Ethical and Legal Issues in Clinical Research

2 credits, course #510, Spring Semester, Mondays 4-6 p.m., course dates TBA

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.

Epidemiology for Clinical Research

3 credits, course #588, Spring Semester, Wednesdays 4:30-7 p.m., course dates TBA, Mario Schootman, PhD, coursemaster

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.

Grantsmanship

3 credits, course #528, Fall Semester, Tuesdays 4:30–6:30 p.m., course dates TBA, Jay Piccirillo, MD, Karen Dodson, BS, coursemasters

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

Scientific Writing and Publishing

2 credits, course #529, Spring Semester, Tuesdays 4:30-6:30 p.m., course dates TBA, Jay Piccirillo, MD, Karen Dodson, BS, coursemasters

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

Participate in an ongoing seminar series to present and discuss research as a work-in-progress

Take elective course work related to their research interests

Submit a final thesis — typically a submitted manuscript or grant application

Advanced placement credit can be earned for past equivalent coursework 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 \$1,000 per credit hour. Training grant or departmental funds are typically used to cover tuition costs. 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 CRTc, located on the second floor of the Wohl Hospital Building.

Further Information

Please visit our web site at crtcmsci.wustl.edu; contact Rachel Driskell, curriculum coordinator, (314) 362-8719, rdriskel@dom.wustl.edu; 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

Faculty

Program Directors

Bradley Evanoff, MD, MPH

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

Director, Masters Training Program Clinical Investigation

Department of Internal Medicine – General Medical Sciences, Washington University School of Medicine

Victoria Fraser, MD

J. William Campbell Professor of Medicine

Co-Director Infectious Diseases Division

Director, Career Development Award Program

Department of Internal Medicine – Infectious Diseases, Washington University School of Medicine

Jane Garbutt, MB, ChB, FRCP (C)

Associate Professor of Medicine and Pediatrics

Medical Director of WU PAARC

Director, Postdoctoral Program

Department of Internal Medicine – General Medical Sciences, Washington University School of Medicine

Jay Piccirillo, MD, FACS, CPI

Professor, Department of Otolaryngology – Head and Neck Surgery

Director, Predoctoral Interdisciplinary Clinical Research Training Program

Department of Otolaryngology, Washington University School of Medicine

Coursemasters

Sarah Boslaugh, PhD, MPH (*Introduction to Statistics for Clinical Investigation, Intermediate Statistics for the Health Sciences*)

Adjunct Instructor, Department of Medicine; Performance Research Analyst, BJC HealthCare

Karen L. Dodson, BS (*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 Gage, MD, MSc (*Designing Outcomes and Clinical Research*)

Associate Professor of Medicine, Department of Internal Medicine — General Medical Sciences, 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 and Sciences

Steven Kymes, PhD, MHA (*Decision Analysis for Clinical Investigation and Economic Evaluation*)

Research Assistant Professor of Ophthalmology and Visual Science, Department of Ophthalmology and Visual Science, Washington University School of Medicine

Rakesh Nagarajan, PhD (*Introduction to Biomedical Informatics*)

Associate Professor of Pathology and Immunology, Department of Laboratory and Genomic Medicine, Washington University School of Medicine

Jay Piccirillo, MD, FACS, CPI

Professor, Department of Otolaryngology – Head and Neck Surgery

Director, Predoctoral Interdisciplinary Clinical Research Training Program

Department of Otolaryngology, Washington University School of Medicine

Mario Schootman, PhD (*Epidemiology for Clinical Research*)

Associate Professor of Medicine, Department of Internal Medicine – Health Behavior Research, Washington University School of Medicine

Instructors and Guest Lecturers

Bradley Evanoff, MD, MPH
Richard A. and Elizabeth Henby Sutter Associate Professor of Occupational, Industrial and Environmental Medicine
Director, Masters Training Program Clinical Investigation
Department of Internal Medicine – General Medical Sciences, Washington University School of Medicine

Jane Garbutt, MB, ChB, FRCP (C)
Associate Professor of Medicine and Pediatrics
Medical Director of WU PAARC
Director, Postdoctoral Program
Department of Internal Medicine – General Medical Sciences, Washington University School of Medicine

Jim Dubois, PhD, DSc
Mader Endowed Professor, Department Chair and Center Director, Department of Health Care Ethics,
Saint Louis University

Brian Waterman, MPH
Adjunct Instructor, Department of Medicine; CEO, Director of Performance Analytics, BJC HealthCare

Robert Mecham, PhD
Alumni Endowed Professor of Cell Biology and Physiology, Department of Cell Biology and Physiology,
Washington University School of Medicine

Dee Owyong, AM
Manager of Administrative Services, Department of Cell Biology and Physiology, Washington University
School of Medicine

Roger Yusen, MD, MPH
Associate Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Division of General
Medical Sciences, Washington University School of Medicine

Marin Kollef, MD
Golman Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Washington University
School of Medicine; Director, Medical Intensive Care Unit, Director, Respiratory Care Services,
Barnes-Jewish Hospital

Anjali Deshpande, PhD, MPH
Research Assistant Professor PEFA, Department of Internal Medicine – Health Behavior Research,
Washington University School of Medicine

Curtis A. Parvin, PhD
Clinical Research Associate Professor of Pathology and Immunology, Department of Laboratory and
Genomic Medicine, Washington University School of Medicine

Natalie Goodwin-Frank
Funding Resources Coordinator, Office of the Vice Chancellor for Research, Washington University

John Michnowicz, BS
Director of Grants and Contracts, Office of the Vice Chancellor for Research, Washington University

Roberto Civitelli, MD
Professor of Medicine, Department of Internal Medicine – Bone and Mineral Diseases, Washington
University School of Medicine

Usha Andley, PhD
Professor of Ophthalmology and Visual Sciences, Department of Ophthalmology and Visual Sciences,
Washington University School of Medicine

J. Phillip Miller, AB
Professor of Biostatistics, Division of Biostatistics, Washington University School of Medicine

Dan Bustillos, JD, PhD
Assistant Professor, Department of Health Care Ethics, Saint Louis University

Rebecca Dresser, JD
Daniel Noyes Kirby Professor of Law, Washington University School of Law

Michael DeBaun, MD
Professor of Pediatrics, Department of Pediatrics, Genetics, and Genomic Medicine, Washington University School of Medicine

William D. Shannon, PhD
Associate Professor of Biostatistics in Medicine, Department of Internal Medicine – General Medical Sciences, Washington University School of Medicine

Mae Gordon, PhD
Professor of Ophthalmology and Visual Sciences, Department of Ophthalmology and Visual Sciences, Washington University School of Medicine

Mark J. Manary, MD
Professor of Pediatrics, Department of Pediatrics Emergency Medicine, Washington University School of Medicine

Kelle H. Moley, MD
Professor of Obstetrics and Gynecology, Department of Obstetrics and Gynecology – Endocrine, Washington University School of Medicine

Catherine Striley, PhD, MSW, LCSW, ACSW, MPE
Research Instructor in Psychiatry, Department of Psychiatry, Washington University School of Medicine

Kim Lipsey
Librarian, Bernard Becker Medical Library, Washington University School of Medicine

Further Information

Please visit our web site at crtcmsci.wustl.edu; contact Rachel Driskell, curriculum coordinator, (314) 362-8719, rdriskel@dom.wustl.edu; or write to:

Washington University in St. Louis

School of Medicine

Master of Science in Clinical Investigation Program

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St. Louis, MO 63110

Link to Web Site

<http://k30.im.wustl.edu>

Genetic Epidemiology

Genetic Epidemiology Masters of Science (GEMS)

The Genetic Epidemiology Masters of Science (GEMS) 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.

Master of Science Degree (Computational and Clinical Tracks)

The core faculty for this multidisciplinary MS program comes from 15 departments/divisions in the School of Medicine. The GEMS degree program is sponsored by the Division of Biostatistics and cosponsored by the departments of Genetics and Psychiatry and includes world-renowned scientific leaders in their respective areas. D.C. Rao, PhD, director of the Division of Biostatistics and the GEMS program director, is one of the founding fathers of the field. The four-semester, summer-to-summer (13-14 months), 35-credit-hour GEMS program is designed to prepare students to work at the interface of genetics, biostatistics, epidemiology and computing. The program has two distinct tracks that encompass training for both graduate students and clinical investigators. See <http://www.biostat.wustl.edu/gems/> for details.

Certificate in Genetic Epidemiology

We offer a Certificate in Genetic Epidemiology, which is earned after successful completion (with a minimum of a "B" average) of five core courses plus labs (14 credit hours) that are normally offered to master's candidates in Genetic Epidemiology. To earn the certificate, these courses may be taken over one or two years:

M21 503	Statistical Computing with SAS (summer)
M21 515	Fundamentals of Genetic Epidemiology (summer)
M21 550	Introduction to Bioinformatics (summer)
M21 560	Biostatistics I (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 from the quantitative or biological sciences, and possibly at different points in their careers: undergraduates with quantitative sciences (e.g., mathematics through calculus plus one semester of statistics) and/or biological sciences (at least through Principles of Biology II and a basic course in Genetics or equivalent) background; physician scientists and other clinical investigators, particularly postdoctoral fellows; people with terminal degrees in other (related) disciplines who seek to gain expertise in genetic epidemiology; current employees of pharmaceutical and biotechnology companies seeking additional training and formal credentials in the field. All prospective students must provide evidence of basic skills in computer programming through coursework, 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 GEMS 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.

Further Information

See our web site, <http://www.biostat.wustl.edu/gems>, contact the program manager at (314) 362-1052 or send e-mail to gems@wubios.wustl.edu, or write to:

The GEMS Program

Division of Biostatistics

Campus Box 8067

660 S. Euclid Ave.

St. Louis, MO 63110-1093

Telephone: (314) 362-1052

Fax: (314) 362-2693

Registration Instructions

All students will register with the program manager in Genetic Epidemiology, gems@wubios.wustl.edu.

Before registering, current Washington University students must obtain appropriate consent from their division or department. Students outside the GEMS program wishing to enroll in individual courses must have permission of the course master.

Academic Calendar

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

Courses

M21 501 SELECTED TOPICS IN MODERN BIOSTATISTICS

Department: Division of Biostatistics

Course master: C. Charles Gu

Credit Hours: 3 units

Frequency: Summers of 2010, 2011 and 2012

An intensive six-week summer course, designed as a survey course that gives broad exposure to the basic concepts, methodology and application of select topics in modern biostatistics, with a concentration in genetic epidemiology and bioinformatics. Current topics will be discussed in six major areas organized by week: principles of modern biostatistics, basics of epidemiology and clinical trials, longitudinal and survival data analysis, fundamentals of genetic epidemiology, introduction to bioinformatics, and a primer of pharmacogenetics. Students will hear from expert biostatisticians in their fields about challenging, real-world questions, then focus on selected important concepts and methods, analyze case studies, and participate in guided reading and group discussions of publications in biostatistics and bioinformatics research. Prerequisites: Math 3200 Elementary to Intermediate Statistics and Data Analysis at WU or the equivalent. Open only to students admitted to the SIBS Program sponsored by NHLBI and NRCC.

Contact the SIBS program administrator for details, to register, or to obtain the required permission of the course master: sibs@wubios.wustl.edu or telephone (314) 362-3950.

M21 502 SUMMER PRACTICUM IN BIOSTATISTICS

Department: Division of Biostatistics

Course master: C. Charles Gu

Credit Hours: 3 units

Frequency: Summers of 2010, 2011, and 2012

Companion course of M21 501: Selected Topics in Modern Biostatistics. All activities are designed around the six weekly topics of the didactic course: principles of modern biostatistics, basics of epidemiology and clinical trials, longitudinal and survival data analysis, fundamentals of genetic epidemiology, introduction to bioinformatics, and primer of pharmacogenetics. This practicum reinforces the concepts and methods to which the students are exposed in M21 501, by solving real-life problems using actual datasets. Students will gain authentic experiences of a career biostatistician through a series of practical activities, including computer labs using real datasets, discussion groups for guided reading of publications, student projects and presentations and summer seminars. Qualified students with advanced experience and strong interest in pursuing a career in biostatistics research will be considered for internship opportunities. Prerequisites: Same as for M21 501 Selected Topics in Modern Biostatistics and simultaneous enrollment therein. Open only to students admitted to the SIBS Program sponsored by NHLBI and NRCC.

Contact the SIBS program administrator for details, to register, or to obtain the required permission of the course master: sibs@wubios.wustl.edu or telephone (314) 362-3950.

M21 503 STATISTICAL COMPUTING WITH SAS®

Department: Division of Biostatistics

Course masters: Jingqin (Rosy) Luo (Section 1); Karen Schwander (Section 2)

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 strongly encouraged to take the Math/Statistics Workshop offered free of charge immediately prior to this course in early July.

Contact the GEMS program manager for details and for the required permission of the course master: gems@wubios.wustl.edu or (314) 362-052.

