Bulletin of
Washington University

School of Medicine
1983/1984
Bulletin of Washington University
St. Louis

School of Medicine
1983/84
You must always be students, learning and unlearning till your life's end, and if...you are not prepared to follow your profession in this spirit, I implore you to leave its ranks and betake yourself to some third-class trade.

Joseph, Lord Lister (1827-1912)
To gather knowledge and to find out new knowledge is the noblest occupation of the physician. To apply that knowledge...with sympathy born of understanding, to the relief of human suffering, is his loveliest occupation.

Edward Archibald
(1872-1945)
A medical center is one of the few places—perhaps the only place—where one can see the entire exciting process of the mind of man working at its best from start to finish...the birth of an idea; the establishment of its validity; the placing it in a usable concept; the teaching of it to others; the testing it for practical utility; the careful weighing of the moral and ethical questions that inevitably arise concerning its use; and its discriminating application for the benefit of a particular human being.

Walsh McDermott
(1909-1981)
Journal of Chronic Diseases
16:108, 1963
Most of the knowledge and much of the genius of the research worker lie behind his selection of what is worth observing. It is a crucial choice, often determining the success or failure of months of work, often differentiating the brilliant discoverer from the...plodder.

Alan Gregg (1890-1957)

*The Furtherance of Medical Research*
It is no forced extrapolation to state that every physician is perforce also a potential clinical investigator when he soundly fulfills his responsibilities for each patient.

David Seegal
(1899-1972)
The Pharos of Alpha Omega
Alpha 26.7, 1963
One of the most valuable experiences the student may have from a pedagogical point of view is to be required to perform a complete physical examination on a patient under the eye of a senior instructor.

Yale Kneeland, Jr.  
(1901-1970)  
and Robert F. Loeb  
(1895-1973)  
Martini's Principles and Practice of Physical Diagnosis, Ch. 7
The needs of children should not be made to wait.

John F. Kennedy (1917-1963)
Message to Congress on the Nation's Youth, February 14, 1963
Until homo sapiens becomes more sapient I can see no prospect of his ever avoiding the foolishness of war or of his learning that two automobiles cannot occupy the same spot at the same time, especially when they come from opposite directions. Broken bones and lacerated wounds are therefore likely to require surgical attention for as long as this would-be clairvoyant can see into the future.

Evarts A. Graham
(1883-1957)
Postgraduate Medicine
7:154. 1950
Scientific discovery is not a monopoly of the fully matured investigator. It is not unusual for a student to present interesting and promising ideas. Best was a medical student when he was associated with Banting in the experiment which led to the discovery of insulin. Cannon was a medical student when he suggested the use of bismuth for visualization of hollow organs by X ray. It is never too soon to be alert and to question all rules as well as all exceptions.

David and Beatrice C. Seegal
(1899-1972) (1898-)
The Diplomate 22:125, 1950
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# Calendar 1983/84

## 1983

### June
- **6** Monday  
  Academic year begins for the third- and fourth-year classes.
- **14, 15** Tuesday, Wednesday  
  National Board Examination, Part I.
- **24** Friday  
  Deadline for registration and initial payment of tuition and fees for the third- and fourth-year classes.

### July
- **4** Monday  
  Independence Day observance.

### August
- **22** Monday  
  Academic year begins for the second-year class.
- **24** Wednesday  
  Orientation, matriculation, and initial payment of tuition and fees for the first-year class.
- **26** Friday  
  Deadline for registration and initial payment of tuition and fees for the second-year class.
- **29** Monday  
  Academic year begins for the first-year class.

### September
- **5** Monday  
  Labor Day holiday.
- **6, 7** Tuesday, Wednesday  
  National Board Examination, Part I.
- **27, 28** Tuesday, Wednesday  
  National Board Examination, Part II.

### November
- **24** Thursday  
  Thanksgiving Day observance.
- **25** Friday  
  Holiday for first- and second-year classes.

### December
- **2** Friday  
  Deadline for payment of the balance of tuition and fees for the third- and fourth-year classes.
- **17** Saturday  
  Winter recess begins at 1:00 p.m.
1984

January
3 Tuesday
6 Friday
9 Monday
13 Friday
13 Friday
16 Monday
20 Friday

Winter recess ends at 8:00 a.m.
First semester for the second-year class ends at 5:00 p.m.
Second semester for the second-year class begins at 8:00 a.m.
Deadline for payment of the balance of tuition and fees due for medical students enrolled in the second-year class.
First semester for the first-year class ends at 5:00 p.m.
Second semester for the first-year class begins at 8:00 a.m.
Deadline for payment of the balance of tuition and fees due for medical students enrolled in the first-year class.

