Calendar 2007-08

2007

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

July
3 Tuesday: Independence Day holiday begins at 5 p.m.
4 Wednesday: Independence Day observance.

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

September
2 Sunday: Labor Day holiday begins at 5 p.m.
3 Monday: Labor Day observance.

November
21 Wednesday: Thanksgiving Day holiday begins at 5 p.m.
22 Thursday: Thanksgiving Day observance.
23 Friday: Holiday for all classes.

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

2008

January
7 Monday: Classes resume for all students.
11 Friday: Deadline for payment of the balance of tuition for all classes.
20 Sunday: Martin Luther King, Jr. Day holiday begins at 5 p.m.
21 Monday: Martin Luther King, Jr. Day observance.

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

April
3 Thursday: Spring break begins at 5 p.m. for the third- and fourth-year classes.
7 Monday: Classes resume for all students.

May
4 Sunday: Academic year ends at 5 p.m. for graduating students.
16 Friday: Academic year ends at 5 p.m. for the second-year class. Commencement.
25 Sunday: Memorial Day holiday begins at 5 p.m.
26 Monday: Memorial Day observance.
30 Friday: Academic year ends at 5 p.m. for the first-year class.
Academic year and clinical clerkships end at 5 p.m. for students in clinical clerkships.

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

Schedule of Clerkship and Elective Intervals

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 18, 2007 – July 15, 2007
5-8: July 16, 2007 – August 12, 2007
17-20: October 8, 2007 – November 4, 2007
37-40: March 10, 2008 – April 6, 2008
41-44: April 7, 2008 – May 4, 2008

*Clinical clerkships end May 30, 2008, after Practice of Medicine III.
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 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; and
• to provide the infrastructure to support teaching, research, scholarship and service for the present and for future generations. Our institution is committed to the philosophy that teaching and research are best conducted in facilities where dedication to safety, health, and environmental stewardship is exemplary.

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 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
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 Brooking 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. Nineteen Nobel laureates have been associated with the School of Medicine.

During Fiscal Year 2006, 133 members of the faculty held individual or career development awards: 94 from the National Institutes of Health; one from the American Diabetes Association; one from the American Gastroenterological Association for Digestive Health and Nutrition; one from the American Glaucoma Society; nine from the American Heart Association; one from the American Society of Hematology; one from Anschap Companies; two from the Aplastic Anemia and MDS International Foundation; one from Bayer Healthcare; one from the Berlex Foundation; one from Brown University; five from the Burroughs Wellcome Fund; one from the Dermatology Foundation; one from the Doris Duke Charitable Foundation; two from the Foundation for Anesthesia Education and Research; one from The Francis Families Foundation; one from the John Douglas French Alzheimer's Foundation; three from the Juvenile Diabetes Research Foundation International; two from the Robert Wood Johnson Foundation; one from the W.M. Keck Foundation; one from the Leukemia Society of America, Inc.; two from the Muscular Dystrophy Association; one from the National Alliance for Research on Schizophrenia and Depression; one from the National Hemophilia Foundation; two from the Orthopaedic Research and Education Foundation; one from the Pfizer Pharmaceuticals; three from Research to Prevent Blindness, Inc.; one from the University of California San Francisco — PEW Charitable Trusts.

The School of Medicine has 19 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 2006-07, the School employed 1,502 full-time, salaried faculty members in its 20 preclinical and clinical departments. The clinical departments are further strengthened by 1,193 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 2006 entering class of 122 students was selected from a pool of 4,064 applicants. The School is a national institution with 45 states and 30 countries represented in the current enrollment.
In 2007, the School conferred the MD degree upon 96 individuals. In addition, ten students received the MA/MD degrees and 21 students graduated with the MD and the PhD degrees. Graduating students who participated in the 2007 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 597 medical students. Programs also are conducted for 585 students who are pursuing graduate degrees in communication sciences, clinical investigation, health administration, occupational therapy, physical therapy, psychiatric epidemiology or genetic epidemiology. The Division of Biology and Biomedical Sciences has extensive graduate training programs for 576 students seeking the Doctor of Philosophy degree in areas of Biochemistry, Computational 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 and Medical School campuses 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 the 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 $2.5 billion for the St. Louis area, according to an economic model maintained by the St. Louis Regional Commerce and Growth Association. With nearly 20,000 employees, the combined Medical Center institutions are the second largest employer in the metropolitan area.

Unprecedented growth has occurred at the Medical Center over the past 10 years. At the School of Medicine alone during the past five years, more than $330 million has been expended on renovation and new construction. Capital improvements and strategic purchases have added 1,490,000 square feet of space to the medical school during this same period. In the most recent fiscal year, more than $75 million of capital improvements were made at the School.

In the last 10 years, School of Medicine expansion has included the East McDonnell Specialized Research Facility, the McDonnell Pediatric Research Building, the Southwest Tower/Charles F. Knight Emergency Center, the Center for Advanced Medicine, Northwest Tower, two parking garages, the acquisition of the Central Institute for the Deaf buildings, and the school's first dedicated teaching facility — the Farrell Learning and Teaching Center. This 110,000-square-foot, six-story facility, located at the corner of Scott and Euclid avenues, is the home for all of the medical school teaching labs, small-group and seminar rooms, and all individual student study areas. A new lecture hall, case-study hall and café are on the first floor of the building, which opened in August 2005.

The 10-story Clinical Sciences Research Building (CSRB) North Tower research addition, 201,349 gross square feet, consolidates medical school specialized research into one structure. The top three floors of the addition house wet lab research space. The 230,000-square-foot McDonnell Pediatric Research Building adds 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. 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 eight-story **Northwest Tower** resides above the seven-level Children’s Hospital Garage. This new 190,000-square-foot building provides faculty office space.

The **Center for Advanced Medicine**, 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.

In addition, major renovations to existing buildings continue, with emphasis on research facilities. Within the last two years, renovations totaling $75 million have been completed. The Department of Genetics, together with the Department of Pharmacology, recently started the Center for Genomics and Human Genetics, with a wet lab renovation of 15,000 square feet on the fifth floor of **4444 Forest Park**, and a second phase of 15,000 square feet of lab renovation to begin in the summer of 2007. The Department of Biochemistry added a Nuclear Magnetic Resonance (NMR) Spectrometer in a small addition to **Cancer Research Building**. The Department of Ophthalmology expanded wet labs and offices on the seventh floor of the **McMillan Hospital Building** and the **Maternity Hospital**. The department of Cell Biology and Physiology and the John T. Milliken Department of Medicine jointly renovated research labs on the fifth floor of the **McDonnell Medical Sciences Building**, and renovations of half of the seventh floor of that building have recently been completed for the Department of Medicine. Ongoing improvements to the campus infrastructure are being made through the **Public Realm Project**, which is focused on landscape and streetscape enhancements.

A major renovation of the **Maternity Hospital** is underway for the Department of Obstetrics. Floors two through six are being completely overhauled as new office space for Obstetrics faculty and administration. The recently acquired building at **4533 Clayton** has been renovated into office space for the departments of Anesthesiology, Radiology and Obstetrics.

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 more than 5.8 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. The McDonnell 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 three 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.

**Biotechnology Center.** This five-story facility was recently renovated into laboratories for the departments of Psychiatry, Medicine, Neurology, and Pathology and Immunology.

**McMillan Hospital Building.** McMillan 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).** Mallinckrodt Institute is internationally recognized for excellence in teaching, research and clinical services. Housed in its own 13-story building, MIR also has satellite facilities in Barnes-Jewish, St. Louis Children’s and Wohl 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.

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

**Maternity Hospital.** 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.

**West 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.** Wohl Hospital Building, opened in 1953, provides offices and laboratories for the departments of Medicine and Surgery.

**Wohl Clinic.** The resident clinics 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.

**4444 Forest Park.** This 294,302-gross-square-foot building 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.

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

The facility, completed in 1989, integrates biomedical information resources and information technology. The eight-level, 114,000-square-foot structure has a capacity for more than 300,000 volumes. The biomedical resource collection includes more than 290,000 volumes, some 1,200 audiovisual items and over 3,450 current journal subscriptions.

The library’s Communication and Outreach Division provides a broad range of biomedical information and training services in biomedical informatics, consumer health, evidence based medicine and information management. It also partners in providing community health information outreach with other units of the medical school. Staff may be contacted by telephone at (314) 362-7085, by e-mail
at askreference@msnotes.wustl.edu, or at the Information Services Desk on Level 1 of the library. Individual and group training sessions are available in database searching. Classes for Medline, evidence based medicine, information management software, and bioinformatics tools can be tailored for specific audiences. Training sessions can be held in the library or off site. The division also oversees the library's Liaison Program where each of the school's divisions, departments or programs has a specifically assigned librarian to focus on their information needs. A list of liaisons can be found at becker.wustl.edu/liaison.

Access and Collection Management Services manages the print collection, circulation services, interlibrary loan, and archives and rare books. Some 2000 volumes from the now-closed Central Institute for the Deaf library were added to Becker's book and journal collection in 2003. The library's Archives and Rare Books unit includes some 22,000 volumes and outstanding collections such as 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 archives of the Medical Center contain the records and private papers of the School, memorabilia and oral histories of individuals who have made important contributions to American medicine. Among the manuscript collections are papers of William Beaumont, Joseph Erlanger, E.V. Cowdry, Evarts Graham and Carl Cori.

Becker's catalog provides complete and current information about the library's collections. It includes access to over 3,900 electronic full-text journals, 1,100 online books, 29 databases, and numerous selected web sites. Ovid Online is the library's premier tool for searching and retrieving biomedical journal literature. Other valuable electronic resources include the Web of Science, Journal Citation Reports, UpToDate, MDConsult, Scopus, and the Cochrane Library. Remote access for most of these products is available for office or home use. Materials not owned by Becker Medical Library can be obtained through interlibrary loan and document delivery services.

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.

Library hours and telephone numbers:

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
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 1,770 physicians and 914 residents, interns and fellows. Barnes-Jewish is licensed for 1,228 beds and in 2006 had 53,907 inpatient admissions, along with 77,847 emergency department visits and 468,132 outpatient registrations. Barnes-Jewish Hospital is the first adult hospital in Missouri to receive Magnet recognition, the highest award given by the American Nurses Credentialing Center.

Rated by U.S. News & World Report as one of the top 10 hospitals in the country, Barnes-Jewish Hospital has a premier reputation in patient care, medical education, research and community service.

St. Louis Children’s Hospital. Since 1879, 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. Its spectrum of pediatric specialty services includes newborn medicine, cardiology, neurosurgery and the world’s leading pediatric lung transplant program. Both *Child* magazine and *U.S. News & World Report* rank St. Louis Children’s Hospital among the best children’s hospitals in America. The hospital has also received the Magnet 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 $2.8 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 **Barnard Free Skin and Cancer Hospital**, Barnes-Jewish Hospital and Washington University, medically indigent patients with cancer or diseases of the skin receive free care from Washington University physicians at the Alvin J. Siteman Cancer Center and Barnes-Jewish Hospital. Barnard Free Skin and Cancer Hospital also houses the Washington University General Clinical Research Center (GCRC), a support center for Washington University clinical investigators.

**Central Institute for the Deaf**. Founded in 1914 as a place where teachers, hearing and speech professionals, and parents work together to help children with hearing loss, Central Institute for the Deaf (CID) 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, helping 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 preschool-kindergarten and primary school programs serve students ages 3 to 12. CID school children have come from 48 U.S. states and 27 other countries.

CID services include mainstream transitional assistance for students and families, continuing education workshops for professionals and books, evaluations and curricula used to help hearing-impaired 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 with hearing loss.

CID is a recipient of a 2006 "What's Right With the Region!" award from Focus-St. Louis for creating quality educational opportunities.

The **Alvin J. Siteman Cancer Center** at Washington University School of Medicine and Barnes-Jewish Hospital is world-renowned for its basic science, translational research, patient care, and outreach. The Siteman Cancer Center, which holds approximately $130 million in extramural funding for cancer research, is organized into eight research programs (Cancer Genomics, Cancer and Developmental Biology, Tumor Immunology, Hematopoietic Development and Malignancy, Cellular Proliferation,
Oncologic Imaging, Prevention and Control, Clinical and Translational and Clinical Research). The Siteman Cancer Center also provides 14 shared resource facilities (with two in development) to its more than 260 research members. Shared resource facilities include: Bioinformatics Core, Biostatistics Core, Clinical Trials Core, Embryonic Stem Cell Core, Hereditary Cancer Core, High-Speed Cell Sorter Core, Molecular Core Laboratory, Multiplexed Gene Analysis Core, Pharmacology Core, Proteomics Core, Small Animal Cancer Imaging Core, Health Behavior and Outreach Core, Good Manufacturing Practice Facility and Tissue Procurement Core. A High Through-put Core and an Imaging Response Assessment team are shared resources in development. 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 also are associated with the School of Medicine, and various members of their staffs hold University appointments:

• Barnes-Jewish West County Hospital
• Barnes-Jewish St. Peters Hospital
• Christian Hospitals Northeast and Northwest
• Metropolitan St. Louis Psychiatric Center
• Missouri Baptist Medical Center
• Veterans Administration Medical Center
• Shriners Hospital for Children
• Parkland Health Center

Research Activities

Grants and contracts totaling more than $472.7 million supported faculty research efforts at the School of Medicine in the fiscal year ending June 30, 2006. Substantial additional support was provided directly to faculty investigators by the Howard Hughes Medical Institute. During fiscal year 2006, gifts and grants from private sources, including alumni, individuals, foundations, corporations and other organizations totaled $62 million from 5,274 entities.

The School of Medicine received $377.6 million in grants from the National Institutes of Health during the federal fiscal year ending Sept. 30, 2005, making it the fourth-largest recipient of NIH dollars among the 123 U.S. medical schools. That money came in 800 separate grants, 728 of which were designated as research grants, with the remainder primarily funding training and education activities. NIH research grants supported the investigations of at least 887 full-time faculty members.

The Johns Hopkins University: $449,354,324
University of Pennsylvania: $399,272,439
University of California, San Francisco: $398,155,640
Washington University: $377,648,058

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.
• Developed a blood test for early diagnosis of prostate cancer.
• Proposed the now-common practice of taking aspirin to help prevent heart attacks.
• Developed a surgery to remove damaged portions of emphysema patients’ lungs, dramatically
improving function.
• 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 heart attack patient will require invasive treatment.
• Performed innovative larynx restoration surgery for the first time in the United States.
• Helped pioneer cochlear implant technology.
• Performed the first surgical lung removal.
• 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.

Ongoing research includes:
• Studying the effects of alcohol and anesthesia on the developing brain.
• Improving pain management strategies for children.
• Developing and using nanoparticles for molecular imaging and targeted drug delivery for cancer and clogged arteries.
• Imaging language areas in adult and pediatric brains during recovery from stroke to observe natural rehabilitation patterns.
• Developing drug therapies for histoplasmosis and malaria.
• Determining how microorganisms naturally residing in the gut contribute to human health and disease.
• Investigating weight loss approaches including low-carbohydrate diets, liposuction, gastric bypass surgery and extreme caloric restriction.
• Developing and using new imaging tools to study how nervous system 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 living in the gut.
• Identifying anatomical and genetic markers of schizophrenia.
• Leading efforts to identify the underlying cause of recurrent urinary tract infections.
• Developing treatments to compensate for individual genetic traits that interfere with drug performance.

BioMed 21
To meet the challenge posed by advances in biomedical sciences, the School of Medicine has devised a strategy called BioMed 21 to support translational research. Three units — the Center for Genome Sciences, the Division of Clinical Sciences and the Center for Biological Imaging — accessible to all faculty, will catalyze and support emerging forms of bioresearch and rapidly convert the knowledge of the genetic blueprint into individualized medical treatments. BioMed 21 is currently supporting expansion of the Center for Genome Sciences. Construction has begun on a 9,000-square-foot, 24-hour Center for Clinical Imaging Research. Planning is underway for a $150 million building supporting translational research. An $18 million facility to spur development of mouse models for human diseases was recently completed. See biomed21.wustl.edu to learn more.

Curriculum
Table of Courses
Lectureships and Visiting Professorships
Course Evaluations
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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 2007-08

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
Alison J. Whelan, MD, 362-7800

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
Robb R. Whinney, MD, 362-5388
  • Ethics and Health Policy
Rebecca Dresser, JD, 454-7116
  • Health Promotion/Disease Prevention
Jane M. Garbutt, MBChb, FRCP, 362-3480
  • Interpreting Illness
Stephen S. Lefrak, MD, 454-7116
  • Patient-Physician Communication
Anne Glowinksi, MD, 286-2217
  • Scientific Method of Clinical Medicine and Research
Jay F. Piccirillo, MD, 362-3480

2007-08 Selectives

M04      • General Selectives
        Koong-Nah Chung, PhD, 362-6844

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

A selective is 10 clock hours in duration.

582   Alzheimer’s Disease
5881  Analysis of Clinical Data
5883  Anatomy and Surgery in the Middles Ages
520H  Art and Medicine
5877  Basic Neuroscience
537   Cardiovascular Control Mechanism
5017  Clinical Correlations in Neuroscience
5381  Clinical Immunology
5351  Complementary and Alternative Medicine
530   Contemporary Molecular Immunology
500C  Developmental Biology and Disease
522H  Dealing with Sick Folks
587K  Discussions in Medical Economics and Public Policy
5874  Doctor as Health Protector and Client
538H  Doctors on Film
5871  Ethics in Neurological Practice
5302  Frontiers in Leukemia
5068  Fundamentals of Molecular Cell Biology
586H  Health and Human Rights
5879  Health Policy
5001  History of Medicine
577   Human Nutrition
899   Independent Study
587L  International Health
587   Introduction to Clinical Radiology
5878  Introduction to Clinical Neurosurgery
5013  Introduction to Emergency Medicine
587S  Introduction to Newborn Medicine
536B  Introduction to Surgery
500A  Journal Club
534A  Kidney Disease
5882  Longitudinal Patient Assessment
524H  Major Religious Traditions
5009  Medical Spanish
5010  Medical Spanish – Advanced
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
Lynn A. Cornelius, MD, 362-8187

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
Leonard B. Bacharier, MD, 454-6299

M25 607 The Practice of Medicine II
Megan Wren, MD, 286-2546
• Clinical Skills
  Robb R. Whinney, MD, 362-5388
• Ethics and Health Policy
  Rebecca S. Dresser, JD, 454-7116
• Health Promotion/Disease Prevention
  Jane M. Garbutt, MBChb, FRCP, 362-3480
• Interpreting Illness
  Stephen S. Lefrak, MD, 454-7116
• Medicine Patient Sessions
  Robb R. Whinney, MD, 362-5388
• Neurology Patient Sessions
  Allyson Zazulia, MD, 362-6378
• Ophthalmology
  Morton E. Smith, MD, 362-3480
• Patient-Physician Communication
  Anne Glowinski, MD, 286-2217
• Radiology
  Sanjeev Bhalla, MD, 362-3480
• Scientific Method of Clinical Medicine and Research
  Jay F. Piccirillo, MD, 362-7394

M70 670A Principles of Pharmacology
Douglas F. Covey, PhD, 362-1726

M85 676A Diseases of the Nervous System: Psychiatry
Melissa A. Swallow, 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
David Windus, MD, 362-7261

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)
Valerie Halpin, 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)  
Angela M. Sharkey, MD, 454-6299  
Douglas W. Carlson, MD, 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)  
Kevin J. Black, 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)  
Kevin J. Black, MD, 362-2469

M90 701 General Radiology Clerkship (4 weeks)  
Christine Peterson, MD, 362-5139

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)  
D. Ashley Hill, MD, 454-8854

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.

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, M.D., 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.


**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 Kopelow to provide an annual lectureship in honor of Drs. Michael and Irene Karl.


**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, M.D. 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.


**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.

**Marvin and Barbara Levin Visiting Lectureship.** Established in 1997 by Dr. Marvin & Mrs. Barbara Levin to support an endocrinology lectureship in Medicine.

**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, M.D. 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 Probstein Oncology Lectureship.** Established in 1985 by Mr. and Mrs. Norman K. Probstein 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.

C. R. Stephen, M.D., F.F.A.R.C.S. 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. Stickles Lectureship in Pediatric Ophthalmology. Established by Arthur and Emily Stickles in 1995 with their generous gift in recognition of Dr. Stickles’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 lecture-ship 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's.
**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 the Associate Dean for Medical Student Education oversees the course evaluation system, which is coordinated by Kelly Noll in the Curriculum Office (362-3404). The collected data are forwarded to the respective coursemasters, the Committee on Medical Education and the Academic Affairs Committee.

**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.

**Degree Programs**

The Washington University School of Medicine offers four programs leading to the MD degree: a regular four-year program, a five-year program, the MA/MD program and a combined MD/PhD program.

Doctor of Medicine
**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.

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.

**Master of Arts and Doctor of Medicine**

The objective of the MA/MD 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 & Digestive & Kidney Diseases (GI, hepatology, endocrinology, nutrition, nephrology and hematology research), Predoctoral Interdisciplinary Clinical Research Training Program (clinical research), and the J. Max Rukes Fund (endocrine and metabolism 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
Doctor of Philosophy

The Division of Biology and Biomedical Sciences offers predoctoral programs in Biochemistry, Computational 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 the Divisional 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

Doctor of Medicine and Doctor of Philosophy

Washington University offers a combined MD/PhD degree program that utilizes the resources of the Division of Biology and Biomedical Sciences, the Program in Biomedical 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 $26,000 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 School of Arts & Sciences, 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 coursework in lieu of certain medical school coursework. In this way, students may substantially meet the coursework requirements of the PhD program during the first two medical school years. The MSTP director and co-director meet with students individually to help them decide on a personalized 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 coursework;
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 or any of the programs of the Division of Biology and Biomedical Sciences. The Division, now in its 34th 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 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 monthly 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 24 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

Applying for Admission

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

Admission Requirements for the Study of Medicine

Policy for International Students
Application Procedure
Background Checks and Screening for Controlled Substances
Full-Tuition Scholarships
Third-Year Class Transfer Program

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. Effective May 2005, 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 cultural development. Specific courses, other than the few in the natural sciences, are not prerequisites because a great variety of courses may prepare students for the many roles they may play in their medical careers.

Policy for International Students

The admission decision at Washington University School of Medicine is based on academic and personal merit and not on the ability of the student to pay the costs of education. However, individuals who are not citizens of the United States of America or who do not hold U.S. Permanent Resident Visa status are not eligible for financial aid due to regulations covering many programs used by the School to fund financial assistance. Therefore, in order for the School to complete the required documents which are necessary for issuance of a visa, the student must document, by a date and in a manner designated by the School, that the necessary amount of funds, as established by the School, is available to pay the costs of education (tuition and living expenses) for the anticipated period of enrollment, normally four years. Documentation of the required amount of financial resources may be by a letter of credit or by deposit of funds in an escrow account with a bank designated by the School.

Application Procedure

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 distributed by the AMCAS and pre-professional advisers. Applicants are urged to file their applications as early as possible.
Applicants to the first-year class must submit their AMCAS application so that it is postmarked 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 promptly contacts the applicant regarding the additional steps to be taken to complete the application. These include completing a supplemental application via the Internet at medschool.wustl.edu/admissions, submission of letters of recommendation and payment of a nonrefundable Application Service Fee of $50. Applicants can check the status of their application via the Internet at the same website as noted above. 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 an interview trip that will include the St. Louis area, it is appropriate to contact us by e-mail (wumscoa@wustl.edu) or by letter to the Interview-Appointments Secretary, Committee on Admissions, Box 8107, Washington University School of Medicine, 660 S. Euclid Ave., St. Louis, MO 63110-1093, to inquire if an interview has been authorized.

Communication by e-mail or facsimile is encouraged. The fax number for the Committee on Admissions is (314) 362-4658. The e-mail address is wumscoa@wustl.edu. The inquiry should be made 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 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 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.

Background Checks and Screening for Controlled Substances

Effective in 2005, students entering the School of Medicine who will have contact with patients will be 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 clinical activities at Washington University School of Medicine affiliated clinical facilities. Drug screening will be conducted during student orientation prior to the start of classes. Incoming, prematriculant 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 will be precluded from matriculation and will not be registered as students in the School of Medicine.
Full-Tuition Scholarships

Please see Financial Information/Financial Assistance section.

Third-Year Class Transfer Program

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

Transfer application forms for admittance into the third-year class are available after October 1 for the following academic year. The deadline for submission of applications is March 31. Those applicants selected for interview will be invited to visit the 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@msnotes.wustl.edu

Financial Information

Cost of Education

Registration, Payment of Financial Obligations and Refunds

Financial Assistance

Cost of Education

For the first-year class matriculant, tuition and housing rates for the 2007-08 academic year are listed below. Students who enter in 2007 will benefit from a tuition stabilization plan, which provides that their annual tuition of $43,380 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 $58,564. Allowances for entertainment, travel, clothing and other miscellaneous items must be added to this estimate.

Tuition (includes Student Health Service and Microscope Lending Plan): $43,380
Books, supplies and instruments: $1,922
Housing and food: $9,428

**Student Health Service**

The Student Health Service provides comprehensive health care, including hospitalization, for all full-time students in the School of Medicine. 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.

**Registration, Payment of Financial Obligations and Refunds**

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 if applications are filed by the deadline. The Office of Student Financial Aid will assist students with loan applications and financial planning upon request.
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, 2008.

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 28 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 Stanley J. Birge, MD
Distinguished Faculty Scholars

The Distinguished Faculty Scholar Program provides up to four 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

Up to five full-tuition scholarships may be awarded annually to members of the entering first-year class. Final selection of scholarship recipients will be made by a committee of the faculty and will be 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 as the school of choice.
Medicine, School Code #G24620, as a recipient. Medical school financial aid application documents and detailed instructions will be made available after January 1, 2008.

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 WWII. 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.

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

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 includes 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 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 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 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 1978 Scholarship Fund. Established in 2002 by members of the class of 1978 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, M.D. 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.

Frederick J. Cornwell, Jr. Scholarship Fund. For scholarship and other financial help for worthy medical students and for medical students, interns and residents to use for research purposes.

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

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

William H. and Elizabeth Gray Danforth Scholars Program. Established in 1998 in honor of Chancellor Danforth’s retirement. The 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, M.D. ’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 Minority Student Scholarships. Up to seven full-tuition scholarships are awarded to students in each first-year class for academic excellence and personal achievement.

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
Robert B. Fickel, D.D.S. 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.

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, M.D. ’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.

Lee B. & 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.

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.

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

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.

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 women 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, M.D. 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. (M.D. ’32) and George K. (M.D. ’64) Powell Medical Student Scholarship Fund.** Established in 1984 by Mrs. George M. Powell in grateful appreciation for the medical education provided to her husband and son by the 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, M.D. 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 Ruokes 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 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, M.D. Scholarship Fund.** Established in 1992 by Dr. Schrick to provide scholarship support to female medical students.

**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.

**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 Underrepresented Minorities 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, M.D., 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.

**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.

Assessing Academic Achievement

Committee on Academic Evaluation of Students

Evaluation and Grading System

Actions for Academic Review

Individual Study Program

Tutorial Assistance Program

Leave of Absence

Policy on Student Status and Benefits During Research Year or Leave of Absence

Appeals Process for CAES Decisions

Research Integrity Policy

Procedures Concerning Breach of Professional Integrity

Liability Insurance

United States Medical Licensing Exams (USMLE)

Committee on Academic Evaluation of Students

Responsibility of the Committee

Overall evaluation of academic performance by students at Washington University School of Medicine will be made by the Committee on Academic Evaluation of Students (CAES). The deliberations of the CAES 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 CAES. The CAES has several important roles, including:

1. Approving promotion of students to a subsequent year of study.
2. 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.
3. Requiring entry of a student into an individualized program of study.
4. Deciding upon matters of academic disciplinary action, including instances of unprofessional behavior brought to CAES.

It is also the ultimate responsibility of the CAES to decide whether each student meets the academic and ethical standards necessary to enter the profession of medicine.
The rules governing operation of the CAES apply to students in the following categories:

1. Students who are engaged in the preclinical and clinical education requirements for the MD degree.

2. Students in a five year MA/MD degree program taking the pre-clinical or clinical portion of their MD education.

3. Students in the Medical Scientist Training Program (MSTP) taking the pre-clinical and clinical portion of their MD education.

4. Those selected students with a prior medically relevant PhD who have been approved by the Medical Scientist Training Placement Curriculum Committee (MSTPCC) and are enrolled in the MD portion of their education.

**Membership of CAES**

**A) Appointed and Ex-Officio Membership**

There will be 12 voting faculty members of the CAES, and membership 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. Initial appointments will be staggered for periods of one-, two-, three- and four-year terms.

A faculty member may be reappointed to serve on CAES. Membership will be equally divided between clinical and preclinical departments. In addition, CAES membership will include, in ex officio capacity, the Registrar (non-voting) and the Associate Dean of Students (non-voting). The Associate Deans of Medical Student Education, Admissions, Diversity Programs and the Director of the Student Health Service may attend CAES meetings as non-voting observers.

**B) Guests**

A course master, who is not a member of the CAES but who has submitted a Fail/Incomplete grade for a student, which is to be discussed at a meeting of the CAES, will be present at the meeting to provide information concerning the student’s performance. Alternatively, a course master will send a designated representative. In the event that a course master or designated representative is not present, final action for that student will be deferred until adequate information concerning the student’s performance is available.

**Chair of CAES**

A faculty member will be appointed by the Dean from within the CAES committee to serve as chair. The term of the chair will be four years.

**Meeting Frequency**

CAES 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 15 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 CAES Meetings**

Seven voting members must be present to consider items of academic disciplinary action (i.e., recommendation for dismissal from enrollment or entry into Individual Study Program).
The Evaluation and Grading System

General

A) 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 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. Such occasions will be promptly reported to the Registrar. 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 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. 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. However, this is an exception, as the complete schedule is reviewed prior to the start of each academic year by course masters and student representatives.

B) In order to continue their studies at Washington University School of Medicine, students must demonstrate the principles of professionalism, including sound judgment, honesty and integrity, responsibility, a sensitivity and compassion for individual needs, an ability to synthesize and apply knowledge and the capability of becoming a safe and effective physician. Serious or repeated breaches of these principles, when related to academic matters, will be referred to the CAES for review.

C) At the annual CAES 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.

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) Prior to graduation, students are required to complete and pass all coursework. Occasionally students are permitted to complete equivalent coursework at other institutions with the permission of the responsible department and written notification to the Registrar.

F) 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 University Health Service or the Associate Dean of Student Affairs for possible accommodations.

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 30 days
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 percent 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 shall 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
I** = -Incomplete, temporary grade pending completion of course requirements, replaced with an F if not removed within 30 days
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 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 also will appear on the student’s official educational 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 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 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 should file his/her request for review along with the basis for the appeal with the course master 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 match rankings for the academic year can be held pending resolution of the matter. If this notice is not filed with the Registrar prior to the deadline, the 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.

NO GRADE CHANGES ARE PERMITTED FOR THE ACADEMIC YEAR AFTER JULY 15.

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Actions for Academic Review

General

A) “Actions for Academic Review” refer to procedures used at the School in the event that a student fails a course or fails to complete a course in the requisite time.

B) 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.

C) 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 CAES for review and determination of a course of action. Actions for Academic Review shall be referred to CAES for consideration by the Associate Dean for Student Affairs or Registrar’s office.

D) Refer to Individual Study Program (ISP) in this document for guidelines pertaining to students engaged in an ISP.

E) When the performance of a student is referred to CAES 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 Associate Dean of Student Affairs shall notify the student of the course(s) for which academic review is proposed and the date and time at which the CAES will address the matter. The Associate Dean for Student Affairs, the Registrar, the course master(s) or their designated representatives shall present the matter to the CAES in a closed and confidential CAES meeting.

4. The student shall be permitted, upon written request, in advance of the CAES meeting, to appear on his or her own behalf. At the student’s written 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 written request, the student may be accompanied by a fellow student enrolled in the School of Medicine.

5. A record of the CAES meeting shall be preserved for purposes of review by the School of Medicine’s Appeals Committee, as necessary. The CAES’s decision shall be by majority vote and shall be communicated, in writing, to the student by the Registrar’s office.

6. For students referred for course failure, CAES meetings will have, in addition to the grade report forms for the course for which the student is referred to CAES, a complete record of the student’s academic performance and the student file.

7. The maximum number of attempts to pass any individual course during enrollment in the School, including time in an ISP, will be three.

8. Throughout the enrollment of a student, it is within the jurisdiction of CAES to terminate the enrollment of a student who has demonstrated serious academic failure or breaches listed under Evaluation and Grading System in this document. Such a course of action for serious academic failure will generally apply to a student for whom the Registrar has recorded Fail/Incomplete grades in three or more subjects.

F) Cumulative Academic Review/Academic Warning

Prior to promotion to the clinical year, the CAES 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 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 notification of advancement with academic warning into the clerkship year, the student must meet with the Associate Dean for Student Affairs to: 1) review the planned clerkship schedule in order to consider schedule changes to facilitate successful clinical experiences, 2) pursue available resources for academic intervention, and 3) 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.

G) Physicianship/Professionalism Concern Forms

The Associate Dean for Student Affairs will report serious or repeated breaches of professionalism to CAES if the violations are related to academic matters (see Procedures Concerning Breaches of...
Professional Integrity in this document for additional information and procedures related to non-academic matters). Action may include probation or dismissal, and CAES also may rule that the Dean’s letter/MSPE should include a citation regarding the matter. Additional consequences may include a program of remediation or additional oversight.

**First Year**

A) If a student has received a Fail/Incomplete 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 before August of the following academic year, OR
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.

B) 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 CAES to review and propose a recommended course of action. The CAES may require such a student to enter an ISP or may terminate enrollment. Alternatively, the CAES 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 CAES for determination of a course of action.

D) For students referred to CAES (under Actions for Academic Review, First Year, in this document), 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 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.

E) The Associate Dean for Student Affairs also may request that the CAES 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 that are remediated within the course. In such instances the CAES may recommend a course of action.

If Fail/Incomplete grades have been recorded for two or more courses or a single re-examination, the CAES 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.


**Second Year**

A) Regarding courses of the second year, the Associate Dean for Student Affairs will meet with the students in the following categories regarding taking a re-examination.
1. A student for whom a Fail or Incomplete grade has been recorded in a single complete yearlong course in the second year curriculum, 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 generally will 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 generally will be 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 CAES to determine a course of action. The CAES 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 CAES for review and resolution of a recommended course of action:
1. Two yearlong courses, OR
2. Three or more block-long courses, OR
3. One complete yearlong course and two block-long courses, OR
4. A student for whom the Registrar has recorded a Fail/Incomplete grade in any re-examination.

D) At review by CAES 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 last week of the inter-academic year break. The CAES may allow the student to defer beginning the clinical rotations so that re-examinations may be taken up to 12 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, CAES may require that a student enter an Individualized Study Program (ISP) or that enrollment in the School of Medicine be terminated.

In the event that CAES decides not simply to permit re-examination, the CAES may require that the student enter an Individualized Study Program as detailed below, or that enrollment in the School be terminated.

E) The Associate Dean for Student Affairs also may request that the CAES 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 CAES may recommend a course of action.

F) No student will be permitted to begin clinical rotations of the third year until all first- and second-year courses have been successfully completed.


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 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 CAES to determine a course of action. When such a student is referred to the CAES, the CAES may permit a re-examination or re-taking 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 CAES 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 CAES for review and proposal of a course of action.

D) The Associate Dean for Student Affairs also may request that the CAES 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 CAES may recommend a course of action.

E) For students referred to CAES, the Committee may endorse or amend the recommendations of course masters from whom Fail/Incomplete grades have been entered for students beyond the second-year curriculum regarding a necessary course of action to remediate the grades entered. In the event that a student fails such a course of remediation, as defined by the course master and approved by the CAES, CAES may require that the rotation be repeated or that enrollment of a student in the School be terminated. Students generally will 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 CAES for action, including possible termination.


**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 be required to enter an Individualized Study Program (ISP), requiring five years to complete rather than four years.

The following rules govern students engaged in an ISP:

A) Recommendation requiring entry into an ISP is made by the CAES after careful consideration of the student’s academic performance at intervals throughout the curriculum.

B) The intent of an ISP is to optimize the prospect that the student will successfully complete the curriculum.

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 CAES. The specific recommendations of the CAES will generally be adopted. The CAES may delineate for the student required to enter an ISP the consequences of a Fail/Incomplete grade recorded in any course once the student has entered the ISP. 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 course work. 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 Fail or Incomplete grade is recorded for a student after entry into an ISP, a re-examination schedule will be determined by CAES. If a Fail/Incomplete grade is recorded for the re-examination of a single course for which two previous final examinations have been failed, enrollment in the School of Medicine will be terminated. If a Fail or Incomplete is recorded for the re-examination of a single course which the student has not previously failed, the student may be permitted to repeat the course.

F) At the completion of the time for their ISP, students who have not successfully completed and
received a grade of Pass or above in the usual courses of the first- and second-year curricula by the start of the second six-week period in the year of the clinical clerkship will be dismissed from enrollment in the School.

**Tutorial Assistance Program**

Students experiencing difficulty in any course may request tutorial assistance. Such requests should initially be directed towards the course masters and thereafter to the Associate Dean for Student Affairs. Students who are repeating courses will be offered the opportunity for tutorial assistance. CAES also may require that a student seek tutorial assistance. The Office of Medical Student Education has a fund from which tutors are paid.

**Leave of Absence**

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 CAES 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. Before returning from a medical leave, students are required to provide a letter of medical clearance.

B) In extreme cases where a student may pose a danger to others, an involuntary leave of absence may be imposed. In such a matter 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 for the involuntary leave, 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 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: 1) rescinded by the suspending authority, or 2) upon the failure of the suspending authority to promptly file a statement of charges with the University Judicial Board or a Disciplinary Committee, or 3) when the case is heard and decided by the University Judicial Board or the Disciplinary Committee.

Return of students from involuntary leave of absence requires clearance of both the Director of the Student Health Service and the Associate Dean for Student Affairs.

C) Students receiving financial aid should be advised that at the end of 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.

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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.

Appeals Process for CAES 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 also must ensure provision of fairness in discharging those rights and responsibilities.

An Appeals Committee, composed of faculty members appointed by the Dean of the School of Medicine, shall be created to review decisions under academic review. A quorum of this committee shall consist of five members.

Within 20 days of the date on which an Academic Disciplinary Action decision is rendered by CAES, the student may request, in writing to the Registrar, that the School of Medicine’s Appeals Committee review the record of such CAES decision or that the Appeals Committee request that the CAES consider additional information which was not previously presented to CAES. The letter to the Registrar should include the basis for the appeal as well as any new information of relevance.

The Appeals Committee shall review the record of the CAES decision solely to determine whether the pertinent CAES procedures were followed and whether all relevant information was considered by the CAES. If the appeal is based on a contention that all relevant information was not presented to CAES, the appeal must provide the Appeals Committee with adequate reason why the student did not present this information at the CAES meeting in question.

On all appeals the Appeals Committee may either remand the matter to the CAES for reconsideration with its explanation for the remand, or deny the appeal. If the matter is remanded to CAES, 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 CAES. However, the Appeals Committee shall not substitute its opinions of the merit of matter and appeal for those of CAES. The Appeals Committee shall provide its decision in writing to the Dean, the student, the CAES, 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 CAES decision.

Within 20 days of the date of the Appeals Committee’s decision or referral back to CAES, 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.
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 MD degree will be directed promptly to that committee. The Research Integrity Committee will promptly investigate the charges and report its conclusions and recommendations to the Dean who will convene a Disciplinary Committee according to the guidelines below.

For further information, refer to the Research Integrity Policy web site: www.wustl.edu/policies/research.html.

Procedures Concerning Breaches 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, including the completion of a Physicianship/Professionalism Concern Form along with other detailed information as necessary and shall be reminded of their confidentiality. Behavior inappropriate to the medical profession shall mean 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; and other misconduct, 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. The Associate Dean for Student Affairs will identify which of the following categories is applicable to the matter which will be addressed accordingly:

A) Academic/Educational
At the discretion of the Associate Dean for Student Affairs, serious or repeated breaches of professionalism (if raising concern about a pattern of behavior) will be referred to CAES if the concern is academically/educationally related. In this case, the Associate Dean for Student Affairs will follow procedures and guidelines outlined under Actions for Academic Review in this document.

B) Non-academic/Non-educational
For matters unrelated to the academic/educational setting, the Associate Dean for Student Affairs will follow the disciplinary procedures as follows:

1. The Associate Dean for Student Affairs shall convene a meeting with the Associate Dean for Admissions or the Associate Dean for Medical Student Education to review the complaint and decide whether further action is necessary.

2. If further inquiry is deemed necessary, the Associate Dean for Student Affairs and one of the Associate Deans listed above will discuss the complaint with the student.

3. If the Associate Dean for Student Affairs considers the matter sufficiently serious or if it represents repeated offenses so as to raise concern about a pattern of behavior, a recommendation will be made to the Dean to convene a Disciplinary Committee.

4. Appointment to a Disciplinary Committee will be made by the Dean and will include five faculty members and one (non-voting) academic representative from the Office of Student Affairs. Appointees will decline if assurances of their impartiality in the matter are not evident. The Dean will appoint a chairperson who will be responsible for applying correct procedure to the hearing. The Registrar will
attend the meeting to record the minutes. A simple majority will prevail (three out of five votes), except when the motion is for recommending to the Dean dismissal from enrollment in the school, where four out of five votes will be required. The recommendation of the Disciplinary Committee will be forwarded to the Dean who will decide upon the disciplinary action to be taken.

5. If the Disciplinary Committee is convened, the Associate Dean for Student Affairs will forward all information concerning the matter to the Committee.

6. The Disciplinary Committee shall, whenever possible, convene within one to two weeks after the initial meeting between the student and the Associate Dean for Student Affairs.

7. Prior to the meeting of the Disciplinary Committee, the Associate Dean for Student Affairs will inform the student in writing regarding the time, date and place of the meeting, that the proceedings are completely confidential, and that the student may bring a faculty member, staff member or fellow student of the School of Medicine for guidance and support. A copy of the complaint will be provided to the student.

8. The following guidelines will be applied to the conduct of the Disciplinary Committee and these will be made available to members of the committee at the opening of the meeting. The aim of the Committee is to provide fair and prompt review of the inquiry. The Committee is not positioned in an adversarial role against the student but simply to review the evidence as presented and determine its decision regarding disciplinary action. The Committee has neither the advantages nor limitations inherent in a court of law. Innocence of the student being questioned will be presumed. No facts or conclusions will be assumed. The decision as to whether the student perpetrated the alleged act will be made solely on the basis of evidence and testimony presented at the meeting. During the hearing the student will have access to all the evidence presented. 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.

9. All who appear before the Committee are assured that their appearance occurs without fear of repercussions from their testimony.

10. After the meeting and decision of the Disciplinary Committee, the Associate Dean for Student Affairs will inform the student verbally and in writing of the result within three working days.

11. The student will have access to the written record of the meeting’s proceedings.

12. Unless it is determined by the Associate Dean for Student Affairs that extraordinary circumstances exist (e.g., physical threat to others), the student will be permitted to continue in the usual academic activities during the disciplinary proceedings.

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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.

**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](http://www.usmle.org).
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**St. Louis**

The St. Louis area has more than 2.7 million residents, making it the nation's 18th largest metropolitan area. A recent Brookings Institution study of Census data found that the area is experiencing net in-migration of college-educated people between the ages of 25 and 34. The proportion of residents with academic degrees — as well as the proportion of professional managers, scientists, and engineers — exceeds the national average. St. Louis has a cost of living that ranks consistently lower than many other 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 — fashionable, 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 find apartments that range from $500-$650 per month and purchase properties ranging from $100,000 and up, all in the immediate area. For those who desire a more suburban lifestyle, west St. Louis County is a growing and beautiful 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 medical school faculty, students and staff.

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. Suplementing 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 St. Louis Art Museum was built for the 1904 World’s Fair, much of the Washington University collection was housed in it. Ties with the St. Louis 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 60 large-scale sculptures by artists of international renown. St. Louis has two major historical museums as well: the Missouri Historical Society in Forest Park and the Museum of Westward Expansion under the Gateway Arch.

Recreation

For recreation, St. Louisans may use any of 93 parks that dot the metropolitan area. In Forest Park, which lies between the two Washington University campuses, are the Art Museum, The Muny, the famed 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 kilometers of St. Louis.
hours’ drive of St. Louis. For sailors, 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 splendid 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 Gas House Gang, Stan Musial, Lou Brock, Ozzie Smith and Mark McGwire are all part of Cardinal history. The new Busch Stadium opened in spring of 2006.

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 a winning history. 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 large cities.

Many major corporations are located here, as are a variety of retail, transportation and banking organizations. Among the top firms are Anheuser-Busch, Emerson and Boeing. 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 WUMC generates an annual financial impact of more than $2.5 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.

**Housing**

Those who come to St. Louis to be associated with the Washington University School of Medicine find apartments that range in price from $550-$750 per month, all in the immediate area. The Apartment and Housing 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 [www.ars.wustl.edu](http://www.ars.wustl.edu).

The Spencer T. Olin Residence Hall, (314) 362-3230, at 4550 Scott Ave. on the Medical Campus, has accommodations for approximately 170 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 rooms for 2007-08 are:

**Summer 2007 (May 26 – August 4)**
- Single Room: $1,024
- Large Single: $1,258
- Solo Suite: $1,525
- Double Room: $703*
- Double Suite: $1,024*

**School Year: Mid August-Mid May (Nine Months)**
- Single Room: $3,422
- Large Single: $4,105
- Solo Suite: $4,986
- Double Room: $2,306*
- Double Suite: $3,422*

*Price per student

**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 2004-2005-2006." 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) 362-4814.

**Parking and Transportation (UPass)**

Hourly, daily and permit parking is available in the 2200-space School of Medicine Clayton Garage (corner of Clayton and Taylor avenues) and the new 700-space School of Medicine Metro Garage (corner of Children’s Place and Taylor Avenue). There is limited Surface Permit parking on School of Medicine surface lots, which are located near a variety of sites on the Medical Campus. School of Medicine surface parking permits are required Monday through Friday from 7 a.m. to 2 p.m. Space is available on a first-come basis. Parking in patient or visitor spaces by faculty, staff and students is strictly prohibited at all times.

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 wusmparking.wustl.edu, contact Transportation Services at (314) 362-6824 or stop by our office in Olin Residence Hall, 4550 Scott Ave. If you are interested in carpooling, vanpooling, Metro passes or coupon books, please contact the School of Medicine's Transportation Services.

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 UPASS online at parking.wustl.edu. There is no charge for the UPASS. It allows you to access the MetroBus and MetroLink system. You must show your Washington University ID in conjunction with a valid UPASS to ride free. The Danforth Campus, West Campus, North Campus and Medical Campus all have MetroLink stations.

**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.
**Lockers**

Student lockers with combination padlocks are on the third and fourth floors of the Farrell Learning and Teaching Center. Locker assignments are made by the Registrar’s Office for a nominal fee to cover the cost of the padlock. Only padlocks issued by the Registrar’s Office may be used.

**Mail**

First-class student mail sent to the School of Medicine will be put in student mailboxes. This 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

**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 [wusmhealth.wustl.edu](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 physicians: internists, allergists, dermatologists 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. The students are able to 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 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. The Health Service has arranged a few options for you to review. A detailed description of the plans and applications are available at the Health Service office.

Dental Care

There is no provision for treatment of dental problems through the Student Health Service, other than for injury to a sound natural tooth. Students frequently ask where to get dental care at a reasonable cost. Two sources of care have been identified. Students may obtain the names of private dentists that offer quality low-cost routine dental care from the Health Service.

A second option is to purchase dental coverage through a group plan offered through the Health Service. Students who wish to purchase this plan should contact the Health Service for a detailed description of the coverage and application form. Student Health Service will collect the yearly premium at the time of enrollment. Enrollment for this plan will close August 30 and will not re-open until August 1 the following year with no exception. A similar individual plan is also available to the spouse of a student enrolled in the dental plan.

Counseling Services

Students within 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 Medical Campus 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.

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 (314) 362-2346 for more information.

Life Insurance

All students are covered by a $10,000 life insurance benefit. Call (314) 362-2346 for more information.

BACK TO TOP
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, and slacks or skirt. Both men and women should wear a short white jacket with the appropriate hospital identification card clearly visible.

**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. In recent years, the service projects have included an ongoing blood pressure screening program done in conjunction with the American Heart Association.

**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 (SOCC)**
As the number of uninsured citizens in America continues to rise, the Student Organized Clinic provides an important service to the community of St. Louis. The clinic provides the sole access that many patients have to the health care system. It provides a close-up look for our student volunteers at how severe the problem of the uninsured in America is.

**Washington University Medical Center Housestaff Auxiliary (WUMCHA)**
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 Kim Latacha at (314) 353-1102 or klatacha@yahoo.com, or by visiting [www.wumcha.com](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. The Reproductive Health Project (SHARE) provides sex education to middle school students. 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. CoMoTion serves as a clearinghouse for students to participate in a series of St. Louis outreach programs. Through this project, students have worked in a soup kitchen and shelters for the homeless, supervised a women’s center and organized a holiday gift drive for homeless families. The Domestic Violence Action (DVA) group has introduced domestic violence issues into the medical school curriculum. These students also organize yearly symposiums on domestic violence for health care workers from the community. The Geriatrics Outreach Program helps prepare students for challenges and rewards with working with older patients. Pediatric Care Organization 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. **Smoking Cessation Project** trains medical students to assist patients in smoking cessation through group and individual counseling using the American Lung Association Freedom from Smoking program. A newer group, **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.

**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.

**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.

**Transcript Service**
The transcript service is run individually by the first- and second-year classes. It is a self-funded program in which both written and audio transcripts are produced for each lecture during the school year. Students alternate various duties, including tape recording, transcribing, copying and distributing the transcripts. It is a voluntary cooperative effort involving interested students (almost all students join) for a relatively modest fee, and is widely viewed as a valuable endeavor.

**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.

**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 carried out at the School of Medicine. Students will be awarded a fellowship and stipend for a two-month program. Inquiries should be made to Student Research Fellowships, Koong-Nah Chung, PhD, Washington University School of Medicine, Campus Box 8107, 660 S. Euclid Ave., St. Louis, MO 63110 or (314) 362-6844.

**Alpha Omega Alpha**

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

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

**Awards and Prizes**

Washington University School of Medicine publicly recognizes and rewards at two annual events outstanding scholarship, research accomplishments and community service of individual students. In December, the Student Awards Luncheon acknowledges academic excellence earned during the first three years of study. As part of the festive commencement activities in May, graduates are recognized for meritorious research and clinical achievements accomplished during their medical school careers.

The Academic Women’s Network 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 2007 recipients: Oluwadamilola Motunrayo Fayanju and Carol Alice Lin.

Morris Alex, M.D. Prize. Awarded each year to the medical student who is outstanding among his or her peers in the second-year Clinical Medicine course. The 2007 recipient: Sunitha Sequeira.
Alpha Omega Alpha Book Prize. Awarded to a member of the graduating class who has performed outstandingly for the entire medical course. The 2007 recipient: Katherine Elizabeth Fleming.

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 2007 recipient: Robert Lazelle White III.

American College of Physicians Michael M. Karl, M.D. 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 2007 recipient: Gina Nicole LaRossa.

American College of Physicians Award for Excellence in Physical Diagnosis. Two recipients are selected annually based on their outstanding performance in the second-year Clinical Medicine course. The 2007 recipient: Steven M. Sperry.

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 2007 recipient: Karrie T. Amor.

American Medical Women’s Association Glasgow-Rubin Memorial Achievement Citations. Presented to women medical students graduating in the top 10 percent of their class.

American Medical Women’s Association Glasgow-Rubin Memorial Award. Presented to a woman graduating first in her class.

Association for Academic Surgery Student Research Award. Recognizes outstanding research efforts by a graduating medical student interested in a surgical career.

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 2007 recipient: Laura M. Houser.


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 2007 recipient: Justin Samuel Sadhu.


Dr. Harvey Butcher Prize in Surgery. Awarded annually in memory of Dr. Harvey Butcher to the member of the graduating class who, as judged by the Department of Surgery, shows the greatest promise for general surgery. The 2007 recipients: Oluwadamilola Motunrayo Fayanju and Paymon Rahgozar.


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 2007 recipient: Karolyn A. Wanat.

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 2007 recipient: Andrew T. Harger.

Carl F. and Gerty T. Cori Prize in Biochemistry. Awarded at the end of the first year to the member of the class who has demonstrated superior scholarship in Biochemistry. The 2007 recipient: Michael A. Dobson.

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 2007 recipient: Michael A. Dobson.

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 2007 recipients: David M. Brogan and Holly B. Lindsay.

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 2007 recipient: Mackenzie Anna Ford.

Distinguished Minority Medical Student Scholarship Prizes. Provided by African-American alumni and friends of Washington University School of Medicine, the prizes are awarded to Minority Scholarship recipients in recognition of their achievements in the first and second year of the curriculum.

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 2007 recipient: Carol A. Lin.

Dr. William Ellis Award. Established in 1990 by Dr. Ellis and awarded to a senior student in recognition of meritorious research in ophthalmology. The 2007 recipient: Amy Min-chi Fang.

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 2007 recipient: John Edward Reuter.

The Family Health Foundation of Missouri Scholarship Award. Awarded to the top graduating student entering the specialty of family medicine. The 2007 recipient: Kao-Ping Chua.

George F. Gill Prize in Pediatrics. Awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics. The 2006 recipient: Kirstin Lee Abel.

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 deases of the chest or pulmonary physiology. The 2007 recipient: Lorraine Cheryl Pelosof.

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 2007 recipient: Bryan Sukwoo Lee.

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 2007 recipient: Yelizaveta I. Sher.

R.R. Hannas Award for Excellence in Emergency Medicine. Offered annually by the Missouri Chapter of...

Dr. John Esben Kirk Scholastic Award. Established in 1975 and awarded to a graduating student of high scholastic standing. The 2007 recipient: Kevin Lee Ard.

Louis and Dorothy Kovitz Senior Prize in Surgery. Senior award in surgery recognizing a member of the graduating class who has shown the most outstanding ability, zeal and interest in surgical problems. The 2007 recipients: Brian Michael Rapp and Kenneth Richard Ziegler.

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 2007 recipient: Katherine Elizabeth Fleming.


Oliver H. Lowry Prize in Pharmacology. Awarded to a second-year medical student for academic excellence in pharmacology.

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 2007 recipient: Alejandro Aquino.

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 2007 recipient: Jessica Duan.

McGraw-Hill/Appleton & Lange Medical Student Book Award. Awarded annually to medical students for high scholastic standing. The 2007 recipients: Rebecca A. Bavolek and Margaret M. Garin.

Medical Center Alumni Scholarship Fund Prize. Given annually to a student who has shown excellence in his or her work during the preceding year. The 2007 recipients: Jeremy R. Etzkorn and Steven M. Sperry.