M21 515 FUNDAMENTALS OF GENETIC EPIDEMIOLOGY

Department: Division of Biostatistics

Course masters: Treva Rice and YunJu 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 Math/Statistics Workshop and especially 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 GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

M21 550 INTRODUCTION TO BIOINFORMATICS

Department: Division of Biostatistics

Course masters: C. Charles Gu and Gary Stormo

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 acquire understanding of mathematical algorithms in genome sequence analysis (alignment analysis, gene finding/predicting), gene expression microarray (genechip) analysis, and of the impact of recent developments 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 Math/Statistics Workshop and 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 GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

M21 5483 HUMAN LINKAGE AND ASSOCIATION ANALYSIS

Department: Department of Genetics

Course masters: 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 based studies), QQ and Manhattan plots, whole genome association analysis; population stratification; Quantitative Trait Analysis; measured genotypes and variance components. Hands-on computer lab experience doing parametric linkage analysis with the program LINKAGE, model free linkage analyses with Genehunter and Merlin, power computations with SLINK, quantitative trait analyses with SOLAR, LD computations with Haploview and WGAViewer, and family-based and case-control association analyses with PLINK and SAS. The methods and exercises are coordinated with the lectures, and students are expected to understand underlying assumptions and limitations and the basic calculations performed by these computer programs. Auditors will not have access to the computer lab sessions. 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 GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

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 practical experience with SAS®.

Participants are strongly encouraged to participate in the Math/Statistics and Computing/UNIX Workshops 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 GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

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 to obtain the required the required permission of the course master, contact the GEMS program manager: gems@wubios.wustl.edu or (314) 362-1052.

M21 599 DIRECTED INDEPENDENT STUDY

Department: Division of Biostatistics

Course master: D.C. Rao

Credit Hours: maximum 6 units

Frequency: Every semester

A faculty member will work with the student in specific areas related to the student's primary needs. Permission of the course master required. Credit: variable, maximum 6 units.

M21 600 MENTORED RESEARCH

Department: Division of Biostatistics

Course Master: D.C. Rao

Credit Hours: 6 units standard, maximum 12 units

Frequency: Every spring and summer (TBA)

Student undertakes supervised research in a mentor's lab. The goal is to acquire important research and presentation skills. A written manuscript of publishable quality based on the research and prepared in the format of an actual scientific publication must be submitted and presented to a select audience. The process begins in the fall with "mentor workshops," in which prospective mentors present research ongoing in their labs so that students can select a research mentor and topic before the semester ends. Intensive literature reading is expected in the break between fall and spring semesters. Class meets regularly starting in spring (where students present their progress updates) and builds up intensity through summer, culminating in final presentations in summer (late July and early August, or even earlier if required). Permission of the course master required.

M21 616 EPIDEMIOLOGY, CLINICAL TRIALS, STUDY DESIGN AND MANAGEMENT

Department: Division of Biostatistics

Course masters: J. Philip Miller and Gina D'Angelo

Credit Hours: 3 units

Frequency: Every spring

Description: Learn critical study design issues, optimal study designs, cost-benefit analysis, power analysis, study management issues (protocols, data entry, data flow, database management, QC), special considerations for multicenter studies, human studies, principles and issues in designing linkage and association studies, and ethical, legal and social issues concerning human studies. Prerequisite: M21 560 Biostatistics I and M21 570 Biostatistics II offered in fall semester.

For details, to register and to receive the required permission of the course master, contact the GEMS program manager: gems@wubios.wustl.edu or telephone (314) 362-1052.

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 is designed to give the students computational experience with the latest statistical genetics methods and concepts, so that they will be able to computationally implement the method(s)/model(s) developed as part of their thesis. Concentrating on the applications of genomics and SAS computing, it deals with creating efficient new bioinformatic tools to interface with some of the latest, most important genetic epidemiological analysis software, as well as how to derive, design and implement new statistical genetics models. The course also includes didactic instruction on haplotype estimation and modeling of relationship to phenotype, LD mapping, DNA pooling analysis methods, analysis approaches in pharmacogenomics (with an emphasis on possible genomic role in drug response heterogeneity), and epistasis (GxG) and GxE interactions; data mining methods, including clustering, recursive partitioning, boosting and random forests; and fundamentals of meta-analysis, importance sampling, permutation tests and empirical p-values, as well as the design of monte-carlo simulation experiments. Prerequisite: M21 560 Biostatistics I. Permission of the course master required: (314) 362-1052.

Faculty

Link to Web Site

<http://www.biostat.wustl.edu/gems/>

Health Care Services

The Health Care Services Program at Washington University responds to the growing need for interdisciplinary professionals with expertise in the planning, implementation and evaluation of health service programs. Sponsored jointly by Washington University's School of Medicine and University College, this 30-unit graduate degree program draws on the broad expertise of university faculty and research personnel. The curriculum examines organizational influences important to the development of innovative programs for individuals and families, stressing health education and the application of current research findings.

Admission to the Health Care Services Program is open on a selective basis to qualified applicants with a bachelor's degree in a science or health-related field from an accredited institution. Applicants should have completed training in one of the several professions involved in the health care environment. Others may be admitted whose training and goals are congruent with the purposes of the program and acceptable to the admissions committee. The Master of Health Science 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. Students may select electives from various departments and divisions of the university (social work, education, nonprofit management, human resources management, clinical research management).

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

Irene Fischer, MPH
Saint Louis University, 1998 (Research Patient Coordinator, Division of Health Behavior Research, Departments of Internal Medicine and Pediatrics)

Instructors

Sarah Boslaugh, PhD, MPH

City University of New York, 1996; Saint Louis University, 2004 (Performance Research Analyst, BJC HealthCare)

Patricia Cavazos-Rehg, PhD

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

Shannon Nanna, PsyD

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

Joan Heins, MA

Washington University, 1990 (Research Patient Coordinator, Division of Health Behavior Research, Departments of Internal Medicine and Pediatrics)

Cheryl A. Houston, PhD

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)

Cheryl Kelly, PhD, MPH

Saint Louis University, 2006 (Assistant Professor, Saint Louis University)

Donald Rickert, PhD

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

Leigh 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)

Link to Web Site

<http://ucollege.wustl.edu/areas-study/biology-and-health-care/master-science-health-care-services>

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.

A full description of degrees in Occupational Therapy is available from the office of the Program in Occupational Therapy, or at the web site www.ot.wustl.edu.

Tuition and fieldwork fees (MSOT, full time) per semester: \$12,542 for first five semesters, \$6,270 per semester for last two semesters while on fieldwork.

Tuition and fieldwork fees (OTD, full-time): \$12,542 per semester first five semesters, \$13,190 per semester last two academic semesters, and \$6,270 for each semester student is on clinical fieldwork or apprenticeship.

Part-time tuition: \$995 per credit

Faculty

M. CAROLYN BAUM, PHD, MA Professor of Occupational Therapy, Elias Michael Executive Director of the Program in Occupational Therapy

JANET MARIE BALOTA, PHD, MA Associate Professor of Occupational Therapy

PEGGY BARCO, MED Instructor in Occupational Therapy

CHRISTINE R. BERG, PHD, MS Assistant Professor of Occupational Therapy

ELLEN F BINDER, MD Associate Professor of Occupational Therapy

REBECCA L BIRKENMEIER, MS Instructor in Occupational Therapy

LISA TABOR CONNOR, PHD, MA Assistant Professor of Occupational Therapy

LINDA B COTTLER, PHD, M PH Professor of Occupational Therapy

ANN MARIE DALE, PHD Research Instructor in Occupational Therapy

JEANENNE M DALLAS, MA Instructor in Occupational Therapy

MICHAEL N DIRINGER, MD, MA 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. ENGSBERG, PHD, MS Associate Professor of Occupational Therapy

BRADLEY A EVANOFF, MD, M PH Professor of Occupational Therapy

SUSAN M FITZPATRICK, PHD Adjunct Associate Professor of Occupational Therapy
SUSAN M FITZPATRICK, PHD Adjunct Associate Professor of Occupational Therapy
ERIN R FOSTER Instructor in Occupational Therapy
DAVID B GRAY, PHD, MS Professor of Occupational Therapy
MARY W HILDEBRAND Instructor in Occupational Therapy
CLAUDIA A HILTON, PHD, MBA Instructor in Occupational Therapy
HOLLY H HOLLINGSWORTH, PHD, MA Research Associate Professor of Occupational Therapy
LINDA ANN HUNT Adjunct Associate Professor of Occupational Therapy
VICTORIA KASKUTAS, MHS Assistant Professor of Occupational Therapy
ALLISON A KING, MD Assistant Professor of Occupational Therapy
KATHLEEN MARIE KNIPEMANN, DED, M PH, BS Instructor in Occupational Therapy
CATHERINE ECKEL LANG, PHD, MS Assistant Professor of Occupational Therapy
SUSAN E MACKINNON, MD Professor of Occupational Therapy
MARIAN A MINOR, PHD, M PH 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
JOEL S PERLMUTTER, MD Professor of Occupational Therapy
MONICA S PERLMUTTER, MA Instructor in Occupational Therapy
JAY FRANCIS PICCIRILLO, MD Professor of Occupational Therapy
ROBERTA G PINEDA, PHS, MHS Research Instructor in Occupational Therapy (Paart-time 80%)
MARY SEATON, MHS Instructor in Occupational Therapy
TIMOTHY L SHURTLEFF, MS Instructor in Occupational Therapy
SUSAN L STARK, PHD, MS Assistant Professor of Occupational Therapy
STEVEN D TAFF, DED, MS Instructor in Occupational Therapy
GARTH D TUBBS Assistant Professor Emeritus of Occupational Therapy
ELLEN TWINING TYSON, MA Assistant Professor Emerita of Occupational Therapy
TIMOTHY J WOLF Assistant Professor of Occupational Therapy

Link to Web Site

<http://ot.wustl.edu>

Population Health Sciences

The **Master of Population Health Sciences (MPHS)**, offered by the School of Medicine, is designed as a one-year, full-time degree program that meets the needs of clinicians seeking training in clinical research methods. Part-time study is also available. Its quantitative curriculum emphasizes the role of epidemiology and biostatistics in approaching clinical effectiveness and outcomes research. Although there is no research component to the degree, an emphasis on applied course work allows for students to focus application of concepts in areas most relevant to their clinical careers including development of research study protocols, performing systematic reviews and designing epidemiologic studies.

Prospective Students

Applicants should have completed a clinical training program at the doctoral level or be in the process of completing such a degree. The program is designed for students who have clinical training or expertise in health care or a health-related field. 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

Statistical computing with SAS
Ethical and regulatory issues in clinical research (M17-510)
Biostatistics 1
Biostatistics 2
Introduction to Epidemiology
Intermediate Epidemiology
Applied Epidemiology

Information on elective courses is available at <http://www.mphs.wustl.edu>.

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 population health research into their clinical careers. 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 2010-2011 Academic Year: August 1, 2010
For 2011-2012 Academic Year: December 15, 2010
Notification of Students of Admission Decision: February 1, 2011
Commitment Deadline: April 1, 2011

Further Information

The director of the MPHS program is Graham Colditz, MD, DrPH. Additional information can be obtained at www.mphs.wustl.edu or by e-mailing mphs@wustl.edu.

Faculty

Lauren Arnold, PhD, MPH
Instructor, Department of Surgery

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, Brown School of Social Work

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

Steve Kymes, PhD
Assistant Professor, Department of Ophthalmology and Visual Sciences

Esther Liu, PhD
Faculty, Institute of Clinical and Translational Sciences

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

D.C. Rao, PhD
Director, Division of Biostatistics

David Stamillio, MD
Associate Professor, Department of Obstetrics and Gynecology

Seth Strobe, MD, MPH
Assistant Professor, Division of Urologic Surgery

Kathleen Wolin, ScD
Assistant Professor, Department of Surgery

Link to Web Site

<http://www.mphs.wustl.edu/>

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 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, and 3) 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 have 1) graduated from an accredited professional physical therapy program, 2) acquired acceptable grade-point averages in previous academic endeavors, 3) achieved acceptable scores on the Graduate Record Examination, and 4) must 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: \$15,308 per semester

Post-professional curriculum: \$480 per credit

Doctoral curriculum: \$19,700 per semester

Further information may be obtained by direct correspondence with the Program in Physical Therapy, Campus Box 8502, 4444 Forest Park Blvd., St. Louis, MO 63108-2212.