March
16 Friday
26 Monday

Spring recess begins at 5:00 p.m. for the first- and second-year classes.
Spring recess ends at 8:00 a.m. for the first- and second-year classes.

April
20-22 Friday through Sunday

Holiday for the third- and fourth-year classes.

May
11 Friday
17 Thursday
18 Friday
19 Saturday
25 Friday

Academic year ends at 5:00 p.m. for the second-year class.
Academic year ends at 5:00 p.m. for graduating students.
Commencement.
Academic year ends for the third-year class.
Academic year ends at 5:00 p.m. for the first-year class.

Holiday for the third- and fourth-year classes.

Clerkship- and Elective-Period Intervals: 1983/84

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The Study of Medicine

PHILOSOPHY AND OBJECTIVES

Washington University encourages application from and gives full consideration to all applicants for admission and financial aid without respect to sex, race, handicap, color, creed, or national or ethnic origin. University policies and programs are nondiscriminatory. The School of Medicine is committed to recruiting, enrolling, and educating an increased number of students from racial minority and educationally deprived groups. Masculine pronouns are used in this book for succinctness only; they are intended to refer to both women and men.

The efforts of the School of Medicine are directed toward providing able students with a stimulating and challenging milieu in which they may acquire a thorough background in scientific medicine, as well as a deep understanding of the meaning of comprehensive medical care. In a field that is developing as rapidly as is medicine, education begun in medical school must serve as the foundation for a lifelong course of learning. As Sir William Osler pointed out some decades ago, a faculty, no matter how talented, can "only instill principles, put the student in the right path, give him methods, teach him how to study, and early to discern between essentials and nonessentials."

Today's student is preparing to cope with a changing world, to contribute, in a constructive, considered way, to resolving problems of medicine and of health care. To assist in that preparation, the faculty's mission is to preserve the joy of learning and to foster a spirit of discrimination and creativity. It is hoped that each student will achieve this grounding during his years in the School of Medicine.

CURRICULUM

The curriculum is the 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. It is planned to provide students, who enter medical school with diverse backgrounds and interests and who will undertake a wide variety of careers, with 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 must also 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 reevaluated.
Table of Required Hours 1983-84

As reported to the Liaison Committee on Medical Education, representing the Council on Medical Education of the American Medical Association and the Executive Council of the Association of American Medical Colleges, credit hours for courses are expressed in terms of clock hours—the scheduled hours per year of actual lecture and laboratory contact between faculty and students. These clock hours are not to be interpreted as semester or quarter hours.

First-year courses are taught during the 36-week academic year.
Gross Anatomy ........................................... 196
Microscopic Anatomy ..................................... 106
Cell Biology .................................................. 85
General Biochemistry* ................................... 90.5
Advanced Biochemistry* ................................ (95)
Medical Genesics .......................................... 35
Topics in Clinical Medicine ............................... 30
Microbiology I .............................................. 112
Microbiology II ............................................. 97.5
Neural Science ............................................. 139
General Physiology ......................................... 122
Biomedical Statistics ...................................... 19
Medicine in Modern Society ................................ 28
Total clock hours for the year .......................... 1,060

Second-year courses are taught during the 36-week academic year.
Introduction to Clinical Medicine
Physical Diagnosis Core .................................. 124
Ophthalmology ............................................. 7
Otolaryngology ............................................ 7
Human Sexuality ........................................... 10
Psychiatry ................................................ 41
Radiology ................................................... 28
Surgery .................................................... 13
Rheumatology ............................................. 7
Neurology and Neuro Surgery ............................ 17
Pathology .................................................. 245
Pharmacology ............................................... 149
Pathophysiology
PP Cardiovascular ......................................... 20
PP Pulmonary ............................................. 15
PP Renal .................................................... 19
PP Metabolism-Endocrinology .......................... 27
PP Gastro Intestinal ...................................... 24
PP Hematology ............................................ 28
PP Oncology ............................................... 12
PP Neurophysiology ...................................... 19
PP Developmental Biology ................................
(a) Developmental Medicine ............................. 16
(b) Reproductive Biology .................................. 24
Total clock hours for the year .......................... 852

*Student's course level determined by Department of Biochemistry.