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 student of the fourth-year class who has excelled in the study of surgery. No individual is eligible for both prizes. The 2007 recipients: Kevin Lee Ard (Medicine) and David Sexton Lewis (Surgery.)


Missouri State Medical Association Award. Presented annually to honor graduates of the senior class. The 2007 recipients: Jennifer Y Chu, Katherine Elizabeth Fleming and Gina Nicole LaRossa.

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 2007 recipient: Oluwadamilola M. Fayanju.

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 2007
recipient: Joseph Edward Ippolito.

James L. O'Leary Neuroscience Prize. Awarded annually to a student who demonstrates the best accomplishments in the Neuroscience course. The 2007 recipient: Sidat M. Kumaratne.


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 are awarded to Minority Scholarship recipients in recognition of their achievements in the first and second year of the curriculum. The 2007 recipients: Adewale O. Adeniran, Oluwafunmilola T. Okuyemi.

Dr. Philip Rosenblatt Award in Pathology. Given to a medical student for distinguished performance during an elective in pathology or laboratory medicine. The 2007 recipient: Kimberley Jane Evason.

St. Louis Pediatric Society Senior Prize. Presented to the senior student showing the greatest promise in clinical pediatrics. The 2007 recipient: Leon Robert Scott.

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 2007 recipients: Benjamin C. Jennings and Caroline M. Maynard.

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 2007 recipient: Justin Samuel Sadhu.

Dr. Margaret G. Smith Award. Given to a woman medical student for outstanding achievement in the first two years of medical school. The 2007 recipient: Valliammai Muthappan.

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 2007 recipient: Rebecca Ann Bavolek.

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 2007 recipient: Mallika Anand.

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 2007 recipient: Yelizaveta I. Sher.

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 2007 recipient: Jeffery Michael Klco.

Washington University Summer Research Prize. The award recognizes a student for meritorious research in the Summer Research Fellowship Program at Washington University School of Medicine. The 2007 recipient: Eugenia Shekhtman.

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 2007 recipients: Gita Natwar Mody and Smita Sihag.
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.

Park J. White, M.D. 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 a student for outstanding performance in the ethics elective offered by the Program for the Humanities in Medicine. The 2007 recipient: Seth Thomas Stalcup.

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 2007 recipient: Jennifer Eryn Sprague.

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 2007 recipients: Edy Yong Kim and Lisanne M. Palomar.

James Henry Yalem Prize in Dermatology. Established by Charles Yalem in memory of his son and awarded annually to a member of the fourth-year class for outstanding work in dermatology. The 2007 recipients: Caroline Patricia Halverstam and Brendan Matthew Lloyd.

The Washington University Graduate

Residency Training

Postdoctoral Training

Continuing Medical Education

Medical Alumni and Development Programs

Residency Training

Although not required by all states for licensure, 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 first, second and third year can participate in career counseling workshops 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 in order to learn more about the fields that they are interested in.

During their third and fourth year, 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 different residency specialities. 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 (2007) are identified in the Alphabetical List of Students area in the Register of Students section.

The School maintains an active interest in its graduates and is pleased to assist them in subsequent years as they seek more advanced training or staff appointments in the communities in which they settle.

**Postdoctoral Training**

Those departments that offer postdoctoral fellowships individualize such educational activity up to a maximum of 36 months of academic time. Such fellowships lead integrally to certification by the appropriate specialty and/or subspecialty boards of the American Medical Association.

**Fellowship And Other Funds**

- **Alexander and Gertrude Berg Fellowship Fund.** Created in 1952 through the bequest of Gertrude Berg to provide a fellowship in the Department of Molecular Microbiology.

- **Glover H. Copher Fellow in Surgical Research.** Established in 1971 to support a postdoctoral fellow in surgery.

- **William H. Danforth Loan Fund for Interns and Residents in Surgery.** Provides financial assistance in the form of loans for postdoctoral students in surgery.

- **Frederick Lee Hawes Fellowship in Congestive Heart Failure.** Established in 1998 to provide a one-year fellowship in congestive heart failure.

- **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.
Julio Santiago Fellowship. Established in 1998 in memory of Dr. Julio Santiago by the John Henry and Bernadine Foster Foundation to provide one year of advanced training for a Pediatric Metabolism/Diabetes Fellow.

Sports Medicine Fellowship Program. Established in 2005 to support a fellow in the Sports Medicine Program.

The Esther and Morton Wohlgemuth Foundation Fellowship. Established to support a fellow in the Division of Cardiovascular Diseases.

Wyeth Fellowship in Antibiotic Resistance. Established in 2005 to provide an additional year of mentored research training for Infectious Diseases Fellow to focus their research on the prevention and control of antibiotic resistance.

Continuing Medical Education

The study of medicine is a lifelong process with continuing medical education being an integral part 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 provide learning opportunities through periodic courses, regularly scheduled conferences, and enduring materials related to all areas of medical practice to local, national and international physicians and other health professionals that result in improved skills, attitude, competency and performance and increased knowledge in order 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 100 symposia and more than 150 recurring academic rounds and conferences as well as videos and monographs are provided with CME credit by this office. About 8,000 registrants attend these courses annually and receive more than 100,000 hours of instruction. CME-Online provides educational programs via the Internet. Since starting in 2000, the program has grown to include more than 120 hours of potential CME credit. The URL is 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.
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 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 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 School’s departments. Nine such chairs have been created thus far.

**Guiding Principles of Professionalism**

**PREAMBLE:**

Medicine is one of the oldest of the learned professions. A professional is one who is in command of a specialized body of knowledge and skills, and is given specific rights not typically allowed to the public. Along with those rights, the professional has specific responsibilities or duties not generally expected of the public.

The singularity of medicine is that it deals with human health. Patients are potentially at their most vulnerable when establishing a relationship with a physician. That the patient’s relationship with 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.

**PROFESSIONAL RESPONSIBILITY:**

Students have a responsibility to actively participate in their education and to work to improve the educational environment for future students.

Students should have a willingness to pursue life-long, self-directed learning, which is an essential attribute of any professional.

Students should act responsibly in their personal and academic lives with regard to meeting deadlines, financial obligations and other comparable responsibilities.

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.

- 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.

Students should report to the appropriate supervisor potentially serious errors that others have committed.

Students should contribute to their community.

- Students are encouraged to participate in the first- and second-year teaching groups.
  - These provide a service to the larger St. Louis community, while teaching students how to communicate with people of diverse backgrounds.
- Students are encouraged to serve at the Saturday Neighborhood Health Clinic and other community service and teaching activities.

Students should be aware of the larger social and economic context in which disease occurs, and take advantage of opportunities to deepen their knowledge about this topic.

**COMPETENCE AND SELF-IMPROVEMENT:**

In order to function at the expected level, students should attend to their own physical and emotional health.

- 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.

Recognizing and admitting errors in patient care are key to being a good physician.

- Students should view mistakes as part of learning. Assuming responsibility for mistakes is critical for professional development.
- Developing productive strategies for dealing with mistakes and non-confrontational ways of correcting them is essential.

Feedback, advice and criticism from residents, fellows and faculty fosters personal and professional development, and should be taken in the context of mentoring.
- 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.
- Students should provide suggestions and examples for improving the mentoring environment by forthrightly evaluating their instructors.

Students should identify and correct errors in patient care as soon as possible or notify those who can correct it.

Students should balance personal and professional interests.
- Students should not overcommit.
- Students should communicate schedule conflicts to course directors, lecturers, and/or house staff.

RESPECT OF OTHERS AND PROFESSIONAL RELATIONSHIPS:

Students should conduct themselves with manners and consideration of all others, and be respectful of others’ time.

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.

- 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.

- During the clinical years, students should understand that their peers are a valuable resource. Likewise, a student should assist peers in patient care responsibilities.

- In all cases, students should respect the work and learning opportunities of their classmates and they should share educational opportunities with their peers. Professional behaviors include listening to other's presentations, and encouraging others' opportunities to present, ask/answer questions, admit patients, participate in surgical cases/procedures, or perform duties.

Respect for the ethnic and cultural diversity of classmates provides for a more nurturing environment for all.

- 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.

- 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.

Students should be supportive of peers during difficult times in their personal and professional lives.

- 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.

Participation and teamwork enhances the educational experience.

- 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.
- Contributing to the overall functioning of the team maximizes both learning and patient care in the clinical setting.
Understanding the appropriate venues for feedback to house staff/fellows/faculty is critical to successfully resolving conflicts.
- Students should be aware of the hierarchy of the team, and appropriate mechanisms for handling disagreement with faculty/residents/fellows. Conflicts can be translated into productive outcomes if handled appropriately. medicine.wustl.edu/students/conduct.htm

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

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.
- Use of offensive language or gestures is unacceptable.
- At times, some religious beliefs will require the use of alternative care approaches.
- 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.

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

**HONESTY AND INTEGRITY:**

Student work should be original.
- Only authorized resources should be used during examinations, quizzes or graded course work. WUSM has a zero tolerance policy for plagiarism.
- 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 of Student Affairs.

Students must respect patients’ rights and maintain confidentiality, in accordance with HIPAA guidelines.
- Students should be ever aware that patients are ill and have the right to refuse care, particularly when poorly provided.
- Patient information should only be discussed with appropriate people at appropriate times.
- Patient records should not be photocopied carelessly or removed from appropriate areas.
- Patient information should be disposed of appropriately to prevent careless transmission of patient information.

Students should clearly communicate their abilities and level of training to patients.
- If a student does not know the answer to a patient's question, it is his/her responsibility to admit this lack of knowledge.
- 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.
- 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.

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.

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.

Although students are often tired or under stress, they should attempt to maintain an appropriate level of composure at all times.

Students should be appropriately attired for all patient care duties.

Students should carefully consider their participation in benefits provided by pharmaceutical companies or other medically-related businesses.

Students should respect the laws of federal, state and local governments in both professional and private life.

**Washington University Policy on Sexual Harassment**

**I. Introduction and Policy Statement**

Washington University is committed to having a positive learning and working environment for its students, faculty and staff and will not tolerate sexual harassment.

Sexual harassment is an attack on the dignity of individuals and the integrity of the University as an institution of learning. Academic freedom can exist only when every person is free to pursue ideas in a non-threatening, non-coercive atmosphere of mutual respect. Sexual harassment is reprehensible and threatening to the careers, educational experience and well being of all members of our community.

Sexual harassment is a form of discrimination that violates University policy. It is also illegal under state and federal law.

This policy applies to all members of the Washington University community. It allocates responsibilities for helping to ensure that University policy is fairly applied, explains the process by which complaints of sexual harassment may be brought forward and provides sanctions for sexual harassment, which may range from reprimands to termination or dismissal, depending upon the severity of the offense. If you believe you have been sexually harassed, Sections IV and V describe options about what you can do and where you can get help. If you believe you have been falsely accused of sexual harassment, the procedures described below are also available to you. Those charged with implementation of this Policy will, whenever appropriate, encourage and assist those who believe they may have been sexually harassed to pursue the assorted informal means outlined in Section IV below for securing the cessation of unwelcome and offensive conduct.

**II. What is Sexual Harassment?**

For the purposes of this statement, Washington University has adapted the Equal Employment Opportunity Commission (EEOC) definition of sexual harassment for an academic community: Sexual harassment is defined as any unwelcome sexual advance, request for sexual favor or other unwelcome verbal or physical conduct of a sexual nature, whether committed on or off campus, when:

1. submission to such conduct is made, either explicitly or implicitly, a term or condition of an individual’s employment or academic advancement;

2. submission to or rejection of such conduct by an individual is used as the basis or threatened to be
used as the basis for employment or academic decisions or assessments affecting an individual; or

3. such conduct has the purpose or effect of unreasonably interfering with an individual's work or educational performance or creating an intimidating or hostile environment for work or learning. Such conduct will typically be directed against a particular individual or individuals and will either be abusive or severely humiliating or will persist despite the objection of the person targeted by the speech or conduct.

Sexual harassment includes but is not limited to situations where one person has authority over another. In such situations, sexual harassment is particularly serious because it may unfairly exploit the power inherent in a faculty member's or supervisor's position.

Sexual harassment can be verbal, visual, physical or communicated in writing or electronically. Some conduct obviously constitutes sexual harassment -- such as a threat that a grade or promotion will depend on submission to a sexual advance. But whether particular conduct constitutes sexual harassment will often depend upon the specific context of the situation, including the participants’ reasonable understanding of the situation, their past dealings with each other, the nature of their professional relationship (e.g., supervisor-subordinate, colleague, etc.) and the specific setting. The inquiry can be particularly complex in an academic community, where the free and open exchange of ideas and viewpoints preserved by the concept of academic freedom may sometimes prove distasteful, disturbing or offensive to some.

Examples of conduct which may constitute sexual harassment include but are not limited to:

- requests for sexual favors
- hugging, rubbing, touching, patting, pinching or brushing another's body
- inappropriate whistling or staring
- veiled suggestions of sexual activities
- requests for private meetings outside of class or business hours for other than legitimate mentoring purposes
- use in the classroom of sexual jokes, stories or images in no way germane to the subject of the class
- remarks about a person's body or sexual relationships, activities or experience
- use of inappropriate body images to advertise events

Members of the University community can expect to be free from sexual harassment and thus all members of the University community should guard against it. The fact that someone did not intend to sexually harass an individual is generally not considered a sufficient defense to a complaint of sexual harassment, although the reasonableness or the accuser’s perceptions may be considered. In most cases, it is the effect and characteristics of the behavior on the complainant and whether a reasonable person similarly situated would find the conduct offensive that determine whether the behavior constitutes sexual harassment.

III. Confidentiality

The University will strive to protect, to the greatest extent possible, the confidentiality of persons reporting harassment and of those accused of harassment. Because the University has an obligation to address sexual harassment, however, the University cannot guarantee complete confidentiality where it would conflict with the University's obligation to investigate meaningfully or, where warranted, take corrective action. Even when some disclosure of the University's information or sources is necessary, it will be limited to the extent possible. The University will, to the extent permitted by law, keep confidential all records of complaints, responses and investigations. The records maintained by the Sexual Harassment Response Coordinator shall be available only to the Coordinator and, to the extent necessary, to administrators and other supervisors charged with responding to allegations of harassment. Allegations of sexual harassment shall not be placed in student records or personnel files unless, after appropriate investigation, such allegations have been sustained. Records of allegations maintained by the Coordinator which do not lead to formal hearings or personnel actions will be discarded after five years unless there are additional, more recent complaints against the same
person. Any records maintained by the Coordinator concerning an allegation about which an accused person was not given reasonably timely notice and an opportunity to respond shall not be used to justify or enhance a sanction, other than an oral or written warning, imposed for a different instance of harassment.

If you want to discuss possible harassment in a more confidential setting or clarify your feelings about whether and how you wish to proceed, you may want to consult a social worker, therapist or member of the clergy, who is permitted, by law, to assure greater confidentiality. Clergy and counseling resources on campus are listed in Bearings, Ternion and Safety and Security on the Hilltop Campus. In addition, any member of the University community may contact the Student Counseling Services at (314) 935-5980 for a confidential discussion and, if desired, referral to off-campus resources.

**IV. Seeking Advice; Making a Complaint**

If you believe that you have been sexually harassed, you have a number of response options, both formal and informal. Some people may wish to pursue informal means instead of or before making a formal complaint; others will not. If an informal procedure is ineffective, the formal procedures will remain open to you. You should select the route you feel most appropriate for your circumstances. However you wish to proceed, you may consult at any time with the Hilltop or Medical Center Sexual Harassment Response Coordinator (listed in the Appendix), whose responsibilities include assisting students, faculty and staff with sexual harassment issues, be they general or specific, formal or informal. You may wish to work with the Coordinator to select an approach.

**A. Informal Procedures**

I. If you feel comfortable dealing with the situation without assistance, you can:
   a. Clearly say “no” to the person whose behavior is unwelcome.
   b. Communicate either orally or in writing with the person whose behavior is unwelcome. The most useful communication will have three parts:

   1. A factual description of the incident(s) including date, time, place and specific action.
   2. A description of the writer’s feelings, including any consequences of the incident.
   3. A request that the conduct cease.

   Frequently, such a communication will cause the unwelcome behavior to stop, particularly where the person may not be aware that the conduct is unwelcome or offensive.

II. If you would like to proceed informally, but with the assistance of someone else, you may:
   a. Ask the person’s supervisor, e.g., department chair, dean, director, housing office representative, academic advisor or resident advisor, to speak to the person whose behavior was unwelcome. The purpose of such conversations is the cessation of unwelcome behavior.

   b. Consult with the Coordinator or one of the Sexual Harassment Response Advisors listed in the Appendix and specifically charged with responding to sexual harassment inquiries and complaints. These individuals are thoroughly familiar with University policy on sexual harassment and are available to consult with victims of sexual harassment, those charged with sexual harassment, witnesses and supervisors of parties to a complaint. They can provide information about informal actions that might remedy the situation and discuss University policy on sexual harassment and procedures for resolving complaints.

   c. Ask the Coordinator to mediate or arrange for mediation. Mediation is discussion and negotiation, with the help of a third party, designed to permit the parties to reach a mutually agreeable resolution of a dispute. If a person complaining of sexual harassment seeks mediation, the person accused of harassment agrees and the Coordinator concludes that the mediation would be consistent with the University’s legal obligations in responding to and preventing sexual harassment, the Coordinator may mediate or arrange for mediation.

**B. Formal Procedures**
Whether or not you have attempted to resolve a sexual harassment claim through informal means, you may initiate a formal sexual harassment grievance proceeding by filing a written complaint. This process may lead to a formal hearing at which evidence will be considered and witnesses heard. If this is the course you wish to take, the Coordinator can assist you in filing a complaint.

Complaints, prepared with or without the assistance of the Coordinator, can be filed with the following Committees, with a copy to the Coordinator for your campus:

Complaints against faculty or staff:

Faculty and Administrative Affirmative Action Committee
(complaints by faculty and administrators)

Discriminatory Harassment and Title IX Grievance Committee
(complaints by students)

Human Resources Advisory Committee
(complaints by staff)

All of these committees may be contacted:
Legail Chandler
Office of Human Resources
Campus Box 8002
4480 Clayton Ave.
St. Louis, MO 63110
(314) 362-4900
(314) 362-2500 (fax)

Hearing procedures are set forth in the Washington University Discrimination and Sexual Harassment Hearing Procedures. These procedures may be obtained from the Office of Human Resources or from any Sexual Harassment Response Coordinator or Advisor.

Complaints against students or student groups:
Legail Chandler
Office of Human Resources
Campus Box 8002
4480 Clayton Ave.
St. Louis, MO 63110
(314) 362-4900
(314) 362-2500 (fax)

Hearing procedures are set forth in the University Judicial Code, found in Bearings and Washington University Faculty Information. These procedures may also be obtained from the University Judicial Administrator or from the Sexual Harassment Response Coordinators or Advisors.

Whether or not you choose to file a complaint, the University may be required, or may otherwise deem it necessary and protective of the academic community, to commence its own investigation.

V. Protection of Rights

The University will not tolerate retaliation or discrimination against persons who report or charge sexual harassment or against those who testify, assist or participate in any investigation, proceeding or hearing involving a complaint of sexual harassment. In this context, retaliation means speech or conduct that adversely affects another’s terms or conditions of employment or education and is motivated by an intent to harm the targeted person because of his or her participation in the filing or investigation of an allegation of sexual harassment. Any such retaliation -- or any encouragement of another to retaliate — is a serious violation of University policy and law; independent of whether the particular claim of sexual harassment is substantiated. If you believe you have been subjected to retaliation in violation of this rule, you may use the procedures described above to complain and seek
redress.

The University seeks to protect the rights of all persons, accusers and accused, to fair procedures. Accusations of sexual harassment typically have injurious far-reaching effects on the careers and lives of accused individuals. Allegations of sexual harassment must be made in good faith and not out of malice. Knowingly making a false or frivolous allegation of sexual harassment, whether in a formal or informal context, will be treated as a serious offense under this policy and, where it applies, the University Judicial Code. If you believe you have been falsely accused of sexual harassment you may use the procedures of this policy or the University Judicial Code, where applicable, to seek redress. See Section IV.

VI. Obligations of Vigilance and Reporting

The University can respond to specific instances and allegations of harassment only if it is aware of them. The University therefore encourages anyone who believes that he or she has experienced sexual harassment to promptly come forward with inquiries, reports or complaints and to seek assistance from the University. In addition, any University employee who becomes aware of instances or allegations of sexual harassment by or against a person under his or her supervisory authority must report it to those charged with responding to such allegations and reports: the appropriate dean, director or department head or other similar administrator or to the Sexual Harassment Response Coordinator or one of the Advisors. It shall be the responsibility of these individuals to respond to allegations and reports of sexual harassment or refer them to other University officials for such response.

Any dean, director or department head or other similar administrator who becomes aware of information indicating a significant likelihood of sexual harassment must report such information to the Sexual Harassment Response Coordinator for the appropriate campus. These administrators must respond not only when they receive a specific complaint or report alleging improper activity, but also when such matters come to their attention informally. Unconfirmed or disputed allegations should be clearly labeled as such and reports should indicate any steps already taken to investigate or otherwise respond. Administrators may wish to consult with the Coordinator or any of the Advisors prior to investigating or otherwise responding to any situation involving alleged harassment.

VII. Possible Sanctions

Possible sanctions for a person found guilty of behavior in violation of this policy include but are not limited to the following:

- oral or written reprimand, placed in the personnel file
- required attendance at a sexual harassment sensitivity program
- an apology to the victim
- oral or written warning
- loss of salary or benefit, such as sabbatical or research or travel funding transfer or change of job, class or residential assignment or location (i.e., removing the person from being in a position to retaliate or further harass the victim.)
- fine
- demotion
- suspension, probation, termination, dismissal or expulsion

While counseling is not considered a sanction, it may be offered or required in combination with sanctions. Where alcohol is involved in the sexual harassment, such counseling may include an alcohol abuse program.

If students or student groups are guilty of sexual harassment, any of the sanctions set forth in the University Judicial Code may also be invoked.

VIII. Education
The best way to deal with sexual harassment is to prevent it. Education is essential to eliminating sexual harassment. To this end, Washington University has developed an ongoing training program. Please call a Sexual Harassment Response Coordinator or Advisor to find out more about these programs, what sexual harassment is, how to respond to it and what to do when someone asks for advice about sexual harassment.

Approved by the Washington University Senate Council, October 19, 1995.
Approved by the Washington University Senate, April 22, 1996.
Revision approved by the Washington University Senate, April 28, 1997.
(This policy supersedes prior University Policies on Sexual Harassment).

Sexual Harassment Coordinators and Advisors
(as of January 2006)

Danforth Campus

Coordinator:

Ann B. Prenatt – (314) 935-7746

Advisors:

Lorraine Goffe-Rush – (314) 935-8046
(complaints by faculty, staff and others)

Kathy Steiner-Lang – (314) 935-5910
(complaints by students and others)

John Drobak – (314) 935-6487
(complaints by faculty and others)

Medical Campus

Coordinator:

Legail Chandler – (314) 362-4900

Advisors:

Apryle Cotton – (314) 362-7198
(complaints by faculty, staff and others)

Leslie Kahl – (314) 362-7481
(complaints by students and others)

Sandra Sledge – (314) 362-4937
(complaints by staff and others)
I. 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.

II. 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.

Examples of conduct that may be considered abusive include but are not limited to:
- Threatening or intimidating behavior or words (written or oral)
- Obscenities/profanities (verbal or gestures) directed at a person
- Threatening or obscene gestures, jokes or cartoons
- Degrading a person or a group on the basis of a personal or cultural characteristic
- Taunting, jeering, mocking or humiliating another person through acts or words
- Screaming and/or yelling at or around others
- Insulting someone, especially in the presence of others
- Endangering the safety of an individual or individuals

In considering a complaint under this policy, the following understandings shall apply:

1. 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.
2. 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.

III. 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
IV. Protection of Rights

1. 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

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.

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.

V. 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.

BACK TO TOP

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.

BACK TO TOP

Washington University School of Medicine Policy for Students with Disabilities

It is the goal of Washington University to assist students with disabilities in removing the barriers their disability may pose and provide support in facing the challenge of pursuing an education at
Washington University recognizes and accepts its professional, legal and moral responsibility to avoid discrimination in the acceptance and education of qualified students with disabilities and to provide reasonable accommodations to such students consistent with the principles embodied in the law. These guidelines apply to students seeking admittance as well as to those who become disabled while they are enrolled.

Washington University makes every effort to ensure that all qualified applicants and students can participate in and take full advantage of all programs and opportunities offered within the University. Washington University encourages and gives full consideration to all applicants for admission. Washington University does not discriminate in access to its programs and activities on the basis of age, sex, sexual orientation, race, disability, religion, color or national origin.

All students in educational programs at the School of Medicine, those seeking admittance, 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 CAES Policies
The policies and procedures of the School regarding promotion and retention are contained in the CAES 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.
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-fifths 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.

Fourth-Year Class Officers

President
Steve Sperry

Medical Education Representative (MER)
Noopur Gangopadhyay

Representative to the Organization of Student Representatives (OSR Rep)
Fummi Okuyemi

Representative to the Graduate Professional Council (GPC Rep)
Andrew Leitner

Third-Year Class Officers

President
Adewale Adeniran

Medical Education Representative (MER)
David Brogan

Representative to the Organization of Student Representatives (OSR Rep)
Ryan Funk

Representative to the Graduate Professional Council (GPC Rep)
Ellen Bailey

Second-Year Class Officers

President
Amit Patel

Medical Education Representative (MER)
Huay-Zong Law

Representative to the Organization of Student Representatives (OSR Rep)
Lina Nayak

Representative to the Graduate Professional Council (GPC Rep)
Aggie Bielksa
First-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

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.

Washington University School of Medicine Tobacco-Free Policy

Effective April 2007

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.

1. 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 20 feet of entryways or exits; near air intakes; or near fire/explosion hazards;
   — any worksites in which individuals within the WUSM Community work.
2. 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.
3. Violations of the policy may result in disciplinary action.

12/06/2006

**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.

**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, national origin, veteran status, or disability. Present Department of Defense policy governing ROTC and AFROTC 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.

**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 Admissions Officers, the University has adopted...
procedures that implement these rights.

A copy of the University policies regarding educational records and the release of student record information may be obtained from the medical school’s Registrar’s Office.

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.

**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 11, 2008. Registration forms will be available early in the Fall 2008 semester, on the Medical Campus at the Student Affairs Office, Room 100, McDonnell 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 post-card 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
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 development and anatomy stress organogenesis as an adjunct to understanding the normal and abnormal anatomy. An extensive museum of labeled dissected specimens is housed in the dissecting room for ready reference by students who encounter abnormalities or variations in their dissections. Frequent use of CT and MRI scans, radiographs and cross-sections aid in the synthesis of knowledge gained through dissection into clinically useful information. Radiologic anatomy and clinical correlation conferences further aid in this process. 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 four-week blocks are: Weeks 29, 33, 37 and 41.

Different regions of the body will be dissected in detail. A period of four weeks should be allowed for each region: head and neck, thorax and abdomen, and superior and inferior limbs. Surgical approaches, cross-sections, X-rays and CT scans can be studied.  
Student time distribution: A minimum of 40 hours is required  
Major teaching responsibility: N/A  
Patients seen/weekly: N/A  
On call/weekend responsibility: N/A

**M05 820 TEACHING ASSISTANT IN HUMAN ANATOMY**  
Instructor: 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 four-week blocks are: Weeks 13 and 21.

Offers the student the opportunity to review human anatomy by assisting the Anatomy faculty in teaching first-year medical students in the Anatomy laboratory.
Student time distribution: N/A
Major teaching responsibility: N/A
Patients seen/weekly: N/A
On call/weekend responsibility: N/A

Research

(M05 900)

Cross-listed with L41 (Bio) 590

Charles H. Anderson, PhD, 2nd Floor East McDonnell Specialized Research Facility, 362-1799. Computational models of neural systems.

Dora Angelaki, PhD, 2nd Floor East McDonnell Specialized Research Facility, 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. Development and synaptic organization of cortical circuits.

Harold Burton, PhD, 3rd Floor East McDonnell Specialized Research Facility, 362-3556. Cortical functional reorganization in sighted and blind people.

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 circuits of motion detection, spatial orientation, and development of motion receptors.

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. Neural mechanisms of the detection and recognition of pheromones.

Arthur D. Loewy, PhD, 9th Floor McDonnell Medical Sciences Building, 362-3930. Brain circuits
controlling physiological functions.

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


Joseph L. Price, PhD, 4th Floor North Building, 362-3587. Structure and organization of the prefrontal cortex and limbic forebrain, and the neuropathology of mood disorders.

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. Genetics and molecular biology of ion channels.

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 Specialized Research Facility, 747-3530. Computational and cognitive issues in cortical control of eye and arm movement.

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

W. Thomas Thach, MD, 2nd Floor East McDonnell Specialized Research Facility, 362-3538. Neural control of posture, movement and motor learning; cognitive functions of the cerebellum.

David C. Van Essen, PhD, 2nd Floor East McDonnell Specialized Research Facility, 362-7043. Organization and function of cerebral cortex in general and primate visual cortex in particular.

Faculty

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

CHARLES H ANDERSON, PHD Research Professor of Neurobiology

DORA ANGEKAKI, PHD 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 Associate Professor of Neurobiology

PAUL C BRIDGMAN, PHD Professor of Neurobiology

ESTELLE BRODMAN, PHD, BS Professor Emeritus of Medical History in Anatomy

ANDREAS H BURKHALTER, PHD Professor of Neurobiology

HAROLD BURTON, PHD Professor of Neurobiology

VALERIA CAVALLI, PHD Assistant Professor of Neurobiology

JAMES M CHEVERUD, PHD Professor of Anatomy

THEODORE J CICERO, PHD Professor of Neurobiology
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 Joe Henry Steinbach, Ph.D., and the Washington University Pain Center under the direction of Rob Gereau, Ph.D. 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, M.D.; Zhou-Feng Chen, Ph.D.; C. Michael Crowder, M.D., Ph.D.; Alex S. Evers, M.D.; Narasimhan Gautam, Ph.D.; Richard S. Hotchkiss, M.D.; Christopher J. Lingle, Ph.D.; Joseph H. Steinbach, Ph.D.; Gina Story, Ph.D.; Yu-Qing Cao, Ph.D.; or Robert W. Gereau, Ph.D. In addition, opportunities exist for clinical research in the Clinical Research Division, under the direction of Evan Kharasch, M.D. Ph.D.

Courses

Fourth Year

Electives

**M10 805 ANESTHESIOLOGY**
Instructor: Tom Davis, MD, 362-2351; davisto@msnotes.wustl.edu
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Gerri Neumann, 362-4449
Other Information: Please contact the department student secretary, Gerri Neumann, at 362-4449 prior to the elective for specific instructions. Students should meet in the Clinical Simulation Center, Third Floor Barnes-Jewish Hospital Service Building, 8:30 a.m. first day of elective.

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

This clinical elective is designed to familiarize the student with basic aspects of anesthesiology practice. The primary teaching method is patient care in an instructional 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, and regional anesthetic techniques. The student will be an integral part of the anesthesia care team and will participate actively in the anesthetic management of surgical patients. The rotation will include clinical simulator sessions using a simulator mannequin for practical management of airway problems and medical/surgical emergencies. By the end of the rotation, the student should be able to independently (under supervision) provide anesthesia for uncomplicated surgical procedures.

Student time distribution: Inpatient 85%, Conferences/Lectures 15%; Subspecialty Care 100%
Major teaching responsibility: Single attending and/or 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 take part or all of any call period in the main operating rooms or in the obstetrical suite.

**M10 811 CARDIOTHORACIC ANESTHESIOLOGY**
Instructor: Rocco Huneke, MD, 362-2617
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Lydia Swink, 362-1196
Other Information: Students should meet at the offices of the Division of Cardiothoracic Anesthesia, Third Floor Barnes-Jewish Service Building, 8:30 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This clinical elective offers practical experience in the perioperative assessment and management of surgical patients undergoing cardiothoracic procedures. The student, as part of the cardiothoracic anesthesia team composed of faculty members, fellows and residents, will learn basic principles of airway management and lung ventilation, essential aspects of pharmacologic treatment of hemodynamic abnormalities and cardiac dysrhythmias, and management of intraoperative coagulation disturbances. Emphasis will be placed on the interpretation of intraoperative hemodynamic data, echocardiographic finding (TEE), and laboratory results in clinical decision making and treatment approach during anesthesia and surgery. During this rotation, the student will also gain practical experience in endotracheal intubation and the placement of intravenous lines, and invasive monitoring lines, including radial artery and pulmonary artery catheters. At the conclusion of the rotation, the student will have a better understanding of invasive monitoring and data interpretation, as well as a more systematic approach to the management of intra- and post-operative hemodynamic, pulmonary and coagulation abnormalities. The students are expected to attend the didactic sessions of CTA and the Department of Anesthesiology. A presentation or paper will be assigned.

Student time distribution: Inpatient 100%; Subspecialty Care 100%
Major teaching responsibility: Rocco Huneke, MD
Patients seen weekly: 15
On call/weekend responsibility: None

**M10 812 PEDIATRIC ANESTHESIA**
Instructors: Gary Hirshberg, MD; Tessa King, MD; David Moore, MD; and David Murray, MD, 454-6215
Location: Fifth Floor, St. Louis Children’s Hospital  
Elective Contact: David Moore, 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: 2  
Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This clinical elective is designed to teach the theory and practice of pediatric anesthesiology and pain management. It features individualized instruction with faculty who specialize in the perioperative care of pediatric patients. The elective consists of four weeks of active participation with pediatric anesthesiologists at St. Louis Children’s Hospital 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 5%, Outpatient 75%, Conferences/Lectures 20%; Subspecialty Care 100%  
Major teaching responsibility: Attending, fellows; students will generally spend most of each day with a single attending or fellow  
Patients seen weekly: 25  
On call/weekend responsibility: Variable

M10 819 CARDIOTHORACIC CRITICAL CARE  
Instructors: Charl de Wet, MD, Coursemaster; Laureen Hill, MD; and Michael Avidan, MD  
Location: Barnes-Jewish Hospital, Southwest Tower  
Elective Contact: Maureen Arends, 747-4155  
Other Information: Students should meet in the Cardiothoracic Intensive Care Unit, 5600 ICU, Fifth Floor Southwest Tower Physician Workroom, 6:30 a.m. first day of elective

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

This clinical elective offers practical experience in the postoperative management of cardiothoracic patients. The student will be fully integrated into the intensive care team and will 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: 17  
On call/weekend responsibility: None
M10 820 CRITICAL CARE
Instructors: Walter Boyle, MD, 747-3581, Course Master; Timothy Buchman, PhD, MD; J. Perren Cobb, MD; Craig Coopersmith, MD; Alex Evers, MD; Richard Hotchkiss, MD; George Tseng, MD; John Mazuski, MD; and Doug Schuerer, MD
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Vickie Kamp, 747-3581
Other Information: Students should meet in Surgical Intensive Care Unit, 7 a.m. first day of elective.

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

This clinical elective is designated to familiarize the student with the management of the critically ill surgical patient. This is accomplished by direct involvement in patient care in the 8400 Surgical Intensive Care Unit at Barnes-Jewish Hospital. The student will receive individualized training and exposure to critical care management and procedures with emphasis on cardiovascular support and invasive hemodynamic monitoring, airway management and support of respiratory failure, fluid and electrolyte management, sedation and pain relief, nutritional support, management of perioperative hemorrhage and coagulation abnormalities, and management of surgical infections including sepsis and septic shock. The student will function as an integral member of the critical care team and will actively participate in management of critically ill patients from all the surgical specialties except cardiothoracic and neurological surgery. Practical experience will also be gained in placement of arterial and central venous lines, interpretation of laboratory and cardiovascular monitoring data, recognition and treatment of shock syndromes, and use of mechanical ventilation.

Student time distribution: Inpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%
Major teaching responsibility: Attendings
Patients seen weekly: 50
On call/weekend responsibility: Variable

M10 821 PAIN MANAGEMENT
Instructor: 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 CAM Building, 8 a.m. first day of elective.

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

Severe, uncontrolled pain is an all-too-often consequence of acute or chronic illness. Pain management students will be involved in the multidisciplinary management of acute and chronic pain, and master the treatment guidelines with which greater than 90 percent of cancer patients’ pain can be successfully managed. This rotation is centered at Barnes-Jewish Hospital, but students also may be involved with patient care at St. Louis Children’s Hospital.

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: René Tempelhoff, MD, 362-2330
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: René Tempelhoff, MD, 362-2330
Other Information: Students should meet on Third 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Challenging neurosurgical procedures. Student will become familiar with complex procedures for brain monitoring, cardiovascular support and airway management and will be exposed to all kinds of neurosurgical ailments.

Student 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: Laila Bottros, MD, 362-1374
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Laila Bottros, MD, 362-1374
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 two- or four-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

The medical students will learn the different analgesia/anesthetic options for the labor patient. They will also learn how the physiological adaptations of pregnancy influence anesthetic management. They will be actively involved in the parturient's management, i.e., starting an IV, placement of spinal, epidural or CSE (combined spinal epidural) anesthetics. They will also attend the OB anesthesia conferences and interview patients in labor (with an OB anesthesia attending).
Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%
Major teaching responsibility: Attending, Senior Resident
Patients seen weekly: 20
On call/weekend responsibility: None (optional)

Faculty

ALEX S EVERS, MD  Henry E Mallinckrodt Professor of Anesthesiology, Head of the Department of Anesthesiology
SIRAIJUDDIN AGHA, MBBS  Assistant Professor of Anesthesiology
GUSTAV AKK, PHD  Research Assistant Professor of Anesthesiology
MICHAEL SIMON AVIDAN, MBBCH  Associate Professor of Anesthesiology
GEORGE RICHARD BENZINGER, III, MD, PHD  Instructor in Anesthesiology
BINAY KUMAR BISWAS  Instructor in Anesthesiology
MATTHEW S BODNER, MD  Assistant Professor of Anesthesiology
LAILA M BOTTROS, MD  Assistant Professor of Anesthesiology
WALTER A BOYLE, III, MD  Professor of Anesthesiology
TIMOTHY G BUCHMAN, MD, PHD  Professor of Anesthesiology
YUQING CAO, PHD  Assistant Professor of Anesthesiology
DAVIDE CATTANO, MD  Instructor in Anesthesiology
LAURA FRANCESCA CAVALLONE, MD  Instructor in Anesthesiology
ZHOUFENG CHEN, PHD  Associate Professor of Anesthesiology
MARY ANN CHENG, MD  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
GORDON LEE COLLINS, JR, MD  Assistant Professor of Anesthesiology
CRAIG M COOPERSMITH, MD  Associate Professor of Anesthesiology
THOMAS E COX, MD  Associate Professor of Anesthesiology
CHARLES M CROWDER, MD, PHD  Associate Professor of Anesthesiology
JANE-LORELIE CUETO, MD  Instructor in Anesthesiology
RAMIN DARBANDI-TONKABON, MD  Instructor in 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
GEORGE J DESPOTIS, MD  Associate Professor of Anesthesiology
SUNITA DHARMAVARAPU  Instructor in Anesthesiology
MICHAEL N DIRINGER, MD  Professor of Anesthesiology
ANTHONY EIDELMAN, MD  Instructor in Anesthesiology
JAMES J FEHR, III, MD  Assistant Professor of Anesthesiology
STEVEN EDWARD FEIT, MD  Instructor in Anesthesiology
BEVERLY J. FIELD, PHD, BA  Assistant Professor of Anesthesiology
STEFAN FIELMUTH  Instructor in Anesthesiology
NARASIMHAN GAUTAM, PHD  Professor of Anesthesiology
ROBERT W GEREAU, PHD  Associate Professor of Anesthesiology
DANIEL PATRICK GILLEEN, MD  Assistant Professor of Anesthesiology
THOMAS JAMES GOBLIRSC, MD  Assistant Professor of Anesthesiology
BARRY A GRAFF, MD  Assistant Professor of Anesthesiology
RUSSELL J.L. GROENER, MBCHB  Assistant Professor of Anesthesiology
DAVID W. GROSSHANS  Instructor in Anesthesiology
ANTHONY HERBERT GUARINO, MD  Instructor in Anesthesiology
CHARLES B HANTLER, MD  Professor of Anesthesiology
DANIEL LUKE HELSTEN, MD  Assistant Professor of Anesthesiology
ROBERT E HEROLD, MD  Assistant Professor of Anesthesiology
LAUREEN L HILL, MD  Associate Professor of Anesthesiology
GARY E HIRSHBERG, MD  Professor of Anesthesiology
BARBEL HOLTOMANN, MD, BS  Associate Professor of Anesthesiology
RICHARD S HOUTCHINS, MD  Professor of Anesthesiology
HAWPENG STEPHEN HSU, MD  Assistant Professor of Anesthesiology
ROCCO HUNEKE, MD  Instructor in Anesthesiology
CATHERINE IFUNE, MD, PHD  Assistant Professor of Anesthesiology
JEBADURAI RATNARAJ, MD  Assistant Professor of Anesthesiology
NECITA L ROA, MD  Associate Professor of Anesthesiology
FRANK EDWARD ROBBINS, MD  Assistant Professor of Anesthesiology
PAULA J RUSHING, MD  Assistant Professor of Anesthesiology
CHARLES R SCHROCK, MD  Assistant Professor of Anesthesiology
ANSHUMAN SHARMA, MD  Associate Professor of Anesthesiology
JAMES M SHEAR, MD  Associate Professor of Anesthesiology
KOLLIPARA SRIDHAR, MBBS  Instructor in Anesthesiology
DUSICA STAMENKOVIC, MD  Instructor in Anesthesiology
JOSEPH H STEINBACH, PHD  Russell and Mary Shelden Professor of Anesthesiology
CHARLES RONALD STEPHEN, MD  Professor Emeritus of Clinical Anesthesiology
GINA M STORY, PHD  Assistant Professor of Anesthesiology
ROBERT A SWARM, MD  Associate Professor of Anesthesiology
SZILVIA SZARVAS, MBBS  Instructor in Anesthesiology
JENS ANDREAS TAN, MD  Instructor in Anesthesiology
RENE TEMPELHOFF, MD  Professor of Anesthesiology
RAGHU P TERKONDA, MD  Assistant Professor of Anesthesiology
JOSEPH M THORNHILL, MD, BS  Assistant Professor of Anesthesiology
OCTAVIAN TOMA, MD  Instructor in Anesthesiology
SILVESTRE A TOMELDAN, JR, MD  Instructor in Anesthesiology
GEORGE S TSENG, MD  Assistant Professor of Anesthesiology
ANDREA VANNUCCI, MD  Instructor in Anesthesiology
SWARUP VARADAY, MBBS  Instructor in Anesthesiology
GERSHON RAM VOLOTZKY, MD  Assistant Professor of Anesthesiology
LAWRENCE SIDNEY WALDBAUM, MD  Associate Professor of Anesthesiology
MICHAEL HAROLD WALL, MD  Associate Professor of Anesthesiology
ALINE VIVIAN WANG, MD  Assistant Professor of Anesthesiology
TROY S WILDES, MD  Instructor in Anesthesiology
BRETT D WOLFF, MD  Assistant Professor of Anesthesiology
XIAOMING XIA, PHD  Research Assistant Professor of Anesthesiology
XIAOBIN YI, MD  Assistant Professor of Anesthesiology
ALEXANDER H YOUNG, MD  Instructor in Anesthesiology

Department’s Web Site
http://www.anest.wustl.edu/

Department of Biochemistry and Molecular Biophysics

Faculty in the Department of Biochemistry and Molecular Biophysics teach a number of basic science courses in the first-year medical school curriculum, as well as higher level, specialized courses that emphasize the physico-chemical underpinnings of biological interactions, and the molecular basis of
physiological processes and diseases. 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. Our faculty are engaged in a broad spectrum of biomedically relevant research endeavors, including the mechanism and regulation of enzymatic reactions, the molecular basis of biological specificity, protein folding and misfolding, cell mechanics and signaling cascades, cellular responses to DNA damage, and DNA replication.

**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.

**Fourth Year**

**Electives**

Descriptions of the elective courses are listed under the Division of Biology and Biomedical Sciences. In some instances, these courses are offered in alternate years. The faculty member in charge of the course should be contacted for specific times.

- L41 (Bio) 5312 MACROMOLECULAR INTERACTIONS
- L41 (Bio) 5318 DNA REPAIR
- L41 (Bio) 5325 PROTEIN STRUCTURE AND FUNCTION
- L41 (Bio) 5326 MOLECULAR MEDICINE
- L41 (Bio) 5384 ADVANCED CELL BIOLOGY/BIOCHEMISTRY OF MEMBRANES
- L41 (Bio) 5456 ADVANCED CRYSTALLOGRAPHY
- L41 (Bio) 5461 MOLECULAR RECOGNITION
- L41 (Bio) 5464 COMPUTATIONAL BIOCHEMISTRY
- L41 (Bio) 548 NUCLEIC ACID AND PROTEIN BIOSYNTHESIS

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

**Research**

**(M15 900)**

**Cross-listed with L41 (Bio) 590**


Wayne M. Barnes, PhD, 3rd Floor North Building, 362-3351. Plant and DNA polymerase genetic engineering.

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 metalloreduction and metallophysiology.

David P. Cistola, MD, PhD, 2nd Floor North Building, 362-4382. NMR studies of proteins and protein-ligand interactions in normal and disease states.

Enrico Di Cera, MD, 2nd Floor McDonnell Medical Sciences Building, 362-4185. Protein engineering. Structure and function of serine proteases.

Tom Ellenberger, DVM, PhD, 2nd Floor South Building, 362-0287. Structural enzymology of DNA replication, repair of chemical damage to DNA, and recombination processes.

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. The roles of thrombospondins and the mechanisms of their receptors in homeostasis and pathogenesis of the cardiovascular and immune systems.

Carl Frieden, PhD, 2nd Floor McDonnell Medical Sciences Building, 362-3344. Protein folding. Protein folding and protein dynamics using NMR and fluorescence methods. Protein misfolding and aggregation.

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


John E. Majors, PhD, 2nd Floor South Building, 362-1135. Control of eukaryotic gene expression.

Garland R. Marshall, PhD, 2201 Center for Computational Biology, 362-1567. Molecular recognition, protein engineering, signal transduction-GPCRs, two-component signaling as antibiotic target.

F. Scott Mathews, PhD, 2nd Floor South Building, 362-1080. X-ray crystallographic studies of proteins and enzymes.

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 Raymond H. Witcoff Professor of Biochemistry and Molecular Biophysics, Head of the Department of Biochemistry and Molecular Biophysics

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

NATHAN A BAKER, PHD Associate Professor of Biochemistry and Molecular Biophysics

WAYNE MORRIS BARNES, PHD Associate 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 Professor of Biochemistry and Molecular Biophysics
PETER TRISTRAM CHIVERS, PHD  Assistant Professor of Biochemistry and Molecular Biophysics
SUDHA MAHAJAN COWSIK, PHD  Research Instructor in Biochemistry and Molecular Biophysics
ENRICO DI CERA, MD  Roy and Diana Vagelos Professor of Biochemistry and Molecular Biophysics
ALLAN DOCTOR, MD  Associate Professor of Biochemistry and Molecular Biophysics
GEORGE ROBERT DRYSDALE, PHD  Professor Emeritus of Biochemistry and Molecular Biophysics
SARAH C.R. ELGIN, PHD  Professor of Biochemistry and Molecular Biophysics
ELLIOIT 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
ROBERTO GALLETTO  Assistant Professor of Biochemistry and Molecular Biophysics
GREGORY I GOLDBERG, PHD  Professor of Biochemistry and Molecular Biophysics
DAVID I GOTTLIEB, PHD  Associate Professor of Biochemistry and Molecular Biophysics
KATHLEEN HALL, PHD  Professor of Biochemistry and Molecular Biophysics
DOUG WALSH HOBBS, PHD  Research Assistant Professor of Biochemistry and Molecular Biophysics (Pending Executive Faculty Approval)
WILLIAM F HOLMES, PHD  Associate Professor Emeritus of Biological Chemistry
JO MARIE HOLT, PHD  Research Assistant Professor of Biochemistry and Molecular Biophysics
STUART A KORNFIELD, MD  Professor of Biochemistry and Molecular Biophysics
ALEXANDER KOZLOV, PHD  Research Instructor in Biochemistry and Molecular Biophysics.
LINDA C KURZ, PHD  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
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
STEPHEN M MOERLEIN, PHD  Associate Professor of Biochemistry and Molecular Biophysics
GREGORY V NIKIFOROVICH, D SC, PHD  Research Professor of Biochemistry and Molecular Biophysics
ROHIT V. PAPPU, PHD  Assistant Professor of Biochemistry and Molecular Biophysics
LINDA J PIKE, PHD  Associate Professor of Biochemistry and Molecular Biophysics
JAY WILLIAM PONDER, PHD  Associate Professor of Biochemistry and Molecular Biophysics
KATHERINE P PONDER, MD  Professor of Biochemistry and Molecular Biophysics
JOSEPH L ROTI ROTI, PHD  Professor of Biochemistry and Molecular Biophysics
J. EVAN SADLER, MD, PHD  Professor of Biochemistry and Molecular Biophysics
DAVID SEPT, PHD  Assistant Professor of Biochemistry and Molecular Biophysics
CHANGGUO TANG, PHD  Research Assistant Professor of Biochemistry and Molecular Biophysics
ROBERT EDWARDS THACH, PHD  Professor of Biochemistry and Molecular Biophysics
DOUGLAS M TOLLEFSEN, MD, PHD  Assistant Professor of Biochemistry and Molecular Biophysics
GABRIEL WAKSMAN, PHD  Adjunct Professor of Biochemistry and Molecular Biophysics
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 include apoptosis, cell cycle control, dynamic cell motility, angiogenesis, signal transduction and membrane trafficking, prions, 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 MECHANISM**
Instructors: Jeffrey M. Gidday, PhD, 286-2795; Dana R. Abendschein, PhD, 362-8925
A hands-on demonstration of various aspects of cardiovascular physiology in an anesthetized pig. Topics covered will include differences between left and right ventricular pressures, arterial pulse wave velocity, respiratory heart rate reflex, carotid sinus reflex, effects of drugs such as nitrates and alpha- and beta-receptor agonists on the heart and circulation, effects of vagal stimulation on cardiopulmonary dynamics, and responses to myocardial ischemia and infarction.

**M04 561 BRAIN BLOOD VESSELS**
Instructor: Thomas A. Woolsey, MD, 362-3601
This course considers structure, development, flow regulation and disease of cerebral blood vessels. Four general themes are: 1) the architecture of cerebral vessels, 2) regulation of cerebral blood flow during neural activity, 3) the blood-brain barrier, and 4) brain blood vessel development. Students select topics and papers for presentation from a menu. For the final session, students study a clinical problem and present their analysis to the rest of the group.

**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
Dana Abendschein, PhD, 9924 Clinical Sciences Research Building, 362-8925. Responses of arteries to acute injury and coagulation mediators of arterial remodeling after injury.

Kendall Blumer, PhD, 506 McDonnell Medical Sciences Building, 362-1668. Signaling mechanisms in hypertension and neurological disorders.

John Cooper, M.D., 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.

David A. Harris, MD, PhD, 5508 Cancer Research Building, 362-4690. Molecular and cellular biology of prion diseases.

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.

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.

James Huettner, PhD, 6600 Cancer Research Building, 362-6628. Excitatory amino acid receptors and synaptic transmission in the central nervous system; neural differentiation of embryonic stem cells.


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.


Colin Nichols, PhD, 4624 Cancer Research Building, 362-6630. The molecular mechanisms of potassium channel regulation and how potassium channels link metabolism to excitability in different physiological and disease states.

Helen Piwnica-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 mechanisms and regulation of intracellular channels for acidification of intracellular vesicles and the molecular pores formed in apoptosis.
Philip Stahl, PhD, 4912 South Building, 362-6950. Signal transduction, membrane trafficking events and the mechanism of endocytosis and phagocytosis including the role of low molecular weight GTPases Ras and Rab. Studies of a unique set of human specific genes that promotes cell growth.

Sheila A. Stewart, PhD, 514 McDonnell Medical Sciences Building, 362-3934. Molecular mechanisms by which telomerase controls cellular mortality and immortality. Stromal influences on tumorigenesis.

Heather L. True-Krob, PhD, 413 McDonnell Medical Sciences Building, 362-3934. Biological consequences of yeast prions — in both their capacity to function as 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.