Phone: (314) 286-1400

Fax: (314) 286-1410
E-mail: ptprog@wustl.edu
Web site: pt.wustl.edu

Faculty

SUSAN S. DEUSINGER, PHD, MA Professor of Physical Therapy, Executive Director of the Program in Physical Therapy

AMY J BASTIAN, PHD Adjunct Assistant Professor of Physical Therapy

MARYBETH BROWN, PHD, MA Adjunct Associate Professor of Physical Therapy

TAMARA LAVON BURLIS, DPT, MHS, BS Associate Director for Clinical Education in Physical Therapy, Assistant Professor of Physical Therapy

WILLIAM TODD CADE, PHD, MS Assistant Professor of Physical Therapy

CHERYL ANN CALDWELL, DPT, MHS Assistant Professor of Physical Therapy

BILLIE RUTH CLARK, PHD Assistant Professor of Physical Therapy

SUZANNE MARIE CORNBLEET, DPT, MA Assistant Professor of Physical Therapy

BETH ELAINE CROWNER, DPT, M PP, MS Division Director of Clinical Practice in Physical Therapy, Assistant Professor of Physical Therapy

SYLVIA LIN CZUPPON, MS Instructor in Physical Therapy

ROBERT H DEUSINGER, PHD, MS Associate Professor of Physical Therapy

KATHLEEN KOLLER DIXON Instructor Emerita in Physical Therapy

GAMMON MARIE EARHART, PHD, MS Assistant Professor of Physical Therapy

JULAINE MARIE FLORENCE, DPT, MS Research Associate Professor of Physical Therapy

JUDITH REBECCA GELBER, DPT Instructor in Physical Therapy

MARY KENT HASTINGS, DPT, MS Assistant Professor of Physical Therapy

MARCIE HARRIS HAYES, DPT, MS Assistant Professor of Physical Therapy

ROBERT JEROME HICKOK Assistant Professor Emeritus of Physical Therapy

GREGORY WILLIAM HOLTZMAN, DPT, MS Assistant Professor of Physical Therapy

HELEN HORNFECK HOST Research Instructor in Physical Therapy

RENEE A. IVENS, DPT, MHS Assistant Professor of Physical Therapy

LYNNETTE C KHOO-SUMMERS, DPT, MS Assistant Professor of Physical Therapy

JOSEPH W. KLAESNER, PHD, MS Research Associate Professor of Physical Therapy

CATHERINE ECKEL LANG, PHD, MS Assistant Professor of Physical Therapy

MATTHEW J MATAVA, MD Associate Professor of Physical Therapy

BESS D MAXWELL, PHD, MS Visiting Assistant Professor of Physical Therapy

DEBRA ANN MCDONNELL, DPT, MS, AS Assistant Professor of Physical Therapy

MARY KATE MCDONNELL, DPT, MHS Associate Director of Residencies and Fellowships in Physical Therapy, Assistant Professor of Physical Therapy

DANIEL MORAN, PHD Assistant Professor of Physical Therapy

JOHN CARL MORRIS, MD Professor of Physical Therapy

MICHAEL JEFFREY MUELLER, PHD, MHS Division Director of Research in Physical Therapy, Professor of Physical Therapy

BARBARA JEAN NORTON, PHD, MHS Associate Professor of Physical Therapy, Associate Director for Postprofessional Education in Physical Therapy

JOEL S PERLMUTTER, MD Professor of Physical Therapy

SUSAN B. RACETTE, PHD Research Associate Professor of Physical Therapy

SHIRLEY ANN SAHRMANN, PHD, MA Professor of Physical Therapy

DAVID R SINACORE, PHD, MHS Associate Director of Postdoctoral Fellowships in Physical Therapy, Professor of Physical Therapy

NANCY BLOOM SMITH, DPT, MS, BS Assistant Professor of Physical Therapy

THERESA M SPITZNAGLE, DPT, MHS Assistant Professor of Physical Therapy

PAUL S. STEIN, PHD, MA Professor of Physical Therapy

JENNIFER S STITH, PHD, MS Division Director for Education in Physical Therapy, Division Director for Education in Physical Therapy

SUSAN KAY STRECKER, DPT, MA Assistant Professor of Physical Therapy

MICHAEL J. STRUBE, PHD, MS Professor of Physical Therapy

W. THOMAS THACH, JR, MD Professor of Physical Therapy

KURT A THOROUGHMAN, PHD Associate Professor of Physical Therapy

STACY LYNNE TYLKA, DPT, MS Instructor in Physical Therapy

LINDA R VAN DILLEN, PHD, MS Associate Professor of Physical Therapy

PAMELA M. WENDL, DPT, MS Assistant Professor of Physical Therapy

KEVIN E YARASHESKI, PHD, MA Professor of Physical Therapy

DEQUAN ZOU, D SC, ME, MS Research Associate Professor of Physical Therapy

Link to Web Site

<http://pt.wustl.edu>

Psychiatric Epidemiology

The MPE Program is a graduate program offered by the Epidemiology and Prevention Research Group in the Department of Psychiatry at Washington University School of Medicine. It was established in 1989 by Lee Robins, PhD, and is the first and only program of its kind in the world. This program teaches advanced basic epidemiological and advanced research skills, with an emphasis on interdisciplinary studies. The program, in a medical school environment, is noted for its community health focus, as it encompasses epidemiology, prevention and health services. It also strongly emphasizes training in the responsible conduct of research.

Candidates develop practical research skills and learn basic epidemiological methods through apprenticeship and didactic approaches. History and development of the major national and international psychiatric epidemiology studies are covered as well as diagnostic instruments commonly used in the field. Students learn how to organize and manage population surveys, including design, data collection and data analysis. Instructors in the program are experienced research investigators with productive research teams.

Students come from varied backgrounds such as public health, economics, social work, education, psychiatry, engineering, infectious disease, policy, medicine, nursing, mathematics, psychology and anthropology. The overall objective of the MPE Program is to prepare predoctoral students and postdoctoral fellows for a productive research career in public health, with an emphasis on behavioral risk and protective factors. Graduate students in other university programs are also encouraged to enroll in

courses. Undergraduate students are welcome, with the instructor's approval.

Master of Psychiatric Epidemiology

A Master of Psychiatric Epidemiology degree may be earned after successful completion of 30 credits made up of 14 core courses (26 credit hours) that are required in the MPE Program and 4 credits of elective courses. Elective credits may include additional hours of Independent Study (beyond the required 6 hours). Required courses are: M08 500 Introduction to General Epidemiology, M08 502 Instruments of Psychiatric Diagnoses and Assessment, M08 544 Applied Statistics for Behavioral Scientists, M08 507 Epidemiology Seminar I, M08 508 Landmarks in Psychiatric Epidemiology, M08 532 Psychiatry Grand Rounds I, M08 533 Psychiatry Research Seminar I (all offered in Fall), M08 507A Epidemiology Seminar II, M08 507B Epidemiology Seminar III, M08 532A Psychiatry Grand Rounds II, M08 533A Psychiatry Research Seminar II, M08 538 Research Methods, M08 676 Psychiatric Disorders of the Nervous System (all offered in Spring) and M08 506 Independent Study (offered Fall, Spring and Summer). In addition, a program-approved manuscript is required for graduation.

Academic Calendar

In general, the MPE Program follows the calendar of the School of Medicine for beginning and ending dates of semesters; students should consult epi.wustl.edu/mpe/course.htm for specific courses offered each semester.

Registration Information for Non-MPE Students

Courses are open to all students, with the instructor's approval.

Registration Information for MPE Students

Registration is done through the MPE Registrar's office.

Further Information

For further information, view our web site at epi.wustl.edu (click on MPE or contact Erin Murdock, registrar (314) 286-2267 or by e-mail at murdockel@epi.wustl.edu).

Location

The MPE Program administration is located at 40 N. Kingshighway Blvd., Parc Frontenac Building, Suite 4. Courses are held in this building and in other locations of the medical school.

Director

The director of the MPE Program is Linda B. Cottler, PhD, MPH, professor of epidemiology in psychiatry.

Associate Director

The associate director of the MPE Program is Catherine Striley, PhD, MSW, ACSW, MPE, Research Assistant Professor of Psychiatry.

Courses

M08 500 INTRODUCTION TO GENERAL EPIDEMIOLOGY

Instructor: L. Cottler, PhD, MPH,

Epidemiology is the study of health and disease in the population. This course, while introducing epidemiologic methods and classic medical studies, emphasizes the clinical importance of psychiatric epidemiology. Credit: 3 units.

**M08 502 INSTRUMENTS OF PSYCHIATRIC DIAGNOSES AND ASSESSMENT
(OFFERED FALL-EVEN YEARS)**

Instructor: K. Bucholz, PhD, MPE

Introduction to commonly used interviews, both structured and semi-structured, and questionnaire development since 1940 for the diagnosis of specific psychiatric disorders in children and adults. Credit: 1 unit.

M08 506A INDEPENDENT STUDY 1

Instructor: Arranged mentor

Student arranges with a faculty member to:

- 1) participate in that person's ongoing research
- 2) research literature on a specific topic
- 3) carry out secondary data analysis with an existing data set
- 4) design and/or carry out an original research project
- 5) prepare a grant proposal

The faculty member meets regularly with the student and guides the project.

Credit: 1 unit.

M08 506B INDEPENDENT STUDY 2

Instructor: Arranged mentor

Student arranges with a faculty member to:

- 1) participate in that person's ongoing research
- 2) research literature on a specific topic
- 3) carry out secondary data analysis with an existing data set
- 4) design and/or carry out an original research project
- 5) prepare a grant proposal

The faculty member meets regularly with the student and guides the project.

Credit: 2 units.

M08 506C INDEPENDENT STUDY 3

Student arranges with a faculty member to:

- 1) participate in that person's ongoing research;
- 2) research literature on a specific topic
- 3) carry out secondary data analysis with an existing data set
- 4) design and/or carry out an original research project
- 5) prepare a grant proposal

The faculty member meets regularly with the student and guides the project.

Credit: 3 units.

M08 507 DRUG ABUSE EPIDEMIOLOGY SEMINAR I: Recent Trends in Drug Epidemiology

Instructor: C. Callahan O'Leary, PhD

Speaker series with topics determined each year to cover important emerging and ongoing research in addiction epidemiology. Credit: 1 unit

M08 507A EPIDEMIOLOGY SEMINAR II: Recent Trends and Progress in Substance Use and Psychiatric Epidemiology

Instructor: R. Grucza, PhD, MPE

This course prepares students for independent research presentations through presenting and critiquing each other's work with faculty guidance. Credit: 1 unit

M08 507B PSYCHIATRIC AND DRUG ABUSE EPIDEMIOLOGY SEMINAR III: Post Doc Presentations

Instructor: A. Agrawal, PhD

Presentations by postdocs and MPE Students. Credit: 1 unit

**M08 508 LANDMARKS IN PSYCHIATRIC AND DRUG ABUSE EPIDEMIOLOGY
(OFFERED FALL- ODD YEARS)**

Instructor: C. Striley, PhD, MSW, ACSW, MPE

A review of the major studies in psychiatric and drug addiction epidemiology, from the 1920s to the present. Students present information on the methods and findings of these studies each week; faculty supplement the presentations with didactic material. Credit: 1 unit

M08 523 MINI-COURSE PSYCHOLOGICAL TESTING

Instructor: G. Heydebrand, PhD

Seminar format. Credit: 1 unit

M08 531 MINI-COURSE PERSONALITY DISORDERS

Instructor: R. Cloninger, MD

Seminar format. Credit: 1 unit

M08 532 PSYCHIATRY GRAND ROUNDS I

Instructor: B. Hong, PhD

Clinical psychiatric issues are discussed and illustrated with presentations of patients. Enrollment is limited to MPE students. Instructor approval required. Credit: 1 unit

M08 532A PSYCHIATRY GRAND ROUNDS II

Instructor: B. Hong, PhD

Clinical psychiatric issues are discussed and illustrated with presentations of patients. Enrollment is limited to MPE students. Instructor approval required. Credit: 1 unit

M08 533 PSYCHIATRY RESEARCH SEMINAR I

Instructor: A. Reiersen, MD, MPE

Research studies in psychiatry covering a broad range of topics. Students meet to discuss the seminar after each lecture. Credit: 1 unit

M08 533A PSYCHIATRY RESEARCH SEMINAR II

Instructor: A. Reiersen, MD, MPE

Research studies in psychiatry covering a broad range of topics. Students meet to discuss the seminar after each lecture. Credit: 1 unit

M08 537 INTRODUCTION TO CHILD PSYCHIATRY

Instructor: A. Glowinski, MD, MPE

Research studies in psychiatry covering a broad range of topics. Students meet to discuss the seminar after each lecture. Credit: 3 units

M08 537B INTRODUCTION TO CHILD PSYCHIATRY II

Instructor: A. Glowinski, MD, MPE

This course addresses normative development and developmental psychopathology as it relates to mental disorders occurring in children and adolescents. Credit: 3 units

M08 538 BEHAVIORAL RESEARCH METHODS

Instructor: L. Cottler, PhD, MPH

A hands-on approach to psychiatric and substance abuse research. Students attend confidential project meetings and are exposed to the ins and outs of a project's daily operations. Students complete a methods project for a study they are involved with, such as IRB submission, a study codebook or other method. Credit: 3 unit

M08 545 MINI COURSE — ALZHEIMER'S DISEASE (FALL 2010)

Instructor: N. Farber, MD

Seminar format. Credit: 1 unit

M08 544 APPLIED STATISTICS FOR BEHAVIORAL SCIENTISTS

Instructors: C. Striley, PhD, MSW, ACSW, MPE

Instruction designed for those behavioral researchers who want to expand their knowledge of practical methods in statistics, with an emphasis on statistical and epidemiological concepts, applications, practical hints and a hands-on approach to data, and using SAS/PC for in-class examples and homework problems. Credit: 3 units