Clinical Clerkship (Third) Year is a 48-week academic year.
Medicine Clerkship ....................................... 462
Neurology/Neurosurgery Clerkship ....................... 154
Obstetrics/Gynecology Clerkship .......................... 231
Ophthalmology/Gynecology Clerkship .................... 231
Otolaryngology Clerkship ................................ 38.5
Pediatrics Clerkship ...................................... 231
Psychiatry Clerkship ..................................... 231
Surgery Clerkship ......................................... 462
Total clock hours for the year .......................... 1,848

Elective (Fourth) Year is a 48-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 Curriculum. Students must take a clinical elective for at least six weeks and a research elective for a minimum of 12 weeks to receive academic credit.

A maximum of 12 weeks’ credit is allowed for full-time elective course work 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 Curriculum and the standing subcommittee of the Committee on Academic Review and Promotions (CARP) III for approval of the plan of study. Absolutely no credit will be granted for electives undertaken prior to subcommittee approval.

Credit may be given for elective work done at any point in the standard four-year doctor of medicine degree program so 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 sophomore class, the student is a duly registered, full-time student for a minimum of two years and nine months and tuition is paid for three complete academic years; or (c) if transferring into the junior 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. Total clock hours for the year .......................... 1,386
Total clock hours for four years ........................ 5,146

Remuneration for work done while participating in electives for credit is prohibited.
DEGREE PROGRAMS

The Washington University School of Medicine offers three programs leading to the M.D. degree: a regular four-year program, a five-year program, and a combined M.D./Ph.D. program.

Doctor of Medicine, Four-Year Program

By conferring the M.D. 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 M.D. degree ordinarily consists of a minimum of four years of study. Students recommended for the degree doctor of medicine 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. Individuals applying for licensure must be twenty-one years of age and must have completed four entire academic years in the study of medicine.

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

Five-Year Program (M.A./M.D. Program)

In addition to the regular four-year program leading to the M.D. degree, students are permitted to spend one additional year in investigative or research concentration. The program must be arranged subject to the approval of the Committee on Medical Education. Students who desire a serious exposure to research may apply for participation in the M.A./M.D. Program.

M.A./M.D. Program

Students who are interested in obtaining a significant research experience during their M.D. training may apply for admission to the M.A./M.D. Program. This program allows selected students to spend one full year (12-15 months) in a research laboratory. Participating students will be expected to write a thesis at the end of their research time to qualify for receipt of a master's degree in biological science which will be conferred along with the M.D. degree upon graduation. Applications will be accepted from those students who have not yet completed their sophomore year of medical school. During the research time, students accepted into this program will qualify for receipt of a graduate stipend currently $6,500. Additional information can be obtained by contacting Mrs. Barbara Fox in the Medical Scientist Training Program office.

M.D./Ph.D. Medical Scientist Training Program (MSTP)

The School of Medicine offers a combined M.D./Ph.D. program within the Division of Biology and Biomedical Sciences, designed for selected students who are interested in a research career and whose undergraduate education has placed major emphasis on science. The program permits the student to obtain both the M.D. and the Ph.D. degree, usually within six years of study. The major purpose of the program is to train medical scientists for careers on clinical and preclinical faculties of schools of medicine. Financial support in the form of stipends (currently $6,500 a year) and tuition remission will be available to all students admitted to the program. Support obtained from National Institutes of Health grants is subject to their policies governing funding. The program maintains a population of approximately 85 students.

The program consists of three segments: 1) the first two years of the usual medical curriculum, 2) three or more years of work in the graduate school portion of the program as outlined below, and 3) a final year which is the usual clinical year of the medical curriculum, individually adjusted to each student's requirements and career goals. This sequence may be modified to fit individual needs. For example, students may wish to begin their research after the first year of the regular medical curriculum. Completion of this sequence or its equivalent will satisfy requirements for both the Ph.D. and M.D. degree.

While the Medical Scientist Training Program includes all those courses required for the M.D. degree, it incorporates a high degree of flexibility for individual students through a wide range of electives and the large number of thesis programs available at Washington University.