Faculty

PHILIP DAMIEN STAHL, PHD Head of Department of Cell Biology and Physiology, Edward Mallinckrodt Jr Professor of Cell Biology and Physiology
DANA RAY ABENDSCHEIN, PHD Associate Professor of Cell Biology and Physiology
YOUSEF ABU-AMER, PHD Associate Professor of Cell Biology and Physiology
NADA A ABUMRAD, PHD Professor of Cell Biology and Physiology
JEFFREY MICHAEL ARBEIT, MD Professor of Cell Biology and Physiology
JACQUES ULRICH BAENZIGER, MD, PHD Professor of Cell Biology and Physiology
STEVEN BASSNETT, PHD Associate Professor of Cell Biology and Physiology
DAVID C BEEBE, PHD Professor of Cell Biology and Physiology
ERNESTO BERNAL-MIZRACHI, MD Assistant Professor of Cell Biology and Physiology
CARLOS BERNAL MIZRACHI, MD Assistant Professor of Cell Biology and Physiology
KENDALL JAY BLUMER, PHD Professor of Cell Biology and Physiology
GEORGE JOHN BROZE, JR, MD Professor of Cell Biology and Physiology
JANICE E BRUNSTROM, MD Assistant Professor of Cell Biology and Physiology
GUOJUN BU, PHD Professor of Cell Biology and Physiology
HAROLD BURTON, PHD Professor of Cell Biology and Physiology
FENG CHEN, PHD Assistant Professor of Cell Biology and Physiology
ROBERTO CIVITELLI, MD Professor of Cell Biology and Physiology
F. SESSIONS COLE, MD Professor of Cell Biology and Physiology
JOHN A COOPER, MD, PHD Professor of Cell Biology and Physiology
JIANMIN CUI, PHD Associate Professor of Cell Biology and Physiology
SUSAN K. DUTCHER, PHD Professor of Cell Biology and Physiology
IGOR R EFIMOV, PHD Associate Professor of Cell Biology and Physiology
DECHA ENKVETCHAKUL, MD Research Assistant Professor of Cell Biology and Physiology
ROBERTA FACCIIO Assistant Professor of Cell Biology and Physiology
THOMAS W FERKOL, MD Associate Professor of Cell Biology and Physiology
<table>
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<th>Name</th>
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<tr>
<td>SIMON FISHER, MD, PHD</td>
<td>Assistant Professor of Cell Biology and Physiology</td>
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<tr>
<td>THOMAS P. FLAGG, PHD, BS</td>
<td>Research Instructor in Cell Biology and Physiology</td>
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<td>WILLIAM A FRAZIER, III, PHD</td>
<td>Professor of Cell Biology and Physiology</td>
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<td>JEFFREY M GIDDAY, PHD</td>
<td>Associate Professor of Cell Biology and Physiology</td>
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<td>SUSANA GONZALO HERVAS, PHD</td>
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<td>MARC RANDALL HAMMERMAN, MD, BA</td>
<td>Professor of Cell Biology and Physiology</td>
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<td>PHYLLIS I HANSON, MD, PHD</td>
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<td>JAMES WILLIAM HARBOUR, MD</td>
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<td>DAVID ALAN HARRIS, MD, PHD</td>
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<td>JOHN E HEUSER, MD</td>
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<td>CARLTON CUYLER HUNT, MD</td>
<td>Professor Emeritus of Physiology</td>
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<td>SAMUEL KLEIN, MD</td>
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<td>SANDOR J KOVACS, MD, PHD</td>
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<td>AIMIN LI, PhD</td>
<td>Research Instructor in Cell Biology and Physiology</td>
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<td>MAURINE E LINDER, PHD</td>
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<td>GREGORY D LONGMORE, MD</td>
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<td>MARK S LONGTINE, PHD</td>
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<td>ROBERT H MACH, PHD</td>
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<td>ELAINE MICHELLE MAJERUS, MD, PHD, BS</td>
<td>Assistant Professor of Cell Biology and Physiology</td>
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<td>BESS ADKINS MARSHALL, MD</td>
<td>Assistant Professor of Cell Biology and Physiology</td>
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<td>ROBERT PAUL MECHAM, PHD</td>
<td>Alumni Endowed Professor of Cell Biology and Physiology</td>
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<td>STANLEY MISLER, MD, PHD</td>
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<td>KELLE HARBERT MOLEY, MD</td>
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<td>MIKE MAX MUECKLER, PHD</td>
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<td>ANTHONY MUSLIN, MD</td>
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<td>COLIN G NICHOLS, PHD</td>
<td>Carl Cori Professor of Cell Biology and Physiology</td>
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<td>DANIEL ORY, MD</td>
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<td>MARSHALL ALAN PERMUTT, MD</td>
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<td>RICHARD A PIERCE, PHD</td>
<td>Research Associate Professor of Cell Biology and Physiology</td>
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<tr>
<td>HELEN PIWNICA-WORMS, PHD</td>
<td>Professor of Cell Biology and Physiology, Howard Hughes Medical Institute Investigator in</td>
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The Department of Genetics is at the forefront in developing new methods for physical and genetic mapping 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 and cloning, computational biology, developmental genetics, neurogenetics, human 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 such subjects as 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 M.D. and Ph.D. 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

For complete descriptions, see Division of Biology and Biomedical Sciences.
L41 (Bio) 5235 GENETICS JOURNAL CLUB
L41 (Bio) 5482 HUMAN LINKAGE AND ASSOCIATION ANALYSIS
L41 (Bio) 5484 GENOMICS AND DEVELOPMENT OF C. ELEGANS JOURNAL CLUB
L41 (Bio) 5485 FUNDAMENTALS OF MAMMALIAN GENETICS
L41 (Bio) 5488 GENOMICS
L41 (Bio) 5491 ADVANCED GENETICS
L41 (Bio) 5495 COMPUTATIONAL MOLECULAR BIOLOGY
L41 (Bio) 5911 CLASSICAL EXPERIMENTS IN MOLECULAR GENETICS

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 4186, 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.


Susan K. Dutcher, PhD, 875 McDonnell Medical Sciences Building, 362-2765. Studies on the role of centrioles and basal bodies in the assembly of cilia and cleavage furrows using molecular genetics, computational and biochemical approaches.

Justin Fay, PhD, Room 5410, 4444 Forest Park, 747-1808. Population and evolutionary genetics, evolution and genetic basis of gene expression in yeast, human DNA sequence variation and evolution.

Warren Gish, PhD, 718 McDonnell Medical Sciences Building, 286-1826. Research and development of automated systems for gene prediction and identification. Emphasis is on combining biological knowledge with algorithm design, information theory and statistics.

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.

Mark Johnston, PhD, Room 5403, 4444 Forest Park, 362-2735. Glucose sensing and signaling in yeast; genome-wide analysis of transcriptional regulatory networks.

Michael Lovett, PhD, 331 Biotechnology Center, 747-3261. The molecular basis of human genetic diseases, cDNA and expression profiling technologies. Craniofacial abnormalities and deafness.

Elaine Mardis, PhD, Room 4122, 4444 Forest Park, 286-1805. Technology development for high-throughput genome sequencing with an emphasis on methods development and the implementation of robotics. Novel, high-throughput DNA sequencing platform development. Array CGH methods development. Non-human primate genomics.

Rob Mitra, PhD, Room 4184, 4444 Forest Park, 362-2751. Systems biology and technology development. Development of tools to make quantitative biological measurements and application of these tools to build mathematical models of biological processes.

Michael A. Province, PhD, Suite 4186-a, 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. 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.

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.

Tanya Wolff, PhD, 829 McDonnell Medical Sciences Building, 362-1509. Epithelial polarity and cell movement in the Drosophila eye. Major emphasis is placed on studying the genes and pathways required for the establishment, interpretation and transduction of the polarity signal.

Faculty

SUSAN K. DUTCHER, PHD Interim Head of the Department of Genetics, Professor of Genetics
PING AN, MD Research Assistant Professor of Genetics
LUCINDA L. ANTONACCI-FULTON Research Instructor in Genetics
SWATHI ARUR, PHD Research Instructor in Genetics
DOUGLAS E BERG, PHD Professor of Genetics
INGRID B BORECKI, PHD Associate Professor of Genetics
ANNE M BOWCOCK, PHD Professor of Genetics
MICHAEL R. BRENT, PHD Associate Professor of Genetics
VICTORIA L. BROWN-KENNERLY, PHD Research Instructor in Genetics
JEREMY D. BUHLER, PHD Assistant Professor of Genetics
JAMES M CHEVERUD, PHD Professor of Genetics
SANDRA W CLIFTON, PHD Research Assistant Professor of Genetics
C. ROBERT CLONINGER, MD Professor of Genetics
J. PERREN COBB, MD Associate Professor of Genetics
BARAK COHEN, PHD Assistant Professor of Genetics
JANET M CONNOLLY, PHD Research Professor of Genetics
JOSEPH C. CORBO, MD, PHD Assistant Professor of Genetics
JAMES P CRANE, MD Associate Professor of Genetics
SETH DANIEL CROSBY, MD Research Assistant Professor of Genetics
WARWICK E. DAW, PHD Research Associate Professor of Genetics (Pending Executive Faculty Approval)
LI DING, PHD Research Instructor in Genetics
IAN WILLIAM DUNCAN, PHD Associate Professor of Genetics
SARAH C.R. ELGIN, PHD Professor of Genetics
JUSTIN C. FAY, PHD Assistant Professor of Genetics
MARY F FEITOSA, PHD Research Assistant Professor of Genetics
ROBERT S. FULTON Research Instructor in Genetics
NARASIMHAN GAUTAM, PHD Professor of Genetics
JONATHAN D GITLIN, MD Professor of Genetics
JARRET I. GLASSCOCK, PHDS, BS Research Instructor in Genetics
ALISON GOATE, PHD Professor of Genetics
MATTHEW I GOLDSMITH, MD Assistant Professor of Genetics
PAUL GOODFELLOW, PHD Associate Professor of Genetics
CHI GU, PHD Assistant Professor of Genetics
DAVID H GUTMANN, MD, PHD Professor of Genetics
TED H HANSEN, PHD Professor of Genetics
ANDREW C HEATH, PHD Associate Professor of Genetics
PATRICK Y JAY, MD, PHD Assistant Professor of Genetics
GEORGE BROOKS JOHNSON, PHD Professor of Genetics
STEPHEN L JOHNSON, PHD Associate Professor of Genetics
H. MARK JOHNSTON, PHD Professor of Genetics, Mc Donnell Professor of Molecular Genetics
ADAM S KIBEL, MD Assistant Professor of Genetics
ALDI T KRAJA, PHD Research Assistant Professor of Genetics
TIMOTHY J LEY, MD Professor of Genetics
MICHAEL LOVETT, PHD Professor of Genetics
VINCENT J MAGRINI, PHD Research Instructor in Genetics
ELAINE RENE MARDIS, PHD Associate Professor of Genetics
PHILIP JOHN MASON, PHD Research Professor of Genetics
JAMES P MC CARTER, MD, PHD Research Instructor in Genetics
RAYMOND D MILLER, PHD Research Assistant Professor of Genetics
ROBI D. MITRA, PHD Assistant Professor of Genetics
MAKEDONKA MITREVA, PHD Research Assistant Professor of Genetics
ROSALIND J NEUMAN, PHD Research Professor of Genetics
TEJ K PANDITA, PHD Associate Professor of Genetics
JONATHAN MARK PETRASH, PHD Professor of Genetics
MICHAEL A PROVINCE, PHD Professor of Genetics
JANET SUE RADER, MD Professor of Genetics
DABEE SU RAO, PHD Professor of Biostatistics in Genetics
JOHN P RICE, PHD Professor of Genetics
JANNETTE RUSCH, PHD Research Instructor in Genetics
NANCY L. SACCONE, PHD Assistant Professor of Genetics
LAWRENCE B SALKOFF, PHD Professor of Genetics
MARK STEVEN SANDS, PHD Associate Professor of Genetics
STANLEY A SAWYER, PHD Professor of Genetics
BARBARA ANNA SCHAAL, PHD Professor of Genetics
TIM B SCHEDL, PHD Professor of Genetics
ALAN SHIELS, PHD Associate Professor of Genetics
JAMES B SKEATH, PHD Associate Professor of Genetics
JOHN G SPIETH, PHD Research Associate Professor of Genetics
GARY D STORMO, PHD Joseph Erlanger Professor of Genetics
BRIAN K SUAREZ, PHD Associate Professor of Genetics
ALAN ROBERT TEMPLETON, PHD Professor of Genetics
RICHARD D TODD, MD, PHD Professor of Genetics
MICHAEL TOMASSON, MD Assistant Professor of Genetics
ZSOLT URBAN, PHD Assistant Professor of Genetics
JOHN WILLIAM WALLIS, PHD Research Instructor in Genetics
MATTHEW JOHN WALTER, MD Assistant Professor of Genetics
WESLEY CHARLES WARREN, PHD Research Assistant Professor of Genetics
MICHAEL C WENDL, D SC, PHS Research Assistant Professor of Genetics
MICHAEL PETER WHYTE, MD Professor of Genetics
RICHARD K WILSON, PHD Professor of Genetics
TANYA WOLFF, PHD Assistant Professor of Genetics
JIAN XU, PHD Research Instructor in Genetics
SHIAW-PYNG YANG, D SC Research Assistant Professor of Genetics
MING YOU, MD, PHD Professor of Genetics
QUNYUAN ZHANG, PHD Research Instructor in Genetics
WEIXIONG ZHANG, PHD, MS Associate 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
Daniel P. Kelley, MD, Chief

Dermatology
Lynn A. Cornelius, MD, Chief

Endocrinology/Metabolism/Lipid Research
Clay F. Semenkovich, MD, Chief
Instruction in Medicine is provided during all four years of the medical curriculum, beginning with The Practice of Medicine I in the first year. Teaching in the second year has two main objectives: the correlation of the basic sciences with clinical aspects of disease and training in the technical methods of physical examination and laboratory diagnosis. By the beginning of the third year, the student is ready for supervised clinical study of individual patients.

A clinical clerkship of 12 weeks, divided into three four-week periods, is served by third-year students on the medical services of the department. In the final year, students may elect a subinternship in general medicine and a series of elective courses in the medical specialties.

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 irrelevant or 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.

We intertwine the various content areas to highlight the inter-relationships inherent in the practice of medicine. We attempt to relate your basic science course material to the clinical and patient-based information. In particular, the Integrative Cases are designed to mesh basic science content with clinical questions. The practice of medicine is both a science and an art. We hope to demonstrate the complementary nature of these outlooks.

This course unfolds over three years. The first-year course, POM I, contains six sections:
Patient/Physician Communication, Clinical Skills, Experience of Illness, Ethics, Scientific Method of Clinical Medicine and Research, and Health Promotion and Disease Prevention.

Objectives for POM I include:

1. Students can describe and analyze the scientific methodology of clinical studies and apply the results to individuals or groups of patients.

2. Students can perform a complete history and physical examination with thoroughness, accuracy, sensitivity and compassion.

3. Students can investigate the influence of culture, religion, ethnicity, socioeconomic factors and politics on the seeking and provision of medical care.

4. Students can examine and analyze their personal and professional competencies, limitations and behaviors.

Sections:

1. Patient-Physician Communication/History-Taking Section

Patient and caregiver engage in an intimate and delicate relationship. Although everyday skills such as listening and asking questions appear easily mastered, compassionate inquiry into confidential areas in an anxiety-laden environment requires a special combination of patience, quiet confirmation and observation. Learning certain guideposts and checkpoints for orientation and direction can prove useful.

2. Clinical Skills

This content area focuses on history-taking, physical examination, presentation of history and physical exam findings, and selected ambulatory skills.

3. Experience of Illness

The Practice of Medicine is an interpretive activity, and while it relies on complex knowledge and sophisticated technology, it is not a science. Medicine's goal is to alleviate suffering and to do so brings a body of practical knowledge to bear in individual cases.

Physicians interpret the symptoms and signs from the patient, who has already interpreted their symptoms into a story of their malady. Thus, while modern medicine is founded on complex knowledge of biological science, attained by arduous work, interpretive skill is required for physicians to function. Medicine begins with the understanding of the patient and continues in therapeutic action on behalf of the patient. To do this requires that we understand how to interpret it, both medically and in a way meaningfully understood by the patient.

4. Ethics

Since the earliest days of medicine, physicians have recognized that they have special ethical
responsibilities to their patients. Many medical ethics principles have endured through the centuries, but changing technologies and social conditions require physicians to apply these principles to new situations over time.

5. Scientific Methods of Clinical Medicine and Research
This section delineates the variety of statistical techniques and methodologies of interpretation of clinical and research data.

6. Health Promotion and Disease Prevention
The objectives of this section include: to understand the importance of Health Promotion and Disease Prevention, to understand different levels of prevention and to be familiar with possible preventive interventions.

Selectives

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 (2006-07).

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.

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, 286-2546
Content Area Leaders: Jay F. Piccirillo, MD; Jane Garbutt, MBCHB; Robb R. Whinney, DO; Rebecca S. Dresser, JD; Stephen S. Lefrak, MD
The goal of The Practice of Medicine (POM) course is to provide students with a set of 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 in the context of today's socio-economic and cultural environment. 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. 81.25 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**
Instructor: Stanley Misler, PhD, MD, 454-7719; David Windus, MD, 362-7261
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: Lynn A. Cornelius, MD, 362-8187
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
M25 707 PRACTICE OF MEDICINE III
Instructors: Robert Rothbaum, MD, Megan E. Wren, MD, 286-2546

In this course, themes and topics introduced in POM I and II are revisited and refocused on the students’ ongoing clinical experiences. The course has quarterly sessions. Each session begins with a short talk or panel discussion. Faculty preceptors then facilitate small group discussions as students reflect on their recent clinical experiences and dilemmas. The group develops potential solutions and management schemes.

Recent topics have included:
1. My most challenging or rewarding clinical experience. Who, what, when, where and why?
2. Medical errors and patient safety: What happens and why?
3. Ethics: What challenges occur? How are decisions made?
4. Doctoring: Am I the doctor that I expected I would be?
5. Family violence: Recognition, investigation and intervention.
6. Interactions with pharmaceutical companies: What is really going on here?
7. How to care when you cannot cure: Treating patients with chronic or terminal illness.

M25 714 AMBULATORY: EMERGENCY MEDICINE
Instructor: 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 and a suture 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 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. There will be an opportunity to participate in EMS. 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 maintain patient encounter logs on hand-held computer and receive short e-mail assignments during this rotation. Grades are calculated from
preceptors’ subjective evaluations (normalized for the preceptor), essay responses and an evaluation of students’ attention to primary care issues.

**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.

**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: Thomas De Fer, MD, 362-8050  
Location: Barnes-Jewish Hospital  
Elective Contact: Holly Steinbecker, 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 6/period for Weeks 1, 5 and 9; 2/period for Weeks 13, 17 and 21 and 1/period for Weeks 25, 29, 33, 37 and 41. 
Valid start weeks for four-weeks blocks are: 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/week: 8-12
On call/weekend responsibility: Yes

**M25 805 RHEUMATOLOGY**  
Instructors: Richard Brasington, MD; Leslie Kahl, MD; and Prabha Ranganathan, MD, 454-7279  
Location: Barnes-Jewish Hospital, Suite 5C, Center for Advanced Medicine (CAM)  
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 four-week blocks are: 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),
osteoahtritis, 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 a rheumatology conference 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/week: ~25 per student
On call/weekend responsibility: None

M25 807 HONORS MEDICINE — VA MEDICAL CENTER
Instructor: Scot Hickman, MD, 289-6308
Location: St. Louis Veterans Affairs Medical Center
Elective Contact: Scot Hickman, MD, 289-6308
Other Information: Students meet in A701 VA Medical Center, 7:30 a.m. first day of elective.

Enrollment limit per period: Limit 3/period for Weeks 1, 5 and 9; 1/period for Weeks 13, 17, 21, 25, 29, 33, 37 and 41.
Valid start weeks for four-weeks blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Subinternship in medicine offers practical experience in the care of patients. Subinterns are an integral part of the house staff team, working under the supervision of a resident and attending physician. Their responsibilities for patients assigned to them are similar to those of interns. Patients are followed by the subintern throughout all levels of care including ICU, telemetry, stepdown and general wards. Subinterns take night call with their team and participate in the teaching conferences of the Department of Medicine.

Student time distribution: Inpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%
Major teaching responsibility: Single attending, chief resident and team resident
Patients seen/week: 6.8 on average
On call/weekend responsibility: Every fourth night

M25 809 HYPERBARIC MEDICINE AND PROBLEM WOUND MANAGEMENT
Instructors: John D. Davidson, MD, and staff, 205-6818
Location: St. Luke's Hospital, Barnes-Jewish Hospital
Elective Contact: John D. Davidson, MD, 205-6818 or pager, 424-2626
Other Information: Interested students should contact Dr. John D. Davidson to discuss in what way this elective can be tailored to their particular interests and goals. Mini-electives of one to two weeks duration can be arranged. (PLEASE contact Dr. Davidson at 205-6818 three weeks prior to the first date of elective to try to tailor the elective as much as possible to your primary interests.)

Enrollment limit per period: 2
Valid start weeks for two-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

The specialty of hyperbaric medicine centers on the use of oxygen under increased atmospheric pressure as a drug for the treatment of many disparate diseases and clinical problems. This elective allows a student to have an acquaintance with this technology, which has a definite role in a wide range of differing specialties including emergency medicine, otolaryngology, plastic and reconstructive surgery, military medicine, rheumatology, dermatology, oral surgery, radiation oncology, internal medicine, neurology and psychiatry, to name a few.

Since students going into these specialties do not need to learn about hyperbaric medicine in depth,
but nevertheless would benefit by some exposure to it, we can arrange a mini-elective of one to two weeks duration. This "exposure elective" can be tailored to a student's special field of interest just as we attempt to do in the usual four-week program. Please call Dr. John D. Davidson for more information.

Student time distribution: Inpatient 3%, Outpatient 92%, Conferences/ Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: John D. Davidson, MD, and Georgia Endicott, Chief Technician
Patients seen/week: 20
On call/weekend responsibility: Attending physician will call student regarding select cases

M25 810 GERIATRIC MEDICINE
Instructor: 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 four-week blocks are: Weeks 5, 13, 17, 21, 25, 29, 33, 37 and 41.

Students will participate in patient care at the rehabilitation center, the skilled nursing facility Barnes-Jewish Extended Care in Clayton, the inpatient geriatric consultation service, the outpatient primary care and geriatric consultation center, and the acute care for the elderly (ACE) unit located at 3200 North Campus. 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/week: 10-15
On call/weekend responsibility: None

M25 814 CLINICAL EMERGENCY MEDICINE, BARNES-JEWISH HOSPITAL
Instructor: 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This rotation offers practical experience in the evaluation and management of acutely sick and injured patients. Students will function as subinterns, initially evaluating their assigned patients and developing a plan for further diagnostic studies and therapy. They will report to a senior-level resident or an attending physician. The student can expect to get an opportunity to perform a wide variety of procedural skills such as suturing, splinting, peripheral and central venous access, and cardiopulmonary resuscitation. Shifts will be eight hours and students will rotate between day, evening and night shifts, including weekend shifts, 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 Dr. Larry Lewis, Director of Research, should take this WUMS IV Emergency Medicine rotation.

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/week: ~5 per shift
On call/weekend responsibility: Evenings and weekends; no on call

M25 821 INPATIENT CARDIOLOGY
Instructors: Marianela Areces, MD, 747-3606; Benico Barzilai, MD; Michael Beardslee, MD; Arthur Halle, MD; Sudhir Jain, MD; Andrew Kates, MD; Keith Mankowitz, MD; and Joshua Stolker, MD
Location: 4104 Queeny Tower
Elective Contact: David Schwartz, MD, 747-3606
Other Information: Students meet in Room 4104 Queeny Tower, 9 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students will participate as members of the Barnes-Jewish Cardiology at Washington University Consultantive 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/week: 10-15
On call/weekend responsibility: None

M25 822 HONORS MEDICINE — CARDIOLOGY
Instructor: Thomas De Fer, MD, 362-8050
Location: Barnes-Jewish Hospital
Elective Contact: Holly Steinbecker, 362-8050
Other Information: Students will receive e-mail communication regarding when/where to report on the first day prior to the beginning of the period.

Enrollment limit per period: Limit 2/period for Weeks 1, 5, 9, 13, 17 and 21; 1/period for Weeks 25, 29, 33, 37 and 41.
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

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/week: 8-12
On call/weekend responsibility: Yes

M25 823 CLINICAL CARDIOLOGY — VA HOSPITAL
Instructor: Wade Martin, MD, 289-6329
Location: John Cochran Veterans Administration Medical Center
Elective Contact: Wade Martin, MD, 289-6329
Other Information: Students should meet in Room B206, Second Floor, Veterans Administration Medical Center.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The major purpose of this elective in clinical cardiology at the John Cochran VA Medical Center 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 one to three outpatient clinics per week; one to four 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/week: 20
On call/weekend responsibility: Varies

M25 825 CARDIAC ARRHYTHMIAS AND ELECTROPHYSIOLOGY
Instructor: Timothy Smith, PhD, MD, 454-7834
Location: Barnes-Jewish Hospital, North Campus
Elective Contact: Timothy Smith, PhD, MD, or Yvonne O’Connell, 454-7834
Other Information: Students meet in the Cardiology Division, Fourth Floor Kingshighway Building, Barnes-Jewish Hospital, North Campus, 8 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This elective 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 electrophysiologic 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/week: 2 new consults/day
M25 827 HEART FAILURE/CARDIAC TRANSPLANTATION
Instructor: 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This rotation is intended to provide trainees with a comprehensive experience managing patients with advanced heart failure. In addition to daily rounds, trainees are invited to attend both heart failure and transplant clinics. Further, the curriculum is supplemented by a comprehensive syllabus that contains the critical literature pertinent to this patient population. The trainees will also have experience with the evaluation of patients for operative heart failure therapies and will have the opportunity to observe these surgical procedures.

Student time distribution: Inpatient 70%, Outpatient 20%, Conferences/Lectures 10%; Subspecialty Care 100%
Major teaching responsibility: Attendings
Patients seen/weekly: 30
On call/weekend responsibility: None

M25 830 DERMATOLOGY
Instructors: 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 four-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 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 fourth-year electives — NOT BOTH.**

Student time distribution: Inpatient 25%, Outpatient 50%, Conferences/Lectures 25%; Specialty Care 100%
Major teaching responsibility: Coursemaster for rotation, private attending and senior resident
Patients seen/week: 25-50
On call/weekend responsibility: None

M25 831 PEDIATRIC DERMATOLOGY
Instructor: Susan J. Baylis, 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
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. Baylis 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/week: 50-100
On call/weekend responsibility: None

**M25 836 CLINICAL GASTROENTEROLOGY AND HEPATOLOGY**
Instructor: Mauricio Lisker-Melman, MD, 454-8141
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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The GI Hepatology elective is integrated into a very active inpatient/outpatient and endoscopy service at Barnes-Jewish Hospital. Students will participate in the evaluation of inpatients and outpatients with a spectrum of gut and liver disorders, will make patient rounds with the faculty and fellows, and have responsibility for patients on whom consultations have been requested. In addition, they will observe biopsy, endoscopic, and intubation techniques and participate in outpatient clinic and GI conferences.

Student time distribution: Inpatient 50%, Outpatient 40%, 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: Christopher Gutjahr, MD, 362-1707
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Patty Lotz, 362-1707
Other Information: Students should meet in the Division of Hospital Medicine office, Room 16-420, 8:30 a.m. first day of elective.

Enrollment limit per period: 1
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.
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/week: 10-15
On call/weekend responsibility: None

**M25 839 DOCTORS ON FILM: THEMES RELEVANT TO POM**
Instructor: Thomas M. De Fer, MD, 747-4366
Location: 6604 Wohl Hospital
Elective Contact: Thomas M. De Fer, MD, 747-4366
Other Information: Location and time to report on first day of elective to be arranged with coursemaster.

Enrollment limit per period: 6
Valid start weeks for four-week blocks are: Weeks 29 and 37.

**OPEN TO WUSM STUDENTS ONLY.** 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 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 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 to provoke thought and discussion. Each student will select a film from a list provided and preview it. They will introduce the film to the group and lead the discussion after the group viewing. Each student will complete an approximate 1,000-word essay regarding the relevant themes in the film and how they relate to the medical profession. All meetings will be arranged with the coursemaster.

Student time distribution: Conferences/Lectures 100%
Major teaching responsibility: Thomas M. De Fer, MD
Patients seen/week: N/A
On call/weekend responsibility: None

**M25 841 CARE OF THE HIV-INFECTED PATIENT**
Instructors: Jessica Grubb, MD, 747-1724, and Kristin Mondy, MD, 747-1725
Location: St. Louis Children’s Hospital, Barnes-Jewish Hospital, plus other ambulatory sites.
Elective Contact: Kristin Mondy, MD, 747-1725
Other Information: Students should contact Laura Waugh 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: 1
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This elective is designed to introduce students to the 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/week: 20
M25 844 HEMATOLOGY AND HEMOSTASIS
Instructors: 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Activities planned include work-up of patients at Barnes-Jewish Hospital under the supervision of the hematology fellow and his staff consultant; attendance at clinical rounds three to five hours weekly; participation in 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/week: 3-5
On call/weekend responsibility: None

M25 847 BONE AND MINERAL DISEASES
Instructors: 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 Dr. Whyte a week before elective for instruction and meeting location.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 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. (Dr. 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%
M25 850 HEMATOLOGY AND ONCOLOGY IV
Instructors: Scot Hickman, MD; Vorachart Auethavekiat, MD; and Daniel Morgensztern, MD, 289-6308
Location: John Cochran Veterans Administration Medical Center
Elective Contact: Scot Hickman, MD, 289-6308
Other Information: Students should contact Dr. Hickman prior to first day of elective.

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

The 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 47.5%, Outpatient 47.5%, Conferences/Lectures 5%; Primary Care 25%, Subspecialty Care 75%
Major teaching responsibility: Attendings and some fellow teaching input as well
Patients seen/week: 25
On call/weekend responsibility: None

M25 855 CLINICAL INFECTIOUS DISEASES
Instructors: 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 four-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/week: 15 new consults
On call/weekend responsibility: None
M25 861 ONCOLOGY — INPATIENT
Instructor: Alex Denes, MD, 362-4803
Location: Seventh Floor, Center for Advanced Medicine (CAM), POD B, Medical Oncology Outpatient Area
Elective Contact: Sharon Thomas, 747-7502
Other Information: Students meet on the Seventh Floor, Center for Advanced Medicine (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 four-week 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/week: 50
On call/weekend responsibility: None

M25 865 INTENSIVE CARE MEDICINE — BARNES-JEWISH NORTH
Instructors: Stephen S. Lefrak, MD, and staff, 454-7116
Location: Barnes-Jewish Hospital, North Campus
Elective Contact: Stephen S. Lefrak, MD, 454-7116
Other Information: Students meet at the MICU (Eighth Floor, Barnes-Jewish Hospital, North Campus), 9 a.m. first day of elective.

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

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: Attendants and residents
Patients seen/week: 8
On call/weekend responsibility: Every third night

M25 867 MEDICAL INTENSIVE CARE
Instructor: 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This elective is offered as an opportunity to gain additional experience in acute, primary care medicine. The elective is an advanced course in patient care involving complex medical problems. Responsibilities involve working up new patients with the MICU team, case presentations and attendance at conferences. Conferences consist of attending rounds Monday through Saturday, radiology rounds Monday through Saturday, pulmonary conference and medical grand rounds on Thursday, and critical care conference once each month. Call schedule is every third night.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%
Major teaching responsibility: Attendings and residents
Patients seen/week: 3
On call/weekend responsibility: Yes

M25 869 PALLIATIVE MEDICINE
Instructors: Jane Loitman, MD, 747-4781
Location: West Pavilion, Barnes-Jewish Hospital
Elective Contact: Jane Loitman, MD, 747-4781
Other Information: Please contact coursemaster at least one week before start of elective. Reporting time is 9 a.m. first day of elective.

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

The 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/withdrawal 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%; Subspeciality Care 100%
Major teaching responsibility: Attendings (Jane Loitman, MD, Bernie Shore, MD, Elliot Gellman, MD)
Patients seen/week: 10
On call/weekend responsibility: None

M25 870 ENDOCRINOLOGY, DIABETES AND METABOLISM
Instructors: Clay Semenkovich, MD, and staff, 362-7617
Location: Eighth Floor, Southwest Tower, Barnes-Jewish Hospital South Campus
Elective Contact: Clay Semenkovich, MD or Karen Muehlhauser, 362-7617
Other Information: Students meet on Eighth Floor, Southwest Tower, Barnes-Jewish Hospital South Campus, 8:30 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.
Students taking this elective see patients with endocrine and metabolic diseases in the Outpatient Consultation office and inpatients at Barnes-Jewish Hospital and the General Clinical Research Center. 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, and metabolic bone disease, as well as 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 program director for both
Patients seen/week: 8-10
On call/weekend responsibility: Elective for students

M25 871 ONCOLOGY — OUTPATIENT
Instructor: Steven Sorscher, MD, 362-9319
Location: Siteman Cancer Center, Center for Advanced Medicine (CAM)
Elective Contact: Karen Addison, 362-5740, kaddison@im.wustl.edu
Other Information: Students meet on the Seventh Floor, Siteman Cancer Center, Center for Advanced Medicine (CAM), 4921 Parkview Place, 8:30 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students will gain experience in the initial treatment of newly diagnosed malignancies and the outpatient management of oncology patients. Participation in multidisciplinary tumor conferences will stress a combined-modality approach to management, incorporating chemotherapy, radiotherapy and surgery. Students will see patients with a variety of malignancies, including lymphoma, myeloma, and tumors of the lung, breast and colon. Management of hypercalcemia and other paraneoplastic syndromes, as well as cancer pain management will be covered. Students will have the opportunity to see how most oncologists spend 90 percent 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/week: 30-50
On call/weekend responsibility: None

M25 880 PULMONARY MEDICINE — BARNES-JEWISH HOSPITAL
Instructors: Daniel Rosenbluth, MD, and staff, 454-8762
Location: Fifth Floor, Kingshighway Building
Elective Contact: Lisa Wetzel, 454-8762
Other Information: Students should page Pulmonary Consult Fellow, 7:30 a.m. first day of elective.

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

Students will acquire skills in the evaluation and management of patients with pulmonary diseases and
in the interpretation of pulmonary function tests. They will gain experience in outpatient Lung Center and attend regular pulmonary and critical care medicine conferences.

Student time distribution: Inpatient 60%, Outpatient 20%, Conferences/Lectures 20%; Subspecialty Care 100%
Major teaching responsibility: Multiple attendings, fellows and residents
Patients seen/week: 20
On call/weekend responsibility: None

**M25 882 PULMONARY MEDICINE — VA HOSPITAL**
Instructor: Carlos Daughaday, MD, 289-6306
Location: John Cochran Veterans Administration Medical Center
Elective Contact: Carlos Daughaday, MD, 289-6306
Other Information: Students meet in 6C-MICU John Cochran VA Medical Center, 7:30 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students will participate in several ambulatory care activities of the Pulmonary Section, including outpatient consultations of common respiratory disorders such as COPD, obstructive sleep apnea, lung cancer and tuberculosis, and follow-up of primary care patients with pulmonary disease. In addition, students will round in medical intensive care units, interpret pulmonary function tests, participate in bronchoscopy and attend scheduled teaching conferences of the Pulmonary Division.

Student time distribution: Inpatient 30%, Outpatient 50%, Conferences/Lectures 20%; Subspecialty Care 100%
Major teaching responsibility: Several attendings
Patients seen/week: 6-10 (by student)
On call/weekend responsibility: None

**M25 883 TRANSFUSION MEDICINE**
Instructor: Douglas Lublin, MD, PhD, 362-8849
Location: Barnes-Jewish Hospital
Elective Contact: Jo Ann Metz, 362-8849
Other Information: Students should discuss their rotation with Dr. Lublin and staff in advance. Students should meet the team on 5900 Pheresis Unit 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 four-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 didactic sessions with senior staff, teaching conferences, 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 apheresis will serve to instruct in current clinical practice along with evolving applications of transfusion medicine, 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/week: 20-25
On call/weekend responsibility: None
**M25 884 BONE MARROW TRANSPLANTATION AND STEM CELL BIOLOGY**
Instructor: John F. DiPersio, MD, PhD, 362-9339
Location: Bone Marrow Transplant Unit 13-100
Elective Contact: John F. DiPersio, MD, PhD, or Angela Hess, 454-8306
Other Information: Students meet in the Bone Marrow Transplant Unit, 8:30 a.m. first day of elective.

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

Intense four-week clinical rotation exposing interested fourth-year medical students to the clinical world of bone marrow transplantation and to the basic science of hematopoiesis and stem cell biology. Students will be primarily responsible for the care of autologous and allogeneic BMT recipients. 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/week: 10-20
On call/weekend responsibility: None

**M25 885 OCCUPATIONAL/ENVIRONMENTAL MEDICINE**
Instructor: Bradley Evanoff, MD, MPH, 454-8638
Location: Barnes-Jewish Hospital, North Campus
Elective Contact: Bradley Evanoff, MD, MPH, 454-8638
Other Information: Students should meet at 8302 Barnes-Jewish Hospital, North Campus, 9 a.m. first day of elective.

Enrollment limit per period: 1 (2 by special arrangement)
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.
(Students may take this elective for up to 12 weeks.)

This elective is designed to introduce students to both the clinical treatment and the prevention of work-related injuries and illnesses. Clinical activities will include the diagnosis and treatment of workers with illnesses due to chemical exposure and repetitive motion, as well as acute injuries. Preventive activities will include work site visits and intervention projects, as well as involvement with work site health promotion and policy making. Specific activities are flexible depending on the students’ interests. Students are also urged to contact Dr. Evanoff if they wish to participate in research projects concerning the epidemiology of work-related diseases.

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) would 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 proposed cement plant upwind of the St. Louis metropolitan area; (2) lead poisoning of children in the City of St. Louis; (3) lead poisoning of children and long-term exposure of adults to lead and possibly other metals in Herculaneum, MO; (4) air and water pollution caused by concentrated animal feeding operations (factory farms) in northern Missouri. Students choosing this option will work with the Environmental Clinic staff and with Dr. Evanoff to evaluate and present evaluations of human health impacts of environmental exposures.

Student time distribution: Outpatient 20%, Conferences/Lectures 10%, Reading/Research 70%; Subspecialty Care 100%
M25 887 CLINICAL CARDIOVASCULAR MEDICINE
Instructor: Thomas F. Martin, MD, (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 meet at Phelps County Regional Medical Center, 1000 W. 10th Street, Rolla, MO, 8 a.m. first day of elective. Ask Intensive Care Unit secretary to page Dr. Martin.

Enrollment limit per period: 1
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33 and 37.

Clinical cardiology with some internal medicine in a rural setting. Room and board provided.

Student time distribution: Inpatient 50%, Outpatient 50%; Subspecialty Care 100%
Major teaching responsibility: Attending
Patients seen/week: 80
On call/weekend responsibility: None

M25 890 CLINICAL NEPHROLOGY
Instructor: Daniel Coyne, MD, 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students assist in both the inpatient and outpatient areas to diagnose patients with acute and chronic renal failure, glomerulonephritis, and electrolyte disorders. The student is a full member of the inpatient renal consult service, diagnosing and treating patients with acute and chronic renal disease and electrolyte disorders. Students will learn electrolyte management, drug dosing, dialysis procedures and complications, kidney biopsy reading, and the management of acute and chronic renal failure. Students are also encouraged to spend two or three half-days in the outpatient center rotating to the General Renal Clinics and the Transplant Clinic. Throughout the rotation, students work closely with 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 two renal fellows
Patients seen/week: Four consults
On call/weekend responsibility: Saturday a.m. rounds desirable but not required

M25 893 ADULT ALLERGY AND CLINICAL IMMUNOLOGY
Instructor: 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.
Students will participate in the allergy consult service at Barnes-Jewish Hospital, North and South Campus. The student will serve as the primary allergy consult for inpatient and Emergency Room consultation and present each patient to the allergy fellows on call and the attending physician. Students will attend The Adult Allergy Clinic, Pediatric Allergy Clinic, and the outpatient clinics at The Asthma & Allergy Center at Barnes-Jewish West County Hospital. Conferences on selected topics in allergy and clinical immunology will be held with the attending staff two to three afternoons a week.

Student time distribution: Inpatient 10%, Outpatient 75%, Conferences/Lectures 15%; Subspecialty Care 100%
Major teaching responsibility: Attending and staff
Patients seen/week: 12
On call/weekend responsibility: Optional

M80 809 AMBULATORY CARE — JACQUELINE MARITZ LUNG CENTER
Instructors: Daniel Rosenbluth, MD, 454-8762
Location: Lung Center, Eighth Floor, Center for Advanced Medicine (CAM)
Elective Contact: Lisa Wetzel, 454-8762
Other Information: Students meet in the Lung Center, Eighth Floor, Center for Advanced Medicine (CAM), 8 a.m. first day of elective.

Enrollment limit per period: 1
Valid start weeks for four-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 wk; 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 basic science laboratory is focused on responses of the arterial wall to injury and on mediators of coagulation that may contribute to acute rethrombosis after coronary fibrinolysis and accelerated restenosis after coronary angioplasty. Current studies are designed to define the time after vessel injury that the luminal surface remains procoagulant, to define the molecular expression of determinants of procoagulant activity associated with the site of injury and their changes with time, and to determine whether agents that inhibit the activity of procoagulant moieties can alter vascular remodeling leading to decreased acute thrombosis and subsequent restenosis in animal models of vascular injury. Students will be expected to observe procedures in experimental animals, to participate in analyses of procoagulant moieties and vascular wall proteins, and to participate in weekly laboratory meetings.

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 Research Building and Seventh 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, 552 Barnard Hospital, 362-7635. Studies of the physiology and pathophysiology of metabolic regulation in normal humans and patients with diabetes mellitus with a focus on hypoglycemia.

Nicholas O. Davidson, MD, 910 Clinical Sciences Research Building, 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 U.S., 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@im.wustl.edu or defert@msnotes.wustl.edu, 6604 Wohl Hospital, 362-8050, Special Projects in Medical Education. Through special arrangement with and approval by the coursemaster, 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 coursemaster 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 coursemaster. 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, most of which have been identified through genomic screening techniques. Large-scale tumor DNA resequencing projects, focused on a small number of tumors and the analysis of many genes, suggest that by the time breast cancer enters the terminal phase, approaching 100 individual somatic mutations may have accumulated. Similarly, array comparative hybridization experiments have uncovered multiple gene amplification and deletion events. The complexity of these changes has given rise to the concept of a "cancer genome atlas" in which all the recurring mutations in cancer are documented in
publicly available databases to assist clinical investigation and translational medicine. Understanding the clinical and biological significance of these somatic changes must represent one of the most important challenges facing breast cancer researchers today because when complete, a functionally annotated breast cancer genome atlas will provide predictive/prognostic biomarkers and therapeutic opportunities that will transform our approach to this common disease.

In the last 10 years my clinical and laboratory efforts have therefore focused on the development of a luminal (hormone receptor positive) breast cancer genome atlas. 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 completed 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 my laboratory. Elective students will focus on projects that relate to individual oncogene candidates, including interpretation of genomic data, confirmatory studies on gene overexpression in cell lines and tissues and functional studies using gene transfer, gene knock-down and pharmacological targeting to verify the identity of bona fide therapeutic targets for further investigation.

Bradley Evanoff, MD, MPH, 454-8638. Occupational medicine epidemiology research. My research involves the use of epidemiology methods to characterize associations between diseases and work-related exposures. I am also doing studies that evaluate the detection and treatment of work-related musculoskeletal diseases. During an elective in occupational medicine epidemiology research, students will learn how to use epidemiologic methods to investigate disease processes by working on a mutually agreed-on topic of interest related to occupational diseases. Other activities can include work site visits and intervention projects, as well as involvement with work site health promotion and policy making. Elective length is variable depending on individual circumstances. Please contact Dr. Evanoff to discuss this research.

Gregory I. Goldberg, PhD, 7740 Barnard Hospital, 362-8172. Role of secreted extracellular matrix metalloproteases in tissue remodeling. Structure and function of the metalloproteases.

Mitchell H. Grayson, MD, 6615 Clinical Sciences Research Building, 454-7412. Dendritic cells in viral airway disease. Our laboratory is interested in understanding the recruitment of dendritic cells to murine airways and their subsequent effects on the immune response. In particular we are interested in the role that dendritic cells play in the generation of an asthmatic and atopic phenotype after viral infection. We use a murine viral model (Sendai virus) that generates changes in murine lung consistent with that seen in human asthma. Ongoing investigations include examining phenotypic changes in dendritic cells in the murine airway following viral infection, the role of the high affinity receptor for IgE on dendritic cells, and the mechanisms underlying the recruitment and trafficking of airway dendritic cells. Participants in this elective will learn cell culture, molecular biology, animal model and flow cytometric techniques, among others.

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, Second 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, Fifth 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.


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 Clinical Sciences Research Building, 362-8933, 362-8935. Students will be members of a collaborative research team headed by Drs. Levin and Rubin (Department of Medicine) investigating the mechanisms underlying the intestinal adaptive response that occurs to compensate for loss of functional small intestine. Specific mechanisms under investigation include the role of retinoids and nuclear receptor signaling and mesenchymal-epithelial interactions on adaptation. 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.


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).

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. Clinical research on the regulation of cognitive function. 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, Fifth Floor, Wohl Hospital Building, 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 Science Research Building, 362-5188. Gene therapy for genetic diseases. Our laboratory is interested in using gene therapy to treat genetic deficiencies such as lysosomal storage diseases and hemophilia A and B. 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 most of the clinical manifestations of these genetic diseases. Current studies focus upon assessing the immunological consequences of gene therapy, and devising ways to block immune responses to the therapeutic gene when and if they occur. In addition, we are further testing the clinical effect of this gene therapy approach in these and other models of disease.

Gustav Schonfeld, MD, 9900 Clinical Sciences Research Building, 362-7040. A) Molecular genetics and pathophysiology of low LDL syndromes. B) Genetics and patho-biology of nonalcoholic fatty liver. Studies employ human families, genome scans, positional cloning, genetically altered cells, and mice.

Clay F. Semenkovich, MD, Eighth floor, Southwest Tower, 362-4454. Fatty acid metabolism and its role in atherosclerosis, diabetes, hypertension and obesity. The modulation of respiratory uncoupling for the
treatment of aging, obesity and vascular disease.

Samuel L. Stanley, Jr., MD, 7244 McDonnell Pediatric Research Building, 286-0432. Dr. Stanley’s lab is interested in the host response to pathogens, including potential bioterroism agents. Work in the laboratory has focused on developing models to better understand the immunopathogenesis of *E. histolytica* and *shigella* infections, and the design and evaluation of recombinant-antigen based vaccines to stimulate mucosal and parenteral immune responses against enteric pathogens. More recently, the laboratory has begun new studies focusing on poxvirus infections, performing translational research looking at the genetic basis for susceptibility to poxvirus infections.

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, like QT variability or T-wave alternans that can be derived from continuous ECG monitoring from Holter recordings or polysomnography recordings in the sleep lab. 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 data available. There is also a subset of the CHS which is known to have died suddenly and we have developed a matched control group. We also have electronic sleep studies at two time points for about 300 of the same people who also participated in the Sleep Heart Health Study. Thus, there is also an opportunity in the CHS dataset for studies on the relationship of heart rate variability (and QT variability) and a huge number of clinical and demographic factors among the elderly.

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.

Douglas M. Tollefsen, MD, PhD, Eighth Floor, Clinical Sciences Research Building, 362-8830. Biochemical and physiologic studies of the interactions of plasma protease inhibitors with coagulation proteases. The student will become acquainted with standard biochemical techniques, such as column chromatography, absorption spectroscopy and radioisotope methods, as well as *in vivo* thrombosis models in mice. Minimum of 12 weeks required.

John Turk, MD, PhD, Eighth 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, M.D., 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 atro Viridis, Epicoccum nigrum and several pollens including those from white oak and Parthenium hysterophoros, a newly recognized allergen.

Faculty

KENNETH S POLONSKY, MBBCH Busch Professor of Medicine, Head of the Department of Internal Medicine
ELLIO EEFRE EBBEY, MD Professor of Clinical Medicine
CAMILLE N. ABBOUD, MD Professor of Medicine
SHADI ABDELNOUR Instructor in Clinical Medicine
CHARLES C ABEL, MD Assistant Professor of Clinical Medicine
DANA RAY ABENDSCHEIN, PHD Associate Professor of Medicine
BARRY K ABRAMSON, MD Instructor in Clinical Medicine
NADA A ABUMRAD, PHD Robert C Atkins Professor of Obesity Research in Medicine
JOSEPH J.H. ACKERMANN, PHD Research Professor of Chemistry in Medicine
TRACY ADAIR-KIRK, PHD Research Instructor in Medicine
SUSAN R ADAMS, MD Instructor in Clinical Medicine
DOUGLAS R ADKINS, MD Associate Professor of Medicine
ANN C AGNEW, MD Assistant Professor of Clinical Medicine
GAIL G AHUMADA, MD Associate Professor Emerita of Clinical Medicine
ABDULLA AKFAIY Instructor in Clinical Medicine
INGRID RENEE ALBERT, MD Assistant Professor of Clinical Medicine (Dermatology)
JORGE M ALEGRE, MD Instructor in Clinical Medicine
MORRIS ALEX, MD Assistant Professor Emeritus of Clinical Medicine
MUHAMMAD A ALI, MD Instructor in Clinical Medicine
DAVID HERSHEL ALPERS, MD William B Kountz Professor of Gerontology in Medicine
MILAN J. ANADKAT, MD Instructor in Medicine (Dermatology)
FRANK KIM ANDERSON, MD Instructor in Clinical Medicine (Dermatology)
SCOTT J ANDERSON, MD, PHD Instructor in Clinical Medicine
JEROME M ARONBERG, MD Assistant Professor of Clinical Medicine (Dermatology)
PHILLIP V. ASARO Assistant Professor of Emergency Medicine in Medicine
FRANK ASHALL, MD, PHD Instructor in Clinical Medicine
JEFFREY JAY ATKINSON, MD, BS Assistant Professor of Medicine
JOHN PATTERSON ATKINSON, MD Samuel Grant Professor of Medicine
CHANDRA AUBIN, MD Assistant Professor of Emergency Medicine in Medicine
VORACHART AUETHAVEKIAT, MD Assistant Professor of Medicine
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RIAD AZAR, MD Assistant Professor of Medicine
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WILLIAM D BIRENBAUM, MD Instructor in Clinical Medicine
CLIFFORD ALLEN BIRGE, MD Assistant Professor of Clinical Medicine
STANLEY J BIRGE, MD Associate Professor of Medicine
THOMAS M BIRKENMEIER, MD Assistant Professor of Medicine
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RICHARD BLIGH, MD Instructor in Clinical Medicine
MOREY A BLINDER, MD Associate Professor of Medicine
IMRE BODO Adjunct Instructor in Medicine
JOHN P BOINEAU, MD Professor of Medicine
MICHAEL BOLGER Instructor in Clinical Medicine
BENJE BOONSHAFT, MD Assistant Professor Emeritus of Clinical Medicine
BENJAMIN A BOROWSKY, MD Professor of Clinical Medicine
DEBAROTI MULLIC BORSHEL Assistant Professor of Medicine (Pending Executive Faculty Approval)
JONATHAN D BORTZ, MD Instructor in Clinical Medicine
RON BOSE Assistant Professor of Medicine (Pending Executive Faculty Approval)
MATTHEW S BOSNER, MD Assistant Professor of Clinical Medicine
ANNE M BOWCOCK, PHD Professor of Medicine (Dermatology)
WILLIAM G BOWEN, MD Associate Professor of Clinical Medicine
JANINA M BRAJTBURG, PHD Research Associate Professor Emerita of Medicine
RICHARD D BRASINGTON, JR, MD Professor of Medicine
ALAN C BRAVERMAN, MD Professor of Medicine
DANIEL C BRENNAN, MD Professor of Medicine
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ANGELA L BROWN, MD Assistant Professor of Medicine
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KATHRYN CORINNE BROWN Instructor in Clinical Medicine
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ROBERT M BRUCE, MD, BS Professor of Clinical Medicine
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TAMARA LAVON BURLIS, DPT, BS Assistant Professor of Medicine
DONALD F BUSIEK, MD Instructor in Clinical Medicine
MELVIN J BUTLER Instructor in Clinical Medicine
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GALILEU CABRAL, MD Instructor in Clinical Medicine
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CHRISTOPHER ROB CARPENTER, MD Assistant Professor of Emergency Medicine in Medicine
DAVID B CARR, MD Associate Professor of Medicine
BEATRIZ M CARRENO, PHD Research Assistant Professor of Medicine
AMANDA FISHBACK CASHEN, MD Assistant Professor of Medicine
MARIO CASTRO, MD Associate Professor of Medicine
LILIBETH MARIA CAYABYAB-LoE, MD Assistant Professor of Clinical Medicine
MURALI M CHAKINALA, MD Assistant Professor of Medicine
MANU V CHAKRAVARTHY, MD, PHD Instructor in Medicine
KAE PYNG CHANG, MD Instructor in Clinical Medicine
HUGH CHAPLIN, JR, MD Professor Emeritus of Medicine
DOUGLAS CHAR, MD Associate Professor of Emergency Medicine in Medicine
LEWIS ROBERT CHASE, MD Professor of Medicine
FENG CHEN, PHD Assistant Professor of Medicine
JANE CHEN, MD Assistant Professor of Medicine
MAY M CHEN Research Instructor in Medicine
PHYLLIS CHEN, MD Instructor in Clinical Medicine
QING CHEN, MD Instructor in Clinical Medicine
ZHOUJI CHEN, PHD Assistant Professor of Medicine
AMY S CHENG Instructor in Medicine
EMILY CHENG, MBBCH, PHD Assistant Professor of Medicine
PEI-HSIN CHENG Instructor in Medicine
STEVEN CHIH NUN CHENG, MD Instructor in Medicine
SU-LI CHENG, PHD Research Assistant Professor of Medicine
PHILIP CHU PAK-YU, MD Instructor in Clinical Medicine
DUCK SUNG CHUN, MD Instructor in Clinical Medicine
MATTHEW AARON CIORBA Instructor in Medicine
GEOFFREY CISLO, MD Assistant Professor of Medicine
ROBERTO CIVITELLI, MD Professor of Medicine
DAVID B CLIFFORD, MD Professor of Medicine
DOROTHY JEAN CLINE, MD Instructor in Clinical Medicine (Dermatology)
JAMES CLOSE, MD  Instructor in Clinical Medicine
WILLIAM EDWARD CLUTTER, MD  Associate Director of the House Staff Training Program, Department of Internal Medicine, Associate Professor of Medicine
SHARI J COHEN, MD  Assistant Professor of Clinical Medicine
SUSAN R COLBERT-THREATS, MD  Assistant Professor of Clinical Medicine
BRENT K COLE, MD  Instructor in Clinical Medicine
DANITA L COLE, MD  Instructor in Clinical Medicine
PATRICIA L COLE, MD  Associate Professor of Clinical Medicine
LLOYD W COLEMAN, PHD  Research Instructor in Medicine
IVAN E COLLIER, PHD  Retiree - Research Assistant Professor of Medicine (Dermatology)
MARCO COLONNA, MD  Professor of Medicine
ARTHUR HAMILTON COMBS  Associate Professor of Clinical Medicine
PHILLIP COMENS, MD  Assistant Professor of Clinical Medicine
RALPH COPP, JR, MD  Assistant Professor of Clinical Medicine
LYNN ANNE CORNELIUS, MD  Associate Professor of Medicine (Dermatology)
JOHN BERNARD COSTELLO, MD  Instructor in Clinical Medicine
MICHAEL R COURTOIS, MA, BS  Research Assistant Professor of Medicine
DANIEL W COYNE, MD  Professor of Medicine
DUANE E COZART, MD, PHD  Assistant Professor Emeritus of Clinical Medicine
JOHNETTA M CRAIG, MD  Instructor in Clinical Medicine
JOHN JEFFERY CRAS, MD  Instructor in Medicine
PETER A. CRAWFORD, MD, PHD  Assistant Professor of Medicine
CHARLES CRECELIUS, MD, PHD  Instructor in Clinical Medicine
SHARON CRESCI, MD  Assistant Professor of Medicine
STEPHEN R CRESPIN, MD  Associate Professor of Clinical Medicine
JEFFREY S CRIPPIN, MD  Professor of Medicine
PHILIP E CRYER, MD  Irene E and Michael M Karl Professor of Endocrinology and Metabolism in Medicine
MARY K CULLEN, MD  Instructor in Clinical Medicine (Dermatology)
ROBERT CULVERHOUSE, PHD  Assistant Professor of Medicine
TILLMANN CYRUS, MD  Instructor in Medicine
WILLIAM H DANFORTH, MD  Professor of Medicine
ERIK D. DANIELS, MD  Instructor in Clinical Medicine
JOHN S DANIELS, MD  Associate Professor of Clinical Medicine
RAND E DANKNER, MD  Associate Professor of Clinical Medicine
MOHAMMAD KHALED DARDARI, MD  Instructor in Clinical Medicine
LAKSHMAN DARSI, MD  Instructor in Clinical Medicine
CARLOS COLTON DAUGHADAY, MD  Associate Professor of Medicine
WILLIAM H DAUGHADAY, MD  Irene E and Michael M Karl Professor Emeritus of Endocrinology and Metabolism in the John Milliken Department of Medicine
JOHN D DAVIDSON, MD  Professor of Clinical Medicine
NICHOLAS O DAVIDSON, MD  Professor of Medicine
VICTOR G DAVILA-ROMAN, MD  Professor of Medicine
THOMAS M DE FER, MD  Associate Professor of Medicine
LISA DE LAS FUENTES, MD  Assistant Professor of Medicine
VINCENT R DE MELLO, MD  Assistant Professor of Clinical Medicine
ANNE V DEAN, MD  Instructor in Clinical Medicine
JENNIFER A. DELANEY, MD  Instructor in Clinical Medicine
JAMES ALBERT DELMEZ, MD  Professor of Medicine
LEE MICHAEL DEMERTZIS, MD, BS  Instructor in Medicine (Assistant Director, Medical Services)
ALEX EUGENE DENES, MD  Associate Professor of Medicine
SUNNY DESAI  Instructor in Clinical Medicine
ROBERT H DEUSINGER, PHD  Associate Professor of Medicine
ENRICO DI CERA, MD  Professor of Medicine
MICHAEL DIAMOND, MD, PHD  Associate Professor of Medicine
BRIAN K DIECKGRAEFE, MD, PHD  Associate Professor of Medicine
KATHRYN M DIEMER, MD  Assistant Professor of Medicine
JAMES A DIESTELHORST, MD  Instructor in Clinical Medicine
JACQUELYN B DILWORTH, MD  Instructor in Clinical Medicine (Dermatology)
JOHN F DIPERSIO, MD, PHD  Lewis T and Rosalind B Apple Professor of Medicine
Marilyn Disch, MD  Instructor in Clinical Medicine
Richard M DiValerio, MD  Instructor in Clinical Medicine
Martin A Docherty, MD  Assistant Professor of Emergency Medicine in Medicine
Irl Joseph DON, MD  Associate Professor of Clinical Medicine
James W Donnelly, MD  Instructor in Clinical Medicine (Dermatology)
Balraj Doray, PhD  Research Instructor in Medicine
Rebecca Susan Dresser, JD  Professor of Ethics in Medicine
William H Drippen, MD  Assistant Professor of Emergency Medicine in Medicine
Erik R Dubberke, MD  Instructor in Medicine
Maria C Dumagad-Sabio, MD  Instructor in Clinical Medicine
William C Dunagan, MD  Associate Professor of Medicine
William Michael Dunne, Jr., PHD  Professor of Medicine
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| SAMUE...
Principles of pharmacology are taught as part of the second-year curriculum of medical school. This course elaborates essential concepts in pharmacology that provide the basis for understanding the mechanisms of drug action for individual classes of drugs discussed elsewhere in different blocks of a newly integrated second-year curriculum.