M08 551 COMMUNITY HEALTH AND RESEARCH

Instructors: C. Striley, PhD, MSW, ACSW, MPE, C. O'Leary, PhD

As a survey course, this class will provide the student with an understanding of social and behavioral factors at the level of the community and system that affect the public health; including preventions, interventions and policies that improve the public health, and the ethics of community health intervention and research. As a practice course, it will provide students with methods to identify such factors, and the forces, including agencies, working to improve the public health; with techniques to participate with the community to prevent poor health and intervene to improve health; and with knowledge of methods to apply evidence-based interventions with the rigor of research. Credit: 3 units

M08 676 PSYCHIATRIC DISORDERS OF THE NERVOUS SYSTEM

Instructor: M. Swallow, MD

Emphasizes the diagnosis of major psychiatric illness. Psychiatric disease will be described in terms of epidemiology, clinical presentation, natural history, genetics, differential diagnosis and clinical management. Biological and psychological influences on these diseases will be presented. Interviewing techniques and performance of the mental status exam will be demonstrated by patient interviews. Credit: 2 units

M08 899 THESIS WORKSHOP

Instructor: Arranged mentor

As the final requirement to be degreed, and under the guidance of a mentor, the student, as first author, develops a publishable manuscript that meets journal requirements and results in submission for peer review. Enrollment is limited to the degree-seeking candidate registered for 0 to 8 hours of course work whose thesis writing qualifies him/her for full-time status. Credit: 0 units

Faculty**Director**

Linda B. Cottler, PhD, MPH
Professor of Epidemiology in Psychiatry

Co-Director

Catherine Striley, PhD, MSW, ACSW, MPE
Research Assistant Professor of Psychiatry

Arpana Agrawal, PhD
Research Assistant Professor of Psychiatry

Laura Bierut, MD
Professor of Psychiatry

Kelly Botteron, MD
Associate Professor of Psychiatry

Kathleen Bucholz, PhD, MPE
Professor of Psychiatry

Catina Callahan O'Leary, PhD
Research Instructor in Psychiatry

C. Robert Cloninger, MD
Wallace Renard Professor of Psychiatry

Karen Dodson
Director and Managing Editor of Academic Publishing Services

Nuri B. Farber, MD

Associate Professor of Psychiatry

Anne Glowinski, MD, MPE
Assistant Professor of Psychiatry

Richard Gucza, PhD, MPE
Research Assistant Professor of Psychiatry

Gitry Heydebrand, PhD
Assistant Professor of Psychiatry

Barry Hong, PhD
Professor of Psychiatry

Daniel Mamah, MD, MPE
Instructor in Psychiatry

Rumi Price, PhD, MPE
Research Associate Professor of Psychiatry

Angela Reiersen, MD, MPE
Instructor in Psychiatry

Edward L. Spitznagel, PhD
Professor of Mathematics

Melissa Swallow, MD
Assistant Professor of Psychiatry

Link to Web Site

<http://epi.wustl.edu/MPE>

Administration

Administration

Board of Trustees

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

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

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Vice Chancellor for Finance

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Vice Chancellor for Research

Pamela S. Lokken
Vice Chancellor for Government and Community Relations

James E. McLeod
Vice Chancellor for Students and Dean of the College of Arts & Sciences

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Vice Chancellor for Human Resources

M. Fredric Volkmann
Vice Chancellor for Public Affairs

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Executive Vice Chancellor for Medical Affairs and Dean

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Associate Vice Chancellor and Director of Medical Alumni and Development Programs

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Associate Vice Chancellor for Clinical Affairs and Chief Executive Officer, Faculty Practice Plan

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Associate Vice Chancellor and Associate Dean for Admissions and Continuing Medical Education

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Associate Vice Chancellor for Administration and Finance

George E. Andersson
Assistant Vice Chancellor and Assistant Dean for Finance

Brian DeFilippis
Assistant Vice Chancellor for Medical and Alumni Development Programs

Lisa M. Braun
Assistant Vice Chancellor and Chief Counsel

Walter W. Davis Jr.
Assistant Vice Chancellor, Assistant Dean for Facilities Operations

Patricia J. Gregory, PhD
Assistant Vice Chancellor and Executive Director of Medical Corporate and Foundation Relations

Steven L. Leary
Assistant Vice Chancellor for Veterinary Affairs and Director of the Division of Comparative Medicine

Glenda K. Wiman
Assistant Vice Chancellor and Assistant Dean of Special Programs

Alison J. Whelan, MD
Senior Associate Dean for Education

Koong-Nah Chung, PhD
Associate Dean for Medical Student Research and Assistant Dean for Admissions and Student Affairs

Diana L. Gray, MD
Associate Dean for Faculty Affairs

Jonathan M. Green, MD
Associate Dean for Human Studies

Leslie E. Kahl, MD
Associate Dean for Student Affairs

Jennifer K. Lodge, PhD
Associate Dean for Research

Rebecca P. McAlister, MD
Associate Dean for Graduate Medical Education

Will R. Ross, MD, MPH
Associate Dean for Diversity

Paul A. Schoening
Associate Dean and Director of the Bernard Becker Medical Library

David W. Windus, MD
Associate Dean for Medical Student Education

Michael P. Caputo
Assistant Dean and Chief Information Officer

Kathryn M. Diemer, MD
Assistant Dean for Career Counseling

Stephen S. Lefrak, MD
Assistant Dean and Director for the Program for the Humanities in Medicine

Robert J. McCormack
Assistant Dean and Director of Financial Aid

Deborah A. Monolo
Assistant Dean for Academic Affairs and Registrar

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

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

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

Carol L. Kwasny
Assistant Registrar

Board of Directors, Washington University Medical Center

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President

Michael A. DeHaven
Secretary and Treasurer

George E. Andersson

Robert W. Cannon

Edward Carter

Richard J. Stanton

Henry S. Webber

National Council, Washington University School of Medicine

Floyd E. Bloom, MD
Chair

Robert G. Clark

Peter B. Corr, PhD

George W. Couch III

Andrew B. Craig III

Joann L. Data, MD

Joseph M. Davie, MD, PhD

Robert C. Drews, MD

John P. Dubinsky

David C. Farrell

I. Jerome Flance, MD

Ira C. Gall, MD

Daniel P. Getman, PhD

Robert J. Glaser, MD

Frederick A. Hermann Jr.

Jay A. Kaiser, MD

Charles F. Knight

Donald E. Lasater

Lee M. Liberman, PhD

Steven H. Lipstein
Carol B. Loeb
Richard J. Mahoney
James S. McDonnell III
Walter L. Metcalfe Jr.
Marilyn Moffat, PhD
William Neaves, PhD
Philip Needleman, PhD
Andrew E. Newman
Roger M. Perlmutter, MD, PhD
Gordon W. Philpott, MD
Mary Dell Pritzlaff
Allan H. Rappaport, MD, JD
Barbara J. Reynolds, MD
Harvey Saligman
William T. Shearer, MD, PhD
Kelvin R. Westbrook
William P. Wiesmann, MD
Raymond H. Wittcoff
Roma Broida Wittcoff
Joyce F. Wood

Officers and Committees of the Faculty

Officers and Committees of the Faculty

Executive Faculty

Voting Members

Executive Faculty

Voting Members

Larry J. Shapiro

Executive Vice Chancellor for Medical Affairs and Dean; Chairman, Executive Faculty

Stephen M. Beverley

Richard A. Chole

Ralph G. Dacey Jr.

Timothy J. Eberlein

Thomas E. Ellenberger

Alex S. Evers

Richard H. Gelberman

Dennis E. Hallahan

David M. Holtzman

R. Gilbert Jost

Michael A. Kass

George A. Macones

Jeffrey D. Milbrandt

Lilianna Solnica-Krezel

Kenneth S. Polonsky

Alan L. Schwartz

Philip D. Stahl

David C. Van Essen

Herbert W. Virgin

R. Jerome Williams (Voluntary Faculty Rep.)

Karen O'Malley (Preclinical Full-Time Rep.)

Charles F. Zorumski

Attending

Mark S. Wrighton, PhD (ex officio)
Chancellor

Edward S. Macias, PhD (ex officio)
Provost

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)

Chair

Karen O'Malley (2011)

Vice Chair

Sherrie Hautt (2011)

Vice-Chair Elect

Jim Skeath (2011)

Clinical Representative to the Executive Committee of the Faculty Council

Shahsikant Kulkarni (2011)

Kevin Yarasheski (2011)

Sharlene Teefey (2012)

Dwight Towler (2012)

Kim Carmichael (2013)

Helen Liapis (2013)

Preclinical Representative to the Executive Committee of the Faculty Council

Paul Taghert (2011)

Raphael Kopan (2012)

Robert Mercer (2013)

Research Track Representative to the Executive Committee of the Faculty Council

Bettina Mittendorfer (2012)

Amy McQueen (2013)

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

Christopher Sampson (2012)

Divisional Representative to Faculty Senate Council

John Cooper (2011)

Elected Member of Practice Plan Board of Directors

Michael Chicoine (2010)

Bob McKinstry (2008)

Animal Studies Committee

Dana Abendschein

Chair

Steven L. Leary

Committee on the Academic and Professional Evaluation of Students

William E. Clutter, MD

Chair

Laura J. Bierut, MD

Erika C. Crouch, PhD, 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

Andrea L.P. Stephens, MD

Robert S. Wilkinson, MD

W. Edwin Dodson, MD

Ex officio

Leslie E. Kahl, MD

Ex officio

Deborah A. Monolo

Ex officio

Will R. Ross, MD

Ex officio

Alison J. Whelan, MD

Ex officio

David Windus, MD
Ex officio

Karen Winters, MD
Ex officio

Committee on Admissions (2010-11)

W. Edwin Dodson
Chair

Natalia Akopyants

Raykee Bhayani

Richard W. Brand

Angela L. Brown

Jinny Chang

Lewis Chase

Koong-Nah Chung

Simone Cummings

John S. Daniels

Maria C. Dans

Carlos Daughaday

Matthew Dobbs

Thomas B. Ferguson, Sr.

James Fleshman

Andrew Galakatos

Alan Glass

Joel Goebel

Ramaswamy Govindan

Christina Gurnett

Elizabeth Avis Harrison

Anjum Hassan

James Heins

Gary Hirshberg

Richard W. Hudgens
Eva Hurst
Sandra Klein
Eric Knoche
Friederike Kreisel
Amy L. Lawson
Kirstin Lee
Marvin Levin
Collins Lewis
Susan E. Mackinnon
Tessa E. Madden
Robert Mahoney
Daniel Mamah
Julie Margenthaler
James Marks
Marcia McCabe
Robert McCormack
Deborah A. Monolo
Rosalind J. Neuman
Brian Nussenbaum
Bridget O'Neal
F. Thomas Ott
William D. Owens
Yumi Padron-Turmelle
Parag Parikh
Jeffrey Peipert
Jane Phillips-Conroy
Steve Plax
Greg Polites

Juanita Polito-Colvin

Lee Ratner

Valerie Ratts

Marvin Rennard

Cynthia Rogers

Will Ross

Mohammed Saghir

Gustav Schonfeld

Julie K. Schwarz

Barbara B. Sterkel

Lisa Stevenson

Amber Traugott

Linda Tsai

Gladys Tse

Nancy Tye-Murray

Colleen Wallace

Alvin Wenneker

Consuelo Wilkins

Karen Winters

Franz Wippold

Gerald Wool

Israel Zighelboim

Committee on Fellowships and Awards

Kelle H. Moley
Chair

Susan K. Dutcher

Robert O. Heuckeroth

Jean Schaffer

Robert W. Thompson

Disclosure Review Committee

William F. Stenson, MD

Chair

Leonard Bacharier, MD

Laura Bierut, MD

Irving Boime, PhD

(Ryan) Scott Brame, PhD

Bradley Castanho, PhD

Ex officio

Leesa Galatz, MD

William Gillanders, MD

Sherrie Hautt, MD

R. Edward Hogan, MD

Henry Huang, PhD

Steve Johnson, PhD

Jack Ladenson, PhD

Philip A. Ludbrook, MD

John E. Majors, PhD

Denise McCartney

Ex officio

Stephen M. Moerlein, PhD

Mike Nonet, PhD

Brian Nussenbaum, MD

Nancy Pliske

Ex officio

Keith Rich, MD

Luis Sanchez, MD

Anshuman Sharma, MD

Alan Shiels, PhD

Frederick Sweet, PhD

Heather True, PhD

Human Research Protection Office (HRPO)