The members of the Medical Scientist Training Program Committee are available to students to help them decide in which elective courses and laboratories they will participate.
Students begin their training on July 1 of the year they enter the School of Medicine. The first two weeks of the summer will be spent visiting faculty in the various departments in order to select a laboratory for summer research. Students will also spend the summer between their first and second years doing research. There is no obligation that the laboratory selected for summer research be the same as that ultimately chosen for the Ph.D. portion of the program.

A student who passes a qualifying examination in any of the regularly offered preclinical courses will be allowed to substitute either advanced course work or laboratory research in the time made available. In this way students can have the opportunity to do supervised research in free periods during the first two years. In addition to normal medical school courses, there are special tutorials for students in the combined degree program.

The performance of each student will be reviewed annually. Students are expected to maintain a high scholastic standard as well as a commitment to research. Usually the following courses are taken in the first two years.

**Year 1**
- First Semester: Gross Anatomy, Biochemistry, Cell Biology, Medical Microbiology, Medicine in Modern Society
- Second Semester: Microscopic Anatomy, Physiology, Neural Sciences, Medical Genetics, Topics in Clinical Medicine, Biomedical Statistics

**Year 2**
- Third Semester: Pathology, Pathophysiology, Pharmacology, Introduction to Clinical Medicine
- Fourth Semester: Pathology, Pathophysiology, Pharmacology, Radiology, Neurology, Surgery, Ophthalmology, Otolaryngology, Introduction to Clinical Psychiatry, Introduction to Clinical Medicine, Human Sexuality

**Years, 3, 4, 5**

The student will spend the third, fourth, and fifth years in satisfying the requirements of the Graduate School of Arts and Sciences for the Ph.D. degree.

The formal requirements for the Ph.D. degree include (1) completion of course work, (2) successful performance in a qualifying examination, usually at the end of the third year, (3) execution of original research suitable for a dissertation, and (4) defense of the thesis. Students are also required to do a teaching assistantship for a semester in one course. Before beginning the third year, the student will select a faculty advisor under whom he will do his thesis research and the training program or department in which he will obtain his Ph.D. degree.

For purposes of graduate training, the Division of Biology and Biomedical Sciences is divided into the following programs: Integrative and Cell Biology, Molecular Biology, Neural Sciences, Plant Biology, and Population Biology. The programs are taught by faculty from all of the preclinical departments of the School of Medicine and from the Department of Biology of the faculty of Arts and Sciences. These programs provide maximum flexibility for student training and, by providing for interdepartmental teaching, not only avoid duplication but assure that each course is taught by the most qualified faculty, regardless of departmental affiliation. Therefore, course requirements reflect the student's background and interests rather than a rigid course sequence. Students may also receive their training by special arrangement in other graduate science departments within the University.

A detailed listing of the various courses available in the Division of Biology and Biomedical Sciences can be found on page 120 as well as in the sections describing the various departments of the School of Medicine.

A program of special monthly seminars will be arranged for students during the research years. Conducted by medical scientists of both clinical and preclinical departments of the School of Medicine, these seminars are aimed at stimulating student interest in clinical medicine and at increasing awareness of major research problems in clinical medicine.
Final Year in Clinical Medicine

The sixth year is the clinical year of the normal medical curriculum. Transition into this year is facilitated by a special two-week course, Introduction to Clinical Medicine. The intensive clinical training provided in this year is the last formal requirement for the M.D. degree. Since one year of the normal medical school curriculum is completely elective, the medical scientist will have taken the equivalent of that year during the period assigned to graduate work. The Ph.D. and M.D. degrees will be granted simultaneously at the end of the final clinical year.

Doctor of Philosophy Programs

The Washington University Graduate School of Arts and Sciences, through the Division of Biology and Biomedical Sciences, offers programs in cellular and developmental biology, evolutionary biology and ecology, molecular biology, neural sciences, and plant biology leading to the Ph.D. degree. Study is organized on an interdepartmental basis using the faculty of the seven preclinical departments of the School of Medicine, as well as the Biology Department of the Graduate School. Additional information and the application for admission may be obtained by writing to:

Office of Graduate Student Affairs
Campus Box 8072
Washington University School of Medicine
660 South Euclid Avenue
St. Louis, Missouri 63110

TUTORIALS AND INDIVIDUALIZED PROGRAMS

The educational program is designed to meet the needs of all medical students in an individual and a personalized way. To help students who may be having academic difficulty or who may wish to reinforce their studies, individual tutorials are offered. The School's experience is that tutorials enable students to handle course work with improved proficiency. Students who are found to have difficulties in handling the normal academic course load will be asked to take an individualized program which would require five rather than four years to complete.