Research in the department emphasizes application of the tools of genetics, molecular and cell biology, genomics and bio-organic chemistry to define mechanisms that regulate cell fate, differentiation and senescence, and to devise ways of modulating these processes in vivo. A principal focus is on developmental biology, using a series of genetically manipulable model organisms. Students participate with the staff in a series of weekly journal clubs discussing recent papers in the literature as well as their own work and that of their colleagues.

Courses

Second Year
M70 670A PRINCIPLES OF PHARMACOLOGY
Instructor: Douglas F. Covey, PhD, 362-1726
The purpose of this course is to provide basic information relating to 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 the coursemaster to enroll in this course.

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.

Jeffrey I. Gordon, MD, 5th Floor, 4444 Forest Park, 362-7243. Symbiotic host-microbial interactions in the mouse and human gut; gut development.

Gregory A. Grant, PhD, 4th Floor, Biotechnology Center, 362-3367. Mechanism of allosteric regulation in enzymes.

Shin-Ichiro Imai, MD, PhD, Room 354, McDonnell Medical Sciences Building, 362-7228. Molecular mechanisms of aging and longevity in mammals.

Eugene M. Johnson, Jr., PhD, 3rd Floor, McDonnell Medical Sciences Building, 362-3926. Biology of neurotrophic factors and mechanisms of neuronal programmed cell death.

Raphael Kopan, PhD, 3600 Cancer Research Building, 747-5520. Notch biology and disease. 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 Hypoplasia (RHD)) and skin abnormalities (alopecia, cancer, ectopic dermatitis).


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. Regulation of lung, heart, skeletal and neurological diseases by members of the fibroblast growth factor family. Biochemical and genetic analysis of the otopetrin gene family in the mouse vestibular system.

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

DAVID M ORNITZ, MD, PHD Alumni Endowed Professor of Molecular Biology and Pharmacology, Interim Head of the Department of Molecular Biology and Pharmacology
CAROLYN J ANDERSON, PHD Associate Professor of Molecular Biology and Pharmacology
RAJENDRA APTE, MD, PHD Assistant Professor of Molecular Biology and Pharmacology
THOMAS J BARANSKI, MD, PHD Associate Professor of Molecular Biology and Pharmacology
MONICA BESSLER, MD, PHD Professor of Molecular Biology and Pharmacology
IRVING BOIME, PHD Professor of Molecular Biology and Pharmacology
WALTER A BOYLE, III, MD Assistant Professor of Molecular Biology and Pharmacology
SHIMING CHEN, PHD Associate Professor of Molecular Biology and Pharmacology
ZHOUFENG CHEN, PHD Associate Professor of Molecular Biology and Pharmacology
RICHARD A CHOLE, MD, PHD Professor of Molecular Biology and Pharmacology
DOUGLAS FLOYD COVEY, PHD Professor of Molecular Biology and Pharmacology
PETER A. CRAWFORD, MD, PHD Assistant Professor of Molecular Biology and Pharmacology
CHARLES M CROWDER, MD, PHD Associate Professor of Molecular Biology and Pharmacology
NICHOLAS O DAVIDSON, MD Professor of Molecular Biology and Pharmacology
AARON DIANTONIO, MD, PHD Associate Professor of Molecular Biology and Pharmacology
ALEX S EVERS, MD Professor of Molecular Biology and Pharmacology
JUDITH P GOLDEN, PHD Instructor in Molecular Biology and Pharmacology
JEFFREY I GORDON, MD Director of the Center for Genome Sciences, Dr Robert J Glaser Distinguished University Professor of Molecular Biology and Pharmacology
GREGORY ALAN GRANT, PHD Professor of Molecular Biology and Pharmacology
RICHARD WARREN GROSS, MD, PHD Professor of Molecular Biology and Pharmacology
ROBERT O HEUCKEROOTH, MD, PHD Associate Professor of Molecular Biology and Pharmacology
DAVID MICHAEL HOLTZMAN, MD Professor of Molecular Biology and Pharmacology
RICHARD S HOTCHKISS, MD Professor of Molecular Biology and Pharmacology
JAMES J HSIEH, MD, PHD Assistant Professor of Molecular Biology and Pharmacology
F. EDMUND HUNTER, JR, PHD Professor Emeritus of Molecular Biology and Pharmacology
MA. XENIA GARCIA ILAGAN, PHD Instructor in Molecular Biology and Pharmacology
SHIN-ICHIRO IMAI, MD, PHD Assistant Professor of Molecular Biology and Pharmacology
EUGENE MALCOLM JOHNSON, JR, PHD Professor of Molecular Biology and Pharmacology
DANIEL P KELLY, MD Professor of Molecular Biology and Pharmacology
David M Kipnis, MD Professor of Molecular Biology and Pharmacology
Raphael Kopan, PhD Professor of Molecular Biology and Pharmacology
Stephen K Kornfeld, MD, PhD Associate Professor of Molecular Biology and Pharmacology
Paul Thomas Kotzbaumer Assistant Professor of Molecular Biology and Pharmacology
Kristen Louise Kroll, PhD Associate Professor of Molecular Biology and Pharmacology
Ruth E. Ley Instructor in Molecular Biology and Pharmacology
Fanxin Long, PhD Assistant Professor of Molecular Biology and Pharmacology
Liang Ma, PhD Assistant Professor of Molecular Biology and Pharmacology
Craig Anthony Micchelli, PhD Assistant Professor of Molecular Biology and Pharmacology
Jason C Mills, MD, PhD Assistant Professor of Molecular Biology and Pharmacology
Aubrey R Morrison, MBBS Professor of Molecular Biology and Pharmacology
Louis J. Muglia, MD, PhD Professor of Molecular Biology and Pharmacology
Philip Needelman, PhD Adjunct Professor of Molecular Biology and Pharmacology
Jeanne M Nerbogne, PhD Alumni Endowed Professor of Molecular Biology and Pharmacology
David R Piwnica-Worms, MD, PhD Professor of Molecular Biology and Pharmacology
Deborah C Rubin, MD Professor of Molecular Biology and Pharmacology
David Rudnick, MD, PhD Assistant Professor of Molecular Biology and Pharmacology
John Hall Russell, PhD Professor of Molecular Biology and Pharmacology
Scott Saunders, MD, PhD Associate Professor of Molecular Biology and Pharmacology
Jean E. Schaffer, MD Professor of Molecular Biology and Pharmacology
Alan L Schwartz, MD, PhD Professor of Molecular Biology and Pharmacology
Erica D Sonnenburg, PhD Instructor in Molecular Biology and Pharmacology
Justin L Sonnenburg, PhD Instructor in Molecular Biology and Pharmacology
Thaddeus S. Stappenbeck, MD, PhD Assistant Professor of Molecular Biology and Pharmacology
Dwight A Tower, MD, PhD Professor of Molecular Biology and Pharmacology
Russell N Van Gelder, MD, PhD Associate Professor of Molecular Biology and Pharmacology
Michael J Welch, PhD Professor of Molecular Biology and Pharmacology
David B Wilson, MD, PhD Associate Professor of Molecular Biology and Pharmacology

Department's Web Site
http://molecool.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 symptomology and pathophysiology.

Selectives

M04 526 NEW DISEASES, NEW PATHOGENS
Instructor: David B. Haslam, MD, 454-6050
This selective will focus on new or re-emerging infectious diseases and will complement the WUMSI microbiology course. In addition to discussing the microbiology and pathophysiology of the emerging diseases, the sessions will consider the social, economic and political implications of these diseases. Presentations will be performed by participating students and examples will be taken from bacterial, protozoan, viral and fungal pathogens.

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; bacterial genetic diversity and individual host specificity; mechanisms and evolutionary costs of 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.


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. Two globally important mosquito-borne RNA viruses are studied — the West Nile encephalitis and Dengue hemorrhagic fever viruses. 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.

Tamara L. Doering, MD, PhD, 10th Floor, McDonnell Pediatric Research Building, 747-5597. The Doering lab studies the opportunistic fungal pathogen, Cryptococcus neoformans. We focus 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.

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.


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.


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.

David Leib, PhD, 1108 McMillan Hospital Building, 362-2689. Molecular biology and latency of herpes simplex virus.

Hsiu-San Lin, MD, PhD, Room A10, Center for Advanced Medicine, 362-8525. Differentiation and function of mononuclear phagocytes.

Jeffrey S. McKinney, MD, PhD, 6105 McDonnell Pediatric Research Building, 286-2912. The molecular mechanisms of E. coli and Salmonella bacterial-host interactions. We employ novel RNA-based techniques of bacterial gene regulation, and real-time in vivo imaging to dissect host-pathogen interactions — including those in invasive disease, as well as bacterial localization to malignant tumors. We also study the diverse capabilities and functions of RNA in vitro and in vivo and are designing new RNA molecules amenable to in vitro evolution and to studies of RNA biology in bacteria.

Virginia L. Miller, PhD, 8th Floor, McDonnell Pediatric Research Building, 286-2891. Molecular basis of pathogenicity of the enteric pathogens Yersinia enterocolitica, Salmonella typhmурium and Klebsiella pneumoniae.

Lee Ratner, MD, PhD, 562 McDonnell Medical Sciences Building, 362-8836. Structure and function of human retroviruses, including HTLV-I, a cause of leukemia, and HIV, the cause of AIDS. The major focus is in studying the regulation of virus infectivity, replication, assembly and pathogenicity.

Robert Schreiber, PhD, 7th Floor, Clinical Sciences Research Building, 362-8747. Biochemistry and biology of cytokines and their receptors. Elucidation of the signal transduction mechanisms used by interferon-gamma and tumor necrosis factor. Definition of the physiologic roles of cytokines in vivo, especially with respect to host responses to tumors, and microbial pathogens.

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.

Samuel L. Stanley, Jr., MD, 7th Floor, McDonnell Pediatric Research Building, 362-1070. We study the protozoan parasite Entamoeba histolytica, the cause of amebic dysentery and amebic liver abscess, focusing on developing models to better understand the pathogenesis of amebic infection, novel targets for anti-amebic drug design, and the nature of the host immune and inflammatory response to enteric pathogens. We are also interested in the immunogenetics of infectious diseases, and how genetic factors increase susceptibility or resistance to select agents and emerging infections.

Gregory Storch, MD, 2N52 St. Louis Children’s Hospital, 454-6079. In this elective, the student will participate in a research project involving the application of techniques of molecular biology, especially the polymerase chain reaction and nucleotide sequencing, to the diagnosis of the infectious diseases. Infectious agents currently under investigation include human cytomegalovirus, Epstein-Barr virus, BK polyoma virus, Ehrlichia, and respiratory viruses. Studies are also directed at molecular detection and analysis of resistance to antimicrobial agents.

Patrick M. Stuart, PhD, 1217B McMillan Hospital Building, 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.

Dong Yu, PhD, 9220D McDonnell Pediatric Research Building, 362-7367. Human cytomegalovirus (HCMV) is a significant human pathogen with worldwide importance. HCMV, a ß herpes-virus, infects 60-80% of the world population and establishes a lifelong latent/persistent infection upon primary infection in the human host. Although usually silent in healthy individuals, HCMV infection is a leading cause of severe or fatal diseases in people with compromised immune functions such as AIDS patients, transplant patients and cancer patients. Further, congenital HCMV infection is the major viral cause of birth defects leading to mental retardation and hearing loss in newborns. Finally, the virus has been implicated in various types of vascular diseases such as atherosclerosis and restenosis. Currently there is no vaccine available to prevent primary HCMV infection and other antiviral treatments have only limited effects to control persistent infection or reactivation of HCMV, underscoring the urgency for a better understanding of the mechanism of HCMV replication and pathogenesis in order to develop effective antiviral therapeutics to control this globally important pathogen.

HCMV is the largest virus known to infect humans, containing a complex 250kb double-stranded DNA genome that encodes >150 putative viral genes, most of which have unknown functions. We have recently cloned the full-length genome of an HCMV strain as an infectious bacterial artificial chromosome (BAC) and developed a BAC-based system that allows us to effectively study HCMV using the genetic approach. Further, we have constructed a comprehensive HCMV mutant library in which mutations have been introduced into all previously uncharacterized viral genes to inactivate their functions. Hence the system that we developed serves as a foundation for further HCMV research to decipher the roles of individual viral genes in HCMV biology.

In my laboratory, students have opportunities to use a combination of genetic, biochemical, genomic, molecular biology and cell biology approaches to study viral and cellular processes that are involved in various aspects of HCMV replication and pathogenesis. Specifically, they will be engaged in (i) using the approach of reverse genetics investigating gene functions that are required for HCMV replication in the culture cell system, (ii) using the approach of forward genetics to study viral genes that are dispensable for virus replication in cultured human fibroblast cells, a cell type that is routinely used to propagate HCMV *in vitro*, (iii) developing a small-animal model for dissecting the mechanism of HCMV infection and pathogenesis *in vivo*, and (iv) deciphering the genetic basis of virulence that is uniquely associated with freshly isolated clinical HCMV strains but is lost in attenuated laboratory viruses.

**Faculty**

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

**NATALIA S AKOPYANTS, PHD, MS** Research Instructor in 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

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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 participate in a four-week clerkship in Neurology, which introduces students to the clinical care of patients with diseases of the nervous system. Neurosurgical faculty members also work with the neurologists in providing lectures, demonstrations and teaching exercises in patients with neurological diagnoses as part of the Clinical Medicine course. Some 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.

The divisions within Neurological Surgery are:

The Division of Pediatric Neurosurgery: Jeffrey R. Leonard, MD; Matthew D. Smyth, MD; Tae Sung Park, MD

The Center for the Study of Nervous System Injury is based in the Department of Neurology with participation by neurosurgery faculty members Ralph G. Dacey, Jr., MD; Jeffrey M. Gidday, PhD; Tae Sung Park, MD

The James L. O’Leary Division of Experimental Neurology and Neurological Surgery: Thomas A. Woolsey, MD (Director)

Areas of neurosurgical specialization include:

Epilepsy Surgery: Joshua L. Dowling, MD; Eric C. Leuthardt, MD

Cranial Base Surgery: Michael R. Chicoine, MD; Robert L. Grubb Jr., MD; Gregory J. Zipfel, MD

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

Neuro-Oncology: Michael R. Chicoine, MD; Ralph G. Dacey, Jr., MD; Keith M. Rich, MD; Eric C. Leuthardt, MD; Sarah C. Jost, MD

Pediatric Neurosurgery: Jeffrey R. Leonard, MD; Matthew D. Smyth, MD; Tae Sung Park, MD
Cerebrovascular Surgery: Michael R. Chicoine, MD; Ralph G. Dacey, Jr., MD; Robert L. Grubb, Jr., MD; Keith M. Rich, 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 elective 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: Ralph Dacey, Jr., MD, 362-3571
Location: McMillan Hospital
Elective Contact: Ralph Dacey, Jr., MD, 362-3571
Other Information: Students should contact Dr. Dacey prior to the first day of the elective.

- Enrollment limit per period: 7
- Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The goal is to provide an overview of neurological surgery. The fourth-year medical student will participate in patient work-ups, pre, intra- and postoperative care, and diagnostic procedures. Students will also scrub in cases with senior level and chief residents assisting with neurosurgical procedures and observing the more critical portions of these procedures. It is expected that they will learn how to perform basic neurosurgical procedures such as lumbar punctures, ICP monitor placement and ventricular drain placement. Fourth-year medical students are encouraged to participate in Grand Rounds, Neurosurgery Resident Curriculum conference and Journal Club with the neurosurgery residents. 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: Outpatient 90%, 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.


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, intracerebral 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. Molecular mechanisms of neutrophil-mediated microvascular injury following ischemia in the brain. Neutrophil-endothelial adherence and consequent endothelial cell injury are studied in hypoxia-reperfusion models of whole animals and cultured endothelial cells. The role of nitric oxide, peroxynitrite, elastase and myeloperoxidase products on neutrophil and endothelial cells in neutrophil-endothelial interactions is under investigation.

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.

Gregory J. Zipfel, MD, 5th Floor McMillan Hospital Building, 747-8871. Role of ApoE and amyloid-beta in ischemic brain injury and subarachnoid hemorrhage. Research in our laboratory focuses on investigating the role of amyloid-beta peptide Aβ and apolipoprotein E (ApoE) on cerebrovascular function, ischemic brain injury and subarachnoid hemorrhage. It has been shown that certain forms of Aβ promote cerebral vessel dysfunction, which could heighten sensitivity to acute neurologic insults such as ischemic brain injury and/or subarachnoid hemorrhage. ApoE is known to differentially influence Aβ metabolism and clearance and in so doing could significantly modulate these Aβ-mediated vascular effects. We hypothesize that Aβ and ApoE, through discreet and/or synergistic vascular mechanisms, contribute to neural injury following ischemic brain injury and/or subarachnoid hemorrhage. Our studies employ a variety of translational and clinical experimental techniques such as in vivo assessment of cerebral arteriole function and cerebral blood flow in transgenic mice expressing human Aβ and human ApoE isoforms, in vivo mouse models of focal cerebral ischemia and subarachnoid hemorrhage, microdialysis to measure brain Aβ levels in mice and humans, and a prospective observational study in humans evaluating the effect of ApoE isoforms on subarachnoid hemorrhage-induced cerebral vasospasm.

Faculty

RALPH G DACEY, JR, MD Henry G and Edith R Schwartz Professor of Neurological Surgery, Head of the Department of Neurological Surgery
KEITH HAP BRIDWELL, MD Professor of Neurological Surgery
JACOB M BUCHOWSKI, MD Assistant Professor of Neurological Surgery
ANDREAS H BURKHALTER, PHD Associate Professor of Neurobiology in Neurological Surgery
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 called 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:** Edwin Trevathan, MD, MPH (division director), Janice Brunstrom, MD, Anne Connolly, MD, Philip Dodge, MD, W. Edwin Dodson, MD, Paul Golumbek, MD, PhD, Chris Gurnett, MD, PhD, David Gutmann, MD, Soe Mar, MD, Jeffrey Neil, MD, PhD, Michael Noetzel, MD, Author Prensky, MD, Steven Rothman, 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, Amit Malhotra, MD, 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, DPhil, David M. Holtzman, MD (department chair), Terri L. Hosto, MSW, David Johnson, PhD, Eugene M. Johnson, Jr., PhD, Thomas M. Meuser, PhD, Pamela Millsap, MSN, Anne Fagan Niven, PhD, Janice L. Palmer, MS, Stacy Jackson, MSN, Yvette I. Sheline, MD, B. Joy Snider, MD, PhD, Martha Storandt, PhD, Christy Tomlinson, MSN, Nigel Cairns, PhD, MRCPath.

**Hope Center for Neurological Disorders:** Mark P. Goldberg, MD (director), Randall Bateman, MD, David Brody, MD, PhD, Janice E. Brunstrom, MD, Maurizio Corbetta, MD, Anne Cross, MD, Ralph G. Dacey, Jr., MD, Gabriel A. de Erausquin, MD, PhD, Anne Fagan Niven, PhD, James E. Galvin, MD, MSc, Jeffrey M. Gidday, PhD, Allison Goate, PhD, David I. Gottlieb, PhD, David M. Holtzman, MD (department chairman), Krzysztof Hyrc, PhD, Mark F. Jaccoun, PhD, Michael Howard, PhD, Eugene M. Johnson, Jr., PhD, Jin-Moo Lee, MD, PhD, Jeffrey D. Milbrandt, MD, PhD, Jeffrey J. Neil, MD, PhD, Tae Sung Park, MD, Alexander Parsadanian, PhD, Joel S. Perlmutter, MD, William J. Powers, MD, Steven M. Rothman, 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, Xiao-Feng Yang, MS, MD, Kejie Yin, MD, PhD

**Cerebrovascular Disease Section:** William J. Powers, MD (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
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, 362-3293
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 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The student will evaluate patients with neurological manifestations of medical, surgical and psychiatric diseases 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/week: 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 Hospital, 7 a.m. first day of elective.

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

Students will 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 Washington University 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/week: 6
On call/weekend responsibility: Every 6th night

M35 830  NEURO-ONCOLOGY
Instructor: David H. Gutmann, MD, PhD, 362-7379
Location: Suite C, Sixth Floor, Center for Advanced Medicine (CAM)
Elective Contact: David H. Gutmann, MD, PhD, 362-7379
Other Information: Students should report to Suite C, Sixth Floor, Center for Advanced Medicine (CAM) 8:30 a.m. first day of elective.

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

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/week: 50
M35 851  CLINICAL ASPECTS OF AGING AND DEMENTIA
Instructors: John C. Morris, MD, and James E. Galvin, MD, 286-2683
Location: 4488 Forest Park Ave. (two-story brick building at intersection with Taylor)
Elective Contact: Tom Meuser, PhD (286-2882) or Mary Coats, MSN (286-2683)
Other Information: Contact Dr. Meuser prior to first day of elective to set up orientation. Students should report to the Memory and Aging Project, Suite 101, 4488 Forest Park Ave., 8:30 a.m. first day of elective.

Enrollment limit per period: 1
Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 33 and 37.

This elective focuses on the distinction of dementia from healthy aging and on the differential diagnosis of dementia, 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 neuropsychological, neuropathological, radiologic and other biomedical procedures important in the diagnostic evaluation of the aged, and consider clinical trials of experimental agents used in memory disorders and practical aspects of the management of the demented patient and his or her family.

Student time distribution: Research and Clinical Patient Evaluation 80%, Conferences/Lectures 20%; Subspecialty Care 100%
Major teaching responsibility: Single attending
Patients seen/week: 6-12
On call/weekend responsibility: None

M35 860  PEDIATRIC NEUROLOGY
Instructor: Edwin Trevathan, MD, 454-6042
Location: 12E25 St. Louis Children’s Hospital
Elective Contact: Kristy Middendorff (middendorffk@neuro.wustl.edu), 454-6042
Other Information: Students report to Dr. Trevathan or designated pediatric neurology attending at St. Louis Children’s Hospital, 8:30 a.m. first day of elective.

Enrollment limit per period: 1 (Inpatient); 1 (Consultation Office Service)
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

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/week: 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, 8:30 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The 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. Daily 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/week: 25
On call/weekend responsibility: Variable

M35 865  ADULT AND PEDIATRIC EPILEPSY
Instructors: Edward Hogan, MD and Liu Lin Thio, MD, PhD, 454-4089
Location: 12th Floor, Northwest Tower
Elective Contact: Kristy Middendorff, middendorffk@neuro.wustl.edu, 454-6120
Other Information: Students should meet on the 12th Floor, Northwest Tower, 9:00 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students will 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/week: 40
On call/weekend responsibility: None

M35 871 CLINICAL NEUROIMMUNOLOGY and MULTIPLE SCLEROSIS
Instructor: Becky Parks, MD
Location: 3rd Floor McMillan Hospital Building
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 four-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 Center for Advanced Medicine (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/week: 20
On call/weekend responsibility: None

M80 807 PHYSICAL MEDICINE AND REHABILITATION
Instructor: Oksana Volshteyn, MD, 454-7757, volshteyno@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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

The elective is designed to provide the student with a broad introduction to the field of physical medicine and rehabilitation. The 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. Student will gain clinical skills in evaluating in management of functional impairments. Students will be expected to participate in daily rounds on inpatient rehabilitation units with the clinical care team, follow three to five 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/week: 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, 2112 East Building, 747-0426. The elective will provide hands-on experience in using functional neuroimaging (PET and fMRI) to map regions of the human brain responsible for vision and attention, and to study recovery of function in patients with cognitive deficits (aphasia, neglect) and brain injury.

Anne H. Cross, MD, Third Floor McMillan 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.

Mark P. Goldberg, MD, 201 Biotechnology Center (Center for the Study of Nervous System Injury), 362-3258. Web-based neurology education. The student will select a topic and target audience, then develop web-based materials to teach the topic. Target audiences may include medical students, patients or family members, or allied health professionals. Most topics will be related to stroke. Completed projects will appear on the Internet Stroke Center web site (www.strokecenter.org) or the education web site of the Department of Neurology. Web development skills are welcome but NOT required.

David H. Gutmann, MD, PhD, 306 Biotechnology Center, 362-7379. Brain tumor research. Tumors of the nervous system represent clinically challenging cancers associated with significant morbidity and mortality. In contrast to other similarly deadly cancers, relatively little is known about the molecular genetics and biology of nervous system tumors. The research in our laboratory is focused on the two most common nervous system tumors, astrocytoma (glioma) and meningioma.

In order to gain insights into molecular and cellular mechanisms critical for astrocytoma and meningioma development, we have focused our studies on the neurofibromatosis 1 (NF1) and neurofibromatosis 2 (NF2) tumor suppressor genes. Since individuals with the NF1 and NF2 inherited tumor syndromes develop astrocytomas and meningiomas at high frequency, the NF1 and NF2 genes therefore represent critical growth regulators for astrocytes and meningeal cells, respectively, and their dysfunction in these cells is sufficient for tumor formation.
Current studies in our laboratory are aimed at (1) identifying the role of the tumor microenvironment in NF1-associated astrocytoma initiation and progression, (2) understanding the impact of NF1 gene dysfunction on normal brain development, (3) defining the mechanisms underlying neurofibromin regulation of astroglial cell growth in vitro and in vivo, (4) determining how the NF2 and Protein 4.1B genes function as negative growth regulators in the nervous system, and (5) developing robust mouse models of human nervous system cancers suitable for preclinical cancer therapeutic studies.

Over the past few years, we have developed several robust mouse models of nervous system tumors suitable for preclinical therapeutic studies. In this elective, students will participate in ongoing preclinical small animal therapy trials and gain an appreciation for translational research aimed at developing better treatments for children and adults with inherited tumor predisposition syndromes. In addition, students will have the opportunity to see adults and children in the Washington University NF Clinical Program at St. Louis Children’s Hospital.

Steven E. Petersen, PhD, 2108 East Building, 362-3319. This lab is interested in the functional localization of higher brain processes, particularly those processes related to language, memory and visual attention. Our main approach to these issues is the use of PET and fMRI activation, but we also study task performance in normal and selected patient populations.

Joel S. Perlmutter, MD, Second Floor East Building, 362-6026. Pathophysiology of movement disorders. The lab is primarily interested in etiology, pathophysiology and treatment of basal ganglia disorders. We have several studies of PD. We investigate mechanisms of action of deep brain stimulation, a dramatic new treatment. These studies combine PET, cognitive testing and quantified measures of movement. We also test new drugs that might rescue injured nigrostriatal neurons (a model of PD). For these, we use PET to measure dopamine pathways and also quantify motor behavior. We 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.

Marcus E. Raichle, MD, Neuro Imaging Laboratory, Second Floor, East Building, 362-6907. In vivo brain hemodynamic, metabolic and functional studies of human cognition and emotion using cyclotron-produced isotopes and emission tomography (PET) as well as functional magnetic resonance imaging (fMRI) in humans. See also Steven E. Petersen, PhD.

B. Joy Snider, MD, PhD, Biotechnology Building, Room 225, 747-2107. Protein degradation and calcium homeostasis in cellular models of neurodegenerative disorders. We study regulation and dysfunction of the ubiquitin-proteasome system in cultured cells, including primary neuronal cultures. A second set of projects is aimed at elucidating the role of intracellular calcium homeostasis in neuronal dysfunction and death.

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 Head of the Department of Neurology, Andrew B. and Gretchen P. Jones Professor of Neurology
ANINDA BHAT ACHARYA, MD Instructor in Clinical Neurology
MUHAMMAD TAHER AL-LOZI, MD Professor of Neurology
C. ROBERT ALMLI, PHD Associate Professor of Neurology
DENIS IAN ALTMAN, MBBCH Associate Professor of Clinical Neurology
LIZETTE ALVAREZ-MONTERO, MD Instructor in Clinical Neurology
SYLVIA AWADALLA, MD Associate Professor of Neurology
YEKATERINA V. AXELROD, MD Assistant Professor of Neurology
ROBERT H BALOH, MD, PHD Instructor in Neurology
DAVID ANTHONY BALOTA, PHD Professor of Neurology
JANET MARIE BALOTA, PHD Assistant Professor of Neurology
RANDALL JOHN BATEMAN, MD Assistant Professor of Neurology
M. CAROLYN BAUM, PHD Professor of Neurology (Occupational Therapy)
MAX PRELY BENZAQUEN Instructor in Clinical Neurology
CHRISTINE R BERG, PHD Instructor in Neurology
LEONARD BERG, MD Professor Emeritus of Neurology
MARY ELLEN BERTRAND Assistant Professor of Neurology
REBECCA L BIRKENMEIER Instructor in Neurology
JOSEPH T BLACK, MD Professor of Clinical Neurology
KEVIN J BLACK, MD Associate Professor of Neurology
LYNN BENNETT BLACKBURN, PHD Assistant Professor of Clinical Neurology
JAMES SCOTT BONNER, MD Instructor in Clinical Neurology
DAVID L BRODY, MD, PHD, BA Assistant Professor of Neurology
JANICE E BRUNSTROM, MD Associate Professor of Neurology
VIRGINIA D BUCKLES, PHD Research Associate Professor of Neurology
GARRETT C BURRIS, MD Associate Professor of Clinical Neurology
NIGEL JOHN CAIRNS, PHD Research Associate Professor of Neurology
DAVID J CALLAHAN, MD Assistant Professor of Clinical Neurology
RUSSELL C. CANTRELL, MD Instructor in Clinical Neurology
DAVID A CARPENTER Associate Professor of Neurology
DAVID B CARR, MD Associate Professor of Neurology
JOHN R. CIRRITO, PHD Research Instructor in Neurology
BILLIE RUTH CLARK, PHD Assistant Professor of Neurology
DAVID B CLIFFORD, MD Melba and Forest Seay Professor of Clinical Neuropharmacology in Neurology
MARY A COATS Research Assistant Professor of Neurology
LAWRENCE A COBEN, MD Associate Professor Emeritus of Neurology
BARRY A. SINGER Assistant Professor of Clinical Neurology
BARBARA JOY SNIDER, MD, PHD Assistant Professor of Neurology
ABRAHAM Z SNYDER, MD, PHD Research Associate Professor of Neurology
RICHARD S SOHN, MD Associate Professor of Neurology
TARA V. SPEVACK, PHD Instructor in Clinical Neurology
SUSAN L STARK, PHD Assistant Professor of Neurology
JENNIFER S STITH, PHD Assistant Professor of Neurology
MARTHA STORANDT, PHD Professor of Neurology (Psychology)
IN SOOK SUNWOO, MD Instructor Emerita in Neurology
SAMER D TABBAL, MD Assistant Professor of Neurology
SANDRA L TATE, MD Instructor in Clinical Neurology
W. THOMAS THACH, JR, MD Professor of Neurology
KWEEL THIO, MD, PHD Assistant Professor of Neurology
JEAN HOLOWACH THURSTON, MD Professor Emeritus of Neurology (Neurochemistry)
JEFFREY B. TITUS, PHD Instructor in Clinical Neurology
CHRISTY MARIE TOMLINSON Research Instructor in Neurology
EDWARD F VASTOLA, MD Professor Emeritus of Neurology
TOM O VIDEEN, PHD Research Associate Professor of Neurology
OKSANA VOLSHTEYN, MD Associate Professor of Neurology
BETH ANN WARD, MD Assistant Professor of Neurology
ANDREW M. WAYNE, MD Instructor in Clinical Neurology
LING WEI, MD Adjunct Research Assistant Professor of Neurology
CONRAD CHRISTIA WEIHL, MD, PHD Assistant Professor of Neurology
HOWARD I WEISS, MD Assistant Professor of Clinical Neurology
STUART WEISS, MD Professor of Clinical Neurology
RICHARD D WETZEL, PHD Professor of Neurology
MICHAEL WONG, MD, PHD Assistant Professor of Neurology
THOMAS A WOLSEY, MD George H and Ethel R Bishop Scholar in Neuroscience in Neurology, Professor of Experimental Neurology
CHENGJIE XIONG, PHD Research Associate Professor of Neurology
JIAN XU, PHD Research Associate Professor of Neurology
KELVIN A YAMADA, MD Associate Professor of Neurology
ALLYSON R ZAZULIA, MD Assistant 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

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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:** Yoel Sadovsky, MD
- **Reproductive Endocrinology and Infertility:** Randall R. Odem, MD
- **Gynecology:** Rebecca P. McAlister, MD
- **Urogynecology:** Lewis Wall, MD
- **Research:** Kelle H. Moley, MD (Basic Research), Jeffrey Peipert, MD, MPH (Clinical Research)

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 and gynecologic malignancies. All third-year medical students participate in a six-week clinical clerkship in Obstetrics and Gynecology. This is divided into three two-week components of outpatient OB/GYN, inpatient obstetrics and inpatient gynecology. In the fourth year, students may elect a subinternship in the listed clinical subspecialties or a research elective.

**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, and labor and delivery, and adaptations of other organ systems to pregnancy. Pathophysiology of pregnancy and deviations from normal labor will also be introduced. The gynecologic component of the course reviews embryology and includes the topics of pediatric and adolescent gynecology, amenorrhea, abnormal uterine bleeding, menopause, surgical anatomy, and diagnosis and treatment of gynecologic neoplasms.

**Third Year**

**M45 730 OB/GYN CLERKSHIP**

Instructor: Andrea L.P. Stephens, M.D., 362-3126

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 Missouri Baptist Hospital. Faculty, house staff and nurse practitioners provide teaching for this rotation. Students participate in all teaching conferences offered by the department; 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, 362-4211
Location: Room 210, Maternity Hospital, Barnes-Jewish Hospital, South Campus
Elective Contact: Patti Hill, 362-1016
Other Information: Students should call Dr. Stephens’ office at 362-4211, 9 a.m. first day of elective for instructions.

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

This experience is designed to acquaint the student with the diagnosis and care of outpatients. While primarily located in the Gynecology Clinic and Outpatient Surgery unit, it should provide a more general overview of how to evaluate, diagnose, and provide definitive treatment (both medical and surgical) without hospital admission. The subintern will spend three to four 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. Students will receive a better understanding of mechanisms utilized in providing surgical care to outpatients and an introduction to both the style and substance of office care.
Student time distribution: Outpatient 100%; Primary Care 100%
Major teaching responsibility: Attendings
Patients seen/weekly: 5-10/day
On call/weekend responsibility: None

M45 810 OB-GYN ENDOCRINOLOGY — INFERTILITY SUBINTERNSHIP
Instructors: Randall Odem, MD; Arnold Bullock, MD; Aimee Chang, MD; Susan Lanzendorf, PhD; Kelle Moley, MD; and Valerie Ratts, MD, 286-2421
Location: 4444 Forest Park Ave., 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The subintern will participate (in the office and hospital) in the study and treatment of women with reproductive endocrine disorders and infertility. S/he will attend and present in conferences, attend surgery, observe assisted reproductive technology procedures, have assigned reading and be an integral part of the reproductive endocrine service. Opportunities for clinical research projects in reproductive endocrinology are also available.
Student time distribution: Inpatient 10%, Outpatient 75%, Conferences/ Lectures 15%; Primary Care 10%, Subspecialty Care 90%
Major teaching responsibility: Attendings, fellow and residents
Patients seen/weekly: 100
On call/weekend responsibility: None

M45 825 GYNECOLOGY ACROSS A WOMAN'S LIFESPAN
Instructor: Diane Merritt, MD, 362-1016
Location: Room 208 Maternity Hospital, Barnes-Jewish Hospital, South Campus
Elective Contact: Patti Hill, 362-1016, or e-mail merrittd@msnotes.wustl.edu
Other Information: Suggested reading and schedule may be obtained prior to the start of the rotation.
Contact Dr. Merritt by e-mail (merrittd@msnotes.wustl.edu).

Enrollment limit per period: 1
Valid start weeks for four-week blocks are: Weeks 1, 13, 17, 21, 25, 29, 33, 37 and 41.

This clinical experience is designed to acquaint the student with outpatient gynecology as it impacts the patient at various times in her lifespan (infancy, adolescence, reproductive years, peri- and post-menopause). Sexuality and sexual dysfunction, congenital anomalies of the reproductive tract, contraception, fertility, menopause and hormone therapy, pediatric and adolescent gynecology, and outpatient management are the focus of this elective. (Obstetrics is not.) The student will spend five half-days a week in clinic seeing patients with Dr. Merritt. The student will also attend departmental conferences and be responsible for independent reading assignments in outpatient gynecology.

Student time distribution: Outpatient 100%; Subspecialty Care-Gyn 100%
Major teaching responsibility: Attending and independent reading
Patients seen/weekly: 20-40 per clinic day
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, 3rd Floor Maternity Hospital, 9 a.m. first day of elective.

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

The subintern will take part in the work-up of tumor patients prior to surgery and/or radiotherapy, assist in pelvic operations, help render postoperative care and review pathology specimens and slides. S/he will participate in GYN Tumor Clinic sessions, hospital rounds with house staff and consultations and will attend OB-GYN conferences. Opportunities for a 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
Instructors: Gil Gross, MD, 747-1336; D. Michael Nelson, MD, Ph.D.; Yoel Sadovsky, MD; Joseph Shumway, MD
Location: Maternity Hospital, Barnes-Jewish Hospital, South Campus
Elective Contact: Gil Gross, MD, 747-1336
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. Gross for instructions.

Enrollment limit per period: 1, unless cleared by coursemaster.
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Subinterns 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 856 OB/GYN ULTRASOUND — GENETICS**

Instructor: Jeffrey Dicke, MD, 454-8135

Location: Ultrasound Unit, 1st Floor Barnes-Jewish Hospital, North Campus

Elective Contact: Jeffrey Dicke, MD, 454-8135

Other Information: Students should contact Dr. Dicke prior to first day of elective.

Enrollment limit per period: 1

Valid start weeks for two-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

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 four attendings of the ultrasound section

Patients seen/weekly: 40

On call/weekend responsibility: None

**M10 823 OBSTETRICAL ANESTHESIA**

Instructor: Laila Bottros, MD, 362-1374

Location: Barnes-Jewish Hospital, South Campus

Elective Contact: Laila Bottros, MD, 362-1374

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 two- or four-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

The medical students will learn the different analgesia/anesthetic options for the labor patient. They will also learn how the physiological adaptations of pregnancy influence anesthetic management. They will be actively involved in the parturient's management, i.e., starting an IV and 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: F. Sessions Cole, MD, 454-6148

Location: 8th Floor Northwest Tower, St. Louis Children's Hospital

Elective Contact: F. Sessions Cole, MD, 454-6148

Other Information: Students should report to Dr. Cole's office by appointment the afternoon (or the
Friday) prior to the beginning of the rotation.

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

This elective has four clinical modules: contraception, sexually transmitted diseases, abortion, and special topics. Students will participate in a variety of clinics, including Adolescent Endocrinology, Child Sexual Abuse, HIV, In vitro Fertilization, Planned Parenthood, Teen Pregnancy, High Risk OB and Genetics/Ultrasound clinics. Clinical experiences will be primarily ambulatory. Reading will include relevant review articles, and a PowerPoint presentation is required at the conclusion of the course.

Student time distribution: Outpatient 90%, Conferences/Lectures 10%; Primary Care 30%, Subspecialty Care 70%
Major teaching responsibility: Attendings
Patients seen/weekly: 10
On call/weekend responsibility: None

Research

(M45 900)

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, Room 616, Maternity Hospital, 362-1765. Preimplantation embryogenesis and glucose transporter biology. From animal and human studies it is clear that mammalian embryos are vulnerable to injury during the preimplantation stage of development. Glucose transport and metabolism are critical for blastocyst formation and further development. The primary focus of our laboratory is how early preimplantation glucose transport and metabolism affects the outcome of pregnancy at a molecular level. An elective in our lab would allow exposure to bench work in reproductive biology.

Glucose enters the blastocyst via one of four facilitative glucose transporters, GLUT1-3, and the novel insulin-regulated transporter we recently cloned, GLUT8. We have shown that murine maternal hyperglycemia leads to down regulation of GLUT1-3 at the blastocyst stage and that this event triggers apoptosis via pathways involving BAX, p53 and caspases. In the murine diabetic model, this increase in apoptosis results in fetal resorption or malformation. Both these adverse pregnancy outcomes are more common in diabetic women. One focus of our lab is how decreased intracellular glucose triggers apoptosis and how this manifests as pregnancy loss or malformation.

We have also demonstrated that hyperinsulinemia and high IGF-1 levels, associated with polycystic ovary syndrome, lead to decreased insulin-stimulated glucose transport and increased apoptosis at a blastocyst stage. We are interested in how GLUT8 and the insulin signalling pathways are involved in apoptosis, blastocyst development and metabolism. Dysregulation of this transporter is responsible for the apoptosis at this stage and thus may be related to the increased miscarriage rate experienced by these women. Projects in the lab are also investigating mechanisms responsible for GLUT8 translocation and fusion with the plasma membrane involving v- and t-SNARE proteins. Visit our web site at www.obgyn.wustl.edu/moleylab/index.asp.

Yoel Sadovsky, MD, 503 Maternity Hospital, 747-0937. In our laboratory we focus on reproductive development and function. First, we study the mechanisms that determine placental differentiation during human pregnancy. This process proceeds from mononucleated cytotrophoblast to a terminally differentiated syncytiotrophoblast, and may be disrupted by diverse insults such as hypoxia and
malnutrition, which lead to fetal growth restriction. We have developed a novel method that incorporates gene-specific variability to improve expression analysis in DNA microarrays. Using our software we integrate DNA microarrays and real-time expression analysis to correlate phenotypic changes with alterations in gene expression. We utilize siRNA to alter gene expression and assess the activity of proteins that play a central role in trophoblast injury and repair, such as the PPAR family of proteins.

Our lab also dissects the molecular mechanisms underlying gonadal function. We focus on the nuclear receptor steroidogenic factor 1 (SF-1). This orphan nuclear receptor is essential for reproductive and endocrine homeostasis, and required for intact development of both female and male gonads. We have cloned co-regulators of SF-1, and utilize molecular and gene ablation approaches to dissect their function. We have identified a synergistic regulation of luteinizing hormone (LH)-β by SF-1 and early growth response-1 (Egr-1), and currently analyze the mechanism and significance of this synergy in vivo.

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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 of the Week." 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 the American Academy of Ophthalmology’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 of the Week." All students are expected to review each case and submit a diagnosis (via reply e-mail). These cases are then reviewed with Morton E. Smith, MD, in a large-group format.

**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 an ocular emergency in the emergency room. 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 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: 6
Valid start weeks are: June 4 – June 29, 2007 and Sept. 10 – Oct. 5, 2007

This elective is for senior students who plan to apply for a residency in ophthalmology. The student rotates through one or more specialty clinics including the general eye clinic and/or 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 9 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: 40
On call/weekend responsibility: 1 night per week (until 9 p.m.)

Research

(M50 900)

Usha P. Andley, PhD, 1114-B 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 is still poorly understood. Recently, Dr. Andley’s laboratory has shown that \( \alphaA \) or \( \alphaB \)-crystallin expression alters the regulation of lens epithelial cell growth, and protects cells from stress-induced death. Mutations in these proteins are the basis of several inherited cataracts. Using genetic approaches, the laboratory is now focusing on visualizing DNA synthesizing cells \textit{in vivo} in the \( \alphaA \) and \( \alphaB \) knockout mice, and the interaction of \( \alphaA \) and \( \alphaB \) with cell cycle proteins. These studies use confocal microscopy, flow cytometric and biochemical techniques to study the role of \( \alpha \)-crystallin in the cell cycle. Time-lapse video microscopy is being used to visualize the protein in living cells. Other studies focus on the role of \( \alphaA \) in the cross talk between cell proliferation and apoptosis in the lens epithelium.

Rajendra S. Apte, MD, PhD, 702 McMillan Hospital Building, 747-5329. I use a murine model of experimental neovascularization that will help us understand the pathophysiology of human 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 the treatment of diabetic retinopathy, and macular degeneration.

Steven Bassnett, PhD, 109 McMillan Hospital Building, 362-1604. Currently, we are using advanced microscopic techniques to elucidate the cellular basis of accommodation and presbyopia.

David C. Beebe, PhD, 101 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, 707 McMillan Hospital Building, 747-5606. My research involves using neurotrophic factors to slow photoreceptor cell death in retinal degenerative diseases such as retinitis pigmentosa. I am also interested in evaluating potential neuroprotective molecules in an effort to delay axonopathy in glaucomatous optic neuropathy. I make extensive use of murine electroretinography in pursuing both of these research avenues: 1. Retinal degeneration. 2. Retinal ganglion cell protection. 3. Electroretinography.

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 target genes
and regulatory network for tissue-specific transcription factors, (2) \textit{in vitro} 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 to 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, Suite 2S89 St. Louis Children's Hospital, 454-2125. 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

J. William Harbour, MD, 603A McMillan Hospital Building, 747-1738. Tumorigenesis and regulation of
cell growth, treatment of ocular tumors.

Vladimir Kefalov, PhD, 1007 McMillan Hospital Building, 362-4376. Considering the great importance of
cone photoreceptors for our visual experience, surprisingly little is known about the mechanisms that
determine their functional properties. Why are cones less sensitive than rods and function only under
daylight conditions? What are the mechanisms that drive their adaptation to wider range of light
intensities compared to rods? What are the mechanisms by which known mutations in cone
phototransduction proteins lead to visual disorders? We use two different experimental approaches to
address these questions. First, using single cell recordings, we characterize the physiological properties
of mouse cones. These studies allow us to investigate the role of various phototransduction proteins by
using available, and possibly generating new, genetically modified animals. We can also study the
mechanisms by which known mutations of cone phototransduction proteins cause disease. Second, we
investigate the differences between rod and cone phototransduction proteins to understand how they
affect photoreceptor properties. This approach builds on our established understanding of rod
phototransduction, which allows the use of rods as a surrogate system to study cone transduction
proteins. We study the signaling properties of cone phototransduction proteins by expressing them in
\textit{Xenopus} rods. The combined studies of knockout, knockin and transgenic mice together with transgenic
\textit{Xenopus} will be invaluable for understanding how cones function.

Steven M. Kymes, PhD, 1125 Shriners Building, 747-4612. Cost-effectiveness of the treatment and
prevention of ocular disease. Evaluation of the performance of diagnostic tests. The impact of eye
disease on quality of life. Measurement of the vision-related quality of life.

David A. Leib, PhD, 1114C McMillan Hospital Building, 362-3826. Latency, pathogenesis and molecular
genetics of herpes simplex virus.

Peter Lukasiewicz, PhD, 1003C McMillan Hospital Building, 362-4284. Roles of receptors for inhibitory and excitatory amino acids in retina. Neurobiology of the vertebrate retina.


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

Alan Shiels, PhD, 625 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.

Russell Van Gelder, MD, PhD, 1204 McMillan Hospital Building, 362-4286. 1. Molecular biology of circadian photoreception. 2. Uveitis and ocular inflammation. 3. Polymerase chain reaction diagnosis and discovery of uveitis pathogens.

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DANIEL PAUL JOSEPH, MD, PHD Associate Professor of Clinical Ophthalmology and Visual Sciences
STEPHEN A KAMENETZKY, MD Associate Professor of Clinical Ophthalmology and Visual Sciences
HUMEYRA KARACAL, MD Instructor in Ophthalmology and Visual Sciences
JACK KAYES, MD Professor of Clinical Ophthalmology and Visual Sciences
VLADIMIR JIVKOV KEFALOV, PHD Assistant Professor of Ophthalmology and Visual Sciences
MONICA S PERLMUTTER  Instructor in Ophthalmology and Visual Sciences
JONATHAN MARK PETRASH, PHD  Professor of Ophthalmology and Visual Sciences
MUJTABA A QAZI  Instructor in Clinical Ophthalmology and Visual Sciences
MARK S RALLO, OD  Instructor in Ophthalmology and Visual Sciences
PRABAKAR KUMAR RAO, MD  Assistant Professor of Ophthalmology and Visual Sciences
V. NATHAN RAVI, MD, PHD  Associate Professor of Ophthalmology and Visual Sciences
MICHAEL DENNIS ROHDE, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
LOUIS J ROSENBAUM, MD  Associate Professor of Clinical Ophthalmology and Visual Sciences
MARK A ROTHSTEIN, MD  Instructor in Clinical Ophthalmology and Visual Sciences
MICHAEL B RUMELT, MD  Assistant Professor Emeritus of Clinical Ophthalmology and Visual Sciences
SCOTT GEOFFREY SAGETT  Instructor in Clinical Ophthalmology and Visual Sciences
MICKEY L SALMON, MD  Instructor Emeritus in Clinical Ophthalmology and Visual Sciences
RAMIN SCHADLU, MD  Instructor in Ophthalmology and Visual Sciences (Chief Resident)
FREDERICK W SCHWAGGER, OD, BS  Adjunct Instructor in Ophthalmology and Visual Sciences
CHRISTOPHER G SEEP, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
DAVID BRIAN SEIBEL, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
GAURAV KIRIT SHAH, PHD  Associate Professor of Clinical Ophthalmology and Visual Sciences
JAMES BANKS SHEPHERD, III, MD  Assistant Professor of Ophthalmology and Visual Sciences
STEVEN M SHIELDS, MD  Assistant Professor of Clinical Ophthalmology and Visual Sciences
ALAN SHIELS, PHD  Associate Professor of Ophthalmology and Visual Sciences
HOWARD NEWTON SHORT, MD  Instructor in Clinical Ophthalmology and Visual Sciences
CARLA J SIEGFRIED, MD  Associate Professor of Ophthalmology and Visual Sciences
CHARLES D SIGNORELLI, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
BRADLEY THOMAS SMITH, MD  Instructor in Ophthalmology and Visual Sciences
MORTON EDWARD SMITH, MD  Lecturer in Ophthalmology and Visual Sciences, Professor Emeritus of Ophthalmology and Visual Sciences
CLAUD RANDALL SNOWDEN, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
CRAIG H SORCE, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
MARK H SPURRIER, MD  Instructor in Clinical Ophthalmology and Visual Sciences
ARTHUR WALDO STICKLE, JR, MD  Assistant Professor Emeritus of Clinical Ophthalmology and Visual Sciences
JAMES F STRIETER, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
PATRICK MICHAEL STUART, PHD  Research Associate Professor of Ophthalmology and Visual Sciences
BRIAN PATRICK SUMNER, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
KENNETH V SWANSON  Instructor in Clinical Ophthalmology and Visual Sciences
PAUL M TESSER, MD, PHD  Assistant Professor of Clinical Ophthalmology and Visual Sciences
MATTHEW A THOMAS, MD  Professor of Clinical Ophthalmology and Visual Sciences
LINDA MEI-LIN TSAI, MD  Assistant Professor of Ophthalmology and Visual Sciences
ROBERT LAWRENCE TYCHSEN, MD  Professor of Ophthalmology and Visual Sciences
RUSSELL N VAN GELDER, MD, PHD  Associate Professor of Ophthalmology and Visual Sciences
GARY LEE VOGEL, OD  Adjunct Instructor in Ophthalmology and Visual Sciences
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. Since the Department of Orthopaedic Surgery has mandatory research rotations in both the second and third years of training, the residents that are rotating on these blocks will be responsible for a not insignificant portion of the teaching of physical examination and case discussion. 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 six separate specialties: Orthopaedic Surgery, Rheumatology, Sports Medicine, Neurosurgery, Bone and Mineral Metabolism and Osteoporosis, and Physical Medicine and Rehabilitation (Physiatry) for balance as well as content expertise.

The following lecture topics will be scheduled monthly:
1) History and Physical Examination of the Musculoskeletal System
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
While the following will be scheduled as part of the 12-week surgery clerkship:
9) Osteoarthritis and Septic Arthritis
10) Musculoskeletal Conditions in the Elderly
11) Lumbar Spine and Low Back Pain
12) Cervical Spine and Neck Pain

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 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 be limited to specific rotation combinations from which to choose:

- Hand/Joint Reconstruction (2 weeks/2 weeks)
- Hand/Orthopaedic Oncology (2 weeks/2 weeks)
- Shoulder and Elbow/Foot and Ankle (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) Christine Cheng (Hand–Plastic Surgery)
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) Perry Schoenecker (Pediatric Orthopaedic Surgery)
9) Eric Gordon (Pediatric Orthopaedic Surgery)
10) Gary Miller (VA Orthopaedic Surgery Service)
11) Robert Barrack and Steve Burnett (Joint Reconstruction)
12) John Clohisy (Joint Reconstruction)
13) Leslie Kahl and Kathy Diemer (Rheumatology Bone and Mineral)
14) Jacob Buchowski (Spine)
15) Paul Santiago (Neurosurgery Spine)
16) Brett Grebing (Foot and Ankle)
17) Douglas McDonald (Orthopaedic Oncology)
18) Leesa Galatz (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 second- or third-year orthopaedic resident on his/her research block will meet weekly with the students to demonstrate physical examination of the neck and spine, shoulder and elbow, hip and knee, and the hand and foot. The normal examination will be covered, and relevant common conditions and provocative tests will be covered as well.