Philip A. Ludbrook

Executive Chair and Associate Dean

Current IRB Committee Members

Jennifer E. Allsworth

Aviva A. Aloush

Christy Auston

Leonard Bacharier

Maria Q. Baggstrom

Karen Balakas

Linda D. Bannister

Randall J. Bateman

Bryan Bear

Courtney E. Beers

Jenny Berla

Paula Bliss

Gordon R. Bloomberg

Diane G. Bohner

Christina Bourne

David L. Brody

Angela L. Brown

Kathleen K. Bucholz

Elizabeth A. Buck

Virginia D. Buckles

Sara Butler

Charles Canter

Kim Carmichael

Patrice Carroll

Ed Casabar

Amanda F. Cashen

Carrie L. Catanzaro

Patricia A. Cavazos-Rehg

Douglas M. Char
Li-Shiun Chen
Mary (Mickey) T. Clarke
Donald E. Clayton
Robert Cole
Susan H. Cook
Carol Conway-Long
Ben Cooper
Linda B. Cottler
Matthew R. Cottler
Rebecca J. Craig-Schapiro
William T. Cramer
Robert Crecelius
Michael D. Darcy
Sherri R. Davies
Karen P. Davis
Lisa de la Fuentes
Carl J. DeSelm
Kathy Dodds
Sandra L. Dolan
Ann M. Doyle
George J. Dowling
Rebecca Susan Dresser
Jacqueline Epps-Wilbanks
Debi Feit
Gina Filley
Geraldyn Fisher
Kirk A. Foster
Sarah B. Fowler-Dixon
Bart W. Freer
Jennifer M. Gartland
Edward M. Geltman
Beverly L. Gibson
William E. Gillanders
Ramaswamy Govindan
Carol K. Gravens
Dennis Green
Jonathan M. Green

Perry W. Grigsby
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Sandra Hale
Dan W. Haupt
Patricia L. Hayden
Sharon L. Heuerman
Charles F. Hildebolt
Anthony Hinrichs
S. Paul Hmiel
Mary P. Hoffner
Tara Lynn Hohn
Richard W. Hudgens
Angela D. Hudson
Elizabeth B. Hughes
Kathy Hunt
Catherine K. Ifune
Annette Irving
Cathy D. Jackson
Patricia A. Jamerson
Michelle V. Jenkerson
Deanna Johnson
Martha F. Jones
Abby Keeley
Dana M. Kelley
Lynn Kersting
Laura J. Kipnis
Sarah Kissel
Robert E. Kleiger
Catherine N. Knoerle
Hannah R. Krigman
Jennifer L. Krupp
David I. Kuperman
Steven M. Kymes
Bruce M. Lane
Susan E. Lanzendorf
Stephanie Lau
Joanne Lauber
Michael Leary

Anna Lijowska
Travis Linneman
Glenn Lopate
Valerie Lunsford
Cynthia X. Ma
Pamela Ann Madden
Daniel Mamah
Mark J. Manary
Julie A. Margenthaler
Denean Marie
Jose Mathews
Amit Mathur
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Dana C. McWay
Kathleen Mead
Gerald Medoff
Pamela F. Millsap
Neville Mistry
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Jared Muenzer
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Julie Nobbe
Catina C. O'Leary
Meg O'Neill
Dawn D. Pesti
Byron Peters
Erwin (Pete) H. Peters
Holly Phernetton
Leida Pickett
Caitlin Plein
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Roxane Rampersad
Rakesh Rao
Jebadurai Ratnaraj
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Peggy Reeds-Watts
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Kelly Righton
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Pam D. Robtoy
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Carol L. Rush
Nael El Said Saad
Kathleen Nina Sadlo
Anneliese Schafer
Linda Schimmoeller
Lawrence E. Schreiber
Robert G. Schwendinger
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Joseph R. Simpson
Gautam K. Singh
Regina Smith
Mitchell Sommers
Phyllis K. Stein
Gary Steps
Lisa M. Steurer
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Chia-Jui Su
Patty Suntrup
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Amber L. Traugott
Akshaya J. Vachharajani
Khleber M. Van Zandt V

Linda M. Van Zandt
Lloyd J. Vasquez Jr.
Kathryn L. Vehe
Jeanne Velders
Alphonso H. Voorhees
Thomas William Walsh
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Jennifer Weinman
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Erin Wingbermuehle
Chengjie Xiong
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Imran Zoberi
Darryl A. Zuckerman

Human Research Quality Assurance/Quality Improvement Committee

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John A. Curci

Brett Drake

Mae Gordon

Aaron Hamvas

Philip A. Ludbrook

John W. Newcomer

Anthony O. Odibo

Nancy Pliske
Ex officio

Institutional Biological and Chemical Safety Committee (IBC)

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Henry Huang, PhD
Co-Chair

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Mark Sands, PhD

Barbara Joy Snider, MD, PhD

Bruce Backus, MS, PE
Ex officio

Kenneth Boschert, DVM
Ex officio

Susan Cook, PhD, CBSP
Ex officio

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Paul Mercurio
Public member

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Linda Peterson

Donna Jeffe

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Kelle Moley
Andrew Galakatos

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Program Co-Director

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Kyunghee Choi

Jianmin Cui

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Cindy M. Kiel
Alternate

Don A. Lichti
Alternate

John M. Michnowicz
Alternate

Sasa Mutic
Alternate

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Alternate

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Alternate

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Ex-Officio

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Yuan-Chuan Tai, PhD

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John D. Pfeifer

Timothy Pluard

Kenneth B. Schechtman

Keith Stockerl-Goldstein

Benjamin Tan

Tom Walsh

Andrea Wang Gillam

Chrisann Winslow

Sara Butler
Ad hoc

Farrokh Dehdashti
Ad hoc

Lorri DeWitt
Ad hoc

Lindsay Hladnik
Ad hoc

David B. Mansur
Ad hoc

Leah Menshouse
Ad hoc

Byron Peters
Ad hoc

Matthew Powell
Ad hoc

Lisa Savage
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 Committee

Nancy L. Bartlett
Chair

Maria Q. Bagstrom

Dana Kelley

J. Philip Miller

Matthew G. Mutch

Michael J. Naughton

Wade L. Thorstad

Register of Students

Register of Students

Alphabetical List of Students

Note: This may not be a complete listing. Some students may have elected to withhold directory information.

Musa Raed Abdelaziz Sunrise, FL, BS, Washington University '09, Program: MSTP, Second Year Medical Student

Temidayo Modupe Adebisi Dolton, IL, BS, University Of Illinois - Chicago '09, Program: MSTP, Second Year Medical Student

Christopher James Adkins Melbourne, FL, BA, Vanderbilt University '09, Program: Doctor of Medicine, Second Year Medical Student

Rashmi Agarwal Mclean, VA, BA, Dartmouth College '09, Program: Doctor of Medicine, Second Year Medical Student

Kwesi Frempong Agyem London, Ontario, BS, Univ of Western Ontario '07, Program: Doctor of Medicine, Elective Year

Syed Hassan Akbari Eureka, MO, BA, Washington University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Usman Akhtar Woodstock, CT, Program: Doctor of Medicine, First Year Medical Student

Hanny Toban Al-Samkari Oakwood, OH, BS, University of Dayton '07, Program: Doctor of Medicine, Elective Year

Alexander William Aleem Atlanta, GA, BS, Johns Hopkins University '06, Program: Doctor of Medicine, 2010 Graduate, Orthopaedic Surgery, Barnes-Jewish Hospital, St. Louis, MO

Danielle Nicole Alfano Sussex, WI, BA, University of Minnesota '07, Program: Doctor of Medicine, Elective Year

Benedict Joseph Alter Dayton, OH, BS, Washington University '03, Program: MSTP, Clinical Clerkship Year

Adam Benjamin Althaus Sioux City, IA, BS, University of Iowa '08, Program: Doctor of Medicine, Clinical Clerkship Year

Rachel Elizabeth Anthor Hoover, AL, BA, Washington University '08, Program: Doctor of Medicine, Second Year Medical Student

Jacqueline Leigh Anderson Carthage, MO, BS, Duke University '06, Program: Doctor of Medicine, 2010 Graduate, Pediatrics, St. Louis Children's Hospital, St. Louis, MO

Lauren Anderson Bolingbrook, IL, BS, Northwestern University '04, Program: Doctor of Medicine, Elective Year

Ryan Everett Anderson Arlington, VA, BA, University Of Virginia '08, Program: Doctor of Medicine, Clinical Clerkship Year

Samuel Michal Anderson Phoenix, AZ, BS, Arizona State University '05, Program: Doctor of Medicine, Second Year Medical Student

Afua Helen Annor Lahaina, HI, Program: Doctor of Medicine, First Year Medical Student

Amrita Aranake Monmouth Junction, NJ, BA, Rutgers University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Bhooma Aravamathan Kalamazoo, MI, BS, Michigan State University '05, Program: MSTP, Clinical Clerkship Year

Guillermo Javier Ares Carolina, PR, BS, Washington University '09, Program: Doctor of Medicine, Second Year Medical Student

Cassandra Mabel Armstead-Williams Moorestown, NJ, BS, Stanford University '05, NM, Rutgers University, Program: Doctor of Medicine, 2010 Graduate, Pediatrics-Preliminary, SUNY Health Science Center Brooklyn, Brooklyn, NY, Anesthesiology, New York University School of Medicine, New York, NY

Mackenzie Capshaw Asel Columbia, MO, BS, Yale University '08, Program: Doctor of Medicine, Second Year Medical Student

Elisabeth Thames Boehme Askin Waco, TX, Program: Doctor of Medicine, First Year Medical Student

Jordan Jerrell Atkins Houston, TX, Program: Doctor of Medicine, First Year Medical Student

Sonoa Ho Au Hong Kong,, BS, Cornell University '07, Program: Doctor of Medicine, Elective Year

Tanya Denise Auzenne Opelousas, LA, BS, Louisiana State University-Baton Rouge '06, Program: Doctor of Medicine, Elective

Year

Marina Avetisyan Staten Island, NY, BA, Johns Hopkins University '09, Program: MSTP, Second Year Medical Student

Oluwafunmi Onaopemipo Awonuga Evans, GA, BS, Tufts University '06, Program: Doctor of Medicine, 2010 Graduate, General Surgery, University of Alabama Medical Center, Birmingham, AL

Roua Azmeh Beavercreek, OH, BS, University of Dayton '07, Program: Doctor of Medicine, Elective Year

Alexandra Hathaway Baker East Falmouth, MA, Program: Doctor of Medicine, First Year Medical Student

Marrissa Leigh Baker Valley Center, CA, BS, University of California-LA '06, Program: Doctor of Medicine, Elective Year

Brundha Balaraman New York, NY, BA, Cornell University '06, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine-Preliminary, Barnes-Jewish Hospital, St. Louis, MO, Dermatology, Barnes-Jewish Hospital, St. Louis, MO

Somalee Banerjee Houston, TX, BA, Washington University '08, Program: Doctor of Medicine, Second Year Medical Student

Dadrie Freda Baptiste St. George's, Grenada, BS, Florida Institute of Technology '05, AS, TA Marryshow CC '00, Program: Doctor of Medicine, 2010 Graduate, General Surgery, Indiana University School of Medicine, Indianapolis, IN

Christopher David Barrett Forest Lake, MN, BS, University Of Minnesota-D '09, Program: Doctor of Medicine, Clinical Clerkship Year

Seth-Emil T Bartel Hoffman Estates, IL, BS, Iowa State University '03, Program: Doctor of Medicine, 2010 Graduate, Transitional Year, St. Johns Mercy Medical Center, St. Louis, MO, Diagnostic Radiology, Barnes-Jewish Hospital, St. Louis, MO

Jacob Martin Basak Hoffman Estates, IL, BS, University of Chicago '05, Program: MSTP, Fourth Year Research

Sarah Alison Basak Louisville, KY, BA, Washington University '04, Program: Master of Arts/ Doctor of Medicine, 2010 Graduate, Pediatrics, St. Louis Children's Hospital, St. Louis, MO

Laura Alycia Battle Los Altos, CA, BS, University Of California, Los Angeles '07, Program: Doctor of Medicine, Second Year Medical Student

Natalie Christine Battle Los Altos Hills, CA, BS, University of California Berkeley '04, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine, Barnes-Jewish Hospital, St. Louis, MO

Gregory Bean Hollywood, FL, BS, Duke University '03, Program: MSTP, Third Year Research

Ignacio Becerra-Licha Tucker, GA, BS, Georgia Institute Of Technology '09, Program: Doctor of Medicine, Second Year Medical Student

Emily Michelle Beck Chesterfield, MO, BS, University Of Missouri - Columbia '09, Program: Doctor of Medicine, Second Year Medical Student

Bahaa Ahmad Bedair Dallas, TX, BS, Southern Methodist University '09, Program: Doctor of Medicine, Second Year Medical Student

Roger V Belizaire Midland, TX, MS, University of Texas Health Science Center '03, BA, Princeton University '00, Program: MSTP, Clinical Clerkship Year

Katharine Anne Belmont Winnetka, IL, BA, Williams College '06, Program: Doctor of Medicine, Elective Year

Julio Benitez Miramar, FL, BS, University of Miami '06, Program: Doctor of Medicine, Elective Year

Aaron Moens Bertoni Spokane, WA, BA, Carroll College '08, Program: Doctor of Medicine, Clinical Clerkship Year

Amit Indra Bery Roswell, GA, Program: Doctor of Medicine, First Year Medical Student

Francesca Betti Pacific Palisades, CA, Program: Doctor of Medicine, First Year Medical Student

Alexander Barton Beyer Seattle, WA, Program: Doctor of Medicine, First Year Medical Student