GRADES

In order to assist the student in evaluating his progress, he is graded in each course by the faculty. In the clinical and elective years, grades are accompanied by detailed descriptive comments characterizing each student's performance. This type of evaluative data is of considerable assistance to the student applying for internship or residency training, since it permits the Assistant Dean for Postgraduate Training to give each hospital to which the student has applied a meaningful, comprehensive summary of the candidate's attributes, abilities, and performance.

A Pass/Fail grading system is employed for the first semester of the first year. At the conclusion of each academic year every student receives a grade report that indicates achievement in each course taken. 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 courses.

Grades are:

- H = Honors
- HP = High Pass
- P = Pass
- F = Fail
- DF = Deferred
- INC = Incomplete

"Honors" is given for a truly outstanding performance, "High Pass" for very good work, and "Pass" for satisfactory work. "Fail" signifies clearly unsatisfactory performance. "Deferred" indicates a marginal performance with some deficiency that must be removed, and "Incomplete" denotes that course work has not been completed.

If a departmental coursemaster submits a grade of "Incomplete," "Deferred," or "Fail" for a medical student duly enrolled in any medical school course, the coursemaster will include an accompanying statement which contains the following information:

1. Student's name
2. Course title
3. Inclusive dates of course
4. Grade
5. Description of extent of academic encumbrance
6. Remedial action recommended to remove the academic encumbrance.

This type of statement will be submitted to the Office of the Registrar at the time student grades are reported and prior to the scheduled meetings of the various committees on academic review and promotions.

The grade of "F" or "DF" remains permanently recorded on the official academic record/transcript. The final grade reflecting a level of success in the course appears as an additional line entry on the record/transcript.

PROMOTIONS

A faculty Committee on Academic Review and Promotions reviews the records of all students by curriculum level.

RULES GOVERNING PROMOTIONS

Students must pass all required courses unless excused from their courses by the responsible departments. Students must have satisfactorily completed all the required courses for the first two years in order to be admitted to candidacy for the degree of doctor of medicine and to proceed to the third year of the curriculum.
Each student's performance will be evaluated periodically by a faculty Committee on Academic Review and Promotions. One such committee (CARP I) is concerned with the first year, another (CARP II) with the second year, and a third (CARP III) with the clinical years of the curriculum. In the case of unsatisfactory progress, as evidenced by failing grades or an inability to develop adequate clinical expertise, the appropriate committee may require that the student be reexamined or repeat the relevant courses. If a student does not achieve or maintain a satisfactory level of scholarship, the Committee may drop the student from the School. Any action to drop a student from the School will be the result of a determination by a CARP Committee (on the basis of the student's performance and on the judgment of the members of the faculty who are familiar with him), that he has demonstrated an inability to successfully complete the requirements of the School for the degree of doctor of medicine.

A decision by a CARP committee to drop a student from the School may be appealed. The appeal must be submitted, in writing, to the Dean of the School of Medicine within 72 hours of the student's receipt of notification of the Committee's decision. Appeals will be considered within 30 days by a standing Appeals Committee appointed by the Dean. The Appeals Committee has limited authority either to uphold the earlier decision of the relevant CARP committee or to recommend to the Dean that the student be reinstated and allowed to continue his studies in the School. The reversal of a decision by a Committee on Academic Review and Promotions will be based only on a presentation of: (1) information which is new and/or different from that previously received by the CARP Committee; or (2) evidence of extreme hardship of which the CARP Committee was not fully apprised.

First-Year Curriculum

The Committee on Academic Review and Promotions I may recommend to any first-semester student whose performance reflects difficulties with the required course work that he enter an individualized program. The Committee's recommendation will be based on a review of the student's performance in the first or second examinations in one or more of the major* first semester courses. The intent of such an individualized program is to permit the student an optimum chance of successfully completing the requirements for the first year by permitting him to take up to two years to complete the first year's work. Students who accept the Committee's recommendation will be permitted to withdraw from one, or at the most two, of the major courses taught in the first semester, and will be eligible for individual tutorial help in the remaining courses. At the end of the first semester the Committee may require a student who has failed one or more of the major courses to enter an individualized program.