**Fourth Year**

**Electives**

**M95 838 PEDIATRIC ORTHOPAEDIC SPINE AND SPORTS SURGERY**

Instructor: Scott J. Luhmann, MD, 747-2543  
Location: Washington University Orthopedics at St. Louis Children’s Hospital  
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosys.wustl.edu  
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available for four weeks during which 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 is required.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%  
Major teaching responsibility: Faculty attendings and resident mentors  
Patients seen/week: Varies  
On call/weekend responsibility: Varies — generally one weekend call every two weeks

**M95 839 ORTHOPAEDIC SPORTS MEDICINE**

Instructor: Rick Wright, MD, 747-2543  
Location: Washington University Orthopedics/Barnes-Jewish Hospital  
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosys.wustl.edu  
Other Information: Students should contact the Education Office prior to the first day of the elective.

Enrollment limit per period: 1  
Valid start weeks for four-week blocks are: Weeks 25, 29, 33, 37 and 41.

This clinical elective is available for four weeks during which the student participates in orthopedic conferences, outpatient clinics, surgical cases and patient rounds on the Sports Medicine service.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%  
Major teaching responsibility: Rick Wright, MD  
Patients seen/week: Varies  
On call/weekend responsibility: Varies

**M95 840 ORTHOPAEDIC SURGERY — FOOT/ANKLE**

Instructors: Jeff Johnson, MD, and Brett Grebing, MD, 747-2543  
Location: Washington University Orthopedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

This clinical elective is available for four weeks during which the student participates in orthopaedic conferences, outpatient clinics, surgical cases and patient rounds. The medical students electing this rotation will serve as an active and integral part of the orthopaedic team.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Faculty attendings and resident mentors
Patients seen/week: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks

M95 842A ORTHOPAEDIC SHOULDER/ELBOW SURGERY
Instructor: Ken Yamaguchi, MD, 747-2543
Location: Washington University Orthopedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available, during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences and dissection of upper-extremity anatomical specimens.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Faculty attendings and resident mentors
Patients seen/week: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks

M95 842B ORTHOPAEDIC SHOULDER/ELBOW SURGERY
Instructor: Leesa Galatz, MD, 747-2543
Location: Washington University Orthopedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available, during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences, and dissection of upper-extremity anatomical specimens.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Faculty attendings and resident mentors
Patients seen/week: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks
**M95 842C ORTHOPAEDIC SHOULDER/ELBOW SURGERY**
Instructor: Jay D. Keener, MD, 747-2543
Location: Washington University Orthopedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available, during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences and dissection of upper-extremity anatomical specimens.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Faculty attendings and resident mentors
Patients seen/week: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks.

**M95 845A ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY**
Instructor: Martin I. Boyer, MD, 747-2543
Location: Washington University Orthopedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

Enrollment limit per period: 1
Valid start weeks for four-week blocks are: Weeks 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: Faculty attending and resident mentors
Patients seen/week: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks.

**M95 845B ORTHOPAEDIC HAND AND UPPER EXTREMITY SURGERY**
Instructors: Charles Goldfarb, MD, and Paul Manske, MD, 747-2543
Location: Washington University Orthopedics/Barnes-Jewish Hospital, Shriners Hospital for Children, and St. Louis Children's Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available, during which time the student will work with attending surgeons primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients,
participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences, and dissection of upper-extremity anatomical specimens. Please note that the hand/upper extremity fellow assigned to Dr. Manske’s service will also participate in the instruction of students choosing this elective.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Faculty attendings and resident mentors
Patients seen/week: Varies
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 Orthopaedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available, during which time the student will work with attending surgeon primarily at Barnes-Jewish Hospital. Activities will include participation in the care of hospitalized inpatients, participation in inpatient and outpatient procedures, attendance at designated attending office hours, attendance at designated orthopaedic conferences and dissection of upper-extremity anatomical specimens.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Richard Gelberman, MD
Patients seen/week: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks

**M95 846 ORTHOPAEDIC TRAUMA**
Instructor: William Ricci, MD, 747-2543
Location: Washington University Orthopedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available for a four-week period, during which time the student will work in orthopaedic trauma at Barnes-Jewish Hospital. 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/week: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks

**M95 848A ORTHOPAEDIC PEDIATRIC SURGERY**
Instructor: Eric Gordon, MD, 747-2543
Location: Washington University Orthopedics/St. Louis Children’s Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available for four weeks during which time the student will work with attending surgeon primarily at St. Louis Children’s Hospital observing and assisting in outpatient and inpatient care. To be included are activities in the OR, ER and outpatient clinics. Attendance at and participation in the weekly pediatric orthopaedic conference activities is required.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Faculty attendings and resident mentors
Patients seen/week: Varies
On call/weekend responsibility: Varies — generally one weekend call every two weeks

M95 849 ORTHOPAEDIC SPINE SURGERY IN ADULT PATIENTS
Instructor: Tim Kuklo, MD, 747-2543
Location: Washington University Orthopedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

This clinical elective is available for four weeks during which time the student will work with the attending surgeon primarily at Barnes-Jewish Hospital observing and assisting when appropriate in outpatient and inpatient care. To be included are activities in the OR, ER and outpatient clinics. Attendance at and participation in the weekly orthopaedic conference activities is required. The spine fellow assigned to this service will serve as a primary contributor to the student’s education experience on this rotation.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Faculty attending, spine fellow assigned to this service and resident mentors
Patients seen/week: Varies
On call/weekend responsibility: Varies — the student generally participates in Trauma call in the Barnes-Jewish Hospital ER at least once during the week. Additional subspecialty at-home call may be included if desired.

M95 855A RECONSTRUCTIVE AND JOINT PRESERVATION SURGERY
Instructors: Robert L. Barrack, MD, John C. Clohisy, MD, and Stephen Burnett, MD, FRCS (C)
Location: Washington University Orthopedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

Clinical elective available, during which time the student will work with the attending physician on the Adult Reconstruction and Joint Preservation/Replacement service. This rotation is primarily centered at Barnes-Jewish Hospital and includes care of hospitalized inpatients, 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/week: Varies
On call/weekend responsibility: On call one weekend every two weeks

M95 859 ORTHOPAEDIC ONCOLOGY
Instructor: Douglas J. McDonald, MD, 747-2543
Location: Washington University Orthopaedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students should contact the Education Office prior to the first day of the elective.

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

This clinical elective, centered primarily at Barnes-Jewish Hospital, is available for four weeks during which the student participates in orthopaedic conferences, outpatient clinics, surgical cases and patient rounds on the Musculoskeletal Oncology service.

Student time distribution: Inpatient 48%, Outpatient 47%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Douglas J. McDonald, MD
Patients seen/week: Varies
On call/weekend responsibility: Varies

M95 8991 ORTHOPAEDIC SURGERY EXTERNSHIP (Visiting Students Only)
Instructors: Martin I. Boyer, MD, and Rick Wright, MD
Location: Washington University Orthopaedics/Barnes-Jewish Hospital
Elective Contact: Orthopaedics Education Office, 747-2543, orthsurg@wudosis.wustl.edu
Other Information: Students meet in the Education Office (6102 Queeny Tower), 8 a.m. first day of the elective.

Enrollment limit per period: Varies
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students rotate on Orthopaedic Services for two- or four-week blocks. Students typically participate in two weeks of hand and upper extremity surgery with Dr. Martin Boyer and two weeks of sports medicine with Dr. Rick Wright. Please contact the Orthopaedics Education Office for further information. E-mail address: orthsurg@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/week: 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, orthsurg@wudosis.wustl.edu or contact the faculty member directly.

Yousef Abu-Amer, PhD
Robert L. Barrack, MD
Stephen Burnett, MD, FRCS (C)
John Clohisy, MD
Matthew Dobbs, MD
Leesa Galatz, MD
Richard H. Gelberman, MD
Charles A. Goldfarb, MD
J. Eric Gordon, 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 Head of the Department of Orthopaedic Surgery, Fred C Reynolds Professor of Orthopaedic Surgery
YOUSEF ABU-AMER, PHD Associate 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
NANCY J BLOOM, DPT, BS Assistant Professor of Orthopaedic Surgery
MARTIN I BOYER, MD Associate Professor of Orthopaedic Surgery
KEITH HAPP BRIDWELL, MD Asa C. and Dorothy W. Jones Distinguished Professor of Orthopaedic Surgery
ROBERT HENRY BROPHY, IV, MD, BS Assistant Professor of Orthopaedic Surgery (Pending Executive Faculty Approval)
JACOB M BUCHOWSKI, MD Assistant Professor of Orthopaedic Surgery
CHERYL ANN CALDWELL, DPT Assistant Professor of Orthopaedic Surgery
ROBERTO CIVITELLI, MD Professor of Orthopaedic Surgery
JOHN C CLOHISY, MD Associate Professor of Orthopaedic Surgery
SUZANNE MARIE CORNBLEET, DPT Assistant Professor of Orthopaedic Surgery
SYLVIA LIN CZUPPON Instructor in Orthopaedic Surgery
Department of Otolaryngology

Otolaryngology is presented to students in the first-, second-, third- and fourth-year classes. Physical diagnosis skills are taught in the first year. Clinically oriented lectures and a physical diagnosis workshop are presented to second-year students. In the third year of the medical curriculum, four-week elective rotations on one of the services in East Pavilion, the 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.

Postgraduate Program

The postgraduate program in otolaryngology at Washington University consists of five years of training with general surgery skills taught in the first year. A two-year research position is offered for two selected candidates from each class. During the clinical years of training, residents rotate on various services, which include the Head and Neck Surgery Service at Barnes-Jewish Hospital, the ENT Clinic, Otology, the Veterans Administration Medical Center, St. Louis Children’s Hospital and Facial Plastic
and Reconstruction. During that time, the resident serves in all aspects of patient care, including the outpatient clinic, inpatient hospital care and the operating room, as well as the various ENT diagnostic laboratories, such as vestibular and audiology. An increasing degree of responsibility is given to residents as they proceed during the training program, depending upon the year in training and the resident’s professional development during this time. Didactic teaching consists of a basic science course during the first year of clinical residency and a two-year rotating core curriculum lecture series throughout the residency. There is also a temporal bone otology course, as well as a head and neck dissection course. Additional conferences include Grand Rounds, Morbidity and Mortality Conference, Journal Club, Otology Conference and Joint Tumor Conference. During the clinical years, residents are expected to participate in clinical and/or basic research and to publish papers in peer-reviewed journals, and they are expected to make presentations at the lectures or Grand Rounds. They are encouraged to submit papers and to make presentations at regional and national otolaryngology meetings. There is a national course consisting of literature given by the American Academy of Otolaryngology in which residents are expected to participate throughout the year. There is also an In-Training Examination given by the American Academy of Otolaryngology that all residents must take on a yearly basis. Throughout their residency, residents receive training in all aspects of otolaryngology, including general otolaryngology; head and neck cancer surgery; microvascular reconstructive techniques; facial plastic surgery; trauma; otology and neurotology; pediatric otolaryngology, including pediatric endoscopy; and allergy and endoscopic nasal sinus surgery.

Central Institute for the Deaf at Washington University School of Medicine

Washington University School of Medicine assumed ownership of CID’s hearing research, adult clinical care and advanced degree programs, as well as of its newly built 66,000-square-foot campus and research facilities at 4560 Clayton Ave. in the Washington University Medical Center in September 2003. These programs are now part of Washington University School of Medicine’s Department of Otolaryngology. They continue to advance CID’s mission to help people with hearing loss under the name CID at Washington University School of Medicine. The additional research laboratories have given the University one of the largest otolaryngology departments in the world, creating an international powerhouse in the field of hearing and deafness.

The University manages CID’s graduate degree programs through its newly named Program in Audiology and Communication Sciences offering a Ph.D. degree in speech and hearing sciences, an Au.D. degree in audiology, and an M.S. degree in deaf education (See the Graduate Programs’ “Program in Audiology and Communication Sciences.”) CID provides faculty and practicum sites for the programs in deaf education and audiology and collaborates on applied research studies involving children with hearing loss. The Spencer T. Olin Hearing Clinic, on the CID campus, is in the Division of Adult Audiology. 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. All of the CID at Washington University School of Medicine programs share a campus with the CID Oral School and Outreach Center.

Courses

First Year

Otolaryngology Clinical Skills
Instructor: Joel A. Goebel, M.D., 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, M.D., 362-6599
This course consists of eight introductory lectures on common diseases of the head and neck, including head and neck carcinoma, hearing loss and dizziness, otitis media, 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, M.D., 747-0553  
Location: 9916 McMillan  
Elective Contact: Maria Harrington, 747-0553  
Other Information: Students considering a career in otolaryngology should speak to Dr. Goebel prior to scheduling this elective. Prior to first day of elective, student should contact Dr. Goebel to discuss options of elective and to ascertain starting time and location.

Enrollment limit per period: Limit 3/period for Weeks: 1, 5; Limit 2/period for Weeks: 9, 13, 17, 21, 25, 29, 33, 37, 41.  
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Four-week rotation includes evaluation of ENT problems presented to specialist for diagnosis and treatment. The student participates in the clinic, hospital and operating room. This also includes time on the Pediatric ENT Service, Audiology, Voice Laboratory and Vestibular Evaluation Laboratory. Option of rotation on the ENT Service at VAMC is available.  
Student time distribution: Inpatient 40%, Outpatient 40%, Conferences/Lectures 20%; Primary Care 20%, Subspecialty Care 80%  
Major teaching responsibility: Attendings and residents  
Patients seen/weekly: 50  
On call/weekend responsibility: Every fourth day

**M55 802 GENERAL OTOLARYNGOLOGY**  
Instructor: Joel Goebel, M.D., 747-0553  
Location: 9916 McMillan  
Elective Contact: Maria Harrington, 747-0553  
Other Information: Students considering a career in otolaryngology should speak to Dr. Goebel prior to scheduling this elective. Prior to first day of elective, student should contact Dr. Goebel to discuss options of elective and to ascertain starting time and location.

Enrollment limit per period: 1  
Valid start weeks for two-week blocks are: Weeks 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

This two-week elective is an extremely flexible program consisting of several options:

General Ear, Nose and Throat Service: Student functions as a junior resident at either Barnes-Jewish Hospital or John Cochran VA Medical Center. At Barnes-Jewish Hospital, participation in clinic, hospital inpatient and operating room settings would expose student to a broad spectrum of patients. At the VA Hospital, the emphasis would be on head and neck tumors.

Head and Neck Service—Barnes-Jewish Hospital: Student functions as junior resident on ENT hospital floor with great deal of exposure to head and neck surgery.

Pediatric Otolaryngology—St. Louis Children’s Hospital: Student participates as a junior resident, involved in pre- and postoperative surgical care as well as outpatient medical care.

Preceptorships: Student is assigned to a private practitioner’s office, functioning in his/her office as well as hospital service.
Other options can be entertained and formulated according to the student's particular needs. Students participating in this elective will be required to spend an afternoon or morning in the Audiology/Vestibular Laboratory learning fundamentals of audiological and vestibular evaluation. Attendance at Monday afternoon conferences as well as Grand Rounds on Wednesday mornings is expected.

Student time distribution: Inpatient 20%, Outpatient 70%, Conferences/Lectures 10%; Primary Care 40%, Subspecialty Care 60%
Major teaching responsibility: Attendings and residents
Patients seen/weekly: 60
On call/weekend responsibility: None

M55 803 PEDIATRIC OTOLARYNGOLOGY
Instructor: David W. Molter, M.D., 454-2136
Location: 3S35 St. Louis Children's Hospital
Elective Contact: Patty Tampow, 454-2136
Other Information: Students should report to 3S35, St. Louis Children's Hospital, 8:30 a.m. first day of elective.

Enrollment limit per period: 2
This course is offered as either a two- or four-week duration. Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41. Valid start weeks for two-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41 and 43.

The student will actively participate in the clinical office, inpatient consultations, and surgery with the attending staff at St. Louis Children's Hospital. Care would be taken to provide experience in the common problems one would see in primary care pediatrics or family practice. Participation in sub-specialty/multidisciplinary clinics such as the Cleft and Craniofacial clinic is encouraged. Opportunity will be provided to learn the fundamentals of audiological evaluation. Students participating in this elective will attend academic conferences in both the pediatric and adult divisions.

Student time distribution: Inpatient 50%, Outpatient 40%, Conferences/ Lectures 10%; Primary Care 30%, Subspecialty care 70%
Major teaching responsibility: Attending physician and residents
Patients seen/weekly: 100
On call/weekend responsibility: At student's discretion

M55 820 PRACTICUM IN ADULT CLINICAL AUDIOLOGY
Instructor: Michael Valente, Ph.D., 362-7489
Location: 11th Floor, Center for Advanced Medicine (CAM)
Elective Contact: Michael Valente, Ph.D., 362-7489
Other Information: Students should contact Dr. Valente to schedule this elective.

Enrollment limit per period: 8
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Guidance provided in the administration and interpretation of audiometric tests. Emphasis on defining the severity of auditory dysfunction in addition to identifying sites of pathological processes. Theoretical bases of acoustics, anatomy and physiology, and electronics reviewed as they relate to auditory assessment. Modification of conventional test paradigms and hearing aid procedures covered according to each student's interests and needs.

Student time distribution: Inpatient 10%, Outpatient 80%, Conferences/ Lectures 10%; Primary Care 50%, Subspecialty Care 50%
Major teaching responsibility: Audiology staff
Patients seen/weekly: 120
On call/weekend responsibility: None

M55 831 NEUROTOLOGY
Instructor: Joel Goebel, M.D., 747-0553  
Location: 9th Floor McMillan  
Elective Contact: Maria Harrington, 747-0553  
Other Information: Students should contact Dr. Goebel if interested in this elective.

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

Active student participation in the physical exam, advanced testing and management of patients with balance dysfunction. Attend patient clinic two days a week and test patients on ENG, rotary chair, and computerized platform three days a week. Research participation welcome with prior arrangements.  
Student time distribution: Outpatient 80%, Conferences/Lectures 20%; Primary Care 10%, Subspecialty Care 90%  
Major teaching responsibility: Attending  
Patients seen/weekly: 40  
On call/weekend responsibility: None

**M55 833 AMBULATORY OTOLARYNGOLOGY FOR THE PRIMARY CARE PHYSICIAN**  
Instructor: Joel Goebel, M.D., F.A.C.S., 747-0553  
Location: Barnes-Jewish Hospital and St. Louis Children’s Hospital clinics  
Elective Contact: Maria Harrington, 747-0553  
Other Information: Students should contact Maria Harrington, 9906 McMillan, 747-0553, prior to the start of this elective.

Enrollment limit per period: 1  
Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This course offers a four-week exposure to ambulatory care of patients with diseases of the head and neck. Eight half-day sessions per week will be offered in attending clinics for general otolaryngology, head and neck cancer, otology and pediatric otolaryngology. Two half-day sessions are reserved for audiology, vestibular lab and voice lab experience. Surgical exposure is available for selected cases as identified by the student and attending physician, but the main goal of this rotation is outpatient diagnosis and management.  
Student time distribution: Outpatient 100%; Primary Care 50%, Subspecialty Care 50%  
Major teaching responsibility: Attendings and residents  
Patients seen/weekly: >100  
On call/weekend responsibility: None

**M80 841 ART OF ASKING QUESTIONS/PROBLEM SOLVING**  
Instructor: J. Gail Neely, M.D., F.A.C.S., 362-7344  
Location: 9th Floor McMillan  
Elective Contact: J. Gail Neely, M.D., 362-7344  
Other Information: Student should report to Carole Bradshaw, 804 McMillan, 8:30 a.m. first day of elective.

Enrollment limit per period: 2  
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Medical Intelligence: The Art of Asking Questions and Efficient Clinical Problem Solving. The pressures of continued learning, competitive residency searches and time constraints can erode the joy and the efficiency of the fundamental principles of medicine, the fiduciary responsibilities to appreciate human values, and to practice intelligent medicine. This is a one-on-one mentored program of independent study designed to increase the student’s efficiency and enjoyment of the intelligent practice of medicine. Students will set the course of their study. Working with the mentor on a daily basis and using the facilities of the institution, they will learn to efficiently think through clinical cases, use science and the techniques of clinical medicine to expand their understanding of the topic, and to express themselves effectively. The underlying efficiencies of thought pivot upon the art of asking
questions while examining a patient and while reading for discovery.
Student time distribution: N/A
Major teaching responsibility: N/A
Patients seen/weekly: N/A
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.

Barbara A. Bohne, PhD, and Gary W. Harding, MSE, 1141 and 1144 Shriner's Building, 362-7497. Studies of structure and function of the abnormal cochlea. The structure and function of the normal and damaged cochlea are studied in this laboratory. Several projects utilize the chinchilla for determining mechanisms of cell degeneration in the hearing organ following exposure to different ototoxicants such as noise. The chinchilla is excellent 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 with chinchillas involve: (a) injecting an inert tracer particle into the endolymphatic space to determine if, when and for how long the boundaries of the space are disrupted after a particular experimental treatment; and (b) using a novel histological preservation technique termed "survival-fixation" to identify changes in the coupling of the tectorial membrane to the hair-cell stereocilia in animals that have sustained a temporary or a permanent loss of hearing. Certain inbred mice have hereditary hearing losses or develop early age-related hearing loss. Therefore, mice are being used to identify some of the genetic bases for variations in susceptibility to ototoxicants and the age of onset of presbycusis.

Brian T. Faddis, PhD, 1020 McMillan, 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 is 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, Eighth Floor McMillan, 747-0553. Clinical research testing of posture and ocular motor control. Projects include headshake testing of the vestibulo-ocular reflex (VOR), interlaboratory rotary chair studies, dynamic posturography and outcome research in dizzy patients.
Bruce H. Haughey, MD, 9903 McMillan, 362-0365. Work in progress is investigating the functional results of allotransplantation of the canine hemitongue. Successful recovery has been observed in five chronic animals, but inhibited in some cases by allograft rejection, despite immunosuppression. Much scope exists for further study of the immunosuppression of tongue tissue and its functional recovery. A new primate study is now approved. Also in progress are clinical studies of rehabilitation following reconstructive surgery of head and neck cancer resections, as well as a clinical database and a study of outcomes of treatment for recurrent head and neck cancer.

Stephen M. Highstein, MD, PhD, 4566 Scott Ave., East McDonnell Science Building, 362-1012. The gain of the vestibulo-ocular reflex (VOR) in alert squirrel monkeys can be plastically adapted either acutely over 4-5 hours or chronically over weeks by employing visual/vestibular interactive stimulation. We study the neural substratum of motor learning and memory for this behavior with (a) intracellular and extracellular recording, (b) neuroanatomical techniques for marking single neurons, and (c) chemical block of selected CNS sites. The patterns of response of single and multiple neurons have led us to construct mathematical models of the neural circuits involved. Brain sites implicated include the brainstem and cerebellum.

We also study the determinants of the response dynamics (phase and gain) of the vestibular horizontal semicircular canal by (a) recording intracellularly from hair cells in situ in different regions of the crista, (b) patch-clamping hair cells isolated from defined regions of the crista, c) measuring the motion of the cupula of the canal using laser interferometry and/or video microscopy, (d) injecting identified primary afferents with tracer to elucidate their peripheral origins and central projections, and (e) recording chronically in natural settings, from primary afferents and efferents that have regenerated through a multichannel sieve recording electrode. We have arrived at a general theory of the contributions of the biomechanical and neural factors that shape the responses of the canal nerve.

Timothy E. Hullar, MD, 2110 Central Institute for the Deaf Building, 362-8641. Function of Vestibular Nerve Afferent Types. Our laboratory’s efforts reflect the principal investigator’s clinical interest in problems of balance and equilibrium. Studies of the peripheral vestibular system have traditionally used linear analysis to estimate the neural signal transmitted by primary vestibular afferents in response to a particular rotation or linear acceleration of the head. This technique, however, does not adequately or accurately represent the information supplied by the vestibular nerve to the brain. An improved understanding of the vestibular system’s function in health and disease requires novel, statistics-based representations of the information transmitted by primary vestibular-nerve afferents. Current projects to achieve this include anatomic studies using light and electron microscopy, digital image processing, and recordings of rodent (mouse and chinchilla) eye movements and neuronal discharges in response to head accelerations.

These studies lead directly to studies with normal and vestibular-deficient human subjects. Interpretation of rotation and linear acceleration is often impaired in patients, and we plan to apply our new understandings of the vestibular periphery to relate vestibular stimulation and perception in humans.

Finally, we are studying the cetacean (whale and dolphin) vestibular system in an effort to understand better possible pathologic mechanisms for the effect of anthropogenic noise (i.e., sonar) on these animals. Ongoing studies include measuring cetacean head movements using trained aquarium animals such as bottlenose dolphins and using microCT techniques to make detailed anatomic measurements of the cetacean inner ear.

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 8th Floor McMillan, 454-2138. Clinical Outcomes Research in Pediatric Otolaryngology. The Clinical Outcomes Research office performs clinical epidemiology and health services research. (Please reference the research elective offered by Dr. Jay Piccirillo in otolaryngology for more details.) These techniques and methodologies are used to investigate clinical problems seen in pediatric otolaryngology. Projects 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, 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 to quantitatively define outcomes during treatments of disorders of the facial nerve.

Jay F. Piccirillo, MD, Eighth Floor McMillan, 362-7394. 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. The scientific methodology of clinical epidemiology is based on the architecture of clinical research, biostatistics and data processing. Part of this methodology is borrowed from public health epidemiology and is applied to the uniquely clinical situations that clinicians face. Clinical epidemiology, therefore, is a methodology that can be applied to the study of any and all human disease and illness. Health services research can be defined as efforts to determine how the health system functions so that its performance can be improved. This definition makes the field essentially activist in nature.

Dwayne D. Simmons, PhD, 4560 Clayton Ave., Central Institute for the Deaf, Lab 2118, 747-7272. Investigations of Synapse Formation in the Inner Ear. Understanding the development of sensorineural connections within the vertebrate inner ear could provide additional insights into congenital hearing and balance disorders. Research in this laboratory concerns the development of peripheral and central auditory pathways, and in particular, how mature synaptic connections are established. One of our primary aims is to gain additional insight into the underlying developmental mechanisms that give rise to the normal structural and functional patterns seen in the adult. Our studies use molecular, anatomical and physiological techniques to characterize neurons as they develop in both the rodent brainstem and inner ear. Currently, we are investigating the nature and diversity of early cholinergic synapses in the rodent inner ear and in particular, the mechanisms associated with nicotinic acetylcholine receptor regulation during synaptogenesis. Using various transgenic mouse models, we are investigating the cellular and molecular cues that give rise to the synaptic remodeling that occurs prior to the onset of hearing.

To study synaptogenesis after traumatic insult, we use the bullfrog amphibian papilla (AP) as a model. The bullfrog AP is a low-frequency mechanosensitive endorgan that shares structural and functional similarities with the mammalian cochlea. However, unlike the cochlea, the bullfrog AP has a peripheral growth margin, permitting in vitro studies of synaptic development. It also can be cultured with an intact statoacoustic ganglion and displays both hair cell repair and regeneration after trauma-induced damage, making it useful for comparing these recovery processes. In our studies of the AP, we use an in vitro culture system that supports both hair cell and neuronal regeneration to study how hair cells acquire, organize and maintain their synaptic machinery.

Students are initially assigned general projects that allow them to become familiar with one or more techniques (western blot analysis, immunocytochemistry, electron microscopy, fluorescence imaging, culture, otoacoustic emissions). After a certain level of proficiency, students then may identify specific research questions to address.

Faculty
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SUPOTE PHIPATANAKUL, MD  Assistant Professor of Clinical Otolaryngology

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KARL SHANKER, DDENT  Instructor in Clinical Otolaryngology (DDS)

HAIYAN SHEN  Visiting Instructor in Otolaryngology

DWAYNE DEANGELO SIMMONS, PHD  Research Associate Professor of Otolaryngology

MARGARET W SKINNER, PHD  Professor of Otolaryngology (Audiology)

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GERSHON J SPECTOR, MD  Professor of Otolaryngology

MALCOLM H STROUD, MD  Professor Emeritus of Otolaryngology

JOHN B. SUNWO O, MD, MS, BS  Assistant Professor of Otolaryngology

ISOLDE E THALMANN, PHD  Research Assistant Professor of Otolaryngology

RUEDIGER THALMANN, MD  Lecturer in Otolaryngology, Professor Emeritus of Otolaryngology

STANLEY E THAWLEY, MD  Associate Professor of Otolaryngology

HERMAN TURNER, DDENT  Instructor in Clinical Otolaryngology

ROSALIE MAY UCHANSKI, PHD  Research Assistant Professor of Otolaryngology

RAVINDRA UPPALURI, MD, PHD  Assistant Professor of Otolaryngology

LORA MAUREEN VALENTE, PHD  Assistant Professor of Otolaryngology (Pending Executive Faculty Approval)

MICHAEL VALENTE, PHD  Professor of Otolaryngology (Audiology)

THOMAS J VERALDI, DDENT  Instructor in Clinical Otolaryngology

WAYNE A VIERS, MD  Associate Professor of Clinical Otolaryngology

MARK EDWARD WARCHOL, PHD  Research Professor of Otolaryngology

CALVIN H WEISS, DDENT  Instructor in Clinical Otolaryngology (DDS)

ALAN P WILD, MD  Instructor in Clinical Otolaryngology
Department's Web Site

http://oto.wustl.edu/

Department of Pathology and Immunology

The Department of Pathology and Immunology is involved in the clinical diagnosis 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 Pathology 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 Pathology (with Peter A. Humphrey, MD, PhD, as director and John D. Pfeifer, MD, PhD, as associate director, Laboratory Medicine (headed by Jack H. Ladenson, PhD) and Neuropathology (with 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, plus offering 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 and Laboratory Medicine, or participate in the research activities of the faculty.

The Section of Immunology integrates immunology 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 in conducting basic research in immunology 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, 362-7440; John P. Atkinson, MD, 362-8391; Robert D. Schreiber, PhD, 362-8748; Barry P. Sleckman, MD, PhD, 747-8235; Herbert W. Virgin IV, MD, PhD, 362-9223

This course consists of lectures, laboratories, 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 their own blood and be tested for allergies. POPS (Patient Oriented Problem-Solving System in Immunology) will also be utilized; they contain a clinical problem that is analyzed and solved during the session. 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 (second 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 (fourth edition) by Rosen and Geha will be used. There will be two formal exams (consisting of multiple choice and true and false questions) and one take-home exam (consisting of essay questions) 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**
Instructors: John Pfeifer MD, PhD, and staff, 747-0276
Location: West Building
Elective Contact: John Pfeifer MD, PhD, 747-0276
Other Information: Students should contact Dr. Pfeifer prior to scheduling this elective.

Enrollment limit per period: 2
Valid start weeks for four-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 four-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: Dr. Anne Lind and two other dermatopathologists
Patients seen/weekly: Average number of specimens per week is 300; percentages above reflect specimens not patients.
On call/weekend responsibility: None

**M60 815 OB-GYN PATHOLOGY SUBINTERNSHIP**
Instructor: 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 four-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**
Instructors: D. Ashley Hill, MD, and staff, 454-8854
Location: Division of Surgical Pathology, Third Floor Peters Building, Barnes-Jewish Hospital, South Campus
Elective Contact: D. Ashley Hill, MD, 454-8854, hill@path.wustl.edu
Other Information: See the pathology web site for detailed orientation and introductory information (pathimm.wustl.edu/). Please call or e-mail Dr. Hill at least one week prior to the elective to discuss individual goals and interests.

Enrollment limit per period: 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, allows. 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 four-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. There are daily didactic sessions that cover the spectrum of neurological diseases, review 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 the reading 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 four-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 hematology. 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 analysis of peripheral blood smears and coagulation tests, interpretation of cardiac enzyme and serum protein electrophoresis patterns, appropriate use of blood component therapy and indications for therapeutic apheresis. 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, 362-8849
Location: Barnes-Jewish Hospital
Elective Contact: Jo Ann Mertz, 362-8849
Other Information: Students should discuss their rotation with Dr. Lublin and staff in advance. Students should meet the team on 5900 Pheresis Unit 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 four-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, participation in daily clinical rounds and exposure to developing programs. 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 apheresis 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: 20-25
On call/weekend responsibility: None

**Research**

(\textbf{M60 900})

Paul M. Allen, PhD, Seventh Floor, Clinical Sciences Research Building, 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 use \textit{in vivo} models to study alloreactivity/graft rejection and the pathophysiological mechanisms involved in rheumatoid arthritis.

Jacques U. Baenziger, MD, PhD, 7th Floor, Clinical Sciences Research Building, 362-8730. Glycobiology, informational role of carbohydrates in protein targeting and reproductive endocrinology.

Erika C. Crouch, PhD, MD, 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.


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 Type2 diabetes.

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.

Curtis A. Parvin, PhD, 2435 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.

Robert E. Schmidt, MD, PhD, Third Floor, 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 streptozotocin diabetic rats; (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.


Barry Sleckman, MD, PhD, 1747 West Building, 747-8235. Cellular immunology; molecular basis of T cell receptor assembly.

Carl H. Smith, MD, St. Louis Children’s Hospital, 454-6029. Placental transport and surface membrane structure and function.
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 using a variety of genetically-manipulated mice.

John Turk, MD, PhD, 6609 Wohl, 362-8190. Studies focus on the role of phospholipase A$_2$ (PLA$_2$) enzymes in the regulation of insulin secretion from pancreatic islet beta cells. A novel PLA$_2$ 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, 3701 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 uses 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
PAUL M ALLEN, PHD Robert L. Kroc Professor of Pathology and Immunology
DONALD CRAIG ALLRED Professor of Pathology and Immunology
JACQUES ULRICH BAENZIGER, MD, PHD Professor of Pathology and Immunology
MOREY A BLINDER, MD Assistant Professor of Pathology and Immunology
GEORGE JOHN BROZE, JR, MD Professor of Pathology and Immunology
NIGEL JOHN CAIRNS, PHD Research Associate Professor of Pathology and Immunology
DENGFENG CAO Assistant Professor of Pathology and Immunology (Pending Executive Faculty Approval)
LEONIDAS CARAYANNPOULOS, MD, PHD, BS Assistant Professor of Pathology and Immunology
BEATRIZ M CARRENO, PHD Research Assistant Professor of Pathology and Immunology
MARINA CELLA, MD Research Associate Professor of Pathology and Immunology
SASO CEMERSKI Research Instructor in Pathology and Immunology
HUGH CHAPLIN, JR, MD Professor Emeritus of Pathology
EMILY CHENG, MBBCH, PHD Assistant Professor of Pathology and Immunology
KYUNGHEE CHOI, PHD Associate Professor of Pathology and Immunology
MARCO COLONNA, MD Professor of Pathology and Immunology
JANET M CONNOLLY, PHD Research Professor of Pathology and Immunology
JOSEPH C. CORBO, MD, PHD Assistant Professor of Pathology and Immunology
ERIKA C CROUCH, MD, PHD Professor of Pathology and Immunology
BIPLAB DASGUPTA, PHD Research Instructor in Pathology and Immunology
ROSA MARIA DAVILA, MD Associate Professor of Pathology and Immunology
LOUIS P DEHNER, MD Professor of Pathology and Immunology
GEORGE J DESPOTIS, MD Associate Professor of Pathology and Immunology
MICHAEL DIAMOND, MD, PHD Associate Professor of Pathology and Immunology
JOHN F DIPERSIO, MD, PHD Associate Professor of Pathology and Immunology
WILLIAM MICHAEL DUNNE, JR., PHD Professor of Pathology and Immunology
TIMOTHY J EBERLEIN, MD Professor of Pathology and Immunology
CHARLES S EBY, MD Associate Professor of Pathology and Immunology
SAMIR KHATTAB EL-MOFTY, DDENT, PHD Associate Professor of Pathology and Immunology
THOMAS A FERGUSON, PHD Associate Professor of Pathology and Immunology
DOROTHY J FIETE Research Instructor in Pathology and Immunology
JOHN LAWRENCE FRATER Assistant Professor of Pathology and Immunology
DAVED H FREMONT, PHD Associate Professor of Pathology and Immunology
ANTHONY RAYMOND FRENCH, MD, PHD Assistant Professor of Pathology and Immunology
SUSAN GILFILLAN, PHD Research Assistant Professor of Pathology and Immunology
JONATHAN D GITLIN, MD Professor of Pathology and Immunology
TIMOTHY A GRAUBERT, MD Associate Professor of Pathology and Immunology
JONATHAN M GREEN, MD Assistant Professor of Pathology and Immunology
ANN MARIE GRONOWSKI, PHD Associate Professor of Pathology and Immunology
MICHAEL L GROSS, PHD Professor of Pathology and Immunology
TED H HANSEN, PHD Professor of Pathology and Immunology
GEORGE J HAROCOPOS, MD Assistant Professor of Pathology and Immunology
ANJUM HASSAN, MD Instructor in Pathology and Immunology
DANA ASHLEY HILL, MD Assistant Professor of Pathology and Immunology
CHYI-SONG HSIEH, MD Assistant Professor of Pathology and Immunology
PHYLLIS C HUETTNER, MD Associate Professor of Pathology and Immunology
PETER A HUMPHREY, MD, PHD Professor of Pathology and Immunology
JOHN M KISSANE, MD Retiree - Professor of Pathology and Immunology
ROBYN SUE KLEIN, MD Assistant Professor of Pathology and Immunology
DANIEL KREISEL, MD Assistant Professor of Pathology and Immunology
FRIEDERIKE H. KREISEL, MD Assistant Professor of Pathology and Immunology
SHASHIKANT KULKARNI, PHD Assistant Professor of Pathology and Immunology (Pending Executive Faculty Approval)
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 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.

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**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.

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**Third Year**

**M65 760 PEDIATRICS CLERKSHIP**  
Instructors: Angela M. Sharkey, MD; Douglas W. Carlson, 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.

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**Fourth Year**

**Electives**

**M65 801 GENERAL PEDIATRIC SUBINTERSHIP — ST. LOUIS CHILDREN'S HOSPITAL**  
Instructors: Angela Sharkey, MD, and Douglas Carlson, MD, 454-6299  
Location: St. Louis Children's Hospital  
Elective Contact: Liz Karner, 4S30 St. Louis Children’s Hospital, 454-6299  
Other Information: Students should call Liz Karner, 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This is the general pediatric subinternship. Liz will hold a lottery in the pediatric medical student education office to determine if the student will be assigned to 8 East or 8 West. The student will be assigned patients on one of two inpatient pediatric floor teams. They will follow patients from initial evaluation and for continuing care. The student works as an extern and is expected to take call every fourth night. Students work directly under the supervision of the senior resident. Teaching rounds are conducted by the faculty. The elective will provide experience in the management of many pediatric medical conditions (variable depending on floor) and will include the care of patients with various diseases including pulmonary, infectious diseases, gastrointestinal, renal, neurological, endocrine and rheumatologic issues. Additionally, patients with failure to thrive, asthmatic exacerbations, poisonings and undiagnosed conditions may be seen.

Student time distribution: Inpatient 100%; Subspecialty Care/General Pediatrics 100%
Major teaching responsibility: Attendings and residents
Patients seen/week: 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; Karen DeMuth, MD; and Caroline Horner, MD; 454-2694
Location: Eighth Floor Northwest Tower
Elective Contact: Kim Tinsley, 454-2158
Other Information: Students should call 454-2158 prior to the start of this elective for location and time.

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

In predominantly an outpatient setting, students will evaluate patients with a wide variety of allergic disorders including asthma, allergic rhinitis, anaphylaxis, food allergy, atopic dermatitis and urticaria/angioedema. 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 20%, Outpatient 70%, Conferences/Lectures 10%; Subspecialty Care 100%
Major teaching responsibility: Leonard B. Bacharier, MD, and Robert C. Strunk, MD
Patients seen/week: 20
On call/weekend responsibility: None

M65 811 PEDIATRIC CRITICAL CARE MEDICINE
 Instructor: Matthew Goldsmith, MD, 454-2527
 Location: St. Louis Children’s Hospital
 Elective Contact: Tracey Erdman, 454-2527
 Other Information: Students report to the PICU, Seventh Floor, St. Louis Children’s Hospital, 8 a.m. first day of elective.

Enrollment limit per period: 1
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.
This elective is designed to familiarize the student with the diagnosis and treatment of critical illness in infants and children. To this end, each student is made responsible for a small number of assigned cases under the direct supervision of pediatric residents, pediatric critical care fellows and faculty. The teaching activities emphasize the understanding of pathophysiological processes that lead to respiratory, cardiocirculatory and central nervous system dysfunction and their therapy in the developing subject. Students are expected to participate in all the daily activities of the Pediatric Intensive Care Unit at St. Louis Children’s Hospital and be on occasional call after hours.

Student time distribution: Inpatient 100%; Subspecialty Care 100%
Major teaching responsibility: Attending, critical care fellows and pediatric residents
Patients seen/week: 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: Student reports to 5S30 St. Louis Children’s Hospital, 8 a.m. first day of elective.

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

Elective will focus on interpretation of hemodynamic and angiographic data acquired in the cardiac catheterization laboratory.

Student time distribution: Inpatient 50%, Outpatient 45%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Two attendings, supplemented by one fellow
Patients seen/week: 10
On call/weekend responsibility: None

**M65 819 PEDIATRIC CARDIOLOGY — OUTPATIENT SERVICE**
Instructors: Angela Sharkey, MD; Charles E. Canter, MD; Mark Grady, MD; Mark Johnson, MD; Dave Balzer, MD; Edward Rhee, MD; Achi Ludomirsky, MD; and Guatam Singh, MD, 454-6095
Location: St. Louis Children’s Hospital
Elective Contact: Angela Sharkey, MD, 454-6095
Other Information: Students report to Heart Station, Second Floor, St. Louis Children’s Hospital, Cardiology Division Office, 9 a.m. first day of elective.

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

Students will independently evaluate outpatients referred for evaluation of cardiac murmurs, chest pain, arrhythmia and report findings to the attending physician. Clinics are held at St. Louis Children’s Hospital, Missouri Baptist Medical Center and many outreach sites. The student will review with the attending all EGGs, Holter monitors, echocardiograms performed. Participation in weekly surgical conference and journal club is expected.

Student time distribution: Outpatient 95%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Multiple attendings
Patients seen/week: 25
On call/weekend responsibility: None required

**M65 826 GENETICS AND GENOMIC MEDICINE**
Instructors: Jonathan D. Gitlin, MD, and Tyler E. Reimschisel, MD, 454-6093
Location: St. Louis Children’s Hospital
Elective Contact: Tyler E. Reimschisel, MD, 454-6093
Other Information: Students should report to 4S30 St. Louis Children’s Hospital, 8 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The goal of this senior elective is to facilitate the acquisition of clinical skills and knowledge in genetics and genomic medicine. The student will actively participate in the diagnosis and management of pediatric and adult patients with genetic disease in both the ambulatory and inpatient setting. 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. Bedside teaching of these principles will be carried out with the attending. A particular focus will include integration of the emerging field of genomic medicine to patient care and an appreciation of the complex ethical and social issues of relevance to the physician, patient and society. Opportunity to explore the clinical laboratory-based approaches in genomic medicine will also be provided through the Center for Genome Sciences.

Student time distribution: Inpatient 30%, Outpatient 60%, Conferences/Lectures 10%; Subspeciality Care 100%.
Major teaching responsibility: Attendings
Patients seen/week: 15
On call/weekend responsibility: None

M65 827 SUBINTERNSHIP IN 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students will assume the responsibilities of a pediatric resident on the inpatient Hematology/Oncology service at St. Louis Children’s Hospital.

Student time distribution: Inpatient 90%, Conferences/Lectures 10%; Subspecialty Care 100%
Major teaching responsibility: Single attending, first-year hem-onc fellow and junior resident
Patients seen/week: 2-3 patients a day
On call/weekend responsibility: Every four days with resident

M65 833 SPECIAL TOPICS IN REPRODUCTIVE HEALTH
Instructor: F. Sessions Cole, MD, 454-6148
Location: Eighth Floor Northwest Tower, St. Louis Children’s Hospital
Elective Contact: F. Sessions Cole, MD, 454-6148
Other Information: Students should report to Dr. Cole’s office by appointment the afternoon (or the Friday) prior to the beginning of the rotation.

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

This elective has four clinical modules: contraception, sexually transmitted diseases, abortion and special topics. Students will participate in a variety of clinics, including Adolescent Endocrinology, Child Sexual Abuse, HIV, In vitro Fertilization, Planned Parenthood, Teen Pregnancy, High Risk OB, and Genetics/Ultrasound. Clinical experiences will be primarily ambulatory. Reading will include relevant review articles, and a PowerPoint presentation is required at the conclusion of the course.
Student time distribution: Outpatient 90%, Conferences/Lectures 10%; Primary Care 30%, Subspecialty Care 70%
Major teaching responsibility: Attendings
Patients seen/week: 10
On call/weekend responsibility: None

M65 835 PEDIATRIC IMMUNOLOGY AND RHEUMATOLOGY
Instructors: Andrew White, MD, 454-6124; Anthony French, MD, PhD; and Fei Shih, MD, PhD
Location: St. Louis Children’s Hospital
Elective Contact: Andrew White, MD, 454-6124
Other Information: Students report to Immunology/Rheumatology Clinic, Suite C, St. Louis Children’s Hospital, 8:30 a.m. first day of elective.

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

Opportunities are available to care for children with a variety of immunologic and rheumatologic disorders. Students will see patients in outpatient clinics and inpatient consultations. An in-depth approach to evaluating disorders of the immunologic system will be provided. Students will participate in evaluation of new patients with a variety of rheumatologic diseases including JRA, SLE and scleroderma at both St. Louis Children's Hospital 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/week: 35-40
On call/weekend responsibility: None

M65 838 PEDIATRIC GASTROENTEROLOGY, HEPATOLOGY AND NUTRITION
Instructor: Robert Rothbaum, MD, 454-6173
Location: Gastroenterology Clinical Offices, Ninth 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The rotation in Pediatric Gastroenterology, Hepatology and Nutrition provides broad exposure to specialized and common pediatric problems. Gastroenterology patients are seen in the outpatient suites and in the hospital. Students see outpatients with common pediatric complaints like abdominal pain, constipation and poor growth. Additionally, students experience the ongoing outpatient care of patients with liver disease, inflammatory bowel disease, short-gut syndrome, celiac disease and other rare disorders. The inpatient service provides experience in caring for patients with acute illnesses such as gastrointestinal bleeding, malnutrition, liver failure, complications of inflammatory bowel disease and pancreatitis. Students participate in diagnostic and therapeutic endoscopic procedures. At weekly divisional conferences, attendings, fellows and students review pathology slides from current cases and discuss difficult patient problems and topics of interest.

Student time distribution: The time spent in the outpatient clinic and on the inpatient service is individualized according to the student’s interests. In general, the distribution is: Inpatient 50%, Outpatient 45%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: Attendings and fellows
Patients seen/week: 30
On call/weekend responsibility: None
M65 840 PEDIATRIC INFECTIONOUS DISEASES
Instructors: Gregory Storch, MD; Alexis Elward, MD; David Haslam, MD; Ericka Hayes, MD; David Hunstad, MD; Jeffrey McKinney, MD, PhD; and Rachel Orschein, MD, 454-6050
Location: St. Louis Children’s Hospital
Elective Contact: Gregory Storch, MD, 454-2261
Other Information: Student reports to 11W32 St. Louis Children’s Hospital, 9 a.m. first day of elective.

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

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. 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/week: 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The goal of this elective is to provide the senior medical student with a broad introductory clinical experience in pediatric emergency medicine. Functioning as a subintern in the Emergency Unit of St. Louis Children’s Hospital, the student will have the opportunity to evaluate and manage patients with a wide variety of emergent and urgent medical and surgical problems. Examples include: respiratory distress, abdominal pain, lacerations, bone injuries, rashes, fever, etc.

Students will work either a day shift (7:30 a.m.-3 p.m.) or an evening shift (3-11 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/week: ~30
On call/weekend responsibility: None (unless making up time)

M65 849 PEDIATRIC ENDOCRINOLOGY AND DIABETES
Instructors: Louis Muglia, MD, PhD; Neil H. White, MD; Abby Hollander, MD; Bess Marshall, MD; Rebecca Green, MD, PhD; Paul Hruz, MD, PhD; and Ana Maria Arbelaez, MD, 286-2761
Location: St. Louis Children’s Hospital
Elective Contact: Angie Hantak, 286-2761
Other Information: Student has the option to extend elective. Students report to Endocrinology/Metabolism Office, 9th Floor Northwest Tower, 8:30 a.m. first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This elective is designed to include broad clinical experience in pediatric endocrinology and diabetes. The student will have an opportunity to evaluate both patients admitted to St. Louis Children’s Hospital and patients referred for consultation in our three outpatient clinics each week. In addition to a divisional conference to review referred patients, several joint conferences with the adult Endocrinology and Diabetes Division (clinical rounds, journal club/research seminar, case conference) are held weekly.

Student time distribution: Inpatient 40%, Outpatient 50%, Conferences/Lectures 10%; Subspecialty Care 100%
Major teaching responsibility: Attending physicians and fellows
Patients seen/week: 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; Carolyn Cannon, MD; PhD; Albert Faro, MD; Anand Patel, MD; and Stuart C. Sweet, MD, 454-2694
Location: Eighth Floor Northwest Tower
Elective Contact: Kim Tinsley, 454-2158
Other Information: Students should call 454-2158 prior to the start of the elective for location and time.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This elective provides an opportunity for students to be exposed to the full scope of respiratory diseases 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 CXR, chest CT, VQ scan, pulmonary function testing and bronchoscopy with biopsy and lavage; (3) therapeutic interventions and the use of bronchodilators, anti-inflammatory agents, et. al. Unique aspects of this rotation include a broad exposure to children with congenital lung defects, life-threatening asthma, cystic fibrosis, and end-stage cardiopulmonary diseases referred for transplantation. Weekly didactic sessions as well as weekly divisional patient care sections are an opportunity to further learn and practice presentational skills.

Student time distribution: Inpatient varies, Outpatient varies, Conferences/Lectures 10%; Subspeciality Care 100%
Major teaching responsibility: Attendings
Patients seen/week: 25
On call/weekend responsibility: None

M65 861 NEWBORN MEDICINE
Instructor: F. Sessions Cole, MD, 454-6148
Location: Eighth Floor Northwest Tower
Elective Contact: F. Sessions Cole, MD, 454-6148
Other Information: Students should report to Dr. Cole’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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.
The goal of this course is to provide students with responsibility for caring for newborn infants who range from normal to acutely ill to chronically ill and for their families. The physiology of the transition from fetal to extraterrestrial 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/week: 30
On call/weekend responsibility: Every fourth night

**M65 875 PEDIATRIC RENAL DISEASE**
Instructors: Keith A. Hruska, MD; Anne M. Beck, MD; S. Paul Hmiel, MD, PhD; and Suresh Matthew, 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, 11W32, St. Louis Children’s Hospital, 9 a.m. first day of elective.

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

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/week: 12-15
On call/weekend responsibility: None

**M65 876 PEDIATRIC LUNG TRANSPLANTATION**
Instructors: Stuart C. Sweet, MD; and Albert Faro, MD, 454-2214
Location: Eighth Floor Northwest Tower, Allergy/Pulmonary Medicine Office
Elective Contact: Karen Emery, 454-2214
Other Information: Students meet in the Eighth Floor Northwest Tower, Allergy/Pulmonary Medicine Office, 9 a.m. first day of elective.
Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

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 fiberoptic 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/week: 20-30
On call/weekend responsibility: None

M65 878 CLERKSHIP IN RURAL PRIMARY CARE PEDIATRICS
Instructor: Angela Sharkey, MD, 454-6299
Site Instructors: Kevin Blanton, MD, in Sikeston and Claudia Preuschoff, MD, in Poplar Bluff
Location: Sikeston or Poplar Bluff, MO
Elective Contact: Liz Karner, St. Louis Children’s Hospital, 454-6299
Other Information: Students should call Liz Karner, 454-6299, at beginning of school year to indicate which rotation (Sikeston or Poplar Bluff) 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 two-week blocks are: Weeks 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 37, 39, 41 and 43.
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 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/week: 25-50
On call/weekend responsibility: Call with instructor, not in-house call

M65 879 HEALTHCARE DISPARITIES
Instructor: Rachel Orscheln, MD, 454-6006
Location: Room 9143 Northwest Tower
Elective Contact: Leah K. Nchama, nchama_l@kids.wustl.edu or page 491-8032
Other Information: Contact Leah Nchama at nchama_l@kids.wustl.edu or page 491-8032, one week before start of elective.
Enrollment limit per period: 1  
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The broad-based primary objective of the elective is to expose medical students to health care limited by financial and/or socio-cultural differences. This would benefit students interested in both local and international health care disparities — the overriding objective is to learn to identify health care deficiencies in select minority populations and then formulate and carry out a plan to overcome or work around them without necessarily having the same resources afforded to the general population.

The proposed format is an experiential one. The student would spend days at locales such as Saint Louis County Department of Health’s health centers (attending specialty clinics such as Pediatrics and Family Medicine at places such as John C. Murphy and South County Health Center), federally-funded health centers (such as Grace Hill and Family Care Health Center), Connect Care, La Clinica, the Saint Louis County Justice Center (i.e., the penitentiary), and on-site school health centers. The student will be able to tailor the experience based on interests and to adjust the established weekly schedule with the help of the course contact coordinator.

Furthermore, students are encouraged to hold discussion groups with BJC/SLCH attendings who have spearheaded overseas projects (e.g., Mark Manary, MD, Patricia Wolff, MD, Gary Weil, MD), during which physicians may discuss what sparked their interest in global/community health, describe how they went about initiating their project, share their overseas experiences as they dealt with social, cultural and political differences, etc. The objective of this contact is to encourage medical students to adhere to their global or community health aspirations.

At the end of the four weeks, the student will submit or present a project on a topic of their choice pertaining to healthcare disparity. This project will be evaluated by the coursemaster and will contribute to 25 percent of the student’s final grade. Project suggestions include keeping a journal of medical and social encounters, doing an ‘artificial budget’ (e.g., research the income and expenditure for a low-income household, the members of which have various acute or chronic medical problems), composing a paper on a topic in global health, or surveying and compiling a list of social resources available for patients at Barnes-Jewish Hospital and St. Louis Children’s Hospital (such as WIC application, Medicaid counseling, etc.).