Pavan Bhat Brentwood, TN, BA, Washington University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Kristin Page Bibee Lynchburg, VA, BA, Washington University '06, Program: MSTP, Third Year Research

Agata Agnieszka Bielska Coopersburg, PA, BS, Univ of Delaware '06, Program: MSTP, Third Year Research

Lauren Kali Biesbroeck Mesa, AZ, BA, University of California - Berkeley '05, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine-Preliminary, Barnes-Jewish Hospital, St. Louis, MO, Dermatology, University of Washington Affiliated Hospitals, Seattle, WA

Laura Nicole Billadello Saint Louis, MO, BA, Stanford University '06, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine-Preliminary, Caritas Carney Hospital, Dorchester, MA, Diagnostic Radiology, Northwestern McGaw/NMH/VA, Chicago, IL

Michael Edward Billington Harrisonburg, VA, BA, Georgetown University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Ryan Eric Blalock Calhoun, GA, BS, University of Georgia '08, Program: Doctor of Medicine, Clinical Clerkship Year

Gregory William Bligard Fort Dodge, IA, Program: MSTP, First Year Medical Student

Seth Michael Bloom Corvallis, MT, BA, Washington University '03, Program: MSTP, Fifth Year Research

Nicholas Michael Bontumasi Clarkston, MI, BS, University of Michigan-Ann Arbor '08, Program: Doctor of Medicine, Second Year Medical Student

James Andrew Botros Solon, OH, BA, Boston University '06, Program: Doctor of Medicine, 2010 Graduate, Neurological Surgery, Univ. of Texas Southwestern Medical Schol, Dallas, TX

Eric Neil-Jensen Boyum Hibbing, MN, BA, Gustavus Adolphus College '06, Program: Doctor of Medicine, 2010 Graduate, Psychiatry, University of Iowa Hospitals and Clinics, Iowa City, IA

Hilary Ann Brazeal Omaha, NE, BA, Washington University '07, Program: Doctor of Medicine, Elective Year

Daniel Saul Brenner Ann Arbor, MI, BS, University of Michigan -Ann Arbor '06, Program: MSTP, First Year Research

Jonathan D Breshears Fulton, MO, BS, Washington University '07, Program: Master of Arts/ Doctor of Medicine, Clinical Clerkship Year

Matthew Ryan Brier Allen, TX, Program: MSTP, First Year Medical Student

Brittanie Broersma Tucson, AZ, Program: Doctor of Medicine, First Year Medical Student

Justin Ryan Brooks Chesapeake, VA, BA, University of Maryland, Baltimore '04, Program: MSTP, Fifth Year Research

Kristin Rebecca Brown Denver, CO, BA, Northwestern University '04, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine, Oregon Health & Science University, Portland, OR

Monique Wietske Bruinsma Morenci, MI, BS, Duke University '04, Program: MSTP, Third Year Research

Gregory Randal Bryant Scotch Plains, NJ, BS, University Of Maryland -College Park '09, Program: Doctor of Medicine, Second Year Medical Student

Joshua Hernandez Buck Houston, TX, BS, Yale University '04, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine-Preliminary, Barnes-Jewish Hospital, St. Louis, MO, Neurology, Barnes-Jewish Hospital, St. Louis, MO

Robert Thomas Buckley Edgewood, NM, BS, University of New Mexico '07, Program: Doctor of Medicine, Clinical Clerkship Year

Rebecca Anna Busch Winnetka, IL, BA, Johns Hopkins University '07, Program: Doctor of Medicine, Elective Year

Catherine Rose Butler St. Paul, MN, BA, Tufts University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Jonathan Byrd Baton Rouge, LA, BS, Tulane University of Louisiana '07, Program: Doctor of Medicine, Elective Year

Sheng Feng Cai Cincinnati, OH, BS, Duke University '02, Program: MSTP, Elective Year

Colin Douglas Canham Bismarck, ND, BS, University of North Dakota '07, Program: Doctor of Medicine, Elective Year

Robert Bruce Canham Bismarck, ND, BA, University of North Dakota '06, Program: Doctor of Medicine, Elective Year

Susan Priscilla Canny Hamden, CT, BS, Stanford University '03, Program: MSTP, Third Year Research

Tracy Marsh Carlson Albuquerque, NM, BA, University of Tulsa '03, Program: MSTP, Sixth Year Research

Bradley John Carra Oakton, VA, BA, College of William and Mary '06, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine-Preliminary, San Antonio Military Medical Center, Lackland AFB, TX, Diagnostic Radiology, San Antonio Military Medical Center, Lackland AFB, TX

Varun Chalivendra Champaign, IL, Program: Doctor of Medicine, First Year Medical Student

Ellen Yulin Chang San Jose, CA, BS, University Of California - Los Angeles '08, MS, Univ of California - Los Angeles '09, Program: Doctor of Medicine, Second Year Medical Student

Julietta Hona Chang Seattle, WA, BA, Univ of Pennsylvania '08, Program: Doctor of Medicine, Clinical Clerkship Year

Ronald Chang Houston, TX, BA, Washington University '09, Program: Doctor of Medicine, Second Year Medical Student

Jake Michael Chanin Los Angeles, CA, BA, University of Pennsylvania '06, MS, University of Pennsylvania '06, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine, Barnes-Jewish Hospital, St. Louis, MO

Stephanie Kae Charshafian Palm Bay, FL, Program: Doctor of Medicine, First Year Medical Student

Anita Nandkumar Chary Savoy, IL, BS, University Of Illinois- Champaign '08, Program: MSTP, Second Year Medical Student

Nilika Chaudhary Cincinnati, OH, Program: Doctor of Medicine, First Year Medical Student

Rittik Chaudhuri Toledo, OH, Program: MSTP, First Year Medical Student

Athena Chen Athens, OH, Program: Doctor of Medicine, First Year Medical Student

Carol Weichi Chen Florence, SC, BS, Duke University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Christopher Tsung-jer Chen Pasadena, CA, Program: Doctor of Medicine, First Year Medical Student

David Yuan-Sou Chen Troy, MI, BS, University of Michigan, Ann Arbor '03, Program: MSTP, Clinical Clerkship Year

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Rachel H Steinhorn Chicago, IL, Program: Doctor of Medicine, First Year Medical Student

Allison Steinmetz Woodbridge, CT, Program: Doctor of Medicine, First Year Medical Student

Jeffrey Gei-Hun Stepan Fremont, CA, BS, St. John's University '08, Program: Doctor of Medicine, Second Year Medical Student

Abby Ling-Lee Stephens Evansville, IN, BS, Washington University '09, Program: Doctor of Medicine, Second Year Medical Student

Amanda Michelle Stewart Springfield, OH, BS, University of Toledo '09, Program: Doctor of Medicine, Second Year Medical Student

Christopher Luke Stockburger Fort Collins, CO, BA, University of Colorado '09, Program: Doctor of Medicine, Second Year Medical Student

Michael Vincent Stock Saint Louis, MO, BS, Vanderbilt University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Geoffrey Evan Stoker Holden, MA, BS, Boston College '09, Program: Doctor of Medicine (5 Year), Research (Here)

David Wesley Strong Southfield, MI, BA, The Johns Hopkins University '03, Program: MSTP, Sixth Year Research

Marshall Channing Strother Potomac, MD, Program: Doctor of Medicine, First Year Medical Student

Jourdan Elizabeth Stuart East Grand Rapids, MI, BA, University of North Carolina - Chapel Hill '06, Program: Master of Arts/ Doctor of Medicine, Elective Year

Sathish Subramanian Lusaka, Zambia, BA, University of Pennsylvania '08, MS, University of Pennsylvania '08, MH, University of Cambridge '09, Program: MSTP, Second Year Medical Student

Feng Su Springfield, MO, BS, Duke University '07, Program: Doctor of Medicine, Elective Year

Sanaa Hasan Suharwardy Danville, CA, BA, University of California - Los Angeles '09, Program: Doctor of Medicine, Second Year Medical Student

Varun Sundaram Muncie, IN, BA, Washington University '09, Program: Doctor of Medicine, Second Year Medical Student

Hank Haw Sun Denver, CO, BA, Washington University '08, Program: Master of Arts/ Doctor of Medicine, Master of Arts

Kai Sun Rochester, NY, BS, Washington University '06, Program: Doctor of Medicine (5 Year), Elective Year

Lulu Sun Cupertino, CA, BS, McGill University '07, Program: MSTP, Second Year Research

Mengyang Sun Singapore, China, BA, Washington University '07, Program: Doctor of Medicine, Clinical Clerkship Year

Michel Muzi Sun Randolph, NJ, BA, Rutgers University '08, Program: MSTP, First Year Research

Teerawit Supakorndej Athens, GA, BS, University of Georgia '07, Program: MSTP, Second Year Research

Yevgeniy V Sychev Ryazan, Russia, BS, University of California-Davis '05, Program: Doctor of Medicine (5 Year), Elective Year

Jane Wadsworth Symington Washington, DC, BS, Yale University '07, Program: MSTP, First Year Research

Nicholas Paul Szrama Darien, IL, BS, University of Illinois - Urbana/Champaign '06, Program: MSTP, First Year Research

Jie Tang Spanish Fort, AL, BS, University of Pennsylvania '09, Program: Doctor of Medicine, Second Year Medical Student

Michael Edward Tang Columbus, OH, Program: Doctor of Medicine, First Year Medical Student

Wen Hui Tan Henderson, NV, BS, Massachusetts Institute of Technology '09, Program: Doctor of Medicine, Second Year Medical Student

Golshid Tazhibi Stockholm, Sweden, BS, University of California-Irvine '06, Program: Doctor of Medicine, 2010 Graduate, Anesthesiology, University of Michigan, Ann Arbor, MI

Ameet Indravadan Thaker Cleveland, OH, BA, Washington University '06, Program: Master of Arts/ Doctor of Medicine, Clinical Clerkship Year

Stephanie Rose Thomas Rochester, MN, Program: Doctor of Medicine, First Year Medical Student

Jessica Thom Richmond Hill, Ontario, California, BS, Queen's Univ at Kingston '08, Program: Doctor of Medicine, Clinical Clerkship Year

Robert John Thorsness Hinsdale, IL, BA, Northwestern University -Evanston '05, Program: Doctor of Medicine, 2010 Graduate, Orthopaedic Surgery, University of Rochester/Strong Memorial, Rochester, NY

Kathleen Margaret Tibbetts Wilmington, DE, BS, Georgetown University '06, Program: Doctor of Medicine, 2010 Graduate, Otolaryngology, Albert Einstein/Montefiore Medical Center, New York, NY

Ilyia Tolokh Guelph, Ontario, BS, University of Guelph '04, MS, University of Guelph '05, Program: MSTP, Fourth Year Research

Ilya V. Treskov Saint Louis, MO, BS, Washington University '01, Program: Doctor of Medicine, 2010 Graduate, Anesthesiology, Barnes-Jewish Hospital, St. Louis, MO

Michael Paul Triebwasser Loveland, OH, BS, University of Wisconsin-Madison '05, Program: MSTP, Third Year Research

Maria Chom Trissal Phoenix, AZ, BS, University of Arizona '06, Program: MSTP, Second Year Research

Jennifer Lee Troyer Evansville, IN, BS, Indiana University -Bloomington '09, Program: Doctor of Medicine, Second Year Medical Student

Shaw-Wei David Tsen Chandler, AZ, BS, Johns Hopkins University '08, Program: MSTP, Second Year Medical Student

Diwakar Turaga Chelmsford, MA, BS, University of Massachusetts '04, Program: MSTP, Clinical Clerkship Year

Jason Eric Turner Indianapolis, IN, BS, Indiana University, Bloomington '08, Program: Doctor of Medicine, Clinical Clerkship Year

Nneka Nnaoke Ufere Marietta, GA, BA, Harvard University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Sanjeev Vaishnavi Snellville, GA, BS, Georgia Institute of Technology '02, Program: MSTP, 2010 Graduate, Internal Medicine-Preliminary, Hospital of the University of Pennsylvania, Philadelphia, PA, Neurology, Hospital of the University of Pennsylvania, Philadelphia, PA

Mark C Valentine Denver, CO, Program: MSTP, First Year Medical Student

Emiliano Valles Albuquerque, NM, BS, University of New Mexico '05, Program: Doctor of Medicine, 2010 Graduate, Psychiatry, University of New Mexico School of MedicineAlbuquerque, NM

Manouela Vesselinova Valtcheva Alpharetta, GA, Program: MSTP, First Year Medical Student

Dorothy Van Oppen Seattle, WA, BA, Carleton College '09, Program: Doctor of Medicine, Second Year Medical Student

Sumeeta Varma Pittsburgh, PA, BS, Stanford University '06, Program: Doctor of Medicine, Elective Year

John Michael Vaszari Rancho Palos Ve, CA, BS, University of California - LA '05, Program: Doctor of Medicine (5 Year), 2010 Graduate, Psychiatry, Barnes-Jewish Hospital, St. Louis, MO

Atheendar Sivabala Venkataramani Clifton Park, NY, BS, Duke University '02, Program: Doctor of Medicine, Elective Year