A student who has been required to enter an individualized program is expected to pass all of his assigned courses in order to continue in subsequent semesters in the School of Medicine. If a student should fail any major course, one reexamination will be offered in each course at some time before the end of the summer preceding the next academic year. Should the student fail any reexamination, in the absence of such extenuating circumstances as personal ill health (physical or mental), he will be dropped from the School. In the second year of the individualized program the student shall complete all remaining first-year courses. If scheduling permits, and with the permission of CARP I, selected courses in the second-year curriculum may be taken.

*The term "major courses" refers only to the first-year courses: Biological Chemistry, Microbiology I, Gross Anatomy, and Cell Biology, which are currently taught in the first semester, and Physiology, Microscopic Anatomy, Neural Science, and Microbiology II, which are currently taught in the second semester.
Second-Year Curriculum

If a second-year student fails a course, one reexamination is permitted. Should the reexamination be failed, the course must be repeated. Failure in the repeated course will result in the student being dropped from the School of Medicine by CARP II. If a second-year student who had been on an individualized program for the first-year curriculum fails a second-year course, that failure can be removed by passing a reexamination. Failure in the reexamination, in this case, constitutes grounds for CARP II to drop the student from the School of Medicine.

No student may take more than three years to complete the course work required for the first two years of the curriculum. The Committee on Academic Review and Promotions II will neither promote a student to the status of candidate for the Doctor of Medicine degree nor permit a student to begin a clinical clerkship until all first- and second-year course work has been satisfactorily completed.

Beyond the Second-Year Curriculum

The Committee on Academic Review and Promotions III meets at least twice each year to review the academic progress of all students who have been promoted or admitted to the status of candidate for the degree of doctor of medicine. This includes students in the regular four-year degree program, students taking a five-year degree program, students in the clinical portion of the Medical Scientist Training Program, those selected students with a prior Ph.D. degree who have been approved by the Medical Science Training Placement Curriculum Committee for individualized curricula and are now in the clinical training period of their program (having previously been promoted to the status of candidate for the degree of Doctor of Medicine), and all others who have successfully completed all aspects of the School’s preclinical curriculum. Just prior to the end of each academic year, the Committee meets and recommends to the Executive Faculty those students who, in the opinion of the Committee, are qualified to receive the degree of Doctor of Medicine. Specific rules are as follows:

1. All academic encumbrances must be removed in order for a student to be recommended for graduation.
2. A candidate having failures in two subjects may, at the discretion of the Committee, be dropped from the School or may continue with an individualized program.

STUDENT RESEARCH FELLOWSHIPS

No matter what medical career an individual chooses, it will be essential for him to evaluate and use fresh knowledge as he moves through his professional life. Student Research Fellowships in basic science or clinical areas, awarded each year to selected students who undertake research projects under the direction of faculty members, are an important part of the educational program. 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. Selected faculty members serve as advisors to students interested in special research opportunities.

Fellowships are available to students after acceptance into the School. They are granted for a minimum of two months. The research must be undertaken during the student’s free time or a vacation period. A number of studies conducted by students are reported in scientific journals.

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 some will gain additional experience as postdoctoral fellows.

In order to aid students in obtaining desirable residency appointments, an active counseling program is maintained by the Assistant Dean for Postgraduate Training. Thus, in their junior year, students are provided with general background information about the kinds of residencies available. Since more residencies exist than there are candidates in any given year, students are able to exercise a considerable degree of selectivity.

The Assistant Dean for Postgraduate Training maintains an open file of brochures and other descriptive data regarding residencies throughout the country. Included are evaluations of their own residencies obtained from our recent graduates. The School participates in the
National Resident Matching Program, which offers distinct advantages to applicants.

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 which 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.

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 formally met its obligations to this learning endeavor through the operation of the Office of Continuing Medical Education. The objectives of this program are:

1) To provide high quality educational activities for alumni of Washington University School of Medicine and other physicians regionally and, on occasion, nationally.
2) To encourage life-long learning by a variety of educational methods appropriate to the learners' needs.
3) To provide for the acquisition of new knowledge and skills and to aid in acquiring efficient problem-solving techniques for ultimate improvement in patient care.
4) To provide a forum where academic and practicing physicians can jointly explore solutions to health problems.
5) To translate the results of research and the habits of critical assessment of new data to the needs of practicing physicians.