Student time distribution: Outpatient 90%, Conferences/Lectures 10%; Primary Care 75%, Subspecialty Care 25%

Major teaching responsibility: Healthcare workers (physicians, nurse practitioners) at various sites.

Patients seen/week: 30-40
On call/weekend responsibility: None

**M25 831 PEDIATRIC DERMATOLOGY**
Instructor: Susan J. Baylis, 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 7:45 a.m. first day of elective.

Enrollment limit per period: 1  
Valid start weeks for four-week blocks are: Weeks 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. Baylis 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%
M80 870 CLERKSHIP IN PRIMARY CARE IN GENERAL PEDIATRICS
Instructors: Paul Simons, MD, and Jay Epstein, MD, 535-7855
Location: Forest Park Pediatrics, 4488 Forest Park Blvd.
Elective Contact: Paul Simons, MD, 535-7855
Other Information: Students should contact coursemaster prior to the first day of the elective.
Reporting time is 9 a.m.

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

The Clerkship in Primary Care in General Pediatrics is designed to provide the student with firsthand experience in general pediatric practice in a model ambulatory care setting at the Forest Park Pediatrics office on the Medical Campus. The major component of the clerkship is direct patient care under the supervision of the senior physicians who are members of the group.

Students will join individual pediatricians as colleagues caring for pediatric patients under supervision. The broad spectrum of general ambulatory pediatrics including behavioral pediatrics, developmental pediatrics, preventive medicine, and acute care aspects of pediatric practice will be emphasized. The objective of this elective is to provide the student with the actual experience of serving as a general pediatrician providing comprehensive health services to the families of a typical broadly based population receiving care through different insurance systems.

Student time distribution: Outpatient 95%, Conferences/Lectures 5%; Primary Care 80%, Subspecialty Care (Developmental Pediatrics) 20%
Major teaching responsibility: Attendings
Patients seen/week: 50+
On call/weekend responsibility: None

Research

(M65 900)

Charles E. Canter, MD, Eighth Floor Northwest Tower, Division of Cardiology, 454-6095. Clinical studies on cardiac transplantation in infants and children.

F. Sessions Cole, MD, Eighth Floor Northwest Tower and Fifth Floor, McDonnell Pediatric Research Building, 454-6148. Using population-based databases and case-control databases, our laboratory focuses on evaluation of associations between polymorphic sites 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. Dr. DeBaun’s 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.

Matthew Goldsmith, MD, Room 7108 McDonnell Pediatric Research Building, 286-2769. Growth control and regeneration in zebrafish. All of our patients are growing. Indeed, it’s the sine qua non of pediatric medicine that distinguishes us from all other physicians. The research efforts of our laboratory center on understanding the biology of growth and regeneration. Growth control and the development of proper size and form is a fundamental problem for growing children, moreover multiple pediatric diseases result in undergrowth, overgrowth or dysregulated growth (i.e., structural birth defects). In
addition, while many animals are capable of extensive regeneration, the ability of diseased or damaged tissues and organs to regenerate in humans is quite limited.

We are using the zebrafish, *Danio rerio*, as a model system for studying the biology of growth and regeneration. Current studies are focused on: 1) Using fin overgrowth mutants already identified in forward genetic screens (e.g., *rapunzel*) to help dissect the genetics of growth control pathways; 2) Using forward genetic and pharmacologic screens to identify novel pathways/molecules important in organ regeneration, and; 3) Understanding how the nutritional environment is integrated into an overall hierarchy of growth regulatory signals.

An elective is offered for students wishing to pursue research on one of the three topics described above.

David B. Haslam, MD, Room 6107 McDonnell Pediatric Research Building, 286-2888. Mechanisms of disease caused by bacterial toxins. Research focuses on the binding and intracellular transport of shiga toxins within human cells. An area of particular interest is the genetic and evolutionary basis for human susceptibility to shiga toxins. In addition, research is examining the ability of shiga toxins to gain access to the cytoplasm by exploiting normal quality control mechanisms in the endoplasmic reticulum.

Robert J. Hayashi, MD, 9S St. Louis Children’s Hospital, 454-4118. Clinical research interests include stem cell transplantation and its complications including post-transplant lymphoproliferative disease and long-term side effects of therapy.

Keith A. Hruska, MD, Fifth Floor McDonnell Pediatric Research Building, 286-2772. The research in the laboratory focuses on chronic kidney disease and its complications of renal osteodystrophy, vascular calcification and immune compromise. The lab has discovered important new pathologic mechanisms of disease, and the translation of these principles into new therapeutic approaches is being aggressively pursued. New therapies for chronic kidney disease and its complications are being studied at the basic molecular mechanism of action. New studies of the molecular basis of renal diseases are being pursued.

Paul Hruz, MD, PhD, Third Floor McDonnell Pediatric Research Building, 286-2797. Research interests include structure/function relationships in facilitative glucose transporters, congenital and acquired lipodystrophy syndromes, and insulin resistance associated with HIV protease inhibitor therapy.

David A. Hunstad, MD, Room 6106 McDonnell Pediatric Research Building, 286-2710. The laboratory studies the molecular mechanisms by which 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.

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 complimented by animal models. Understanding in the human infant is assisted by technologies such as electroencephalography and MR scanning, the results of which are also related to neurodevelopmental outcomes. Neuroprotective strategies, such as hypothermia and treatment of ‘clinically silent’ seizures in infants are also being undertaken in trials within our laboratory.

David M. Jaffe, MD, 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.

Lori Luchtman-Jones, MD, 9S St. Louis Children’s Hospital, 454-6018. Investigative efforts are focused on clinical coagulation and hemophilia.

Jeffrey S. McKinney, MD, PhD, 6105 McDonnell Pediatric Research Building, 286-2912. The molecular pathogenesis of *E. coli* and *Salmonella* infections. We employ novel RNA-based techniques of bacterial gene regulation to dissect host-pathogen interactions, using *E. coli* and *Salmonella* as model systems. We also study the diverse capabilities and functions of RNA in vitro and in vivo and are designing new RNA molecules amenable to in vitro evolution and to studies of RNA biology in bacteria, and to development of new antimicrobial agents.

Virginia L. Miller, PhD, 8260 McDonnell Pediatric Research Building, 286-2891. Molecular basis of the pathogenesis of the enteric pathogens *Yersinia enterocolitica* and *Salmonella typhimurium*, the bioterror pathogen *Yersinia pestis*, and the respiratory pathogen *Klebsiella pneumoniae*.

Louis Muglia, MD, PhD, 4108 McDonnell Pediatric Research Building, 286-2847. Studies in our laboratory seek to determine: (1) the mechanism determining the timing of parturition; and (2) the role and regulation of hypothalamic neuropeptides involved in the stress response and reproduction, utilizing transgenic and gene knockout mice.

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 immunologic basis of graft versus host disease and the development of novel therapies in bone marrow transplant.

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. Current projects include: (1) the detection of herpes viruses and polyomaviruses in blood or organ transplant recipients; (2) the detection of respiratory pathogens; and (3) the molecular detection and epidemiology of antibiotic resistance. Future projects will explore other infections caused by other unconventional pathogens that are not easily diagnosed using existing methods, and the application of PCR for quantitation of infectious agents and the detection of resistance to antiviral agents.

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, 6 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), and functional gastrointestinal disorders. Short- and long-term projects can be arranged around these and other related efforts. The exact nature of the project depends on the time that the student can contribute to the effort, and the availability of any of the division faculty, who all have established track records as mentors. Interested students should contact any of our faculty, or Dr. Tarr, to discuss the possibilities.

Neil H. White, MD, CDE, Ninth Floor Northwest Tower, St. Louis Children’s Hospital, 286-1157. Our work involves patient-oriented research in the management of diabetes in children. Arrangements can be made for involvement in or development of projects aimed at improving outcome or prevention of diabetes mellitus and its complications.

David B. Wilson, MD, PhD, 3102 McDonnell Pediatric Research Building, 286-2834. Research is focused on the molecular switches that regulate control genes during early embryonic development and differentiation.

Faculty

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<td>JEFFREY SCOTT MCKINNEY, MD, PHD, BS</td>
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<td>JOHN NEAL MIDDELKAMP, MD</td>
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Barbara Ann Zehnbauer, PhD  Professor of Pediatrics
Department of Psychiatry

Instruction in psychiatry is given during the second, third and fourth years of the medical curriculum. Emphasis is on the teaching of psychiatry as a medical discipline, including the biological, social and psychological mechanisms and manifestations of psychiatric illness, as well as psychological reactions to other illnesses. Psychiatric disorders are common and disabling illnesses. An explosion of knowledge resulting from research in neuroscience, genetics and epidemiology is leading to exciting advances in understanding and treating these disorders. Our department is heavily involved in this research and our didactic curriculum integrates current clinical information with research advances to help students develop the knowledge, skills and attitudes to recognize these illnesses and understand the basic principles of treatment.

William Greenleaf Eliot Division of Child 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 a varied and broad population of children with 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: Kevin J. Black, 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: Kevin J. Black, MD, 362-2469
Up to six 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, Metropolitan St. Louis Psychiatric Center emergency room, BJC Behavioral Health or child psychiatry clinic. As of this writing, there is no night call at any site. See www.nil.wustl.edu/labs/kevin/psy/options.htm for further details.

Fourth Year

Electives

M85 805  PSYCHIATRY CONSULT SERVICE
Instructor: Mehmet E. Dokucu, MD, PhD, 747-4583
Location: 17301A West Pavilion, Barnes-Jewish Hospital, South Campus
Elective Contact: Mehmet E. Dokucu, MD, PhD, 747-4583
Other Information: Students should contact the consult team by voice mail at 848-2402, 8 a.m. first day of elective.

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

The 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: Three workups per week expected; follow up to 10 or more
On call/weekend responsibility: None

M85 810  OUTPATIENT COMMUNITY PSYCHIATRY
Instructor: Keith Garcia, MD, 362-1222
Location: Wohl Clinic and community sites
Elective Contact: Keith Garcia, MD, 362-1222
Other Information: Location of first meeting will be specified in a mailing.

Enrollment limit per period: minimum 2; maximum 3.
Valid start weeks for four-week blocks are: Weeks 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 831  ELECTROCONVULSIVE THERAPY (ECT)
Instructor(s): Michael Jarvis, PhD, MD, and ECT staff, 362-1819
Location: Barnes-Jewish Hospital, South Campus  
Elective Contact: Michael Jarvis, PhD, MD, 362-1819  
Other Information: Students should call Dr. Jarvis prior to scheduling the elective.

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

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.  
Student time distribution: Inpatient 80%, Outpatient 15%, Conferences/Lectures 5%; Subspecialty Care 100%  
Major teaching responsibility: Michael Jarvis, PhD, MD  
Patients seen/weekly: 40  
On call/weekend responsibility: None

M85 836 CLINICAL PSYCHIATRY — INPATIENT PSYCHIATRIC SERVICE  
Instructor: Michael Jarvis, PhD, MD, 362-1819  
Location: Renard Hospital  
Elective Contact: Michael Jarvis, PhD, MD, 362-1819  
Other Information: Students report to Dr. Jarvis' office, 17301 West Pavilion, 8 a.m., first day of elective.

Enrollment limit per period: 3  
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This is a senior rotation that provides the students with an opportunity to expand their knowledge of inpatient clinical psychiatry by functioning as externs. 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.  
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: Gary Boxer, MD, 286-1740  
Location: Montclair Building, 24 S. Kingshighway Blvd., Outpatient Psychiatry Clinic  
Elective Contact: Gary Boxer, MD, 286-1740  
Other Information: Interested students should contact Dr. Gary Boxer at 286-1740 in the Department of Psychiatry.

Enrollment limit per period: 1  
Valid start weeks for four-week blocks are: Weeks 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This 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 a topic of the student’s choosing is required.  
Student time distribution: Outpatient 75%, Conferences/Lectures 25%; Subspecialty Care 100%  
Major teaching responsibility: Attendings and fellows
Research

(M85 900)

Andrey Anokhin, PhD, Suite 2T, Montclair Building, 18 S. Kingshighway Blvd., 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, to better understand biobehavioral mechanisms underlying nicotine and alcohol addiction, as well as possible mediators of genetic risk, such as behavioral disinhibition and negative affect. One of the studies 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 potentials (ERPs) recording during a variety of behavioral tasks. They are also administered neuropsychological tests and personality questionnaires. Another study, which is a longitudinal study of adolescent twins, investigates developmental and genetic aspects of brain activity patterns related to attention and self-regulation of action. 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.

Laura Jean Bierut, MD, Maternity Hospital, 362-3492. This research elective will focus on analyzing data from a 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, 2210 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 focus on public health psychiatry among community and offender populations and include: (1) the short- and long-term effectiveness of interventions to reduce drug use and sexual risks in St. Louis and Bangalore, India; (2) NIH pre- and postdoctoral training for psychiatric epidemiology, drug abuse comorbidity and biostatistics; (3) applicability, reliability and validity of abuse and dependence concepts with special emphasis on new and emerging substances in Sydney, United States and Taiwan; (4) development of interviews that assess psychiatric and substance use disorders, and environmental risk factors for such disorders, and (5) the link between biological data and self-reported behavioral risk factors.

Linda B. Cottler, PhD, MPH, Kathleen Bucholz, PhD, Rick Grucza, PhD, Lee Hoffer, PhD, Ed Spitznagel, PhD, Catherine Striley, PhD, 40 N. Kingshighway Blvd., 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, emphasizes the clinical importance of psychiatric epidemiology; (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) Epidemiology Seminar I: Recent Trends in Epidemiology. Speaker series around topics to be determined; (4) Epidemiology Seminar II: Recent Progress in Epidemiology. Speaker series around topics to be determined; (5) Landmarks in Psychiatric Epidemiology. A review of the major studies in psychiatric epidemiology, describing methods and results, from the 1920s to the present; (6) 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/PC for in-class examples and homework problems.

John G. Csernansky, MD, 6612 Renard Hospital, 747-2160. Neurobiology of schizophrenia. Students may participate in the conduct of clinical or preclinical studies of schizophrenia and related topics. Involvement in clinical studies can include training and experience in interviewing psychiatric patients, or gaining experience in the techniques of brain imaging. Involvement in preclinical studies can involve training and experience in receptor binding, microdialysis, immunohistochemistry and animal behavior.

Gabriel A. de Erausquin, MD, PhD, G02 Biotechnology Center, 362-5186. Genetics of movement disorders in schizophrenia. Students may participate in evaluation of movement abnormalities from videotapes with standardized methods, quantitative analysis of phenotypic data from neurocognitive, personality and imaging assessments, and analysis of genetic data.

Alison Goate, DPhil, G04A Biotechnology Center, 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.

Dan Haupt, MD, 4405 Renard Hospital, 362-2592. Metabolic disturbances associated with mental illness and treatment. Students will design a customized learning experience to address their clinical and/or research interests. Possible activities include supervised literature reviews and participation in the process of designing, completing and securing funding for ongoing NIH-funded clinical studies of metabolic effects of psychoactive medications.

John W. Newcomer, MD, 4412 Renard Hospital, 362-5939. Clinical memory research; research concerning the control of weight and glucose and lipid metabolism. This elective offers the student a broad exposure to clinical protocols related to changes in glucose and lipid metabolism in persons with 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 Road, CID 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; epidemiologic studies of developmental psychopathology with a focus on race/ethnicity disparities; a human-genome epidemiology study focusing on modeling gene-environment interactions for substance abuse and psychiatric disorder comorbidity; and epidemiologic applications of highly-flexible computational techniques.
Yvette Sheline, MD, 1115 Renard Hospital, 2109 East Building, 362-8422. Two-month minimum. Opportunity for students with computer skills to work closely with Dr. Sheline in a neuroimaging project; (1) investigating brain activation in the limbic system in response to emotional stimuli. Students will be involved in acquiring and analyzing fMRI data, interviewing patients and writing up results or (2) recruiting depressed subjects and matched controls, measuring brain structures affected in major depression and correlating these findings with neuropsychological performance.

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 Head of the Department of Psychiatry, Samuel B. Guze Professor of Psychiatry
ARPANA AGRAWAL, PHD Research Instructor in Psychiatry
AQEEB AHMAD Instructor in Clinical Psychiatry
DALE J ANDERSON, MD Instructor in Clinical Psychiatry
RICHARD H ANDERSON, MD, PHD Instructor in Clinical Psychiatry
ANDREY P ANOKHIN, PHD Research Associate Professor of Psychiatry
E. JAMES ANTHONY, MD, PHD Professor Emeritus of Psychiatry (Child Psychiatry)
SCOTT J ARBAUGH, MD Instructor in Clinical Psychiatry
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GARY BOXER, MD Associate Professor of Psychiatry (Child Psychiatry)
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LI-SHIUN CHEN Instructor in Psychiatry
ZHOUFENG CHEN, PHD Associate Professor of Psychiatry
THEODORE J CICERO, PHD Professor of Neuropharmacology in Psychiatry, Vice Chairman for Research, Department of Psychiatry

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<tr>
<th>Name</th>
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<tr>
<td>WILLIAM W CLENDENIN, MD</td>
<td>Assistant Professor of Clinical Psychiatry</td>
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<td>C. ROBERT CLONINGER, MD</td>
<td>Wallace Renard Professor of Psychiatry</td>
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THOMAS F RICHARDSON, MD Associate Professor of Psychiatry
WILLIAM M RIEDESEL, II, MD Associate Professor of Clinical Psychiatry
STEPHEN L RISTVEDT, PHD Assistant Professor of Medical Psychology in Psychiatry
SYED T RIZVI Assistant Professor of Clinical Psychiatry (Child Psychiatry)
LEE NELKEN ROBINS, PHD Professor Emerita of Sociology in Psychiatry
JOHN DENO ROGAKOS, MD Instructor in Clinical Psychiatry (Child Psychiatry)
JOHN W ROHRBAUGH, PHD Associate Professor of Psychiatry
EUGENE HAROLD RUBIN, MD, PHD Vice Chairman for Education, Department of Psychiatry, Professor of Psychiatry
JAMES RUTHERFORD, MD Assistant Professor Emeritus of Clinical Psychiatry
JO-ELLYN M RYALL, MD Associate Professor of Clinical Psychiatry
FRANK SCOTT SACCONE, PHD Research Assistant Professor of Psychiatry
MARCEL T SAGHIR, MD Professor of Psychiatry
BERETTE A SALAZAR, MD Assistant Professor of Clinical Psychiatry
NORMAN SARTORIUS Adjunct Professor of Psychiatry
LAWRENCE M. SCHEIER Adjunct Associate Professor of Psychiatry
JEFFREY FRANK SCHERRER, PHD Research Assistant Professor of Psychiatry
JEFFREY I SCHULMAN, MD Instructor in Clinical Psychiatry (Child Psychiatry)
EARL R SCHULTZ, MD, BS Associate Professor of Clinical Psychiatry
ADELITA SEGOVIA LANGLEY Instructor in Clinical Psychiatry (Child Psychiatry)
LORETTA CASS SELESKI, PHD Assistant Professor Emerita of Medical Psychology in Psychiatry (Child Psychiatry)
PAUL W SHEFFNER, MD Assistant Professor of Clinical Psychiatry
YVETTE I SHELINE, MD Professor of Psychiatry
NATHAN M SIMON, MD Assistant Professor of Clinical Psychiatry
BAKEAL B SIMPSON, MD Assistant Professor of Clinical Psychiatry
ERIK J SIREVAAG, PHD Research Assistant Professor of Psychiatry
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 Instructor in Psychiatry
Department of Radiation Oncology

The Department of Radiation Oncology was created on July 1, 2001, having been part of the Mallinkrodt 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 (CerroBend) shielding system to protect normal tissues during irradiation
- design and construction of the first small dedicated computer for radiation therapy treatment planning
- in collaboration with Varian Associates and NCI, design and construction of the first generation of high-energy, dual-modality, multiple-energies linear accelerator (Clinac 35)
- development of three-dimensional radiation therapy treatment planning and delivery systems
- clinical applications of 3-D conformal and intensity-modulated radiation therapy
- use of multiple imaging modalities in treatment planning in 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 a Gamma Knife unit, 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 two 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. All of these new initiatives are part of developing The Center for Molecular Targeted Radiotherapy, where combined biological, imaging and physics strategies are integrated in the development of new clinical paradigms.

**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
Instructors: Joseph R. Simpson, MD, PhD, 362-8567 and Simon N. Powell, MD, PhD, 362-9706
Location: Center for Advanced Medicine, Lower Level
Elective Contact: Joseph R. Simpson, MD, PhD, 362-8567
Other Information: Students should meet the chief resident in the Department of Radiation Oncology in the Siteman Cancer Center, lower level of the Center for Advanced Medicine (CAM).

Enrollment limit per period: 3
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The clinical division offers an elective with emphasis on the evaluation, planning of and administration of radiation therapy in patients with malignant tumors. The students have the opportunity to enhance their knowledge on the natural history, pathological and biological features of cancer and to sharpen their clinical skills participating in the management of these patients.

Student time distribution: Inpatient 7%, Outpatient 78%, Conferences/Lectures 15%; Subspecialty Care 100%
Major teaching responsibility: Attendings, residents and staff
Patients seen/weekly: 20-35 per physician
On call/weekend responsibility: None

Research

(M90 900)

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.

Simon N. Powell, MD, PhD, Radiation Oncology, Division of Radiation and Cancer Biology, 362-9706. Broad range of opportunities for investigation in biological studies exploring mechanisms involved in cellular DNA damages and repair by irradiation, heat and/or cytologic agents.

Faculty

SIMON N. POWELL, MD, PHD Professor of Radiation Oncology, Head of the Department of Radiation Oncology
KATHY BAGLAN Instructor in Clinical Radiation Oncology
WALTER R BOSCH, PHS Research Assistant Professor of Radiation Oncology
JEFFREY D BRADLEY, MD Associate Professor of Radiation Oncology
JOSEPH O. DEASY, PHD Associate Professor of Radiation Oncology
VENKATA RAO DEVINENI, MD Associate Professor of Clinical Radiation Oncology
ROBERT E DRZYMALA, PHD Associate Professor of Radiation Oncology
ISSAM M EL NAQA, PHD Instructor in Radiation Oncology
JACQUELINE ESTHAPPAN, PHD Assistant Professor of Radiation Oncology
SEYMOUR FOX, PHD Instructor in Radiation Oncology
JOSE L GARCIA Instructor in Radiation Oncology
SREEKRISHNA M GODDU, PHD Assistant Professor of Radiation Oncology
SUSANA GONZALO HERVAS, PHD Assistant Professor of Radiation Oncology
PERRY W GRIGSBY, MD, MS Professor of Radiation Oncology
LANNIS E HALL-DANIELS, MD Assistant Professor of Clinical Radiation Oncology
RYUJI HIGASHIKUBO, PHD Research Associate Professor of Radiation Oncology
NOBUO HORIKOSHI, PHD Assistant Professor of Radiation Oncology
ENRIQUE WILMAR IZAGUIRRE, PHD Instructor in Radiation Oncology
ERIC E KLEIN, PHD Professor of Radiation Oncology
ANDREI LASZLO, PHD Associate Professor of Radiation Oncology
HUI LI, PHD Instructor in Radiation Oncology
HSIU-SAN LIN, MD, PHD Retiree - Professor of Radiation Oncology
DANIEL ABRAHAM LOW, PHD Professor of Radiation Oncology
WEI LU, PHD Instructor in Radiation Oncology
MUHAMMAD SALEEM MAJMOOD, MD Instructor in Clinical Radiation Oncology
DAVID B MANSUR, MD Assistant Professor of Radiation Oncology
JOHN W MATTHEWS, D SC Research Assistant Professor of Radiation Oncology
JEFF MICHAEL MICHALSKI, MD Professor of Radiation Oncology
SASA MUTIC Associate Professor of Radiation Oncology
ROBERT J MYERSON, MD, PHD Professor of Radiation Oncology
OSCAR D. NORTON, MD Instructor in Clinical Radiation Oncology
GILBERT H NUSSBAUM, PHD Associate Professor Emeritus of Radiation Oncology
TEJ K PANDITA, PHD Associate Professor of Radiation Oncology
PARAG J. PARIKH, MD Instructor in Radiation Oncology
CARLOS A PEREZ, MD Professor Emeritus of Radiation Oncology
JAMES VERNON PIEPHOFF, MD Instructor in Clinical Radiation Oncology
JAMES A PURDY, PHD Adjunct Professor of Radiation Oncology
GARY A RATKIN, MD Instructor in Clinical Radiation Oncology
KEITH M RICH, MD Associate Professor of Radiation Oncology
BUCK EDWARD ROGERS, PHD Assistant Professor of Radiation Oncology
JOSEPH L ROTI ROTI, PHD Professor of Radiation Oncology
TAPAN ROY Instructor in Clinical Radiation Oncology
LAKSHMI SANTANAM, PHD Instructor in Radiation Oncology
SHAUN PATRICK SCOTT, PHD, BS Instructor in Radiation Oncology
JOSEPH ROGERS SIMPSON, MD, PHD Associate Professor of Radiation Oncology
WILLIAM L STRAUBE Research Assistant Professor of Radiation Oncology
MARIE E TAYLOR, MD Assistant Professor of Radiation Oncology
WADE L THORSTAD, MD Assistant Professor of Radiation Oncology
TERESA JANE VIETTI, MD  Professor Emeritus of Radiology
BRUCE J WALZ, MD  Associate Professor of Clinical Radiation Oncology
XIAOWEI WANG, PHD  Instructor in Radiation Oncology
TODD H WASSERMAN, MD  Professor
VIRGIL MATTHEW WILLCUT  Instructor in Radiation Oncology
QIN YANG, MD, PHD  Assistant Professor of Radiation Oncology
JUNRAN ZHANG, PHD  Instructor in Radiation Oncology
JIAN-MING ZHU, PHD, MS  Assistant Professor of Radiation Oncology (Pending Executive Faculty Approval)
IMRAN ZOBERI, MD  Assistant Professor of Radiation Oncology

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, St. Louis Children’s and Wohl 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 Hospital and Barnes-Jewish St. Peters Hospital.

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). PET clinical and research facilities are available on the seventh floor. A comprehensive interventional radiology center occupies the eighth floor. Nuclear

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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 a PET/CT scanner, 13 CT scanners, four PET scanners, 13 MR scanners, 11 high-end ultrasound machines plus three portable units, seven interventional radiology systems, six digital chest units, seven computer radiography units, three high-end 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 research facilities are in the Clinical Sciences Research Building (radiological sciences), in the East Building (electronic radiology) and in the Scott Avenue Imaging Center (neurological PET, molecular pharmacology, biomedical MR imaging, optical imaging and cardiovascular imaging).

Administrative, teaching and support functions occupy the sixth floor and the ninth through the 12th floors of the Institute.

The Mallinckrodt Institute of Radiology at Washington University Imaging Center is an extension of the medical school campus East Building. Opened in November 1994, the Imaging Center’s 70,000 square feet of space is dedicated to PET, MR and related sciences research. One of the best-equipped multidisciplinary facilities worldwide, the Imaging Center provides centralized resources for the scientific evaluation of imaging technology and for the development and application of advanced imaging systems. Researchers have access to advanced PET systems; powerful magnetic resonance scanners; three medical cyclotrons; in vivo MR spectroscopy; laboratories; animal care facilities; a neuropsychology laboratory; electrical engineering laboratories for image reconstruction; and high-end graphics workstations. The Imaging Center also houses sophisticated computer facilities that are used for clinical, research and teaching applications.

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 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. In 2007, the Institute will open the Center for Clinical Imaging Research, a bioimaging facility for basic and translational inpatient and outpatient clinical research.

Courses

Second Year

Twelve hours of lecture are devoted to an introduction to radiology. The majority of the course is devoted to diagnostic radiology, including computed tomography, ultrasound, nuclear medicine and magnetic resonance. Radiation biology also is introduced. The course also includes review of individual teaching file cases at small group sessions.
Sanjeev Bhalla, MD, Catherine Appleton, MD

Third Year

M90 701 GENERAL RADIOLOGY CLERKSHIP

Coursemasters: Catherine Appleton, MD, and Christine Peterson, MD, Department of Radiology,
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, Pediatrics, Chest, Abdominal Imaging, Musculoskeletal, Neuroradiology and Interventional Radiology. 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.

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. During this time, students will be responsible for identifying a case of interest. From noon to 1 p.m., the student will attend the daily departmentwide conference and will then spend time researching the case of interest and developing a brief (5-10 minute) presentation. At 2 p.m., students will convene with a designated radiology resident. Cases will be presented and discussed. The radiology resident will then present either a didactic or case-based lecture appropriate for third-year medical student teaching.

Students will select two cases for submission to a digital teaching file. A final quiz will be administered at the course end. 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 between four and seven students each month. The course will not be offered if enrollment falls below four.

**Fourth Year**

**Electives**

**M90 801 GENERAL RADIOLOGY**

Instructors: Catherine Appleton, MD, and Christine Peterson, MD, 362-5139  
Location: Radiology Staff Library (First Floor Mallinckrodt Tower, Room 117)  
Elective Contact: Chiquita Anderson, 362-5139

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

This four-week introductory radiology elective will be offered to fourth-year medical students. Each student will rotate through four of the following radiology services: Emergency Department, Pediatrics, Chest, Abdominal Imaging, Musculoskeletal, Neuroradiology and Interventional Radiology. 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.

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. During this time, students will be responsible for identifying a case of interest. From noon to 1 p.m., the student will attend the daily departmentwide conference and will then spend time researching the case of interest and developing a brief (5-10 minute) presentation. At 2 p.m., students will convene with a designated radiology resident. Cases will be presented and discussed. The radiology resident will then present either a didactic or case-based lecture appropriate for third-year medical student teaching.
Students will select two cases for submission to a digital teaching file. A final quiz will be administered at the course end. 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.

Student time distribution:
Major teaching responsibility: Attendings, fellows and residents
Patients seen/weekly: N/A
On call/weekend responsibility: None

M90 808 BODY CT
Instructors: Fernando R. Gutierrez, MD, and Sanjeev Bhalla, MD, 362-2927
Location: Mallinckrodt Institute of Radiology
Elective Contact: Fernando R. Gutierrez, MD, Sanjeev Bhalla, MD, 362-2927
Other Information: Students should contact Dr. Gutierrez or Dr. Bhalla to discuss meeting location and time for first day of elective.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students will work with two attendings and four residents and participate in all aspects of the Body CT service including interview of patients, protocoling examinations, review and interpretation of diagnostic CT examination and consultation with referring physicians. Approximately 400 CTs are performed each week including chest, abdominal and pelvic examinations and biopsy procedures. Students will attend the daily CT teaching conference and have the opportunity to attend other lectures and conferences. Special interests can be accommodated.

Student time distribution: Inpatient 30%, Outpatient 50%, Conferences/Lectures 20%; Primary Care 50%, Subspecialty care 50%
Major teaching responsibility: Attending physician and residents
Patients seen/weekly: N/A
On call/weekend responsibility: None

M90 815 EMERGENCY RADIOLOGIC IMAGING
Instructors: Sanjeev Bhalla, MD, 362-2927
Location: Emergency Department, Southwest Tower
Elective Contact: Sanjeev Bhalla, MD, 362-2927
Other Information: Students should contact Dr. Bhalla to discuss meeting location and time for first day of elective and to obtain reading list.

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

A four-week elective emphasizing the interactions between radiologists and emergency department physicians. Students will have extensive exposure to evaluation of both medical and surgical emergencies in the adult patient. They will learn appropriate use of radiologic resources and will also learn the basics of film reading (chest, bone and joint, and body CT) at the viewing console. Students will serve as a liaison with the clinical physicians and support staff. This active elective will include attendance at the daily radiologic emergency department conference.

Student time distribution: Inpatient (ER) 80%, Conferences/Lectures 20%
Major teaching responsibility: Attendings and residents on the ER radiology service
Patients seen/weekly: 250 chest radiographs, 100 bone and joint, 40 CT exams
On call/weekend responsibility: None
M90 820 CLINICAL NUCLEAR MEDICINE  
Instructors: Tom R. Miller, MD, PhD, 362-2809  
Location: 956 West Pavilion  
Elective Contact: Tom R. Miller, MD, PhD, 362-2809  
Other Information: Students report to 956 West Pavilion, 8:30 a.m. first day of elective.

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

The student will be exposed to the full range of clinical nuclear medicine. In conjunction with the staff, the student will be responsible for planning and interpreting imaging studies in patients referred to the Department. Opportunity exists to learn instrumentation techniques, including computer applications. There are daily conferences and scan interpretation sessions.

Student time distribution: Inpatient 30%, Outpatient 50%, Conferences/Lectures 20%; Primary Care 50%, Subspecialty Care 50%  
Major teaching responsibility: Multiple attendings and fellows  
Patients seen/weekly: 200  
On call/weekend responsibility: None

M90 830 INTERVENTIONAL RADIOLOGY  
Instructor: Jennifer Gould, MD, 362-2900  
Location: Mallinckrodt Institute of Radiology  
Elective Contact: Jennifer Gould, MD, 362-2900  
Other Information: Students should contact Dr. Gould to discuss meeting location and time for first day of elective.

Enrollment limit per period: 2  
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

Students will be exposed to all clinical and procedural aspects of interventional radiology including: patient evaluation and consultation, preparation of patients for procedures, performance of a wide range of vascular and nonvascular 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

M90 842 THORACIC IMAGING — MIR  
Instructor: Harvey Glazer, MD, 362-2927  
Location: Mallinckrodt Institute of Radiology  
Elective Contact: Harvey Glazer, 362-2927  
Other Information: Students meet instructor at 7 a.m. in the chest reading room, Second Floor, Mallinckrodt Institute of Radiology.

Enrollment limit per period: 3  
Valid start weeks for four-week blocks are: Weeks 1, 9, 17, 25, 33 and 41.

A four-week elective emphasizing the interactions between chest radiologists and the various clinical services, to include thoracic surgery, thoracic oncology and pulmonary medicine. Learn to read chest radiographs at the viewing console while providing liaison with the clinical teams. This active elective
will include the daily chest teaching conference and participation in weekly autopsy, thoracic surgery and thoracic oncology conferences, as well as the imaging aspects of the clinico-pathological medicine conference. Learn to identify subtle pneumothorax and pneumonia. Learn the limitations of portable chest radiographs.

Student time distribution: Inpatient 40%, Outpatient 35%, Conferences/ Lectures 25%
Major teaching responsibility: Attendings and residents on chest radiology service
Patients seen/weekly: 500 CXRs seen weekly
On call/weekend responsibility: None

**M90 880 NEURORADIOLOGY CLINICAL ELECTIVE**
Instructors: JoAnne Lacey, MD, 362-2978 and Franz J. Wippold II, MD
Location: Neuroradiology section, Queeny Tower, 16th Floor
Elective Contact: JoAnne Lacey, MD; Franz J. Wippold II, MD; and Pam Jearls, 362-5949
Other Information: All students interested in this elective must contact Dr. Lacey prior to beginning the elective.

Enrollment limit per period: 4
Valid start weeks for four-week blocks are: Weeks 13, 17, 21, 25, 29, 33 and 37.

Neuroradiology is the subspecialty of radiology that concerns the diagnosis and endovascular/percutaneous treatment of brain, spine and extracranial head and neck diseases. The diagnostic division of Neuroradiology focuses on the use of plain films, computed tomography (CT), magnetic resonance (MR) imaging, myelography and angiography in diagnosing central nervous system disease. The therapeutic division uses primarily angiographic and percutaneous techniques in treating appropriate lesions. The medical student participating in this elective will experience all facets of neuroradiology by rotating through all segments of the service and by contributing to the decision matrix for patients seen during the rotation.

Student time distribution: Diagnostic neuroradiology 60%, Conferences/Lectures 20%, Interventional neuroradiology 10%, Case Preparation 10%
Major teaching responsibility: Preparation of case presentations for the neuroradiology teaching file
Patients seen/weekly: 100 Neuro CT, 100 Neuro MRI, 5 Myelograms, 5 Neuroangiograms
On call/weekend responsibility: None

**Research (M90 900)**

Interested students should contact the appropriate individual in each division regarding the types of research projects available.

Tom Conturo, MD, PhD, Second Floor, East Building, Room 2120, 362-8421. Magnetic resonance (MR) imaging is a noninvasive means of providing images of the human body at high spatial resolution and contrast sensitivity. The contrast can be manipulated to depend on different properties of tissue water, enabling the study of a variety of biological processes. In some cases, endogenous or exogenous paramagnetic MR contrast agents are used to alter the MRI contrast by perturbing the tissue water environment. Recently, new MRI hardware has also enabled techniques having high temporal resolution. Using the unique contrast properties of MRI and the higher spatial/temporal resolution, noninvasive techniques can be devised to study neuronal activity, tissue perfusion, water mobility (diffusion) and neuronal fiber pathways in the human brain. The goals of Dr. Conturo's research lab are to develop and apply MR imaging techniques for quantitative imaging of cerebral perfusion, brain function, water diffusion and neuronal fiber pathways. These techniques utilize the MR signal effects of exogenous bolus-injected contrast agents, endogenous hemoglobin and microscopic water diffusion. Long-term goals are to apply these methodologies toward imaging and understanding tissue structure, function and physiology in the brain and other organs in normal and abnormal conditions. The approaches that are used in this laboratory cover a broad range of areas, including MRI physics, MRI pulse sequence development, theoretical derivations, computer simulations, image-processing,
computer graphics, custom contrast agent design and syntheois, phantom studies, animal models, human studies, clinical patient studies and comparison with other imaging modalities.

Farrokh Dehdashti, MD, Nuclear Medicine PET Facility, Seventh 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 16\(\alpha\)\[^{18}\)F\]-fluoro-17\(\beta\)-estradiol (FES), an estrogen receptor based imaging tracer, Cu-60-diacetyl-bis[N\(^4\)methylthiosemicarbazone (Cu-60 ATSM), a hypoxic imaging tracer, and \(^{99m}\)Tc-sestamibi to assess the functional capacity of multidrug drug resistance. Below is a partial list of the research projects relating to PET: (1) PET assessment of response to hormone therapy in advanced hormone-sensitive breast cancer (the major goal of this project is to predict response to hormone therapy in breast cancer based on PET assessment of flare reaction); (2) Imaging MDR1 P-glycoprotein transport activity \textit{in vivo} with Tc-sestamibi PET to predict response to chemotherapy (the major goal of this project is to assess whether \(^{99m}\)Tc-sestamibi PET will provide a functional assessment of MDR1 Pgp in advanced lung cancer and whether tumor uptake of \(^{99m}\)Tc-sestamibi prior to chemotherapy will predict treatment failure in these patients); (3) To determine if quantitative measures of the change in tumor FDG uptake after 24 hours after starting estradiol therapy is a surrogate biomarker of the efficacy in patients with hormone-sensitive metastatic breast cancer. In an exploratory analysis, the effect of the two doses of estradiol on tumor glucose metabolism will be compared; (4) PET assessment of tumor hypoxia using Cu-ATSM in patients with breast cancer (the major goal of this project is to predict prognosis and response to neoadjuvant chemotherapy); (5) Functional assessment of P-glycoprotein with conventional nuclear medicine imaging and \(^{99m}\)Tc-sestamibi in patients with advanced breast cancer; (6) PET assessment of prostate cancer using C-11 acetate; (7) To investigate the effects of letrozole therapy on tumor FES uptake in patients with hormone-sensitive breast cancer (to determine whether the up-regulation of ER expression as a result of estrogen deprivation caused by letrozole therapy can be detected by FES-PET.

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, to image the biologic processes of interest requires continued technical developments for each of the imaging methods listed above. There are ongoing efforts to permit more accurate PET measurements of myocardial substrate metabolism. They include the development of novel tracers of extracted substrates, the development of acquisition schemes to assess endogenous substrate metabolism, and the validation of mathematical approaches to correlate the tracer kinetics with the underlying metabolic processes. These studies are being pursued in small and large animal models and then in humans. Another example includes the current efforts to develop approaches to image the coronary arteries noninvasively by MRI using novel contrast agents and acquisition schemes. In addition, techniques are being developed to permit MR guided interventions on the coronary arteries. This undertaking includes the development of novel guide-wire tracking and catheter tracking schemes using both passive and active approaches. Finally, to permit assessments of myocardial oxygenation and thus, perfusion, techniques are being developed to permit BOLD imaging the myocardium. Another path of the research is to determine how this perfusional-metabolic-functional relation is altered by normal life changes and then determine how disease states alter the relationship. For example, both PET and echocardiography are being used to characterize the age- and gender-related changes on myocardial perfusion, substrate metabolism and function. To study the relationship in disease states, similar studies are being performed in patients with diabetes and obesity. A third path is to determine the mechanisms responsible for these changes in this metabolic-functional relation and identify potential interventions that may reverse or ameliorate
them. In this regard, similar imaging studies are being performed to determine the importance of nitric oxide and the PPARα system in defining this metabolic-functional relation.

Charles Hildebolt, DDS, PhD, Third Floor, East Building, 362-8410. The assessment of oral bone by digital radiographic imaging, including new assessment methods based on photostimulable phosphor radiography. Assessments are focused on the use of radiographic imaging of oral bone to determine osteoporosis risk and the association between oral bone mass and dietary intake of calcium and vitamin D.

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 to test the responsiveness and down-regulation of this system. Other ongoing research involves in vivo 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, PhD, Radiological Sciences, 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 is researched, with a primary interest in novel agents for examination of neurological processes by PET.

David Piwnica-Worms, MD, PhD, Third Floor, East Building, 362-9356. Research projects in molecular imaging are available. Molecular imaging is broadly defined as the characterization and measurement of biological processes in living animals, model systems and humans at the molecular and cellular level using remote imaging detectors such as PET, SPECT, MRI, bioluminescence and near-infrared fluorescence. Our goal is to advance the understanding of normal biology and pathophysiology through noninvasive investigation of molecular and cellular events in vivo. Projects focus on creation, validation
and use of luciferase reporters and bioluminescence imaging as well as PET reporters to investigate protein-protein interactions, signal transduction, and gene expression in cancer and infectious disease, development of peptide conjugates for membrane transduction of PET, SPECT and optical contrast agents, and investigations of the transport functions of the multidrug resistance (MDR1) P-glycoprotein family of membrane transporters in cancer and Alzheimer’s disease.

Marc Raichle, MD, Second Floor, East Building, 362-6907. We use functional imaging techniques, both positron emission tomography and functional magnetic resonance imaging, to study the normal organization of the human brain and the effect of selected diseases. The research focuses on both the methodology (imaging and experimental) and specific questions in cognitive neuroscience.

Michael J. Welch, PhD, Fourth, 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.

**Faculty**

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JIE ZHENG, PHD Assistant Professor of Radiology
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Department's Web Site
http://www.mir.wustl.edu/

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 general surgery rotation at Barnes-Jewish Hospital, Christian Northeast Hospital or the Veterans Administration Medical Center. In addition, each student selects two elective rotations from a variety surgical specialties and/or rotations in a related discipline, such as critical care/anesthesia or musculoskeletal. The focus of the 12-week clerkship is on the diagnosis, care and management of patients who have surgically treatable diseases or conditions. The student is an active participant in the daily care of patients on each service and attends clinics, rounds, operating rooms, and teaching conferences. Central to the 12-week rotation are weekly small-group didactic sessions with assigned faculty members and a biweekly lecture series that covers a wide range of surgical topics and specialties.

**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 “sub-intern,” 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 863 ACTING INTERNSHIP, SURGICAL ONCOLOGY AND ENDOCRINE SURGERY**

Instructors: Timothy Eberlein, MD; Jeffrey Moley, MD; Rebecca Aft, MD; Bruce Hall, MD; L. Michael Brunt, MD; Jill Dietz, MD; and William Gillanders, 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Endocrine and Surgical Oncology Service (Unit I Service). Students will serve as clerks and will be responsible for patient management with house staff under the guidance of the chief resident and attending surgeons. Clinical exposure is focused on thyroid, parathyroid and adrenal surgery, as well as breast oncology, 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/week: 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, 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, and 41.

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Hepatobiliary/Pancreatic (Unit II) Service. The Unit II Service is a busy upper gastrointestinal service with a focus on hepatobiliary and pancreatic diseases and their treatment. The course will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative patient management. Students will serve as clerks and will be responsible for patient management with house staff under the guidance of the 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 and junior residents
Patients seen/week: Varies
On call/weekend responsibility: Every third or fourth night with a resident who will directly supervise

**M95 814 ACTING INTERNSHIP, TRAUMA SERVICE**
Instructors: Timothy G. Buchman, PhD, MD; Bradley Freeman, MD; John Kirby, MD; Douglas Schuerer, MD; and Robb Whinney, DO
Location: 6104 Queeny Tower
Elective Contact: Vicki Amelung, 362-9347
Other Information: This is NOT a “preceptor” elective. However, students may elect to make prior arrangements to work more closely with particular attendings on this service (based on availability).

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

The student on this elective will function as a subintern on the Trauma and Acute Care Surgical Service within the Section of Acute and Critical Care Surgery. Student involvement in all aspects of clinical surgery is accomplished by student attendance in the outpatient office, preoperative patient evaluation, in-hospital patient management and postoperative outpatient follow-up after discharge. Practical experience will focus on the initial evaluation and resuscitation of traumatized patients and
other emergency care patients. The student will also participate in regular rounds, conferences and in-house call. Note: If a student desires to work more closely with a “specific attending,” he/she must make special arrangements with the faculty member prior to beginning this elective. If you have any questions regarding this notice, please call 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/week: 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: Students 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This subinternship elective in minimally invasive surgery is offered by L. Michael Brunt, MD, a member of the HPB/GI Section of 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 60%, Outpatient 30%, Conferences/Lectures 10%; Subspecialty Care 100%
Major teaching responsibility: Attending and residents
Patients seen/week: ~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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Vascular Surgery Service. The elective will offer opportunities for
students to gain experience in preoperative, intraoperative and postoperative management of patients with surgically treated vascular diseases/conditions. Students will serve as clerks and will be responsible for patient management with house staff under the guidance of the chief resident and attending surgeons. There will be opportunity for students to evaluate patients, decide on a diagnostic and management strategy and provide care under house staff and faculty guidance, as well as ample opportunity to attend and participate in conferences. Notice: If a student desires to work more closely with a “specific attending,” he/she must make special arrangements with the faculty member prior to beginning this elective. If you have any questions regarding this notice, please call 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/week: 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; David Dietz, MD; Steve Hunt, MD; Ira Kodner, MD; Jennifer Lowney, MD; and Matthew Mutch, MD
Location: 14102 Queeny Tower, South Campus
Elective Contact: Carol Wolfslau, 454-7179
Other Information: This is NOT a “preceptor” elective. However, students may elect to make prior arrangements to work more closely with a specific attending on this elective (based on availability).

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

This subinternship elective is designed to give students in-depth experience in the clinical management of patients on the Colorectal Surgery Service. Students work closely with the attendings within the Section of Colon and Rectal Surgery, and clinical exposure is focused on a wide range of benign and malignant colorectal diseases. There is exposure to radiation oncology and the specialized areas of nursing related to care of patients with colorectal cancer and inflammatory bowel disease. The course will offer opportunities for students to gain experience in preoperative, intraoperative and postoperative patient management under house staff and faculty guidance, as well as ample opportunity to attend and participate in conferences. Notice: If a student desires to work more closely with a “specific attending,” he/she must make special arrangements with the Colorectal Surgery Office prior to beginning this elective.

Student time distribution: Inpatient 75%, Outpatient 20%, Conferences/Lectures 5%; Subspecialty Care 100%
Major teaching responsibility: James W. Fleshman, MD; David Dietz, MD; and colorectal fellows
Patients seen/week: 25-50
On call/weekend responsibility: Every fifth night or negotiable

M95 891 ORGAN TRANSPLANTATION
Instructors: Surendra Shenoy, MD, PhD; Martin Jendrisak, MD, 362-5701; William Chapman, MD, 362-7792; Niraj Desai, MD, 747-1393; and Jeffrey Lowell, MD, 362-2820
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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The care of transplant patients requires the integration of multiple diverse medical and surgical disciplines. This elective clerkship in organ transplantation encompasses the preoperative evaluation and management of adult and pediatric recipients of liver, kidney and pancreas. Students participate
in procurement of allografts from cadaveric or living donors, organ preservation and transplantation. Emphasis is also placed on postoperative care, multimodality immunosuppression and management of allograft rejection. Basic hepatic and renal physiology, fluid and electrolyte balance, and transplantation immunology are stressed. Rotation provides an elaborate exposure to different facets of management of end stage renal and liver disease. Management of the complications of diabetes, hypertension, portal hypertension, and infectious problems are an integral part of of pre- and post-transplant care. This course is designed to offer the student an overview of the field of organ transplantation. 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/week: 40
On call/weekend responsibility: Yes

M95 820 CARDIOTHORACIC SURGERY
Instructors: Jennifer Lawton, MD; Michael Avidan, MBCH; Richard Battafarano, MD, PhD; Ralph Damiano, MD; William A. Gay, MD; Charles B. Hudsonston, MD; Dan Kreisel, MD, PhD; Bryan Meyers, MD; Nader Moazami, MD; Marc Moon, MD; Michael K. Pasque, MD; G. Alexander Patterson, MD; Charli DeWet, MD; Lauren Hill, MD; and Eric Jacobsohn, 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 four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.

The senior elective in cardiothoracic surgery is a four-week clinical rotation with two-week blocks divided between adult cardiac, pediatric cardiothoracic and general thoracic surgery according to the student’s preference. Students will participate in morning work rounds, attend the operative procedures of their choice, and attend weekly conferences and teaching rounds. Students will be introduced not only to the surgical procedures but also to the postoperative care of the surgical patients.

On the pediatric and adult cardiac services, students will be introduced to the principles of cardiopulmonary bypass, 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 to perform bronchoscopy, esophagoscopy, and gastroscopy, and to 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/week: 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; Christine Cheng,
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/week: 12
On call/weekend responsibility: Recommended

M95 831 PLASTIC SURGERY AMBULATORY CARE
Instructors: Susan E. Mackinnon, MD; Keith E. Brandt, MD; Christine Cheng, MD; Alex Kane, MD; Terence Myckatyn, MD; and Thomas Tung, MD, 362-4588
Location: 11th Floor Northwest Tower
Elective Contact: Thomas Tung, MD, 362-4588
Other Information: Students should meet on the 11th Floor, Northwest Tower., 8:30 a.m. first day of elective.

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/week: 150
On call/weekend responsibility: Recommended

M95 850 UROLOGY
Instructor: Gerald Andriole, MD, 362-8212
Location: Wohl Hospital Building
Elective Contact: Sally Wahlbrink, 362-8212
Other Information: Students should contact Dr. Andriole’s office at 362-8212 prior to first day for room assignment.

Enrollment limit per period: 2
Valid start weeks for four-week blocks are: Weeks 1, 5, 9, 13, 17, 21, 25, 29, 33, 37 and 41.
A four-week clinical clerkship in pediatric and/or adult urology will offer the interested student experience with a spectrum of problems in clinical urology. The student will learn the basic diagnostic procedures and management of surgical and nonsurgical 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/week: >20
On call/weekend responsibility: None

M95 880 PEDIATRIC SURGERY
Instructor: Patrick A. Dillion, MD, 454-6022
Location: 5S60 St. Louis Children’s Hospital
Elective Contact: Stacy Adkisson, 454-6070
Other Information: Students should report at 8:30 a.m. on the first day of the rotation. Call Dr. Dillon’s office for location.

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

The student will participate as a subintern in all aspects of pediatric surgical patient care and will be exposed to a wide variety of pediatric surgical cases. This includes the preoperative and postoperative evaluation of patients as well as the care of pediatric trauma patients. Daily rounds are made with both the resident and attending staff and active participation is expected in the pediatric surgery clinic and the operating room. Weekly conferences include Mortality and Morbidity, Radiology, Pathology and case presentations, with the student expected to prepare a conference presentation on a topic of interest.

Student time distribution: Inpatient 60%, Outpatient 30%, Conferences/Lectures 10%; Subspecialty Care 100%
Major teaching responsibility: Attendings
Patients seen/week: 35
On call/weekend responsibility: Optional

M10 820 CRITICAL CARE
Instructors: Timothy G. Buchman, PhD, MD, 362-9347; Walter Boyle, MD; J. Perren Cobb, MD; Craig Coopersmith, MD; Alex Evers, MD; Richard Hotchkiss, MD; George Tseng, MD; John Mazuski, MD; and Doug Schuerer, MD
Location: Barnes-Jewish Hospital, South Campus
Elective Contact: Vicki Amelung, 362-9347
Other Information: Students should meet in Surgical Intensive Care Unit, 7 a.m. first day of elective.

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

This clinical elective is designated to familiarize the student with the management of the critically ill surgical patient. This is accomplished by direct involvement in patient care in the 8400 Surgical Intensive Care Unit at Barnes-Jewish Hospital. The student will receive individualized teaching and training in critical care management and procedures with emphasis on cardiovascular support and invasive hemodynamic monitoring, airway management and support of respiratory failure, fluid and electrolyte management, sedation and pain relief, nutritional support, management of perioperative hemorrhage and coagulation abnormalities, and management of surgical infections including sepsis and septic shock. The student will function as an integral member of the critical care team and will actively participate in management of critically ill patients from all the surgical specialties except cardiothoracic and neurological surgery. Practical experience will also be gained in placement of
arterial and central venous lines, interpretation of laboratory and cardiovascular monitoring data, recognition and treatment of shock syndromes, and use of mechanical ventilation.

**Student time distribution:** Inpatient 80%, Conferences/Lectures 20%; Subspecialty Care 100%

**Major teaching responsibility:** Attendings

**Patients seen/week:** 50

**On call/weekend responsibility:** Variable

**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.

David W. Dietz, MD, 14th Floor Queeny Tower, Barnes-Jewish Hospital, 454-7179. Clinical research in colorectal cancer and inflammatory bowel disease. Minimum rotation length: one month. Ongoing projects are focused on predictors of response to neoadjuvant therapy in rectal cancer and genotype/phenotype correlations in Crohn’s disease. Currently, “Cu-ATSM PET scanning is being evaluated as a measure of tumor hypoxia and response to neoadjuvant chemoradiation. Potential also exists for the evaluation of molecular and genetic markers in this context through collaboration with the laboratory of Howard McLeod, PharmD. Patients with terminal ileal Crohn’s disease are also being genotyped for mutation in NOD2/CAG0 15, OCTN and DLG-5. It is hypothesized that mutations in these risk-conferring genes may predict disease behavior, i.e., recurrence, after ileocolic resection. A number of clinical projects are also available utilizing the colorectal cancer and Crohn’s disease databases maintained in the section. The student will work under the direct supervision of Dr. David Dietz and other members of the Section of Colon and Rectal Surgery.