Vivek Verma Pittsburgh, PA, BS, University of Pittsburgh '08, Program: Doctor of Medicine, Second Year Medical Student

Michael C Verre Niles, IL, BA, Washington University '08, Program: Doctor of Medicine, Second Year Medical Student

Matthew David Vesely Tampa, FL, BA, Creighton University '03, Program: MSTP, Sixth Year Research

Natalie Marie Villafranco San Antonio, TX, BS, Ohio State University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Alecia C Vogel Freeburg, IL, Program: MSTP, Fifth Year Research

Matthew R Vogt St. Peters, MO, BA, Washington University '05, Program: MSTP, Fourth Year Research

Jamie Sue Votava Fargo, ND, BS, Yale University '06, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine, University of Michigan, Ann Arbor, MI

Monica R Walker Orland Park, IL, BA, Northwestern University '04, Program: MSTP, Clinical Clerkship Year

Betsy Peixi Wan Irvine, CA, BA, Washington University '09, Program: Doctor of Medicine, Second Year Medical Student

Gary Xiaoshi Wang Chantilly, VA, BA, University of Chicago '05, Program: MSTP, Fourth Year Research

Vicky Patricia Wang Westminster, CA, BS, University of California-LA '06, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine, Oregon Health & Science University, Portland, OR

Xinyu Wang Winchester, MA, BS, Harvard University '09, Program: MSTP, Second Year Medical Student

Yi Wang Woodinville, WA, BS, Massachusetts Institute of Technology '09, Program: Doctor of Medicine, Second Year Medical Student

YunZu Michele Wang Arcadia, CA, BS, University of California - Los Angeles '09, Program: Doctor of Medicine, Second Year Medical Student

Stephen James Warner Livonia, MI, BS, University of Michigan - Ann Arbor '00, Program: MSTP, Elective Year

Julia Therese Warren Summit, NJ, BA, The University of Chicago '07, Program: MSTP, Second Year Research

Iga Natalia Wegorzewska Brooklyn, NY, BS, Georgetown University '04, Program: MSTP, Fourth Year Research

Elliott Mark Weiss Skokie, IL, BA, Washington University '05, Program: Doctor of Medicine, 2010 Graduate, Pediatrics, New York University School of Medicine, New York, NY

Brian Richard White Cape Elizabeth, ME, BA, Harvard University '04, Program: MSTP, Clinical Clerkship Year

Elizabeth Louisa Whitlock Chapel Hill, NC, BA, Scripps College '05, Program: MSCI/MD, Elective Year

Krista Renee Whitney Olathe, KS, BA, Washington University '09, Program: Doctor of Medicine, Second Year Medical Student

Jared Daniel Wilkinson Indianapolis, IN, BS, Purdue University '09, Program: Doctor of Medicine, Second Year Medical Student

Jennifer Brooke Williams Braggs, OK, BA, Rice University '06, Program: Doctor of Medicine, 2010 Graduate, Pediatrics, Univ. of Texas Southwestern Medical Schol, Dallas, TX

Jordan Williams Dell Rapids, SD, BS, South Dakota State University '05, Program: MSTP, Fourth Year Research

Michael Brandon Williams Mission, TX, BS, Brown University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Robert David Wojahn Denver, CO, BS, Northwestern University '09, Program: Doctor of Medicine, Second Year Medical Student

Morgan Bernard Wolfe, Jr Houma, LA, BS, Georgia Institute of Technology '09, Program: Doctor of Medicine, Second Year Medical Student

Ambrose Hon-Wai Wong Vancouver, British Columbia, Canada, BS, University of British Columbia '04, Program: Doctor of Medicine (5 Year), 2010 Graduate, Emergency Medicine, New York University School of Medicine, New York, NY

Kristine Shannon Wong Hockessin, DE, Program: Doctor of Medicine, First Year Medical Student

Elizabeth Copeland Wright Albuquerque, NM, BA, University of New Mexico '06, Program: MSTP, First Year Research

Jonathan Owen Wright Sandy, UT, Program: Doctor of Medicine, First Year Medical Student

Melissa Anderson Wright St. Louis, MO, Program: Doctor of Medicine, First Year Medical Student

Melinda Youeen Wu Riverside, CA, BS, University of Southern California '05, Program: Doctor of Medicine, Elective Year

Tiffany Wu Parsippany, NJ, BA, New York University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Xiaodi Wu Toronto, Canada, BA, Harvard University '09, Program: MSTP, Second Year Medical Student

Yuewei Wu Shrewsbury, MA, BS, University of Chicago '09, Program: Doctor of Medicine, Second Year Medical Student

Lauren Margaret Yang Silver Spring, MD, Program: Doctor of Medicine, First Year Medical Student

Zao Yang Atlanta, GA, Program: Doctor of Medicine, First Year Medical Student

Peter Hou Yu Yen San Marino, CA, Program: Doctor of Medicine, First Year Medical Student

David Qianli Ying Miami, FL, BS, Massachusetts Institute of Technology '09, Program: Doctor of Medicine, Second Year Medical Student

Michael Cheuk Ming Yip Buffalo Grove, IL, BS, The University of Illinois at Chicago '07, Program: Doctor of Medicine, Elective Year

Shaun Robert Yockelson Eugene, OR, BS, Tulane University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Christine C Yokoyama St. Louis, MO, BA, Harvard University '04, Program: MSTP, Second Year Medical Student

Andrew Lee Young Bethesda, MD, Program: MSTP, First Year Medical Student

Erica Paige Young Sharon, MA, BS, Massachusetts Institute of Technology '09, Program: Doctor of Medicine, Second Year Medical Student

Margaret Ashley Young Laytonsville, MD, BS, Carnegie Mellon University '05, Program: MSTP, Fourth Year Research

Kevin Zheng Yuan Chesterfield, MO, Program: Doctor of Medicine, First Year Medical Student

Fang Yu Mcallen, TX, BS, Duke University '07, Program: Doctor of Medicine, Elective Year

Jennifer Yu Columbus, IN, BS, Washington University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Yousef Zarbalian Baton Rouge, LA, BS, Louisiana State University - Baton Rouge '06, Program: Doctor of Medicine, 2010 Graduate, Internal Medicine, University of Maryland Medical Center, Baltimore, MD

Mark Alan Zaydman Rochester, NY, BS, Case Western Reserve University '07, Program: MSTP, Second Year Research

Joseph Zenga Medford, MA, BA, Cornell University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Wenjing Zeng Miami, FL, BS, Yale University '08, Program: Doctor of Medicine, Clinical Clerkship Year

Cindy Erxin Zhang St. Louis, MO, BS, Washington University '06, Program: Doctor of Medicine, 2010 Graduate, Obstetrics and Gynecology, Duke University Medical Center, Durham, NC

May Meishu Zhang Thousand Oaks, CA, Program: Doctor of Medicine, First Year Medical Student

Yingxin Zhang Worcester, MA, BS, Massachusetts Institute of Technology '07, MH, Massachusetts Institute of Technology '08,

Program: Doctor of Medicine, Clinical Clerkship Year

Jeff Guanbo Zhao Burnaby, British Columbia, Canada, BA, Dartmouth College '08, Program: Doctor of Medicine, Clinical Clerkship Year

Yi Zhao Boca Raton, FL, Program: MSTP, First Year Medical Student

Elizabeth Yaxi Zhou Norman, OK, BS, Washington University '07, Program: Doctor of Medicine, Elective Year

Kristen Elizabeth Ziara Okemos, MI, BS, University of North Carolina-Chapel Hill '07, Program: Master of Arts/ Doctor of Medicine, Master of Arts

Lawrence Richard Zieske Union City, CA, Program: Doctor of Medicine, First Year Medical Student

Matthew Scott Zinter Sacramento, CA, BA, Washington University '07, Program: Doctor of Medicine, Elective Year

Summary of Students in the School of Medicine

2009-10

Doctor of Medicine and Doctor of Philosophy Degrees

Graduating Class: 12

Third-Year Class: 19

Fifth-Year Research: 15

Fourth-Year Research: 18

Third-Year Research: 31

Second-Year Research: 18

First-Year Research: 23

Second-Year Class: 25

First-Year Class: 22

Doctor of Medicine and Master of Arts Degrees

Graduating Class: 9

Trainees: 7

Doctor of Medicine and Master of Science in Clinical Investigation Degree

Graduating Class: 3

Doctor of Medicine Degree

Graduating Class: 91

Five-Year Research Program: 5

Third-Year Class: 101

Second-Year Class: 99

First-Year Class: 100

Doctor of Physical Therapy Degree

Graduating Class: 75

Second-Year Class: 78

First-Year Class: 83

Part-Time Students: 37

Doctor of Occupational Therapy Degree

Graduating Class: 17

Third-Year Class: 23

Second-Year Class: 18
First-Year Class: 20

Doctor of Audiology

Graduating Class: 14
Third-Year Class: 15
Second-Year Class: 10
First-Year Class: 12

Master of Science in Occupational Therapy Degree

Graduating Class: 42
Second-Year Class: 53
First-Year Class: 60

Master of Science in Psychiatric Epidemiology

Graduating Class: 7
First-Year Class: 1

Master of Science in Genetic Epidemiology

Graduating Class: 7
First-Year Class: 7
Certificate/SCND: 4

Master of Science in Deaf Education

Graduating Class: 7
First-Year Class: 13

Master of Science in Clinical Investigation

Graduating Class: 11
First-Year Class: 16
Certificate: 7
SCND: 12

Total: 1247

Map

Map

WASHINGTON UNIVERSITY MEDICAL CENTER



BARNES-JEWISH HOSPITAL-SOUTH

- 23 Peters Building
- 28 Barnes Service Building
- 52 Queeny Tower
- 53 Barnes Central
- 54 Barnes Lodge
- 57 Southwest Tower
- 59 Rand Johnson
- 68 Clayton Avenue Building
- 68a Employee Day Care Facility
- 71 East Pavilion
- 72 West Pavilion
- 73 Parking Garage
- 74 Parking Garage

BARNES-JEWISH HOSPITAL-NORTH

- 30 Shoenberg School of Nursing
- 31 Kingshighway Building
- 32 Steinberg Building
- 33 Shoenberg Pavilion
- 34 Yalem Research Building
- 35 Center for Advanced Medicine (CAM)
- 36 Goldfarb School of Nursing
- 39 Parking Garage
- 55 Parking Garage
- 58 Power Plant

WASHINGTON UNIVERSITY SCHOOL OF MEDICINE

- 1 North Building
- 2 Cancer Research Building
- 3 South Building
- 4 BJC Institute of Health @ WUSM
- 5 Maternity
- 6 McMillan
- 7 Biomedical Computing Laboratory
- 8 Shriners
- 9 Irene Walter Johnson Institute of Rehab
- 10 Olin Residence Hall
- 12 McDonnell Medical Sciences Building
- 13 Becker Medical Library
- 14 West Building
- 15 HAP Building
- 16 McDonnell Pediatric Research Building
- 17 Renard
- 18 East McDonnell S.R.F.
- 19 Mallinckrodt Institute of Radiology
- 20 Clinical Sciences Research Building
- 21 Wohl Clinic
- 22 Wohl Hospital
- 24 825 S. Taylor Ave.
- 26 4580 Clayton Ave.
- 27 4533 Clayton Ave.
- 40 Storz Building
- 43 Northwest Tower
- 44 Supply Room
- 45 4480 Clayton Ave.
- 46 SRF - East
- 80 Library Annex

WASHINGTON UNIVERSITY MEDICAL CENTER

- 11 Eric P. Newman Education Center
- 25 818 S. Euclid Ave.
- 94 Taylor Ave. Building (TAB)

BARNARD HOSPITAL

- 50 Barnard Hospital

ST. LOUIS CHILDREN'S HOSPITAL

- 48 Parking Garage
- 49 Children's Hospital
- 77 Parking Garage
- 78 Child Development Center

HEALTH SOUTH

- 81 Rehabilitation Institute of St. Louis

CORTEX

- 98 CORTEX 1

SURFACE PARKING LOTS

- BJH P - Barnes-Jewish Hospital
- CID P - Central Institute
- STLCOP P - St. Louis College of Optometry
- WUSM P - Washington University School of Medicine
- H - Helix



For a printable version of the School of Medicine campus map, please download this pdf: **PUBLIC AFFAIRS MAP 2010.pdf**

For additional information, see the map at: <http://visitor.wustl.edu/medicalmap.pdf>

Schools of Washington University

Schools of Washington University

All schools are located at One Brookings Drive, St. Louis, Missouri 63130 except Medicine (660 S. Euclid Ave., St. Louis, Missouri 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

Alvin J. Siteman Cancer Center Web Site

<http://www.siteman.wustl.edu/>

All Faculty

Alphabetical List of Faculty

OMAR F ABBASI, MD Instructor in Ophthalmology and Visual Science, Ophthalmology & Visual Sci, MD UNIVERSITY OF MICHIGAN 06

ELLIOT EFREM ABBEY, MD Professor of Clinical Medicine, Internal Medicine, BA CORNELL UNIVERSITY 71, MD NEW YORK UNIVERSITY 75