Susan E. Mackinnon, MD, Box 8238, 660 S. Euclid Ave., 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, M.D., Box 8238, 660 S. Euclid Ave., 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 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, 3327 Kingshighway Building, Barnes-Jewish Hospital, North Campus, 454-7194. 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  Bixby Professor of Surgery (General Surgery), Head of the Department of Surgery
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<th>Name</th>
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<tr>
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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 and promotes interactions among the cancer research efforts throughout the campus and has provided an organizational focus and stimulus for researchers to continue to produce high quality institutional research. The Center holds approximately $130 million in extramural funding for cancer research and is organized into eight research programs (Cancer Genetics, Cancer and Developmental Biology, Tumor Immunology, Hematopoietic Development and Malignancy, Cellular Proliferation, Oncologic Imaging, Prevention and Control, and Translational and Clinical Research). Siteman also provides 14 shared resource facilities, with two in development, to its more than 260 research members. Shared resource facilities include: Bioinformatics Core, Biostatistics Core, Clinical Trials Core, Embryonic Stem Cell Core, Hereditary Cancer Core, High Speed Cell Sorter Core, Molecular Core Laboratory, Multiplexed Gene Analysis Core, Pharmacology Core, Proteomics Core, Small Animal Cancer Imaging Core, Health Behavior and Outreach Core, Good Manufacturing Practice Facility and Tissue Procurement Core. A High Through-put Core and an Imaging Response Assessment Team are shared resources in development.

Siteman’s Program for the Elimination of Cancer Disparities (PEnCaD) 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 Genomics Program has seminars on the second and third Tuesdays of each month; a new discussion group around new gene discovery is planned. Contact Paul J. Goodfellow, PhD or Simon Powell, MD, PhD, for more information.

• 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 at 4 p.m. on Mondays in the Eric P. Newman Education Center. 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, 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.

### Link to Web Site

http://www.siteman.wustl.edu/

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Eric J Richards  Professor of Biology, Washington University School of Medicine
Stephen L Ristvedt  Assistant Professor of Psychiatry, Washington University School of Medicine
Buck E Rogers  Assistant Professor of Radiation Oncology, Division of Radiation and Cancer Biology, Washington University School of Medicine
John W Rohrbaugh  Associate Professor of Psychiatry, Washington University School of Medicine
Daniel B Rosenbluth  Associate Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Washington University School of Medicine
Joseph L Roti Roti  Professor of Radiation Oncology and Chief, Division of Cancer and Radiation Biology, Washington University School of Medicine

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University School of Medicine

Henry D Royal  Professor of Radiology and Chief, Division of Nuclear Medicine, Mallinckrodt Institute of Radiology, Washington University School of Medicine

Deborah C Rubin  Professor of Medicine, Division of Gastroenterology, Washington University School of Medicine

Joshua B Rubin  Assistant Professor of Pediatrics, Division of Hematology and Oncology, Washington University School of Medicine

David A Rudnick  Assistant Professor of Pediatrics, Division of Gastroenterology and Nutrition, Washington University School of Medicine

John H Russell  Professor of Molecular Biology and Pharmacology, Washington University School of Medicine

Stuart S Sagel  Professor of Radiology and Chief, Section of Chest Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine

Linda J Sandell  Professor of Orthopaedic Surgery and of Cell Biology and Physiology, Washington University School of Medicine

Vetta L. Sanders Thompson  Associate Professor of Community Health, Division of Behavioral Science and Health Education, Saint Louis University School of Public Health

Mark S Sands  Associate Professor of Medicine, Division of Oncology, Section of Stem Cell Biology, Washington University School of Medicine

Paul Santiago  Assistant Professor of Neurosurgery, Washington University School of Medicine

Scott Saunders  Assistant Professor of Pediatrics and of Molecular Biology and Pharmacology, Washington University School of Medicine

Kenneth B Schechtman  Associate Professor of Biostatistics, Washington University School of Medicine

Tim B Schedl  Professor of Genetics, Washington University School of Medicine

Paul H. Schlesinger  Associate Professor of Cell Biology and Physiology, Washington University School of Medicine

Mario Schootman  Assistant Professor of Medicine, Division of Health Behavior Research, Washington University School of Medicine

Robert D Schreiber  Alumni Endowed Professor of Pathology and Immunology, Section of Immunology and Molecular Pathology, Washington University School of Medicine

Alan L Schwartz  Harriet B. Spehrer Professor and Chairman, Department of Pediatrics, Washington University School of Medicine

Robert D Sengelmann  Associate Professor of Medicine, Division of Dermatology, Washington University School of Medicine

Robert M Senior  Dorothy R. and Hubert C. Moog Professor of Pulmonary Diseases, Division of Pulmonary and Critical Care Medicine, Washington University School of Medicine

William D Shannon  Associate Professor of Medicine, Division of General Medical Sciences, Washington University School of Medicine

Andrey S Shaw  Emil R. Unanue Professor of Immunobiology, Department of Pathology and Immunology, Washington University School of Medicine

Shalini Shenoy  Assistant Professor of Pediatrics, Division Hematology/Oncology, Washington University School of Medicine

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Marilyn J Siegel  Professor of Radiology, Division of Diagnostic Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine

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Erik J Sirevaag  Research Assistant Professor of Psychiatry, Washington University School of Medicine

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School of Medicine

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Steven M Strasberg Pruett Professor of Surgery and Chief, Section of Hepatobiliary, Pancreatic and Gastrointestinal Surgery, Washington University School of Medicine

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Robert A Swarm Associate Professor of Anesthesiology and Chief, Division of Pain Management, Washington University School of Medicine

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John-Stephen A Taylor Professor of Chemistry, Washington University School of Medicine

Marie E Taylor Assistant Professor of Radiation Oncology, Washington University School of Medicine

Sharlene A Teefey Professor of Radiology, Division of Diagnostic Radiology, Section of Abdominal Imaging, Mallinckrodt Institute of Radiology, Washington University School of Medicine

Steven L Teitelbaum Wilma and Roswell Messing Professor of Pathology, Division of Anatomic Pathology, Washington University School of Medicine

Premal H. Thaker Assistant Professor of Obstetrics and Gynecology, Division of Gynecologic Oncology, Washington University School of Medicine

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Michael H Tomasson Assistant Professor of Medicine, Division of Oncology, Section of Stem Cell Biology, Washington University School of Medicine

R. Reid Townsend Associate Professor of Medicine, Division of Endocrinology, Metabolism and Lipid Research, Washington University School of Medicine

Sergey M Troyanovsky Associate Professor of Medicine, Division of Dermatology, Washington University School of Medicine

Thomas H Tung Assistant Professor of Surgery, Division of Plastic and Reconstructive Surgery, Washington University School of Medicine

Peter G Tuteur Associate Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Washington University School of Medicine
Emil R Unanue  Professor of Pathology and Immunology, Washington University School of Medicine

Ravindra Uppaluri  Assistant Professor of Otolaryngology, Division of Head and Neck Surgical Oncology, Washington University School of Medicine

Suresh Vedantham  Associate Professor of Radiology, Division of Diagnostic Radiology, Section of Interventional Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine

Ramakrishna Venkatesh  Assistant Professor of Surgery, Division of Urologic Surgery, Washington University School of Medicine

Teresa J Vietti  Professor Emeritus of Pediatrics, Division of Hematology and Oncology, Washington University School of Medicine

Ravi Vij  Assistant Professor of Medicine, Division of Oncology, Section of Bone Marrow Transplantation, Washington University School of Medicine

Haris G. Vikis  Research Assistant Professor of Surgery, Division of General Surgery, Washington University School of Medicine

Reina C. Villareal  Assistant Professor of Medicine, Division of Bone and Mineral Diseases, Washington University School of Medicine

Herbert W Virgin  Edward Mallinckrodt Professor and Chairman, Department of Pathology and Immunology, Washington University School of Medicine

Matthew J. Walter  Assistant Professor of Medicine, Division of Oncology, Section of Bone Marrow Transplantation, Washington University School of Medicine

David Wang  Assistant Professor of Molecular Microbiology, Washington University School of Medicine

Hanlin L Wang  Assistant Professor of Pathology and Immunology, Division of Anatomic Pathology, Washington University School of Medicine

Yian Wang  Associate Professor of Surgery, Division of General Surgery, Washington University School of Medicine

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Katherine N Weilbaecher  Assistant Professor of Medicine, Division of Oncology, Section of Molecular Oncology, Washington University School of Medicine

Steven J Weintraub  Research Assistant Professor of Surgery, Division of Urologic Surgery, Washington University School of Medicine

Peter Westervelt  Associate Professor of Medicine and Chief, Section of Bone Marrow Transplantation, Washington University School of Medicine

Alison J Whelan  Professor of Medicine, Division of Medical Genetics, Washington University School of Medicine

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Samuel A Wickline  Professor of Medicine, Cardiovascular Division, Washington University School of Medicine

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Richard K Wilson  Professor of Genetics, Washington University School of Medicine

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Karen L Wooley  James S. McDonnell Distinguished University Professor in Arts and Sciences, Department of Chemistry, Washington University

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Neill M Wright  Associate Professor of Neurosurgery, Washington University School of Medicine

Mai Xu  Research Instructor of Radiation Oncology, Washington University School of Medicine
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Junran Zhang Instructor of Radiation Oncology, Washington University School of Medicine

Gregory J. Zipfel Assistant Professor of Neurosurgery, Washington University School of Medicine

Imran Zoberi Instructor of Radiation Oncology, Washington University School of Medicine
Teaching and Research Divisions and Programs

Division of Biostatistics

The Division of Biostatistics is a medical-schoolwide facility that engages in research, biostatistical consultation and training activities. Interested students may pursue intensive studies through 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); a coordinating center for the Consortium for Radiologic Imaging Studies for Polycystic Kidney Disease (CRISP) to determine the effectiveness of new and innovative imaging methods for monitoring and assessing the progression of PKD; a coordinating center for the Polycystic Kidney Disease Treatment Network (PKD-TN) to evaluate hypertensive medications that may be effective in slowing progression of PKD in individuals suffering from the disease; a coordinating center for a trial in ocular hypertensives (OHTS); important collaborative studies of Alzheimer’s disease and cancer through support roles as the ADRC biostatistics core and the Alvin J. Siteman Cancer Center biostatistics core; studies on ischemic heart disease; 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 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 conditions.
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.

The Division of Biostatistics sponsors (with the Departments of Genetics and Psychiatry as co-sponsors) 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 Biological and Biomedical Sciences a PhD program in Human and Statistical Genetics, which offers an interdisciplinary 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 dbbs.wustl.edu.

Genetic Epidemiology Masters of Science (GEMS) Program (M21)
The Genetic Epidemiology Masters of Science (GEMS) training program provides an interdisciplinary 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 come from 11 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 full-time, 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 student and clinical investigators. See 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 four core courses plus labs (11 credit hours) that are normally offered to master’s candidates in Genetic Epidemiology. These courses may be taken over one or two summers:

M21-503 Statistical Computing with SAS
M21-505 Biostatistics for Research Workers (prerequisite M21-503)
M21-505A Biostatistics for Research Workers Computer Lab
M21-515 Fundamentals of Genetic Epidemiology
M21-515A Fundamentals of Genetic Epidemiology Computer Lab
M21-550 Introduction to Bioinformatics (prerequisite M21-505)
M21-550A introduction to Bioinformatics Computer Lab

Prospective Students
Since Genetic Epidemiology is an interdisciplinary field, we expect applicants to come from a variety of
backgrounds, but primarily from the quantitative or the 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: Genetics or equivalent) background; 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.), Rooms 3301-3312.

**Further Information**
See our web site, [www.biostat.wustl.edu/gems](http://www.biostat.wustl.edu/gems), contact the program administrator at (314) 362-1052 or pa@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**
Students will register with the program administrator in Genetic Epidemiology. Before registering, current Washington University students must obtain appropriate consent from their division. Students outside the GEMS program enrolling in individual courses must have permission of the coursemaster.

**Academic Calendar**
The GEMS program begins the first weekday after the July 4 holiday each year with preparatory workshops, followed by four intensive summer semester courses. For the fall and spring semesters, the GEMS program follows the calendar of the College of Arts & Sciences.

**Summer Institute Program to Increase Diversity (SIPID) in Cardiovascular Genetic Epidemiology:** An all-expense-paid summer institute is offered effective summer 2007, 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 [www.biostat.wustl.edu/sipid](http://www.biostat.wustl.edu/sipid) or contact the program administrator at sipidge@wubios.wustl.edu.

**Courses**

**M21 503 STATISTICAL COMPUTING WITH SAS®**  
Department: Division of Biostatistics  
Coursemasters: Jingqin Luo and colleagues  
Credit Hours: 2 units  
Frequency: Every summer

Description: Intensive hands-on summer training in SAS® during six 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 M21-505 Biostatistics for Research Workers. The registration/grade option of "Audit" is not available.

Participants are strongly encouraged to participate in the Computing/Unix workshop offered free of charge prior to this course.
Contact the GEMS program administrator for details and for the required permission of the coursemaster: pa@wubios.wustl.edu or (314) 362-1052.

M21 505 BIOSTATISTICS FOR RESEARCH WORKERS
Department: Division of Biostatistics
Coursemasters: Kenneth B. Schechtman, Chengjie Xiong and colleagues
Credit Hours: 2 units
Frequency: Every summer

Description: Intensive two-week summer course designed for those researchers who want to expand their knowledge of practical methods in statistics. Oriented toward statistical and epidemiological concepts, applications, practical hints and hands-on approach to data, rather than theory or derivation of formulas. Heavy use is made of SAS® for in-class examples and homework problems. We will cover classical methods (e.g., t-test, chi-square, correlation), multivariate methods (regression, logistic models, ANOVA, survival analysis), study design, probability and maximum likelihood. Some selected topics are then covered in greater detail. Prerequisite: M21 503 Statistical Computing with SAS®, or student must have practical experience with SAS®.

Participants are strongly encouraged to participate in the Computing/Unix and Statistics workshops offered free of charge prior to this course and to take the companion SAS® course, M21 503. For details, to register and to obtain the required permission of the Coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

M21 505A BIOSTATISTICS FOR RESEARCH WORKERS — COMPUTER LAB
Department: Division of Biostatistics
Course Masters: Kenneth B. Schechtman and colleagues
Credit Hours: 1 unit
Frequency: Every summer

Description: Intensive two-week computer laboratory work in SAS® designed for significant hands-on practice of concepts and methods discussed as part of M21 505. Available only with concurrent registration in M21 505. Required of all Computational Track MS students. Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. The registration/grade option of “Audit” is not available.

For details, to register and to obtain the required permission of the coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

M21 515 FUNDAMENTALS OF GENETIC EPIDEMIOLOGY
Department: Division of Biostatistics
CourseMasters: Treva Rice and colleagues
Credit Hours: 2 units
Frequency: Every summer

Description: This intensive two-week summer course covers causes of phenotypic variation, familial resemblance and heritability (correlation, path analysis and variance components models), Hardy-Weinberg equilibrium, major genes, ascertainment, study designs and basic concepts in linkage and association analysis. Lab practice with various genetics programs (SEPATH, PAP, SOLAR, MERLIN, QTDT) requires enrollment in M21 515A.

Participants are strongly encouraged to participate in the Computing/Unix and Statistics workshops offered free of charge prior to this course and to take the companion SAS® course M21 503. For details, to register and to obtain the required permission of the coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

M21 515A FUNDAMENTALS OF GENETIC EPIDEMIOLOGY — COMPUTER LAB
Department: Division of Biostatistics
Coursemasters: Treva Rice, Yun Ju Sung, PhD, and colleagues
Credit Hours: 1 unit
Frequency: Every summer

Description: Intensive two-week summer computer laboratory designed as hands-on practice of fundamental concepts. This Computer Lab is an optional elective for those registered in the Clinical
Track of the MS program. Students will gain practical experience with various genetics computer programs such as SEGPATH, PAP, SOLAR, MERLIN and QTDT. Available only with concurrent registration in M21 515. Required of all Computational Track MS candidates. Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. The registration/grade option of "Audit" is not available.

For details, to register and to obtain the required permission of the coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

M21 550 INTRODUCTION TO BIOINFORMATICS
Department: Division of Biostatistics
Coursemasters: C. Charles Gu, Gary Stormo and colleagues
Credit Hours: 2 units
Frequency: Every summer

Description: Intensive two-week summer course designed to provide broad exposure to the basic concepts, methodology and application of bioinformatics to solve biomedical problems. Specifically, the 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. Prerequisite: M21 505 Biostatistics for Research Workers.

For details, to register and to obtain the required permission of the coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

M21 550A INTRODUCTION TO BIOINFORMATICS — COMPUTER LAB
Department: Division of Biostatistics
Coursemasters: C. Charles Gu, Gary Stormo and colleagues
Credit Hours: 1 unit
Frequency: Every summer

Description: Intensive two-week summer computer laboratory work designed for significant hands-on practice of bioinformatics concepts. Students will learn and practice basics of the R/Bioconductor for statistical analysis and graphics, and apply specialized R packages to solve statistical and bioinformatics problems discussed in lectures of M21 550. They will also learn basics of bioinformatics tools and databases (BLAST/WUBLAST, Prospector, etc.) and practice applying the new knowledge in real medical research of human diseases. Available only with concurrent registration in M21 550. Required of all Computational Track MS candidates. Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. The registration/grade option of "Audit" is not available.

For details, to register and to obtain the required permission of the coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

M21 5483 HUMAN LINKAGE AND ASSOCIATION ANALYSIS
Department: Department of Genetics
Coursemasters: John Rice and colleagues
Credit Hours: 2 units
Frequency: Every fall

Description: Basic genetic concepts: meiosis, inheritance, Hardy-Weinberg equilibrium, Linkage, segregation analysis; Linkage analysis: definition, crossing over, map functions, phase, LOD scores, penetrance, phenocopies, liability classes, multipoint analysis, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis, determination of power for mendelian and complex trait analysis; Linkage disequilibrium analyses: allelic association (case control designs and family bases studies), whole genome association analysis; quantitative trait analysis: measured genotypes and variance components. Prerequisite: M21 515 Fundamentals of Genetic Epidemiology. Cross-listed as
For details, to register and to obtain the required permission of the coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

**M21 5485 HUMAN LINKAGE AND ASSOCIATION ANALYSIS — COMPUTER LAB**
Department: Department of Genetics
Coursemasters: John Rice and colleagues
Credit Hours: 1 unit
Frequency: Every fall

Description: 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 Haplovew, 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 Computational Track MS candidates. Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. Cross-listed as L41 5485.

For details, to register and to obtain the required permission of the coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

**M21 615 STUDY DESIGN AND MANAGEMENT**
Department: Division of Biostatistics
Coursemasters: J. Philip Miller and colleagues
Credit Hours: 3 units
Frequency: Every fall

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 505 Biostatistics for Research Workers and M21 515 Fundamentals of Genetic Epidemiology. Permission of the coursemaster required: (314) 362-1052.

**M17 588 EPIDEMIOLOGY FOR CLINICAL RESEARCH**
Department: Clinical Investigation Program
Coursemaster: Mario Schootman
Credit Hours: 3 units
Frequency: Every spring

Description: Introduction: 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. Purpose: This course will focus on common applications of epidemiologic principles and tools in clinical research, in clinical issues and in understanding the medical literature concerning these issues. This will be accomplished via different venues that will enhance the critical thinking and scientific/analytic competencies for the students who complete the course.

For details, to register and to obtain the required permission of the coursemaster, contact the program administrator: pa@wubios.wustl.edu or (314) 362-1052.

**M21 621 COMPUTATIONAL STATISTICAL GENETICS**
Department: Division of Biostatistics
Coursemasters: Michael Province, Aldi Kraja and colleagues  
Credit Hours: 3 units  
Frequency: Every spring  

Description: 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 505 Biostatistics for Research Workers. Permission of the coursemaster required: (314) 362-1052.

**M21 599 DIRECTED INDEPENDENT STUDY**  
Instructors: D.C. Rao and Michael Lovett  
A faculty member will work with the student in specific areas related to the student’s primary needs. Permission of the coursemaster required. Credit: variable, maximum 6 units.

**M21 610 INDEPENDENT RESEARCH**  
Instructors: D.C. Rao and Michael Lovett  
Student selects a faculty mentor in consultation with the instructors to undertake a supervised research project in the mentor's lab. The goal is to acquire independent research skills and to develop excellent writing and presentation abilities. A report based on the research must be written in the format of an actual scientific publication and presented to a select audience. Permission of the coursemaster required. Credit: maximum 6 units.

Link to Genetic Epidemiology Masters of Science

Faculty

DABEERU C RAO, PHD Director of the Division of Biostatistics, Professor of Biostatistics  
INGRID B BORECKI, PHD Associate Professor of Biostatistics  
ROBERT CULVERHOUSE, PHD Assistant Professor of Biostatistics  
GINA MARIE D’ANGELO, D SC Assistant Professor of Biostatistics (Pending Executive Faculty Approval)  
MICHAEL R DEBAUN, MD, MS Professor of Biostatistics  
FENG GAO, PHD Research Assistant Professor of Biostatistics  
MAE ETSUKO GORDON, PHD Professor of Biostatistics  
CHI GU, PHD Assistant Professor of Biostatistics  
BARBARA B HIXON Assistant Professor Emerita of Biostatistics  
NAN LIN, PHD, MA Assistant Professor of Biostatistics  
JINGQIN LUO, PHD Instructor in Biostatistics  
J. PHILIP MILLER Professor of Biostatistics
Program in Medical Humanities

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
Instructors: Rebecca Dresser, JD; 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 20 students. Each section consists of six two-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/
M04 582-01 ALZHEIMER'S DISEASE IN THE CLINIC AND THE LAB
Instructors: John C. Morris, MD; Thomas M. Meuser, PhD; and faculty affiliated with the Alzheimer’s Disease Research Center, Department of Neurology. For information, contact Dr. Meuser at 286-2882 or meusert@abraxas.wustl.edu.

Alzheimer’s disease (AD) affects more than 4 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 $100 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 will be treated to 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 disorders clinic, participate in neuropathology evaluations of demented individuals, and interact with investigators from the fields of molecular genetics, cell biology and neuropathology.
Graduate Programs
Division of 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 PhD 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 Department of Chemistry and Psychology in the School of Arts & Sciences; and the Department of Computer Science and Biomedical Engineering in the School of Engineering & Applied Science. More than 350 faculty are affiliated with one or more of 12 broad training programs: Biochemistry, Computational Biology, Developmental Biology, Evolution Ecology and Population Biology, Immunology, Molecular Biophysics, Molecular Cell Biology, Molecular Genetics, Molecular Microbiology and Microbial Pathogenesis, Neurosciences, Plant Biology, and Quantitative Human and Statistical Genetics. 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 500 graduate students are enrolled in the Division, including 150 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.)

Students admitted to the graduate programs are guaranteed full stipend and tuition support contingent upon satisfactory performance. The stipend for the 2007-08 academic year will be $26,000 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.

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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
Instructor: 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, 935-6338
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 as an in-depth introduction to immunology. Topics: antibody structure and genetics, B cell recognition, T cell receptor, major histocompatibility complex, T cell recognition, regulation of the immune response, immune mediators, 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) 5065 Cell Biology of the Stress Response
Instructor: Joseph L. Roti Roti, PhD, 362-9770
Both prokaryotic and eukaryotic cells have evolved strategies to cope with potentially lethal stresses. Current knowledge of these stress responses will be discussed, including the repair of damaged DNA, cell-cycle check-point pathways, scavenging free radicals, alteration of gene expression to resist further exposure to stress and the basis for genomic instability. Prerequisite: Protein Chemistry, Nucleic Acid Chemistry. Two hours lecture and one hour journal club per week, with students presenting assigned paper(s). Credit: 2 units.

L41 (Bio) 5066 Biostatistics for Research Workers
For full description, see Division of Biostatistics, M21 505.
L41 (Bio) 5067 Intro to Bioinformatics
Instructors: C. Charles Gu, PhD, 362-3642; Gary D. Stormo, PhD, 747-5534
Provide a broad exposure to the basic concepts, methodology and application of bioinformatics to solve biological problems. Specifically, the students will learn the basics of online genomic/protein databases and database mining tools, and will acquire understanding of mathematical algorithms in genome sequence analysis (alignment analysis, gene finding/predicting), gene expression microarray (genechip) analysis, and of the impact of recent developments in the protein microarray technology. Prerequisite: M21 505 Biostatistics for Research Workers. Credit: 3 units. Same as M21 GEMS 550.

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) 5092 Molecular and Developmental Biology Journal Club
Instructors: Aaron DiAntonio, MD, PhD, 362-9925; Kristen L. Kroll, PhD, 362-7045
This course will teach the fundamentals of organization and oral presentation of scientific information. Presentations will be of recent articles from the literature relating to modern molecular and developmental biology, as well as original research by the students. Students will be evaluated on clarity and effectiveness of presentations. Credit: 1 unit.

L41 (Bio) 5102 Issues of Disability in Society
Instructor: David B. Gray, PhD, 286-1658
The emergence of disability as a public health concern in the United States has implications for all aspects of society. This course allows the student to explore global disability issues with an emphasis on the more personal aspects of living with a disability, including policy issues, community integration, housing, assistive technology, transportation, employment self-care, recreation, communication and health care. The course has a multidisciplinary focus and is designed for students pursuing professional careers where issues of disability must be considered and for students who want to become informed of the impact of disability on the individual and society. Credit: 3 units. Same as M01 OT 426.

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: J. Michael Shipley, PhD, 454-7990
This journal club covers a broad range of topics of current interest, 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 faculty, students and postdoctorates. Students receive one credit for regular participation and for making one presentation. Credit: 1 unit.

L41 (Bio) 5132 Cytoskeleton Discussion Group
Instructor: David D. Sept, PhD, 935-8837
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 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. Credit: 1 unit.

L41 (Bio) 5146 Principles and Applications of Biological Imaging
Instructors: Carolyn J. Anderson, PhD, 362-8427; 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) 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-hour lab periods, four 1-hour clinical discussion groups. Credit: variable, maximum 3 units.

L41 (Bio) 5191 Pathobiology of Human Disease States
Instructors: Daniel C. Link, MD, 362-8771; Hector D. Molina, MD, 747-0339
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
Instructors: 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) 5193 Frontiers in Human Pathobiology
Instructors: David A. Rudnick, MD, PhD, 286-2832; Rodney D. Newberry, MD, 362-2671
Leading physician-scientists from the Washington University community will present state-of-the-art lectures on important areas of human pathobiology in which they are expert. This program will provide graduate students, post-doctoral fellows, and medical students with a "cutting-edge" introduction to important biological principles relevant to human diseases. Prerequisite: Graduate or medical student in good standing at WUMS. Credit 1 unit.

L41 (Bio) 5215 Thursday Development Rave
Instructor: Kristen Kroll, PhD, 362-7045; Ross L. Cagan, PhD, 362-7796
Travel the medical school to gain hands-on experience with new techniques and approaches to developmental biology. We will emphasize a different approach in which doing goes hand-in-hand with asking. Developmental biology can be fun ... so ... no note-taking allowed; we'll give you the notes. Bring your curiosity. Food, beverages and music are all part of the mix. You will learn! Due to the nature of the class, size will be limited. Prerequisite: Graduate standing and coursemaster approval required. Credit: 2 units.

L41 (Bio) 5217 Special Topics in Microbial Pathogenesis
Instructors: David A. Leib, PhD, 362-2689
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, to participate actively in discussion, and to design specific aims for one related research project. Prereq: 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) 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. Credit: 1 unit.

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 indepth 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
Instructors: Barry P. Sleckman, MD, PhD, 747-8235; 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 C.R. Elgin, Ph.D., 935-5348; Douglas L. Chalker, Ph.D., 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 Quantitative Human Statistical Genetics graduate program. Credit: 3 units.

L41 (Bio) 5288 Special Topics in Molecular Genetics: Molecular Basis of Cancer
Instructor: Lee Ratner, MD, PhD, 362-8836
A special topics course with lectures and discussion on the molecular basis of cancer including cell cycle regulation, tumor suppressor genes, tumor invasion, angiogenesis, immune evasion, resistance to apoptosis, signaling, imaging, gene expression, chromosomal translocations, and viral oncology. Credit 2 units.

L41 (Bio) 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 non-linear 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) 5316 Intro to Biomolecular Statistical Thermodynamics
Instructor: Rohit V. Pappu, PhD, 362-2057
This course is designed to provide a conceptual foundation in statistical thermodynamics for upperclassmen graduate students with interests in Biophysics, Biochemistry, Biomedical Engineering, Chemical Engineering, Chemistry, and Computational Biology. A reasonable foundation in calculus as well as statistics is necessary. Statistical thermodynamics provides the only framework for studying the folding, self-assembly, and functions (binding) of proteins, nucleic acids, lipids, and surfactants. These topics will be covered via a thorough discussion of: Intermolecular forces; Ensemble theories in statistical physics; Theories of liquids, solutions, solubility, mixtures, and electrolytes; Thermodynamics of flexible polymer solutions; Macromolecular phase transitions; Applications to problems in protein folding and aggregation; And the use of statistical thermodynamics for
interpreting ensemble and single molecule experiments. This course also serves as useful complement to Biol 5312 (Macromolecular Interactions). Credit 3 units. Same as home course E72 BME 531.

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. 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: Coursemaster approval is required. 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) 5325 Protein Structure and Function
Instructor: Jay W. Ponder, PhD, 362-4195
The first half of the course covers descriptive amino acid, peptide and protein structure; protein folding, engineering and design; and introductions to enzyme kinetics and thermodynamics protein-ligand interactions. The second half of the course focuses on biophysical methods for the determination and analysis of protein structure and function. These include sections on visible spectroscopy, nuclear magnetic resonance and crystallography. This course is required for the Programs in Biochemistry and in Molecular Biophysics. Prerequisite: undergraduate course in physical chemistry. Credit: 3 units.

L41 (Bio) 5326 Molecular Medicine
Instructor: Enrico Di Cera, MD, 362-4185
This course offers a broad overview of molecular mechanisms of disease. Areas of focus include blood coagulation, inflammation, immune response, hypercholesterolemia, diabetes and Alzheimer's disease. Basic aspects of ligand binding, linkage, enzyme kinetics, specificity, allostery and site-directed mutagenesis are reviewed to introduce essential knowledge for the analysis and interpretation of underlying mechanisms of recognition and regulation. State-of-the-art lectures on specific examples of molecular mechanisms of disease are delivered by world experts in each field. The course is targeted to students interested in a direct connection between quantitative biochemistry and medically relevant systems. Prerequisite: General Biochemistry. Credit 2 units.

L41 (Bio) 5327 Optical Spectroscopy: Theory and Applications
Instructor: Kathleen B. Hall, PhD, 362-4196
Spectroscopic methods to be covered include fluorescence, both ensemble and single molecule, and absorption (circular dichroism); fluorescence correlation spectroscopy will also be discussed. The quantum chemistry/physics behind these methods will be reviewed. Prerequisite: Consent of instructor. Credit 2 units.

L41 (Bio) 5329 Mathematical Methods for Biophysics and Biochemistry
Instructor: Nathan A. Baker, PhD, 362-2040
The purpose of this course is to introduce the basic concepts of mathematical physics to students in the context of problems they are likely to encounter in their coursework and research. Specifically, the course will introduce analytical and numerical mathematical methods relevant to the fields of biophysics and biochemistry. By the end of the course, the students should have a good grasp of these basic techniques, their application to biological problems, and related software and computational resources. Credit 3 units. Same as E62 BME 5329.

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) 5384 Advanced Cell Biology
Instructors: Jean E. Schaffer, MD, 362-8717; Daniel S. Ory, MD, 362-8737
A lecture/discussion course for graduate and MSTP students that emphasizes current research directions in fundamental processes of cellular biology. Topics will be covered in depth over two-week blocks and will include glycoprotein biology, lipid homeostasis, protein degradation, and cell senescence. Emphasis on development of journal club presentation and grant writing skills. Prerequisite: L41 (Bio) 5068 or permission of coursemasters. Credit: 3 units.

L41 (Bio) 5392 Molecular Microbiology and Pathogenesis
Instructor: Michael Caparon, PhD, 362-1485
First half focuses on microbial physiology and genetics, with special attention to recent discoveries in gene regulation and protein processing. Second half devoted to microorganisms that cause disease, with emphasis on the molecular interactions between pathogen and host. Prerequisite: first-semester core curriculum for programs in Cell and Molecular Biology. Credit: 3 units. This is referenced in the Department of Molecular Microbiology.

L41 (Bio) 5393 Molecular Virology Journal Club
Instructors: David A. Leib, PhD, 362-2689; Andrew S. Pekosz, PhD, 747-2132
Journal club covering a broad range of topics in virology with an emphasis on pathogenesis or molecular biology of medically important viruses. A minimum of one student presentation with faculty critique. Prerequisite: permission of instructor. Credit: 1 unit.

L41 (Bio) 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 & Pathogenesis. Credit 0.5 unit.

L41 (Bio) 5416 Molecular Microbiology and Pathogenesis Journal Club
Instructor: Joseph Vogel, PhD, 747-1029
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 give 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, founded in 1966, covers a broad range of topics of current interest in hematology and oncology including areas of research in hematology, oncology, hematology and oncology. The course will emphasize techniques used to give good presentations. 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, postgraduate fellows and the faculty. Each attendee presents two to three times per year. Participants are expected to attend all the sessions. Credit: 1 unit.

L41 (Bio) 5424 Translational and Public Health Aspects of Basic Infectious Disease Research
Instructors: David Wang, PhD, 286-1123; Jeffrey S. McKinney, PhD, 286-2912
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 microbe pathogenesis. Required for participants in the Infectious Diseases Scholars program at Washington University. Prerequisite: BIO 5392 or permission of instructor. Credit 1 unit.

L41 (Bio) 5443 Nucleic Acids and Nucleic Acid Protein Interactions Journal Club
Instructor: Peter Burgers, PhD, 362-3872
The biochemistry of nucleic acids and nucleic acid-protein interactions. Focus is on the functional and structural properties of these molecules, addressed through basic biochemical and quantitative approaches. Credit: 1 unit.

L41 (Bio) 5465 Advanced MRI and Molecular Imaging Techniques Journal Club
Instructor: Patrick M. Winter, Ph.D., 454-5007
This journal club is intended for MSTP or engineering graduate students. Magnetic resonance imaging is unique among clinical imaging modalities due to the ability to image anatomy, function, metabolism and/or physiology, and the wide variety of cellular, vascular or targeted contrast agents. We will review recent publications on diverse topics of MRI such as molecular imaging, contrast agent development, cellular imaging, functional imaging, nanotechnology, multi-nuclear imaging, image guided therapy, interventional imaging and drug delivery. The choice of papers will focus on clinically relevant applications in cardiovascular disease and cancer. Familiarity with MRI physics, image processing and image reconstruction is assumed. Credit: 1 unit. Same as home course E72 BME 505.

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 Optical Bioelectric 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, Biol 3050 or permission of instructor. Credit 3 units. Same as home course E72 BME 504.

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. Prerequisite: Calculus, introductory human physiology/anatomy/biology course. Same as E62 BME 502. Credit: 3 units.

L41 (Bio) 5474 Algorithms for Computational Biology
Instructor: Michael R. Brent, PhD, 935-6621
This course will focus on how to sequence and analyze a genome, emphasizing computational and algorithmic issues. After taking this course, you should be able to parachute into a genome informatics group, understand what’s going on, and do something useful on your first day. Topics covered include: the essential biology, the essential probability theory, base calling and quality clipping, genome assembly (including aspects of sequence alignment), repeat masking, predicting protein-coding genes
(including Hidden Markov Models and comparative genomics approaches), predicting gene function by comparing to proteins of known function, basic RNA gene finding, and advanced topics in sequence alignment. This course will include a combination of paper-and-pencil homework assignments and programming labs. Prerequisite: CS 241 or CS 514N or L41 (Bio) 5495. Same as E81 CSE 587A. 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 presently 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: David Sept, PhD, 935-8837
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: John E. Majors, PhD, 362-1135
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) 5481 Student-Run Molecular Genetics Journal Club
Instructor: John E. Majors, PhD, 362-1135
Students in the Molecular Genetics Program have organized this journal club, which meets weekly. The speaker provides the faculty member in charge with a one-page outline of their presentation ahead of the class time. Students provide written evaluations of the quality and content of each others’ talks. The forms are given to each speaker by way of the faculty member in charge. All students receiving credit are expected to give one presentation per semester and to attend regularly. This is referenced in the Department of Biochemistry and Molecular Biophysics. Credit: 1 unit.

L41 (Bio) 5483 Human Linkage and Association Analysis
Instructor: John P. Rice, PhD, 286-2572
Meiosis, inheritance, Hardy Weinberg Equilibrium, segregation analysis, linkage analysis: definition, crossing over, map functions, phase, LOD scores, LINKAGE, genetic heterogeneity, penetrance, phenocopies, and liability classes, multipoint analysis, non-parametric analysis (sibpairs and pedigrees), quantitative trait analysis, determination of power for mendelian and complex trait analysis, linkage disequilibrium analyses, allelic association (case control designs and family bases studies) practical aspects of data management of genetic data, quantitative trait analysis using measured genotypes and variance components. Hands-on computer exercises will be emphasized. There will be student presentations. Credit: 3 units. Same as M21 GEMS 5483.

L41 (Bio) 5484 Genetics and Development of C. Elegans Journal Club
Instructor: Tim Schedl, PhD, 362-6162
Students will present a research paper (or present their current thesis research) and the appropriate background material. Credit: 1 unit.
L41 (Bio) 5488 Genomics
Instructors: Barak A. Cohen, PhD, 362-3674; Robi D. Mitra, PhD, 362-2751
A hybrid of concepts and practical applications in genomics. Areas covered include how genomes are mapped and sequenced, computational methods for gene predictions, functional genomic techniques for ascribing function to DNA, RNA and protein sequence and how genomic techniques and resources can advance the study of human disease. Heavy emphasis will be placed on students acquiring basic skills needed to navigate and manipulate databases of DNA sequence, gene expression and other types of genome wide data. Prerequisites: L41 (Bio) 5068 Molecular Cell Biology, L41 (Bio) 548 Nucleic Acids or by permission of instructor. Lecture 3 units of credit, lab one additional unit, space limited. Credit: 3 or 4 units.

L41 (Bio) 5491 Advanced Genetics
Instructor: James B. Skeath, PhD, 362-0535
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 7805. Credit: 1 unit.

L41 (Bio) 5497 Special Topics in Computational Molecular Biology
Instructor: Gary D. Stormo, PhD, 747-5534
Indepth discussion of problems and methods in Computational Molecular biology. Each year three topics will be covered and those will change yearly. Prerequisite: Bio 5495 or instructor's consent. Credit 2 units.

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) 5501 The Biology and Pathology of the Visual System
Instructor: David C. Beebe, PhD, 362-1621
The purpose of the course is to provide a fascinating view of vertebrate eye development, anatomy, physiology and pathology. Topics to be covered include the molecules that control eye formation, ocular stem cells, the physiology of transparency, hereditary ocular diseases, the neurobiology of the retina, age-related eye diseases, and many others. The course is open to all second year graduates and above. Ophthalmology residents and postdocs with an interest in vision are strongly encouraged to attend. Credit 3 units.

L41 (Bio) 5506 Data Mining and Applications to Computational Biology
Instructor: Weixiong Zhang, PhD, 935-8788
Formerly CS 529A. Many scientific computing problems are, by nature, statistical. Such problems appear in many domains, such as text analysis, data mining on the web, computational biology and
various medical applications. Another source of the statistical nature of such problems is the lack of sufficient information of the problem domains as well as the specific problems at hand. What is available for a typical application is usually a set of data from observation or experiments. The main objective of this course is to gain experience of dealing with statistical data analysis problems by studying various statistical methods that can be used to make sense out of data, by reading and reviewing literature as well as by working on a specific statistical problem in a selected application domain. Prerequisite: CSE 241 and SSM 326A (or Math 320), or their equivalent, or permission of the instructor. Credit 3 units. Same as home course E81 CSE 514A.

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: Jim Huettner, PhD, 362-6624
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. Ten lectures plus four hours of discussion per week for six weeks. There will be two exams and a written research proposal, as well as homework problems and summaries of discussion papers. Prerequisite: graduate standing or permission of the instructor. Credit: 6 units.

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 multi-disciplinary integrative final review paper. Case-study topics will vary somewhat from year to year, but are likely to include some of the following: temporal coding as a mechanism for information processing, coordinate transformations in sensory-motor integration, mechanisms of cognitive control, motor control strategies including application to neural prosthetics, and memory systems in health and disease. Credit: 3 units. 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, each student will develop a research plan in their chosen area of interest. The plan will be developed in consultation with at least two faculty members (from at least two different subdisciplines within the pathway) as well as the other students and faculty participating in the course. The culmination of this course will be for each student to produce an NIH-style grant proposal on the research project of their choosing. For most students, this will serve either as their thesis proposal or a solid precursor to the thesis proposal. The course will be designed to help facilitate the development of such a research plan through didactic work, class presentations, class discussion, and constructive feedback on written work. The course will begin with a review of written examples of outstanding research proposals, primarily in the form of grant submissions similar to those that the students are expected to develop (i.e., NRSA style proposals, R03 proposals). Review of these proposals will serve as a stimulus to promote discussion about the critical elements of good research proposals and designs in different areas. Each student will be expected to give three presentations.
throughout the semester that will provide opportunities to receive constructive feedback on the
development and implementation of research aims. The first presentation (towards the beginning of
the semester) will involve presentation of the student’s general topic of interest and preliminary
formulation of research questions. Feedback will emphasize ways to focus and develop the research
hypotheses into well-formulated questions and experiments. The second presentation will involve a
more detailed presentation of specific research questions (along the lines of NIH-style Specific Aims)
and an initial outline of research methods. The final presentation will involve a fuller presentation of
research questions and proposed methods. Feedback, didactic work, and group discussion throughout
the semester will include guidance on critical components of the development of a research plan,
including how to perform literature searches, formulate testable hypotheses, write critical literature
summaries, and design experiments and analyses. The course will meet once a week, with faculty
members from different tracks within the Pathway present at each meeting. This will allow students to
receive feedback from several perspectives. 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: 4
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 three-credit option: calculus, some experience
with differential equations, and cell or systems biology. Junior and senior undergraduates need
permission of instructor. Prerequisites for one-credit option: permission of instructor, calculus II, and
introductory biology. Credit: 3 units. Same as E62 BME 572.

L41 (Bio) 5663 Neurobiology of Disease
Instructors: Bradley L. Schlaggar, PhD, 454-6120; Mark P. Goldberg, MD, 362-3258
This is an advanced graduate seminar on the neuroscience of nervous system disorders. This course is
intended to acquaint basic scientists with a spectrum of clinical diseases, and to consider how
advanced neuroscience approaches may be applied to promoting recovery in the brain. The class will
meet for 2 1/2 hours each week. Each session will be led by a faculty guest with expertise in a specific
neurological or psychiatric disease. In the first hour, the speaker will discuss clinical manifestations
and pathophysiology. Where possible, the clinical presentation will be supplemented with a patient
demonstration or videotape. The second hour will follow a journal club format. Two or three students
will review current papers assigned by the speaker or course director. This course is offered in
alternate years. Credit: 2 units.

L41 (Bio) 572 Seminar in Plant Biology
Instructor: Eric J. Richards, PhD, 935-7196
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

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attendance and active participation in group discussions. Credit: 1 unit.

L41 (Bio) 580 Seminar in Population Biology
Instructor: Garland E. Allen, PhD, 935-6808
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
Instructor: Jan Salick, PhD, 577-5165
Students in this journal club will meet weekly with ethnobotanists, ethnozoologists, and ecologists from various St. Louis institutions (including Washington University, UM-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
Instructors: Sarah C.R. Elgin, PhD, 935-5348; Kathryn G. Miller, PhD, 935-7305
Exploration of issues encountered in serving as a laboratory mentor to undergraduate biology students. Topics include communication skills, setting goals and expectations, resolving challenges and issues, evaluating progress, developing a mentoring philosophy. Resources, including "Entering Mentoring," by Handelsman et al, will be provided. Eight 90-minute sessions in Jan/Feb beginning January 9; one follow-up session in June. Prereq: open to graduate students, with priority for those who plan to mentor undergraduates in summer research experiences. Permissions of instructor and Assistant Dean of Graduate Studies at University College are required. 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 credits. 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
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 500 Independent Study
BME 501 Graduate Seminar
BME 502 Cardiovascular MRI — From Physics to Clinical Application
BME 503A Cell and Organ Systems Biology
BME 504 Special Topics: Optical Bioelectric Imaging
BME 505 Special topics: 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 Special Topics: Kinetics of Receptor-mediated Processes  
BME 523 Biomaterials Science  
BME 530 Special Topics: Molecular Cell Biology for Engineers  
BME 531 Introduction to Biomolecular Statistical Thermodynamics  
BME 533 Biomedical Signal Processing  
BME 537 Computational Molecular Biology  
BME 537A Intensive Course in Computational Molecular Biology  
BME 540 Modelling Biomolecular Systems II  
BME 5494 Quantitative Cardiovascular Physiology  
BME 556 Special Topics: Experimental Methods in Biomechanics  
BME 557 Cellular and Subcellular Biomechanics  
BME 558 Biological Transport  
BME 559A Intermediate Biomechanics  
BME 560A Biomechanics  
BME 561 Special Topics: Principles of Protein Structure: Folding, evolution and macromolecular assemblies  
BME 562 Mechanics of Growth and Development  
BME 5641 Computational Neuroscience  
BME 566 Cardiac Electrophysiology  
BME 567 Cardiovascular Engineering II: Cardiac Mechanics  
BME 568 Cardiovascular Dynamics  
BME 572 Biological Neural Computation  
BME 573 Special Topics: Applied Bioelectricity  
BME 575 Special Topics: Molecular Basis of Bioelectrical Excitation  
BME 586 Advanced Cognitive, Computational and Systems Neuroscience  
BME 590K Nonlinear Elasticity in Biomechanics  
BME 590L Special Topics: Engineering Aspects of Biotechnology  
BME 590X Special Topics: Design of Artificial Organs  
BME 5911 Cardiovascular Biophysics Journal Club  
BME 599 Master’s Research  
BME 600 Doctoral Research  
BME 614 Mechanics of Continua  

For additional related courses, see the Bulletin of the School of Engineering and Applied Science.

**Faculty**

**Professor and Chairman of Department**

Frank Chi-Pong Yin, PhD  

**Professors Emeriti**

Salvatore P. Sutera, PhD  

**Full-time Professors**

Lihong Wang, PhD  
Rice University, 1992

Yoram Rudy, PhD  
Case Western Reserve University, 1978

Larry A. Taber, PhD  
Stanford University, 1979
Affiliate Full Professors

R. Martin Arthur, PhD
University of Pennsylvania, 1968

Philip V. Bayly, PhD
Duke University, 1993

G. James Blaine III, DSc
Washington University, 1974

John P. Boineau, MD
Duke University, 1959

Michael R. Brent, PhD
Massachusetts Institute of Technology, 1991

Harold Burton, PhD
University of Wisconsin, 1968

Elliot L. Elson, PhD
Stanford University, 1966

William A. Frazier III, PhD
Washington University, 1973

Stephen M. Highstein, MD
University of Maryland, 1965; PhD, University of Tokyo, 1976

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

Jeanne Nerbonne, PhD
Georgetown University, 1978

Colin G. Nichols, PhD
Leeds University, 1985

Thomas R. Miller, MD
University of Missouri, 1976

Marcus E. Raichle, MD
University of Washington, 1964

Carl M. Rovainen, PhD
Harvard University, 1967
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
David C. Van Essen, PhD
Harvard University, 1971
Michael J. Welch, PhD
University of London, 1965
Samuel A. Wickline, MD
University of Hawaii, 1980
Thomas A. Woolsey, MD
The Johns Hopkins University, 1969

**Full-time Associate Professors**

Jianmin Cui, PhD
State University of New York Stony Brook, 1992
Igor R. Efimov, PhD
Moscow Institute of Science and Technology, 1992
Rohit V. Pappu, PhD
Tufts University, 1996
Shelly E. Sakiyama-Elbert, PhD
California Institute of Technology, 2000
David S. Sept, PhD
University of Alberta, 1997
Jin-Yu Shao, PhD
Duke University, 1997

**Affiliate Associate Professors**

Dora Angelaki, PhD
University of Minnesota, 1991
Nathan A. Baker, PhD
University of California, San Diego, 2001
Paul C. Bridgman, PhD
Purdue University, 1980
Andreas H. Burkhalter, PhD
University of Zurich, 1977

Daniel R. Fuhrmann, PhD
Princeton University, 1984

Robert J. Gropler, MD
University of Cincinnati, 1981

Sándor J. Kovács, PhD, MD
California Institute of Technology, 1977; MD, University of Miami, 1979

Gregory M. Lanza, PhD
University of Georgia, 1981

Stanley Misler, PhD, MD
New York University, 1976; MD, 1978

Joseph A. O’Sullivan, PhD
University of Notre Dame, 1986

Steven E. Petersen, PhD
California Institute of Technology, 1982

William D. Richard, PhD
University of Missouri, Rolla, 1988

Matthew J. Silva, PhD
Massachusetts Institute of Technology, 1996

M. Victor Wickerhauser, PhD
Yale University, 1985

Research Associate Professors

Jack R. Engsberg, PhD
University of Iowa, 1985

Joseph W. Klaesner, PhD
Vanderbilt University, 1995

Richard B. Schuessler, PhD
Clemson University, 1977

Full-time Assistant Professors

Dennis L. Barbour, MD, PhD
The Johns Hopkins University, 2003

Donald L. Elbert, PhD
University of Texas, Austin, 1997

Daniel W. Moran, PhD
Arizona State University, 1994

Kurt A. Thoroughman, PhD
The Johns Hopkins University, 1999
**Affiliate Assistant Professors**

Kyongtae T. Bae, PhD  
University of Pennsylvania, 1988; MD, University of Chicago, 1992

Thomas E. Conturo, MD, PhD  
Vanderbilt University, 1989

P. Duffy Cutler, PhD  
University of California, Los Angeles, 1992

Robert H. Deusinger, PhD  
University of Iowa, 1981

Anthony French, MD/PhD  
University of Illinois, Urbana-Champaign, 1995; MD, 1996

James E. Huettner, PhD  
Harvard University, 1987

Eric Leuthardt, MD  
University of Pennsylvania, 1999

Timothy J. McCarthy, PhD  
University of Liverpool, 1989

Robi Mitra, PhD  
Massachusetts Institute of Technology, 2000

Michael J. Mueller, PhD  
Washington University, 1992

Ruth J. Okamoto, DSc  
Washington University, 1997

Jay W. Ponder, PhD  
Harvard University, 1984

Stavros Thomopoulos, PhD  
University of Michigan, 2001

Nikolaos V. Tsekos, PhD  
University of Minnesota, 1995

Jerold W. Wallis, MD  
Stanford University, 1981

**Research Assistant Professors**

John M. Ollinger, DSc, PhD  
Washington University, 1986

Patrick M. Winter, PhD  
University of Texas, Arlington, 2000

DeQuan Zou, DSc
Genetic Epidemiology Masters of Science (GEMS)

The Genetic Epidemiology Masters of Science (GEMS) training program provides an interdisciplinary 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 come from 11 departments/divisions in the School of Medicine. The GEMS degree program is sponsored by the Division of Biostatistics and co-sponsored 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 full-time, 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 student and clinical investigators. See 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 four core courses plus labs (11 credit hours) that are normally offered to master’s candidates in Genetic Epidemiology. These courses may be taken over one or two summers:

M21 503 Statistical Computing with SAS
M21 505 Biostatistics for Research Workers (prerequisite M21 503)
M21 505A Biostatistics for Research Workers Computer Lab
M21 515 Fundamentals of Genetic Epidemiology
M21 515A Fundamentals of Genetic Epidemiology Computer Lab
M21 550 Introduction to Bioinformatics (prerequisite M21 505)
M21 550A introduction to Bioinformatics Computer Lab

Prospective Students

Since Genetic Epidemiology is an interdisciplinary field, we expect applicants to come from a variety of backgrounds, but primarily from the quantitative or the 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: Genetics or equivalent) background; 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 the Shriners Building (706 S. Euclid Ave.), Rooms 3301-3312.

**Further Information**
See our web site at [www.biostat.wustl.edu/gems](http://www.biostat.wustl.edu/gems) or contact the program administrator (314/362-1052 or pa@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**
Students will register with the program administrator in Genetic Epidemiology. Before registering, current Washington University students must obtain appropriate consent from their division. Students outside the GEMS program enrolling in individual courses must have permission of the coursemaster.

**Academic Calendar**
The GEMS program begins the first weekday after the July 4 holiday each year with preparatory workshops, followed by four intensive summer semester courses. For the fall and spring semesters the GEMS program follows the calendar of the College of Arts & Sciences.

Summer Institute Program to Increase Diversity (SIPID) in Cardiovascular Genetic Epidemiology: An all-expense-paid summer institute is offered effective summer 2007, 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 [www.biostat.wustl.edu/sipid](http://www.biostat.wustl.edu/sipid) or contact the program administrator at sipidge@wubios.wustl.edu.

**Courses**

**M21 503 Statistical Computing with SAS®**
Department: Division of Biostatistics
Coursemasters: Jingqin Luo and colleagues
Credit Hours: 2 units
Frequency: Every summer
Description: Intensive hands-on summer training in SAS® during six 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 505 Biostatistics for Research Workers. The registration/grade option of "Audit" is not available.

Participants are strongly encouraged to participate in the "Computing/Unix" workshop offered free of charge prior to this course. Contact the GEMS program administrator for details and for the required permission of the coursemaster (pa@wubios.wustl.edu or 314-362-1052).

**M21 505 Biostatistics for Research Workers**
Department: Division of Biostatistics
Coursemasters: Kenneth Schechtman, Chengjie Xiong, and colleagues
Credit Hours: 2 units
Frequency: Every summer
Description: Intensive two-week summer course designed for those researchers who want to expand
their knowledge of practical methods in statistics. Oriented toward statistical and epidemiological concepts, applications, practical hints and hands-on approach to data, rather than theory or derivation of formulas. Heavy use is made of SAS® for in-class examples and homework problems. We will cover classical methods (e.g., t-test, chi-square, correlation), multivariate methods (regression, logistic models, ANOVA, survival analysis), study design, probability, and maximum likelihood. Some selected topics are then covered in greater detail. Prerequisite: M21 503 Statistical Computing with SAS® or student must have practical experience with SAS®.

Participants are strongly encouraged to participate in the "Computing/Unix" and "Statistics" workshops offered free of charge prior to this course and to take the companion SAS® course M21-503.

For details, to register and to obtain the required permission of the coursemaster, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).

**M21 505A Biostatistics for Research Workers — Computer Lab**
Department: Division of Biostatistics  
Coursemasters: Kenneth B. Schechtman and colleagues  
Credit Hours: 1 unit  
Frequency: Every summer  
Description: Intensive two-week computer laboratory work in SAS® designed for significant hands-on practice of concepts and methods discussed as part of M21 505. Available only with concurrent registration in M21 505. Required of all Computational Track M.S. students. Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. The registration/grade option of "Audit" is not available.