Camille N Abboud Siteman Cancer Center, Professor of Medicine, Division of Oncology, Section of Bone Marrow Transplantation, Washington University School of Medicine, 1973-1974: Intern, American University Hospital, Beirut, Lebanon, 1974-1976: Resident, medicine, University of Medicine and Dentistry of New Jersey and Rutgers University, Piscataway, N.J., 1976-1977: Clinical fellow, hematology, University of Rochester., 1974: MD, American University of Beirut, Beirut, Lebanon, Primary Specialty: Acute myeloid leukemia, chronic myeloid leukemia, myelodysplastic syndrome, myeloproliferative disorders, lymphoma, myeloma, chronic lymphoid leukemia, Board Certified:, 1976: American Board of Internal Medicine, Internal Medicine

1978: American Board of Internal Medicine, Hematology

CAMILLE N. ABOUD, MD Professor of Medicine, Internal Medicine, BS AMERICAN UNIVERSITY OF BEIRUT 70, MD AMERICAN UNIVERSITY OF BEIRUT 74

NABIL ABOUD, MD Instructor in Anesthesiology, Anesthesiology, BA CHRISTIAN BROTHERS COLLEGE 63, MD ST. JOSEPH UNIVERSITY, BEIRUT 70

SHADI ABDELNOUR Instructor in Clinical Medicine, Internal Medicine

DANA RAY ABENDSCHEIN, PHD Associate Professor of Cell Biology and Physiology, Cell Biology & Physiology, BS STATE UNIVERSITY OF NEW YORK 74, PHD PURDUE UNIVERSITY 78

DANA RAY ABENDSCHEIN, PHD Associate Professor of Medicine, Internal Medicine, BS STATE UNIVERSITY OF NEW YORK 74, PHD PURDUE UNIVERSITY 78

MARC BRUCE ABRAMS, DENT Instructor in Clinical Otolaryngology, Otolaryngology, BA UNIVERSITY OF MO KANSAS CITY 68, DENT UNIVERSITY OF MO KANSAS CITY 72

BARRY K ABRAMSON, MD Instructor in Clinical Medicine, Internal Medicine, BA JOHNS HOPKINS UNIVERSITY 81, MD UNIVERSITY OF MIAMI 85

YOUSEF ABU-AMER, PHD, MS Professor of Cell Biology and Physiology, Cell Biology & Physiology, BS HEBREW UNIVERSITY 85, MS HEBREW UNIVERSITY 87, PHD HEBREW UNIVERSITY 93

YOUSEF ABU-AMER, PHD, MS Professor of Orthopaedic Surgery, Orthopaedic Surgery, BS HEBREW UNIVERSITY 85, MS HEBREW UNIVERSITY 87, PHD HEBREW UNIVERSITY 93

NADA A ABUMRAD, PHD Professor of Cell Biology and Physiology, Cell Biology & Physiology, BS AMERICAN UNIVERSITY OF BEIRUT 72, PHD STATE UNIVERSITY OF NEW YORK 78

NADA A ABUMRAD, PHD Robert C Atkins Professor of Obesity Research in Medicine, Internal Medicine, BS AMERICAN UNIVERSITY OF BEIRUT 72, PHD STATE UNIVERSITY OF NEW YORK 78

ANINDA BHAT ACHARYA, MD Instructor in Clinical Neurology, Neurology, BS UNIVERSITY OF KANSAS 92, MD UNIVERSITY OF KANSAS 96

SAMUEL I ACHILEFU, PHD Professor of Biochemistry and Molecular Biophysics, Biochem & Molec Biophysics, PHD UNIVERSITY OF NANCY I 91

SAMUEL I ACHILEFU, PHD Professor of Radiology, Radiology, PHD UNIVERSITY OF NANCY I 91

Samuel I Achilefu Siteman Cancer Center, Associate Professor of Radiology, Division of Radiological Sciences, Mallinckrodt Institute of Radiology, Washington University School of Medicine, 1991-1993: Postdoctoral research fellow, bioorganic/inorganic chemistry, Oxford University, Oxford, England, 1991: PhD, chemistry, University of Nancy, Nancy, France

Joseph JH Ackerman Siteman Cancer Center, William Greenleaf Eliot Professor and Chair, Department of Chemistry, Washington University School of Medicine, 1977-1978: Postdoctoral research associate, chemistry, Colorado State University, Fort Collins, 1978-1979: Postdoctoral fellow, biochemistry, University of Oxford, Oxford, England, 1977: PhD, physical chemistry, Colorado State University, Fort Collins

JOSEPH J.H. ACKERMAN, PHD Professor of Radiology, Radiology, BA BOSTON UNIVERSITY 72, PHD COLORADO ST UNIVERSITY 77

JOSEPH J.H. ACKERMAN, PHD Research Professor of Chemistry in Medicine, Internal Medicine, BA BOSTON UNIVERSITY 72, PHD COLORADO ST UNIVERSITY 77

GARY K ACKERS, PHD Professor Emeritus of Biochemistry and Molecular Biophysics, Biochem & Molec Biophysics, BS HARDING UNIVERSITY 61, PHD JOHNS HOPKINS UNIVERSITY 64

TRACY ADAIR-KIRK, PHD Research Instructor in Medicine, Internal Medicine, PHD UNIVERSITY OF TENNESSEE 99

SUSAN E ADAMS, MD, PHD, BS Assistant Professor of Clinical Pediatrics, Pediatrics, BA UNIVERSITY OF KANSAS 77, MD WASHINGTON UNIV IN ST. LOUIS 91, PHD UNIVERSITY OF KANSAS MEDICAL 84, BS UNIVERSITY OF KANSAS 77

SUSAN R ADAMS, MD Instructor in Clinical Medicine, Internal Medicine, BA CARLETON COLLEGE 85, MD UNIVERSITY OF MISSOURI 89

WILLIAM S ADAMS, MD Assistant Professor of Clinical Pediatrics, Pediatrics, BA WASHINGTON UNIV IN ST. LOUIS 85, MD UNIVERSITY OF MISSOURI 89

DOUGLAS R ADKINS, MD Associate Professor of Medicine, Internal Medicine, BS WRIGHT STATE UNIVERSITY 82, MD WRIGHT STATE UNIVERSITY 86

Douglas R Adkins Siteman Cancer Center, Associate Professor of Medicine, Division of Oncology, Section of Medical Oncology, Washington University School of Medicine, 1986-1989: Intern and resident, internal medicine, University of Texas Health Science Center, San Antonio, 1989-1990: Fellow, medical oncology/hematology, University of Texas Health Science Center, San Antonio, 1990-1992: Fellow, bone marrow transplantati, 1986: MD, Wright State University, Dayton, Ohio, Primary Specialty: Head and neck cancer, sarcoma, Board Certified., 1990, 2000: American Board of Internal Medicine, Internal Medicine

1993, 2003: American Board of Internal Medicine, Medical Oncology

BENARD C ADLER, MD Professor Emeritus of Clinical Otolaryngology, Otolaryngology, BS WASHINGTON UNIV IN ST. LOUIS 37, MD WASHINGTON UNIV IN ST. LOUIS 37

REBECCA L AFT, MD, PHD Associate Professor of Surgery (General Surgery), Surgery, BS UNIV OF WISCONSIN MADISON 78, MD WASHINGTON UNIV IN ST. LOUIS 92, PHD UNIV OF WISCONSIN MADISON 83

SIRAJUDDIN AGHA, MBBS Assistant Professor of Anesthesiology, Anesthesiology, MBBS LIAQUAT MEDICAL COLLEGE 69

ANN C AGNEW, MD Assistant Professor of Clinical Medicine, Internal Medicine, BA UNIVERSITY OF MISSOURI 86, MD UNIVERSITY OF MISSOURI 89

ARPANA AGRAWAL, PHD Assistant Professor of Psychiatry, Psychiatry, PHD VIRGINIA COMM UNIVERSITY 04

AQEEB AHMAD Instructor in Clinical Psychiatry, Psychiatry

NAWAL MONA AHMED Instructor in Clinical Otolaryngology (DDS), Otolaryngology

SUN-YOUNG AHN, MD Instructor in Pediatrics, Pediatrics, BS YONSEI UNIVERSITY 96, MD YONSEI UNIVERSITY 00

GAIL G AHUMADA, MD, MA Associate Professor Emerita of Clinical Medicine, Internal Medicine, BA STANFORD UNIVERSITY 61, MA STANFORD UNIVERSITY 62, MD UNIVERSITY OF CALIFORNIA 72

WALTER JOHN AKERS, DVM, PHD Assistant Professor of Radiology, Radiology, BS UNIVERSITY OF MO COLUMBIA 04, DVM UNIVERSITY OF MO COLUMBIA 01, PHD UNIVERSITY OF MO COLUMBIA 05

Walter J. Akers Siteman Cancer Center, Instructor of Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine, 2001: DVM, University of Missouri, Columbia, 2005: PhD, biomedical engineering, University of Missouri

ABDULLA AKFALY Instructor in Clinical Medicine, Internal Medicine

GUSTAV AKK, PHD Assistant Professor of Anesthesiology, Anesthesiology, BS MOSCOW STATE UNIVERSITY 91, PHD STATE UNIV OF NY BUFFALO 97

ETIHAD S. AL-FALAH Instructor in Clinical Pediatrics, Pediatrics

MUHAMMAD TAHER AL-LOZI, MD, MS Professor of Neurology, Neurology, BA UNIVERSITY OF PANJAB 76, MS UNIVERSITY OF JORDAN 85, MD UNIVERSITY OF PANJAB 80

INGRID RENEE ALBERT, MD Assistant Professor of Clinical Medicine (Dermatology), Internal Medicine, BA BARNARD COLLEGE 67, MD SCHOOL NOT LISTED 71

SUZANNE G ALBRECHT Instructor in Clinical Pediatrics, Pediatrics

Kassandra Alcaraz Siteman Cancer Center, Doctoral Student, George Warren Brown School of Social Work, Washington University, 2005-2007: Predoctoral fellowship, eliminating health disparities, Saint Louis University, 2007: MPH, biostatistics and epidemiology, Saint Louis University

JORGE M ALEGRE, MD Instructor in Clinical Medicine, Internal Medicine, MD SCHOOL NOT LISTED 65

MORRIS ALEX, MD Assistant Professor Emeritus of Clinical Medicine, Internal Medicine, BS UNIVERSITY OF MISSOURI 42, MD WASHINGTON UNIV IN ST. LOUIS 43

MUHAMMAD A ALI, MD Instructor in Clinical Medicine, Internal Medicine, MD SCHOOL NOT LISTED 85

ZARMEENA ALI, MBBS Instructor in Medicine, Internal Medicine, MBBS AGA KHAN UNIVERSITY 97

PAUL M ALLEN, PHD, MS Robert L. Kroc Professor of Pathology and Immunology, Pathology & Immunology, BS UNIVERSITY OF MICHIGAN 74, MS UNIVERSITY OF MICHIGAN 77, PHD UNIVERSITY OF MICHIGAN 81

Paul M Allen Siteman Cancer Center, Robert L. Kroc Professor of Pathology and Immunology, Division of Immunology and Molecular Pathology, Washington University School of Medicine, 1981-1984: Research fellow, pathology, Harvard Medical School, Boston, 1977: MS, Immunology, University of Michigan, Ann Arbor, 1981: PhD, Immunology, University of Michigan, Ann Arbor

HENRY W ALLHOFF, OD Adjunct Instructor in Ophthalmology and Visual Sciences, Ophthalmology & Visual Sci, BA UNIVERSITY OF MISSOURI 76, OD ILLINOIS COLLEGE OF OPTOMETRY 81

ARDIS KAY ALLISON, DOST Instructor in Clinical Pediatrics, Pediatrics, DOST OKLAHOMA ST UNIVERSITY 80

DONALD CRAIG ALLRED, MD Professor of Pathology and Immunology, Pathology & Immunology, BS UNIVERSITY OF UTAH 75, MD UNIVERSITY OF UTAH 79

D. Craig Allred Siteman Cancer Center, Professor of Pathology and Immunology, Division of Anatomic and Molecular Pathology, Washington University School of Medicine, 1979-1981, 1982-1983: Resident, anatomic pathology, University of Connecticut Health Center, Farmington, 1981-1982: Fellow, immunobiology, University of Connecticut Health Center, 1979: MD, University of Utah, Salt Lake City, Primary Specialty: Breast pathology, Board Certified:, 1984: American Board of Pathology, Anatomic Pathology

JENIFER ELIZABE ALLSWORTH, PHD Assistant Professor of Obstetrics and Gynecology, Obstetrics & Gynecology, PHD BROWN UNIVERSITY 01

DAVID HERSHEL ALPERS, MD William B Kountz Professor of Gerontology in Medicine, Internal Medicine, BA HARVARD UNIVERSITY 56, MD HARVARD UNIVERSITY 60

DENIS IAN ALTMAN, MBBCH Assistant Professor of Clinical Pediatrics, Pediatrics, MBBCH UNIVERSITY OF THE WITWATERSRA 75

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