For details, to register, and to receive the required permission of the coursemaster, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).

**M21 515 Fundamentals of Genetic Epidemiology**
Department: Division of Biostatistics  
Coursemasters: Treva Rice and colleagues  
Credit Hours: 2 units  
Frequency: Every summer  
Description: This intensive two-week summer course covers causes of phenotypic variation, familial resemblance and heritability (correlation, path analysis and variance components models), Hardy-Weinberg Equilibrium, major genes, ascertainment, study designs and basic concepts in linkage and association analysis. Lab practice with various genetics programs (SEPATH, PAP, SOLAR, MERLIN, QTDT) requires enrollment in M21 515A.

Participants are strongly encouraged to participate in the "Computing/Unix" and "Statistics" workshops offered free of charge prior to this course and to take the companion SAS® course M21 503. For details, to register and to obtain the required permission of the coursemaster, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).

**M21 515A Fundamentals of Genetic Epidemiology — Computer Lab**
Department: Division of Biostatistics  
Coursemasters: Treva Rice, Yun Ju Sung, PhD, and colleagues  
Credit Hours: 1 unit  
Frequency: Every summer  
Description: Intensive two-week summer computer laboratory designed as hands-on practice of fundamental concepts. This Computer Lab is an optional elective for those registered in the Clinical Track of the MS program. Students will gain practical experience with various genetics computer programs such as SEPATH, PAP, SOLAR, MERLIN, and QTDT. Available only with concurrent registration in M21 515. Required of all Computational Track MS candidates. Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. The
registration/grade option of "Audit" is not available.

For details, to register and to receive the required permission of the coursemaster, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).

### M21 550 Introduction to Bioinformatics

**Department:** Division of Biostatistics  
**Coursemasters:** C. Charles Gu, Gary Stormo, and colleagues  
**Credit Hours:** 2 units  
**Frequency:** Every summer  
**Description:** Intensive two-week summer course designed to provide broad exposure to the basic concepts, methodology and application of bioinformatics to solve biomedical problems. Specifically, the 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. Prerequisite: M21 505 Biostatistics for Research Workers.

For details, to register and to receive the required permission of the coursemaster, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).

### M21 550A Introduction to Bioinformatics — Computer Lab

**Department:** Division of Biostatistics  
**Coursemasters:** C. Charles Gu, Gary Stormo, and colleagues  
**Credit Hours:** 1 unit  
**Frequency:** Every summer  
**Description:** Intensive two-week summer computer laboratory work designed for significant hands-on practice of bioinformatics concepts. Students will learn and practice basics of the R/Bioconductor for statistical analysis and graphics, and apply specialized R packages to solve statistical and bioinformatics problems discussed in lectures of M21 550. They will also learn basics of bioinformatics tools and databases (BLAST/WUBLAST, Prospector, etc.) and practice applying the new knowledge in real medical research of human diseases. Available only with concurrent registration in M21 550. Required of all Computational Track MS candidates. Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. The registration/grade option of "Audit" is not available.

For details, to register and to receive the required permission of the coursemaster, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).

### M21 5483 Human Linkage and Association Analysis

**Department:** Department of Genetics  
**Coursemasters:** John Rice and colleagues  
**Credit Hours:** 2 units  
**Frequency:** Every fall  
**Description:** 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. Prerequisite: M21 515 Fundamentals of Genetic Epidemiology. Cross-listed as L41 5483.

For details, to register and to receive the required permission of the coursemaster, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).
M21 5485 Human Linkage and Association Analysis — Computer Lab  
Department: Department of Genetics  
Coursemasters: John Rice and colleagues  
Credit Hours: 1 unit  
Frequency: Every fall  
Description: 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 Haploviev, 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 Computational Track MS candidates. Clinical Track MS students are strongly encouraged to take this lab as an elective for credit toward the degree. Cross-listed as L41 5485.

For details, to register and to receive the required permission of the Course Master, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).

M21 615 Study Design and Management  
Department: Division of Biostatistics  
Coursemasters: J. Philip Miller and colleagues  
Credit Hours: 3 units  
Frequency: Every fall  
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 505 Biostatistics for Research Workers and M21 515 Fundamentals of Genetic Epidemiology. Permission of the coursemaster required (314-362-1052).

M17 588 Epidemiology for Clinical Research  
Department: Clinical Investigation Program  
Course Masters: Mario Schootman  
Credit Hours: 3 units  
Frequency: Every spring  
Description: Introduction: 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. Purpose: This course will focus on common applications of epidemiologic principles and tools in clinical research, in clinical issues, and in understanding the medical literature concerning these issues. This will be accomplished via different venues that will enhance the critical thinking and scientific/analytic competencies for the students who complete the course.

For details, to register and to receive the required permission of the coursemaster, contact the GEMS program administrator (pa@wubios.wustl.edu or 314-362-1052).

M21 621 Computational Statistical Genetics  
Department: Division of Biostatistics  
Course Masters: Michael Province, Aldi Kraja and colleagues  
Credit Hours: 3 units  
Frequency: Every spring  
Description: 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 505 Biostatistics for Research Workers. Permission of the coursemaster required (314-362-1052).

M21 599 Directed Independent Study
Instructors: D.C. Rao and Michael Lovett
A faculty member will work with the student in specific areas related to the student’s primary needs. Permission of the coursemaster required. Credit: variable, maximum 6 units.

M21 610 Independent Research
Instructors: D.C. Rao and Michael Lovett
Student selects a faculty mentor in consultation with the instructors to undertake a supervised research project in the mentor's lab. The goal is to acquire independent research skills and to develop excellent writing and presentation abilities. A report based on the research must be written in the format of an actual scientific publication and presented to a select audience. Permission of the coursemaster required. Credit: maximum 6 units.

Faculty

Link to Web Site
http://www.biostat.wustl.edu/gems/

Health Administration

Admission
The Health Administration Program is not accepting applications. It will be discontinued in 2008. Students interested in graduate study at Washington University can find information about all the University's degree programs at www.wustl.edu/prospective/graduate.html.

Philosophy
The faculty of the Health Administration Program of Washington University believes that administrative personnel in health organizations require not only a solid foundation in management, but also an understanding of those aspects of finance, regulation and strategic planning unique to the health care field. Since its inception in 1946, the program has acted on the premise that health administration students would benefit from exposure to the environment in which they ultimately will work. To this end, the program has maintained an organizational structure consisting of a core faculty located within the School of Medicine, augmented by faculty from other schools and departments within the university, as well as affiliated institutions and agencies. This multidisciplinary approach enables the student to acquire not only management knowledge and skills, but also an understanding of the many complexities unique to the health care sector.

Curriculum and Sequence of Study
Required courses constitute 70 percent of the course sequence for the Master of Health Administration degree, offering vital exposure to the generic knowledge in the health administration area. In addition to the elective courses available within the Health Administration Program (HAP), students may take
up to 15 semester hours of graduate work in other units of Washington University. The HAP student’s faculty adviser must approve the selection of courses in the student’s individual curriculum.

As a means of furthering interdisciplinary study, up to 15 semester hours of HAP courses are open to interested graduate students from other areas of Washington University. There is also a dual MHA-JD degree with the School of Law, a dual MHA-MBA degree with the School of Business, a dual MHA-MIM degree with the School of Engineering & Applied Science, and a dual MHA-MSW degree with George Warren Brown School of Social Work. A dual degree is also offered with the School of Arts & Sciences in Human Resource Management (MHA-MA) through University College. Medical students interested in health administration can choose a fourth year elective offered by HAP.

The sequence of study requires two years, each consisting of a fall and spring semester. Upon completion of the four semesters, or a total of 60 units, the student will receive a master of health administration (MHA) degree. The statute of limitations is five years from the date of matriculation to complete all requirements for the MHA degree. Contingent upon graduation, the student has the option of pursuing a 12-24 month postgraduate administrative fellowship. A certificate will be awarded by Washington University School of Medicine and the affiliated fellowship organization upon its satisfactory completion.

**Administrative Fellowship**

The 12-24 month optional postgraduate administrative fellowship will be served in a hospital, health agency, health organization or health system that has been recommended and approved by the full-time faculty. This option is available only to those persons who have the M.H.A. degree conferred upon them by the Washington University Health Administration Program. The purpose of the fellowship is to provide the graduate with an opportunity to observe and practice those concepts and principles learned during the didactic on-campus exposure. The administrative fellowship is strongly recommended, as this postgraduate practical exposure is deemed necessary for adequate professional career preparation. The fellowship is completed under the direction of a well-qualified and experienced health care executive.

The full-time faculty maintains a close liaison with the administrative fellow and the preceptor. An educational plan that outlines the fellow’s activities for the coming year must be filed by the fellow. The fellow reviews his/her learning progression at the end of the fellowship in a report to the HAP director. The preceptor sends two evaluation reports to the director of HAP and shares the responsibility for recommending the awarding of the certificate by Washington University School of Medicine and the fellowship site organization.

**Tuition and Fees**

Tuition per semester: $12,000

Books and supplies (per semester): $725

**Faculty**

Ronald E. Gribbins, PhD  
Interim Director and Adjunct Assistant Professor of Health Administration

Simone Marie Cummings, PhD  
Instructor in Health Administration

James O. Hepner, PhD  
Professor Emeritus of Health Administration

Dennis Lee Lambert, PhD, MS  
Instructor in Health Administration

Daniel K. Mueller, PhD, MA
Director of Executive MHA Programs, Instructor in Health Administration

Link to Web Site
http://hap.wustl.edu/

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, Department of Psychology 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 (health administration, social work, psychology, human resources management).

Faculty

Director

Mario Schootman, PhD
University of Iowa, 1993 (Interim Chief and Assistant 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 (Postdoctoral Fellow)

Teresa Deshields, PhD
University of Georgia, 1985 (Manager of Psycho-Oncology Services, Siteman Cancer Center)

Kelly Everard, PhD
University of Kentucky, 1995 (Education Coordinator, Saint Louis University)

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)

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

Leigh Tenkku, MPH  
Saint Louis University, 1998 (Research Associate, Department of Community and Family Medicine, Saint Louis University School of Medicine)

Brian Waterman, MPH  
Saint Louis University, 1997 (Manager of Performance Analytics, BJC HealthCare)

Link to Web Site  
http://www.artsci.wustl.edu/~ucollege/graduate_healthca.html

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, 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-health, 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 OT Program 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 coursework, 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 coursework.

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 four areas of concentration: Productive Aging, Social Participation and the Environment, Work and Industry, and Pediatrics. The OTD requires seven semesters of study and three clinical placements for students entering professional practice. Post-professional 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: $11,200 for six semesters

Tuition and fieldwork fees (OTD, full-time): $11,200 per semester first four semesters, $12,900 per semester last four semesters

Part-time tuition: $880 per credit

Faculty

M. CAROLYN BAUM, PHD Professor of Occupational Therapy, Elias Michael Executive Director of the Program in Occupational Therapy

C. ROBERT ALMLI, PHD Associate Professor of Occupational Therapy

JANET MARIE BALOTA, PHD Associate Professor of Occupational Therapy

PEGGY BARCO Instructor in Occupational Therapy

SHIRLEY BEHR, PHD Senior Scholar in Resident

CHRISTINE R BERG, PHD Instructor in Occupational Therapy

ELLEN F BINDER, MD Associate Professor of Occupational Therapy

REBECCA L BIRKENMEIER Instructor in Occupational Therapy

LISA TABOR CONNOR, PHD Assistant Professor of Occupational Therapy

JEANENNE M DALLAS Instructor in Occupational Therapy

MICHAEL N DIRINGER, MD Professor of Occupational Therapy

JACK R. ENGSBERG, PHD, MS Associate Professor of Occupational Therapy (Pending Executive Faculty Approval)

BRADLEY A EVANOFF, MD Associate Professor of Occupational Therapy

DAVID B GRAY, PHD Associate Professor of Occupational Therapy

MARY W HILDEBRAND Instructor in Occupational Therapy

HOLLY H HOLLINGSWORTH, PHD Research Associate Professor of Occupational Therapy

VICTORIA KASKUTAS Instructor in Occupational Therapy

ALLISON A KING, MD Assistant Professor of Occupational Therapy (Pending Executive Faculty Approval)

KATHLEEN MARIE KNIEPMANN, DED, BS Instructor in Occupational Therapy

CATHERINE ECKEL LANG, PHD Assistant Professor of Occupational Therapy

PATRICIA D LAVESSER, PHD Assistant Professor of Occupational Therapy

SUSAN E MACKINNON, MD Professor of Occupational Therapy

MARIAN A MINOR, PHD Research Associate Professor of Occupational Therapy

KERRI A MORGAN Instructor in Occupational Therapy

JOHN GAIL NEELY, MD Professor of Occupational Therapy

PEGGY A NEUFELD, PHD, MA Assistant Professor of Occupational Therapy

MONICA S PERLMUTTER Instructor in Occupational Therapy

JAY FRANCIS PICCIRILLO, MD Professor of Occupational Therapy

MARY SEATON Instructor in Occupational Therapy
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 $14,010 per semester
Post-professional curriculum: $480 per credit
Doctoral curriculum: $17,250 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

AMY J BASTIAN, PHD Adjunct Assistant Professor of Physical Therapy
NANCY J BLOOM, DPT, BS Assistant Professor of Physical Therapy
MARYBETH BROWN, PHD Adjunct Associate Professor of Physical Therapy
TAMARA LAVON BURLIS, DPT, BS Assistant Professor of Physical Therapy, Associate Director for Clinical Education in Physical Therapy
WILLIAM TODD CADE, PHD, BS Assistant Professor of Physical Therapy
CHERYL ANN CALDWELL, DPT Assistant Professor of Physical Therapy
BILLIE RUTH CLARK, PHD Assistant Professor of Physical Therapy
SUZANNE MARIE CORNBLEET, DPT Assistant Professor of Physical Therapy
BETH ELAINE CROWNER, DPT, MS Instructor in Physical Therapy, Division Director of Clinical Practice in Physical Therapy
SYLVIA LIN CZUPPON Instructor in Physical Therapy
DIANE L. DAMIANO, PHD Research Associate Professor of Physical Therapy
ROBERT H DEUSINGER, PHD Associate Professor of Physical Therapy
SUSAN S. DEUSINGER, PHD Professor of Physical Therapy, Executive Director of the Program in Physical Therapy
KRIKOR T DIKRANIAN, MD, PHD Instructor in Physical Therapy
KATHLEEN KOLLER DIXON Instructor Emeritus in Physical Therapy
GAMMON MARIE EARHART, PHD Assistant Professor of Physical Therapy
JULAINE MARIE FLORENCE, DPT Research Associate Professor of Physical Therapy
MARY KENT HASTINGS, DPT Assistant Professor of Physical Therapy
MARCIE HARRIS HAYES, DPT Assistant Professor of Physical Therapy
ROBERT JEROME HICKOK Assistant Professor Emeritus of Physical Therapy
STEPHEN M HIGHSTEIN, MD, PHD Professor of Physical Therapy
GREGORY WILLIAM HOLTZMAN, DPT Instructor in Physical Therapy
RENEE A IVENS, DPT Instructor in Physical Therapy
LYNNETTE C KHOO-SUMMERS Instructor in Physical Therapy
JOSEPH W. KLAESNER, PHD, BS Research Assistant Professor of Physical Therapy
CATHERINE ECKEL LANG, PHD 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, AS Assistant Professor of Physical Therapy
MARY KATE MCDONNELL, DPT Associate Director of Clinical Practice 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 Associate Director for Movement Science Curriculum in Physical Therapy, Associate Professor of Physical Therapy
BARTEREAU JEAN NORTON, PHD Associate Director for Postprofessional Education in Physical Therapy, Associate Professor of Physical Therapy
JOEL S PERLMUTTER, MD Professor of Physical Therapy
SUSAN B. RACETTE, PHD Assistant Professor of Physical Therapy
SHIRLEY ANN SAHRMANN, PHD Professor of Physical Therapy
DAVID R SINACORE, PHD Associate Director of Postdoctoral Fellowships in Physical Therapy, Associate Professor of Physical Therapy
THERESA M SPITZNAGLE, DPT Instructor in Physical Therapy
PAUL S. STEIN, PHD Professor of Physical Therapy
JENNIFER S STITH, PHD Division Director for Education in Physical Therapy, Assistant Professor of Physical Therapy
MICHAEL J. STRUBE, PHD Professor of Physical Therapy
W. THOMAS THACH, JR, MD Professor of Physical Therapy
KURT A THOROUGHMAN, PHD Assistant Professor of Physical Therapy
STACY LYNNE TYLKA Instructor in Physical Therapy
LINDA R VAN DILLEN, PHD Assistant Professor of Physical Therapy
PAMELA M WENDL, DPT Instructor in Physical Therapy
KEVIN E YARASHESKI, PHD Professor of Physical Therapy
DEQUAN ZOU, D SC Research Assistant Professor of Physical Therapy

Link to Web Site
http://pt.wustl.edu

Master of Psychiatric Epidemiology Program (MPE)

The MPE Program is a graduate program offered by the Epidemiology and Prevention Research Group in the Department of Psychiatry at Washington University Medical School. It was established in 1989 by Lee Robins, PhD, and is the first and only program of its kind in the world. This program offers fundamental epidemiological and research skills, with an emphasis on interdisciplinary studies within a medical school environment. The program is noted for its public health focus, as it encompasses prevention, treatment and intervention research. It also strongly emphasizes training in the responsible conduct of science.

Candidates develop practical research skills and learn basic epidemiological methods that can be applied to many disciplines. They study the history and development of the major national and
international psychiatric epidemiology studies, and they become familiar with 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, social work, social welfare, engineering, medicine, nursing, mathematics, psychology and anthropology. The overall objective of the MPE Program is to prepare pre-doctoral students and post-doctoral fellows for a productive research career in epidemiology, with an emphasis on behavioral risk factors. Graduate students in other University programs are also encouraged to enroll in courses. Undergraduate students are welcome, with the instructor’s approval.

**Degree in Psychiatric Epidemiology**

A Master of Psychiatric Epidemiology degree is offered to candidates enrolled in the program. The 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)
- M08 506 Independent Study (offered Fall and Spring)

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 the web site given below for specific courses offered each semester.

**Registration Information for Non-MPE Students**

All courses are open to any student, 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 [www.epi.wustl.edu](http://www.epi.wustl.edu) (click on MPE or contact Erin Murdock, registrar (314) 286-2261 or by e-mail at murdockel@epi.wustl.edu).

**Location**

The MPE Program Administration is located at 40 N. Kingshighway, 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 Instructor in 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**
Instructor: K. Bucholz, PhD
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 EPIDEMIOLOGY SEMINAR I: Recent Trends in Epidemiology**
Instructor: L. Hoffer, PhD
Speaker series on various topics of current importance in the field of epidemiology.
Credit: 1 unit
M08 507A EPIDEMIOLOGY SEMINAR II: Recent Progress in Epidemiology
Instructor: R. Grucza, PhD, MPE
Speaker series on various topics to be determined.
Credit: 1 unit

M08 507B EPIDEMIOLOGY SEMINAR III: Post Doc Presentations
Instructor: A. Glowinski, MD, MPE
Presentations by postdocs and MPE Students
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: M.Dokucu, MD, 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. Glowinski, 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. Glowinski
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 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 in’s and out’s of a project’s daily operations.
Credit: 3 units

M08 540 MINI-COURSE EPIDEMIOLOGY METHODS
Instructor: K. Bucholz, PhD
Short course in epidemiologic methods.
Credit: 1 unit

M08 543 MINI-COURSE ANXIETY DISORDERS
Instructor: N. Farber, MD
Seminar format.
Credit: 1 unit

M08 544 APPLIED STATISTICS FOR BEHAVIORAL SCIENTISTS
Instructors: E. Spitznagel, PhD, 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 547 MINI COURSE — MAJOR DEPRESSION
Instructor: N. Farber, MD
This course reviews the basic and clinical neuroscience underlying Major Depressive Disorder. Treatment approaches are also discussed. Open to residents in psychiatry and MPE students with the approval of the coursemaster.
Credit: 1 unit

M08 599 PUBLISHING WORKSHOP
Instructor: K. Dodson
Workshop designed to instruct students and researchers in the areas of oral presentation, the publishing application process, manuscript preparation and grant writing. Anecdotes as well as tried and true ideas will be shared by experts.
Credit: 1 unit

M08 676 PSYCHIATRIC DISORDERS OF THE NERVOUS SYSTEM
Instructor: L. Beirut, MD, 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
coursework 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 Instructor in Psychiatry

Laura Bierut, MD
Associate Professor of Psychiatry

Kelly Botteron, MD
Associate Professor of Psychiatry

Kathleen Bucholz, PhD
Professor of Psychiatry

C. Robert Cloninger, MD
Wallace Renard Professor of Psychiatry

Danielle Dick, PhD
Research Assistant Professor of Psychiatry

Karen Dodson
Director and Managing Editor of Academic Publishing Services

Mehmet Dokucu, MD, PhD
Assistant Professor of Psychiatry

Nuri B. Farber, MD
Associate Professor of Psychiatry

Anne Glowinski, MD, MPE
Assistant Professor of Psychiatry

Julia Grant, PhD
Research Assistant Professor of Psychiatry

Richard Grucza, PhD, MPE
Research Assistant Professor of Psychiatry

Gitry Heydebrand, PhD
Instructor in Psychiatry

Lee Hoffer, PhD, MPE
Research Instructor in Psychiatry

Barry Hong, PhD
Professor of Psychiatry

Joan Luby, MD
Associate Professor of Psychiatry

Michael Lynskey, PhD
Program in 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. PACS also maintains its close affiliation with the CID Oral School and Outreach Center.

Courses

Doctor of Audiology (Au.D.)

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.

http://epi.wustl.edu/MPE/MPEhome.htm
The audiology program is accredited by the American Speech-Language-Hearing Association (ASHA). 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 coursework and practice teaching experiences. Introductory coursework provides the foundation for practice. Students gain knowledge in the basic and applied sciences, curriculum, and instructional methods. Advanced coursework provides training in evaluation techniques, manual communication, intervention strategies, counseling techniques, research methods and practice teaching experiences. The CID Oral School and Outreach Center serves as the primary site for student teaching for students in the deaf education program, with additional practice teaching sites available, both locally and nationally.

The deaf education program is accredited by the State of Missouri’s Department of Elementary and Secondary Education (DESE), the Council on Education of the Deaf (CED) and the Council for Exceptional Children (CEC). Graduates of the program are eligible for teacher certification in the State of Missouri (Deaf/Hearing Impaired, K-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.

**Calendar**

PACS follows the academic calendar of the School of Arts & Sciences. Students should consult the PACS academic calendar for specific information.

**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@msnotes.wustl.edu
Web: http://pacs.wustl.edu

Faculty

Program Director

William W. Clark, PhD
University of Michigan, 1975

Professors (Joint)

Barbara A. Bohne, PhD
Washington University, 1971

Richard A. Chole, MD, PhD
University of Minnesota, 1977

Margaret W. Skinner, PhD
Washington University, 1976

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)

J. David Dickman, PhD
University of Wyoming, 1985

Jill B. First, PhD
University of Illinois, 1998

Johanna G. Nicholas, PhD
Washington University, 1990

Kevin K. Ohlemiller, PhD
Northwestern University, 1990

Dwayne D. Simmons, PhD
Harvard University, 1986

Assistant Professors (Joint)

Jianxin Bao, PhD
University of Florida, 1992

Lisa S. Davidson, PhD
Washington University, 2003

Brian T. Faddis, PhD
University of California-Davis, 1994
Instructors

Lynda C. Berkowitz, MS
Washington University, 1983

Carl D. Bohl, DSc
University of Cincinnati, 1973

Donald G. Brennan, PhD
University of Oklahoma, 1974

Christine M. Clark, MA
Maryville University, 1999

J. Eric Driskill, MEd
University of Arkansas, 1994

JoEllen Epstein, MAEd
Maryville University, 2000

Christine H. Gustus, MS
Washington University, 1975

Barbara A. Lanfer, MAEd
University of Missouri-St. Louis, 1998

Robert J. Mareing, AuD
Pennsylvania College of Optometry, 2003

James D. Miller, PhD
Indiana University, 1957

E. Tracy Mishler, MA
Northwestern University, 1981

T.K. Parthasarathy, PhD
University of Texas-Dallas, 1987

Kathleen Rehwinkel, MS
Washington University, 2000

Mary A. Shortal, MS
Washington University, 1976

Karen S. Stein, MS
Washington University, 1974

Julia L. West, MS
Lecturers

A.U. Bankaitis, PhD
University of Cincinnati, 1995

Elizabeth A. Elliott, MAT
Webster University, 2004

Roanne K. Karzon, PhD
Washington University, 1982

Christina M. Koehler, MS
Washington University, 2000

Jean S. Moog, MS
Washington University, 1964

Catherine Schroy, MS
Washington University, 1998

Professors Emeritus

Donald H. Eldredge, MD

Ira J. Hirsh, PhD

David P. Pascoe, PhD

Link to Web Site

http://pacs.wustl.edu

School of Medicine/St. Louis College of 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.
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Associate Dean for Student Affairs

Philip A. Ludbrook, MD
Associate Dean for Human Studies

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Associate Dean for Graduate Medical Education
Will R. Ross, MD
*Associate Dean and Director of Office of Diversity Programs*

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*Associate Dean and Director of the Bernard Becker Medical Library*

Alison J. Whelan, MD
*Associate Dean for Medical Student Education*

Michael P. Caputo
*Assistant Dean and Chief Information Officer*

Koong-Nah Chung, PhD
*Assistant Dean for Admissions and Student Affairs*

Kathryn M. Diemer, MD
*Assistant Dean for Career Counseling*

Stephen S. Lefrak, MD
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Divisional Representative to Faculty Senate Council

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_Elected Member of Practice Plan Board of Directors_

David Mutch (2008)
_Elected Member of Practice Plan Board of Directors_

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_Deep of Faculty Affairs, ex officio_

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_Ex officio_

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Edward Berg  

Raykee Bhayani  

Sam Bhayani  

Joseph J. Billadello  

Gary Boxer  

Richard W. Brand  

Angela L. Brown  

Lewis Chase  

Koong-Nah Chung  

Jonas Cooper  

Simone Cummings  

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Richard W. Hudgens
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Marvin Levin
Collins Lewis
Susan E. Mackinnon
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Majesh Makan
Daniel Mamah
Julie Margenthaler
James Marks
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Michael McDaniel
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Jeffrey Peipert
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Sharon Barnholtz
Randall J. Bateman
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Monica E. Bishop
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Lloyd J. Vasquez, Jr.
Kathryn L. Vehe
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Thomas William Walsh
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Ryan T. Whitesell
Michael P. Whyte
Laurel A. Wiersema-Bryant
Tanya M. Wildes
Marilyn Wilson
Abigail M. Woodland
Chengjie Xiong
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Stuart D. Yoak
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**Human Subject Research Quality Assurance/Quality Improvement Committee**

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Brett Drake

Mae Gordon

Philip A. Ludbrook

Leonard Matheson

John W. Newcomer

Nancy Pliske  
*Ex officio*
Robert C. Strunk

**Institutional Biological and Chemical Safety Committee (IBC)**

Michael Caparon  
*Co-Chair*

Henry Huang  
*Co-Chair*

Lars Angenent

Max Arens

Bruce Backus  
*Ex officio*

Kenneth Boschert  
*Ex officio*

Susan Cook  
*Ex officio*

Michael Diamond

Jennifer Jockel-Balsarotti  
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Dennis Jenkerson  
*Public*

Robert F. Koehler  
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Jennie Mayfield

Daniel Ory

Mark Sands

**MA/MD Program Committee**

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F. Sessions Cole

Michael R. DeBaun

Jonathan M. Green

Ellen Li

Jay F. Piccirillo

Daniel P. Schuster

Lawrence H. Snyder
Katherine N. Weilbaecher

Medical School Faculty Rights Committee (2007-08)

Daniel Schuster  
*Chair*

Jacques Baenziger

Susan K. Dutcher

Paul A. Schlesinger  
*Alternate*

Andrey Shaw  
*Alternate*

Medical Scientist Training Program Committee

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*Program Director*

Jeanne M. Nerbonne  
*Program Co-Director*

Dora E. Angelaki

Kendall J. Blumer

Michael S. Diamond

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Anthony J. Muslin

David R. Piwnica-Worms

Jean E. Schaffer

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Thomas A. Woolsey

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Barry A. Siegel  
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Radioactive Drug Research Committee

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Marcus E. Raichle  
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Keith C. Fischer

Edward M. Geltman

Susan M. Langhorst  
*Ad hoc*
Lorri DeWitt  
*Ad hoc*

Farrokh Dehdashti  
*Ad hoc*

Paula M. Fracasso  
*Ad hoc*

David B. Mansur  
*Ad hoc*

Lindsay Hlaknik  
*Ad hoc*

Byron Peters  
*Ad hoc*

Matthew Powell  
*Ad hoc*

Dana Viviano  
*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*

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Dana Kelley

J. Philip Miller

Matthew G. Mutch

Michael J. Naughton

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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.

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Caroline Lyle Arthur Denver, CO, BS, Brown University '03, Program: Doctor of Medicine, Elective Year

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Daniel Alexander Wattson  Shorewood, MN, BS, Cornell University ’00, Program: Doctor of Medicine, Clinical Clerkship Year

Iga Natalia Wegorzewska  Brooklyn, NY, BS, Georgetown University ’04, Program: MSTP, First Year Research

Cindy Hsinyao Wei  Princeton Junction, NJ, BA, Rutgers State University ’00, Program: Master of Arts/ Doctor of Medicine, 2007 Graduate, Plastic Surgery, UMDNJ-New Jersey Medical School Program, Newark, NJ

Elliott M Weiss  Skokie, IL, BA, Washington University ’05, Program: Doctor of Medicine, Second Year Medical Student

Kristin Kay Wenger  North Olmsted, OH, BA, Ohio Wesleyan University ’97, Program: MSTP, Clinical Clerkship Year

Leana Sheryle Wen  Los Angeles, CA, BS, California State University, Los Angeles ’01, Program: Doctor of Medicine (5 Year), 2007 Graduate

Brian Richard White  Cape Elizabeth, ME, BA, Harvard University ’04, Program: MSTP, Second Year Research

Ryan Thomas Whitesell  Dayton, OH, BS, Wright State University ’04, Program: Doctor of Medicine, Clinical Clerkship Year

Eric Brandon Whiteside  Tulsa, OK, BS, Oklahoma State University ’06, Program: Doctor of Medicine, Second Year Medical Student


Elizabeth Whitlock  Chapel Hill, NC, BA, Scripps College ’05, Program: Master of Arts/ Doctor of Medicine, Master of Arts

Alton Cleotha Williams  Huntsville, TN, BS, Austin Peay State University ’06, Program: Doctor of Medicine, Second Year Medical Student

Derek Edwin Williams  Lilburn, GA, BS, Vanderbilt University ’03, Program: Doctor of Medicine, 2007 Graduate, Surgery-Preliminary, University of Texas Southwestern Program, Dallas, TX

Jennifer Brooke Williams  Braggs, OK, BA, Rice University ’06, Program: Doctor of Medicine, Second Year Medical Student

Jordan Williams  Dell Rapids, SD, BS, South Dakota State University ’05, Program: MSTP, First Year Research

Sandra Gisela Williams  San Juan, Puerto Rico, BS, University of Chicago ’06, Program: MSTP, Second Year Medical
Student

Ambrose Hon Wai Wong  Vancouver, British Columbia, Canada, BS, University of British Columbia ’04, Program: Doctor of Medicine (5 Year), Research (Away)

Robert Daniel Wong  Syosset, NY, BS, Yale University ’03, Program: Doctor of Medicine, Elective Year

Anna Woodbury  Houston, TX, BA, Rice University ’04, Program: Doctor of Medicine, Elective Year

Elizabeth Copeland Wright  Albuquerque, NM, BA, University of New Mexico ’06, Program: Doctor of Medicine, Second Year Medical Student

Melinda Youeen Wu  Riverside, CA, Program: Doctor of Medicine, First Year Medical Student

Nicole Keiko Yamada  Sacramento, CA, BS, University of California - Los Angeles ’04, Program: Doctor of Medicine, Clinical Clerkship Year

Dan Yang  Syracuse, NY, BA, Washington University ’03, Program: Doctor of Medicine, 2007 Graduate, Psychiatry, Stanford University, Stanford, CA

Louise Yeuk Yan Yeung  Los Angeles, CA, BA, Case Western Reserve University ’03, Program: Doctor of Medicine, 2007 Graduate, General Surgery, Univ of California, San Francisco-East Bay, Oakland, CA

Michael Cheuk Ming Yip  Buffalo Grove, IL, Program: Doctor of Medicine, First Year Medical Student

Victoria Hyun Yom  Stevenson Ranch, CA, Program: Doctor of Medicine, First Year Medical Student

Mae Ewing Young  Stillwater, OK, BS, Iowa State University ’05, Program: Doctor of Medicine, Clinical Clerkship Year

Margaret Ashley Young  Laytonsville, MD, BS, Carnegie Mellon University ’05, Program: MSTP, First Year Research

Frank Fang Yu  Mcallen, TX, Program: Doctor of Medicine, First Year Medical Student

Yousef Zarbalian  Baton Rouge, LA, BS, Louisiana State University - Baton Rouge ’06, Program: Doctor of Medicine, Second Year Medical Student

Mark Alan Zaydman  Rochester, NY, Program: MSTP, First Year Medical Student

David William Zeltser  Valencia, CA, BS, University of California - Berkeley ’04, Program: Doctor of Medicine, Clinical Clerkship Year

Cindy Erxin Zhang  St. Louis, MO, BS, Washington University ’06, Program: Doctor of Medicine, Second Year Medical Student

Dongyang Zhang  Cape Girardeau, MO, BA, Washington University ’03, Program: MSTP, Third Year Research

Victoria Nan Zheng  Boulder, CO, BA, University of California - Berkeley ’04, Program: Doctor of Medicine, Clinical Clerkship Year

Elizabeth Yaxi Zhou  Norman, OK, Program: Doctor of Medicine, First Year Medical Student

Kristen Elizabeth Ziara  Okemos, MI, Program: Doctor of Medicine, First Year Medical Student

Kenneth Richard Ziegler  Los Angeles, CA, BA, University of California, Berkeley ’01, Program: Doctor of Medicine, 2007 Graduate, General Surgery, Yale-New Haven Hospital, New Haven, CT

Andrew Joseph Zimolzak  Jackson, MI, BS, Michigan State University ’02, Program: Doctor of Medicine, 2007 Graduate, Internal Medicine, University Hospitals, Columbia, MO

Matthew Scott Zinter  Sacramento, CA, Program: Doctor of Medicine, First Year Medical Student

Daniel Christian Zurcher  Salt Lake City, UT, BS, Brigham Young University ’04, Program: Doctor of Medicine, Elective Year

Summary of Students in the School of Medicine

2006-07

Doctor of Medicine and Doctor of Philosophy Degrees

Graduating Class: 21
Third-Year Class: 6
Seventh-Year Research: 1
Sixth-Year Research: 2
Fifth-Year Research: 18
Fourth-Year Research: 16
Third-Year Research: 19
Second-Year Research: 28
First-Year Research: 19
Second-Year Class: 31
First-Year Class: 20

**Doctor of Medicine and Master of Arts Degrees**
Graduating Class: 10
Trainees: 9

**Doctor of Medicine Degree**
Graduating Class: 96
Five-Year Research Program: 6
Third-Year Class: 117
Second-Year Class: 93
First-Year Class: 101

**Doctor of Physical Therapy Degree**
Graduating Class: 64
Second-Year Class: 55
First-Year Class: 77
Part-Time Students: 49

**Doctor of Occupational Therapy Degree**
Graduating Class: 14
Third-Year Class: 12
Second-Year Class: 14
First-Year Class: 12

**Doctor of Audiology**
Fourth-Year Class: 11
Third-Year Class: 10
Second-Year Class: 11
First-Year Class: 14

**Master of Health Administration Degree**
Graduating Class: 29
First-Year Class: 21
Part-Time Students: 1

**Master of Science in Occupational Therapy Degree**
Graduating Class: 23
Second-Year Class: 34
First-Year Class: 48

**Master of Science in Psychiatric Epidemiology**
Graduating Class: 3
First-Year Class: 7

**Master of Science in Genetic Epidemiology**
Graduating Class: 11
First-Year Class: 7
Certificate/SCND: 2

**Master of Science in Deaf Education**
Graduating Class: 10
First-Year Class: 9

Total: 1161
For a printable version of the School of Medicine campus map, please download this pdf:

PUBLIC AFFAIRS MAP.pdf

For additional information, see the map at: http://visitor.wustl.edu/medicalmap.pdf
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 School of Business

School of Engineering & Applied Science

School of Law

School of Medicine

George Warren Brown School of Social Work
All Faculty

Alphabetical List of Faculty

ELLIOT EFREM ABBEY, MD  Professor of Clinical Medicine, Internal Medicine, BA CORNELL UNIVERSITY 71, MD NEW YORK UNIVERSITY 75

CAMILLE N. ABBOUD, MD  Professor of Medicine, Internal Medicine, MD AMERICAN UNIVERSITY OF BEIRUT 74

SHADI ABDELNOUR  Instructor in Clinical Medicine, Internal Medicine

CHARLES C ABEL, MD  Assistant Professor of Clinical Medicine, Internal Medicine, BA WESTMINSTER COLLEGE 52, MD WASHINGTON UNIV IN ST. LOUIS 56

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, MD PURDUE UNIVERSITY 78

MARC BRUCE ABRAMS, DDENT  Instructor in Clinical Otolaryngology, Otolaryngology, BA UNIVERSITY OF MO KANSAS CITY 68, DDENT 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  Associate 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  Associate 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, MD UNIVERSITY OF KANSAS 96

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 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

TRACY ADAIR-KIRK, PHD  Research Instructor in Medicine, Internal Medicine, PHD UNIVERSITY OF TENNESSEE 99

SUSAN E ADAMS, MD, PHD, BS  Instructor in 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
UNIVERSITY 66, MA MICHIGAN STATE UNIVERSITY 68, PHD MICHIGAN STATE UNIVERSITY 70

DAVID HERSHEY ALPERS, MD William B Kountz Professor of Gerontology in Medicine, Internal Medicine, BA HARVARD UNIVERSITY 56, MD HARVARD UNIVERSITY 60

DENIS IAN ALTMAN, MBCH Assistant Professor of Clinical Pediatrics, Pediatrics, MBCH UNIVERSITY OF THE WITWATERSRA 75

DENIS IAN ALTMAN, MBCH Associate Professor of Clinical Neurology, Neurology, MBCH UNIVERSITY OF THE WITWATERSRA 75

LOUIS ALTSHULER, DDENT Assistant Professor Emeritus of Clinical Otolaryngology, Otolaryngology, DDENT OHIO STATE UNIVERSITY 45, DDENT OHIO STATE UNIVERSITY 45

LIZETTE ALVAREZ-MONTERO, MD Instructor in Clinical Neurology, Neurology, BA WASHINGTON UNIV IN ST. LOUIS 87, MD SCHOOL NOT LISTED 91

MARYELLEN AMATO, MD Instructor in Clinical Radiology, Radiology, BA NOTRE DAME COLLEGE 76, MD CASE WESTERN RESERVE UNIV 81

PATRICIA J AMATO, MD Assistant Professor of Clinical Pediatrics, Pediatrics, BS NOTRE DAME COLLEGE 79, MD SCHOOL NOT LISTED 82

NAVINKUMAR J AMIN Associate Professor of Clinical Ophthalmology and Visual Sciences, Ophthalmology & Visual Sci, MS UNIVERSITY OF BOMBAY 66

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PING AN, MD Research Assistant Professor of Genetics, Genetics, MD SHANGHAI MEDICAL UNIVERSITY 87

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DALE J ANDERSON, MD Instructor in Clinical Psychiatry, Psychiatry, MD WASHINGTON UNIV IN ST. LOUIS 78

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PAUL G ANDERSON, PHD Associate Professor of Biomedical Communication, Director of Archives, Medical School Admin., BA UNIVERSITY OF MICHIGAN 64, MS WAYNE STATE UNIVERSITY 76, PHD WAYNE STATE UNIVERSITY 77

RICHARD H ANDERSON, MD, PHD Instructor in Clinical Psychiatry, Psychiatry, BS BRIGHAM YOUNG UNIVERSITY 82, MS BRIGHAM YOUNG UNIVERSITY 84, MD SAINT LOUIS UNIVERSITY 89, PHD BRIGHAM YOUNG UNIVERSITY 86

SCOTT J ANDERSON, MD, PHD Instructor in Clinical Medicine, Internal Medicine, BA UNIVERSITY OF CALIFORNIA 75, MD DUKE UNIVERSITY 82, PHD DUKE UNIVERSITY 81

USHA P ANDLEY, PHD Assistant Professor of Biochemistry and Molecular Biophysics, Biochem & Molec Biophysics, BS DELHI UNIVERSITY 70, MS DELHI UNIVERSITY 72, PHD SCHOOL NOT LISTED 77

USHA P ANDLEY, PHD Professor of Ophthalmology and Visual Sciences, Ophthalmology & Visual Sci, BS DELHI UNIVERSITY 70, MS DELHI UNIVERSITY 72, PHD SCHOOL NOT LISTED 77

DOROTHY A ANDRIELO, MD Assistant Dean for Student Affairs and Medical Education, Assoc Dean Curriculum, BA NEW YORK UNIVERSITY 76, MD NEW YORK UNIVERSITY 90

DOROTHY A ANDRIELO, MD Assistant Professor of Surgery (General Surgery), Surgery, BA NEW YORK UNIVERSITY 76, MD NEW YORK UNIVERSITY 80
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ANDREY P ANOKHIN, PHD  Research Associate Professor of Psychiatry, Psychiatry, MS MOSCOW STATE UNIVERSITY 81, PHD SCHOOL NOT LISTED 87

Andrey P Anokhin  Siteman Cancer Center, Research Assistant Professor of Psychiatry, Washington University School of Medicine, 1989-1991: Research fellow, Institute of Human Genetics and Anthropology, University of Heidelberg, Heidelberg, Germany, 1996-1999: Postdoctoral fellow, psychiatry, Washington University, St. Louis, 1981: MS, human biology, Moscow State University, 1987: PhD, psychology and psychophysiology, Institute of Psychology, Russian Academy of Science

E. JAMES ANTHONY, MD, PHD  Professor Emeritus of Psychiatry (Child Psychiatry), Psychiatry, BS SCHOOL NOT LISTED 38, MS SCHOOL NOT LISTED 41, MD SCHOOL NOT LISTED 49, PHD SCHOOL NOT LISTED 48

LUCINDA L. ANTONacci-FULTON  Research Instructor in Genetics, Genetics, BS SOUTHERN ILL UNIV EDWARDSVILLE 91, MS SOUTHERN ILL UNIV EDWARDSVILLE 92

AMAL F. ANTOUN  Instructor in Clinical Pediatrics, Pediatrics

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SCOTT J ARBAUGH, MD  Instructor in Clinical Psychology, Psychiatry, BA SAINT LOUIS UNIVERSITY 80, MD SAINT LOUIS UNIVERSITY 85


JEFFREY MICHAEL ARBEIT, MD  Professor of Cell Biology and Physiology, Cell Biology & Physiology, BS BOSTON UNIVERSITY 72, MD RUSH UNIVERSITY 76

JEFFREY MICHAEL ARBEIT, MD  Professor of Surgery (Urologic Surgery), Surgery, BS BOSTON UNIVERSITY 72, MD RUSH UNIVERSITY 76

ANA MARIE ARBELAEZ PEREZ, MD  Instructor in Pediatrics, Pediatrics, MD SCHOOL NOT LISTED 95

Robert H Arch  Siteman Cancer Center, Assistant Professor of Medicine, Division of Pulmonary and Critical Care Medicine, Washington University School of Medicine, 1994-1995: Postdoctoral fellow, immune regulation and tumor defense, German Cancer Research Center, Heidelberg, Germany, 1996-1998: Postdoctoral fellow, lupus and immunology research, University of Chicago, 1990: MA, biology, University of Wurzburg, Wurzburg, Germany, 1994: PhD, immunology and cell biology, University of Wurzburg

AHMAD BEHESHTI ARDEKANI, MD  Assistant Professor of Clinical Psychiatry, Psychiatry, MD SCHOOL NOT LISTED 74

MAX QUIRIN ARENS, PHD  Associate Professor of Pediatrics, Pediatrics, PHD VA POLYTECHNIC INST & STATE U 72

KENNETH J ARNOLD, MD  Assistant Professor of Clinical Surgery (General Surgery), Surgery, BA UNIVERSITY OF NOTRE DAME 64, MD WASHINGTON UNIV IN ST. LOUIS 68

JEROME M ARONBERG, MD  Assistant Professor of Clinical Medicine (Dermatology), Internal Medicine, BA WASHINGTON UNIV IN ST. LOUIS 67, MD WASHINGTON UNIV IN ST. LOUIS 71

NEVA P ARRIBAS, MD, AA  Associate Professor Emerita of Clinical Ophthalmology and Visual Sciences, Ophthalmology & Visual Sci, MD SCHOOL NOT LISTED 54, AA SCHOOL NOT LISTED 49

JENNIFER L. ARTER  Instructor in Clinical Pediatrics, Pediatrics, BS UNIVERSITY OF IOWA 93

SWATHI ARUR, PHD  Research Instructor in Genetics, Genetics, BS DELHI UNIVERSITY 94, MS SCHOOL NOT LISTED 96,
PHD SCHOOL NOT LISTED 01

PHILLIP V. ASARO  Assistant Professor of Emergency Medicine in Medicine, Internal Medicine

SARAH BETH ZEFF ASCHKENASI, MD  Instructor in Pediatrics, Pediatrics, BS EMORY UNIVERSITY 96, MD HARVARD UNIVERSITY 02

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JEFFREY JAY ATKINSON, MD, BS  Assistant Professor of Medicine, Internal Medicine, BS LOYOLA COLLEGE 90, MD HAHNEMANN UNIVERSITY 94, BS LOYOLA COLLEGE 90, MD HAHNEMANN UNIVERSITY 94

JOHN PATTERSON ATKINSON, MD  Professor of Molecular Microbiology, Molecular Microbiology, BA UNIVERSITY OF KANSAS 65, MD UNIVERSITY OF KANSAS 69

JOHN PATTERSON ATKINSON, MD  Samuel Grant Professor of Medicine, Internal Medicine, BA UNIVERSITY OF KANSAS 65, MD UNIVERSITY OF KANSAS 69

ROBERT K ATTEBERRY  Instructor in Clinical Pediatrics, Pediatrics

CHANDRA AUBIN, MD  Assistant Professor of Emergency Medicine in Medicine, Internal Medicine, BA UNIVERSITY OF MISSOURI 83, MD UNIVERSITY OF MISSOURI 83

VORACHART AUETHAVEKIAT, MD  Assistant Professor of Medicine, Internal Medicine, MD SCHOOL NOT LISTED 81

PAUL F AUSTIN, MD  Associate Professor of Surgery (Urologic Surgery), Surgery, BA MURRAY ST UNIVERSITY 87, MD UNIVERSITY OF KENTUCKY 91


JAMES G AVERY, MD  Assistant Professor of Clinical Medicine, Internal Medicine, BA WASHINGTON UNIV IN ST. LOUIS 86, MD UNIVERSITY OF TENNESSEE 90

MICHAEL SIMON AVIDAN, MBBCH  Associate Professor of Anesthesiology, Anesthesiology, MBBCH UNIVERSITY OF THE WITWATERSRA 91

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RIAD AZAR, MD  Assistant Professor of Medicine, Internal Medicine, MD SAINT JOSEPHS UNIVERSITY 94

HILARY M BABCOCK, MD  Instructor in Medicine, Internal Medicine, BA BROWN UNIVERSITY 89, MD UNIVERSITY OF TEXAS SOUTHWEST 94

RICHARD G. BACH, MD  Associate Professor of Medicine, Internal Medicine, BS GEORGETOWN UNIVERSITY 77, MS NEW YORK UNIVERSITY 80, MD NEW YORK UNIVERSITY 84

LEONARD B BACHARIER, MD  Associate Professor of Pediatrics, Pediatrics, BA JOHNS HOPKINS UNIVERSITY 88, MD WASHINGTON UNIV IN ST. LOUIS 92

LEONARD B BACHARIER, MD  Instructor in Medicine, Internal Medicine, BA JOHNS HOPKINS UNIVERSITY 88, MD WASHINGTON UNIV IN ST. LOUIS 92

KYONGTAE T BAE, MD, PHD, MS  Adjunct Associate Professor of Radiology, Radiology, BS SEOUL NATIONAL UNIVERSITY 81, ME UNIVERSITY OF IOWA 83, MD UNIVERSITY OF CHICAGO 92, PHD UNIVERSITY OF PENNSYLVANIA 88, MS UNIVERSITY OF PENNSYLVANIA 85

Jacques U Baenziger  Siteman Cancer Center, Professor of Pathology and Immunology, Division of Anatomic Pathology, Washington University School of Medicine, 1975-1976: Intern, pathology, Washington University, St. Louis, 1976: National Institute of General Medical Sciences trainee and research associate, genetics, Washington University, 1976-1977: Resident, pathology, Washington University, 1975: MD/PhD, biochemistry, Washington University, St. Louis

JACQUES ULRICH BAENZIGER, MD, PHD  Professor of Cell Biology and Physiology, Cell Biology & Physiology, BA NEW COLLEGE CALIFORNIA 68, MD WASHINGTON UNIV IN ST. LOUIS 75, PHD WASHINGTON UNIV IN ST. LOUIS 75

JACQUES ULRICH BAENZIGER, MD, PHD  Professor of Pathology and Immunology, Pathology & Immunology, BA NEW COLLEGE CALIFORNIA 69, MD WASHINGTON UNIV IN ST. LOUIS 75, PHD WASHINGTON UNIV IN ST. LOUIS 75

NANCY L BAENZIGER, PHD  Research Associate Professor of Neurobiology, Anatomy & Neurobiology, BA ST OLAF
JILL M BAER, MD Assistant Professor of Clinical Pediatrics, Pediatrics, BS UNIVERSITY OF KENTUCKY 72, MD UNIVERSITY OF KENTUCKY 75

ERIC SCOTT BAGGSTROM, MD Assistant Professor of Medicine, Internal Medicine, MD UNIVERSITY OF TEXAS HOUSTON 95

MARIA QUINTOS BAGGSTROM, MD Assistant Professor of Medicine, Internal Medicine, BS WILLIAMS COLLEGE 91, MD UNIVERSITY OF TEXAS HOUSTON 96

Maria Q. Baggstrom Siteman Cancer Center, Assistant Professor of Medicine, Division of Oncology, Section of Medical Oncology, Washington University School of Medicine, 1996-1999: Resident, internal medicine, University of North Carolina, Chapel Hill, 1999-2002: Fellow, hematology/oncology, University of North Carolina, 1996: MD, University of Texas Medical School at Houston, Primary Specialty: Lung cancer, Board Certified, 1999: American Board of Internal Medicine, Internal Medicine 2004: American Board of Internal Medicine, Medical Oncology

KATHY BAGLAN Instructor in Clinical Radiation Oncology, Radiation Oncology

OM PARKASH BAHL Assistant Professor of Clinical Medicine, Internal Medicine, MS PUNJAB UNIVERSITY 57

SEAN B BAILEY, MD Instructor in Clinical Otolaryngology, Otolaryngology, BS TULANE UNIVERSITY 81, MS TULANE UNIVERSITY 87

THOMAS C BAILEY, MD Associate Professor of Medicine, Internal Medicine, BA WILLIAM JEWELL COLLEGE 80, MD WASHINGTON UNIV IN ST. LOUIS 84

Elizabeth A Baker Siteman Cancer Center, Associate Professor of Community Health, Division of Behavioral Science and Health Education, Saint Louis University School of Public Health, 1987: MPH, health behavior/education, University of Michigan, Ann Arbor, 1993: PhD, health behavior/education, University of Michigan, Ann Arbor

NATHAN A BAKER, PHD Associate Professor of Biochemistry and Molecular Biophysics, Biochem & Molec Biophysics, BS UNIVERSITY OF IOWA 97, PHD UNIVERSITY OF CALIFORNIA 01

DENNIS M BALFE, MD Professor of Radiology, Radiology, BS SANTA CLARA UNIVERSITY 68, MD UNIV OF WISCONSIN MADISON 75

Dennis M Balfe Siteman Cancer Center, Professor of Radiology, Mallinckrodt Institute of Radiology, Washington University School of Medicine, 1975-1979: Resident, diagnostic radiology, St. Mary's Hospital, San Francisco, 1979-1980: Fellow, Washington University, St. Louis, 1975: MD, Medical College of Wisconsin, Milwaukee, Primary Specialty: Radiology, abdominal imaging, Board Certified, American Board of Radiology, Diagnostic Radiology

FRED J BALIS, MD Assistant Professor of Clinical Medicine, Internal Medicine, BS UNIVERSITY OF VERMONT 81, MS CORNELL UNIVERSITY 85, MD WASHINGTON UNIV IN ST. LOUIS 89

WALTER F BALLINGER, MD Professor Emeritus of Surgery (General Surgery), Surgery, MD UNIVERSITY OF PENNSYLVANIA 48

ROBERT H BALOH, MD, PHD Instructor in Neurology, Neurology, BS BROWN UNIVERSITY 95, MD WASHINGTON UNIV IN ST. LOUIS 01, PHD WASHINGTON UNIV IN ST. LOUIS 05, MD WASHINGTON UNIV IN ST. LOUIS 01

DAVID ANTHONY BALOTA, PHD Professor of Neurology, Neurology, BA UNIVERSITY OF MO ST LOUIS 76, MA UNIVERSITY OF SOUTH CAROLINA 78, PHD UNIVERSITY OF SOUTH CAROLINA 81

JANET MARIE BALOTA, PHD Assistant Professor of Neurology, Neurology, BA UNIVERSITY OF MISSOURI 76, MA UNIVERSITY OF SOUTH CAROLINA 79, PHD UNIVERSITY OF SOUTH CAROLINA 82

JANET MARIE BALOTA, PHD Associate Professor of Occupational Therapy, Occupational Therapy, BA UNIVERSITY OF MISSOURI 76, MA UNIVERSITY OF SOUTH CAROLINA 79, PHD UNIVERSITY OF SOUTH CAROLINA 82

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BHASKAR BANERJEE, MBBS, BS Associate Professor of Medicine, Internal Medicine, BS SCHOOL NOT LISTED 76, MBBS ST GEORGES 83, BS SCHOOL NOT LISTED 78

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JIANXIN BAO Research Associate Professor of Audiology and Communication Sciences, Prgm in Aud & Commun.Science

JIANXIN BAO Research Associate Professor of Otolaryngology, Otolaryngology

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