Each year 25 to 30 symposia on a wide variety of topics are sponsored by this office. About 3000 registrants attend these courses annually and receive more than 400 hours of instruction. In addition to formal courses, the CME office sponsors computer-assisted instruction, medical and pediatric newsletters, audiotapes, mini-residencies, and a speaker's bureau, and supports continuing medical education in selected community hospitals. The educational program is fully accredited by the National Accreditation Council for Continuing Medical Education and provides credits to physicians seeking them for the Physician's Recognition Award of the American Medical Association, as well as various other types of state and specialty recertification and relicensure.
Admission

ENTRANCE REQUIREMENTS

Entrance requirements to the School of Medicine are:
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 New Medical College Admission Test of the Association of American Medical Colleges;
4. evidence of character, attitude, interests, 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 integral calculus; and to have a background in chemistry, including organic chemistry. A course in physical chemistry (with calculus as a prerequisite) is strongly recommended. 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 presented as prerequisite because a great variety of courses may prepare the student for the many roles he may play in his medical career.

APPLICATION PROCEDURE

The Washington University School of Medicine participates in the American Medical College Application Service (AMCAS) of the Association of American Medical Colleges. AMCAS is a centralized procedure 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 preprofessional advisors. For this reason, individuals requesting an application and a Bulletin from Washington University will receive an AMCAS Application Request Card and a brochure describing the School of Medicine. The Bulletin is mailed to candidates upon receipt of their application credentials from AMCAS. Applicants are urged to file their applications as early as possible.

Early Decision Admission

This is an optional program for the applicant whose first-choice school of medicine is Washington University and who desires an admission decision on his application no later than October 1, 1983. To receive this special consideration, the applicant must agree to: (1) apply only to Washington University prior to receiving its admission decision; (2) present an academic record of 90 semester hours that indicates completion, or plans for completion, of all courses required for admission; (3) have a superior academic record and correspondingly strong scores on the New Medical College Admission Test; (4) submit all required credentials to AMCAS by August 1, 1983; (5) visit the Medical Center for interviews on a mutually convenient date prior to September 1, 1983; and (6) accept a position in the class, if offered one. There is no quota on
the maximum number of positions in the class of 120 to be
filed by Early Decision applicants. The AMCAS Appli-
cation for Admission contains complete instructions
regarding Early Decision programs.

Regular Admission
All applicants to the Washington University School
of Medicine must submit their application to AMCAS by
November 1, 1983. On receipt of the application from
AMCAS, the Committee on Admissions promptly for-
wards to applicants the additional materials that must be
submitted to complete the application process. At this
stage, a nonrefundable Application Service Fee of $35 is
charged by the University. Once complete, the applicant's
admission credentials are reviewed and independently
evaluated by members of the Committee on Admissions.
Selected applicants are invited for a personal interview.
Final decisions are made by the 20-member faculty com-
mittee. Washington University School of Medicine oper-
ates on a rolling admissions schedule beginning October
15, and applicants are notified as soon as a final admission
decision has been made on their application. By May 15,
1984, every applicant should have a final decision: ac-
cepted, waiting list, or not accepted.

Personal Interview
The Committee on Admissions would like to inter-
view every applicant who passes the initial evaluation
screening process, but since this involves several thousand
applicants, it is physically impossible to accomplish.
Therefore, selected applicants are invited to visit the
Washington University Medical Center for an interview,
as well as a tour of the School of Medicine and its
hospitals. This visit will provide an opportunity for the
applicant to meet and talk with students and faculty
members.

If an applicant is planning an interview trip which
will include the St. Louis area, it is appropriate for him to
write the Interview-Appointments Secretary, Committee
on Admissions, Box 8107, Washington University School
of Medicine, 660 South Euclid Avenue, St. Louis,
Missouri 63110, and inquire if an interview will be re-
quested of him. The inquiry should be made at least three
weeks in advance of the anticipated travel. The Office of
Admissions is open on weekdays from 8:30 a.m. to 5 p.m.
central time.

Accepted Applicants
Upon notification of acceptance for admission to the
School, the applicant is required to file a Statement of
Intent. Three options are presented: 1) accept the offer of
admission and submit the $100 reservation deposit; 2)
accept the offer of admission, submit the $100 deposit,
and request financial aid materials; and 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 June 16, 1984, the deposit is refunded.

THIRD-YEAR CLASS TRANSFER
PROGRAM
Each year the Washington University School of
Medicine accepts approximately fifteen transfer students
into its third-year class. This class enlargement is permit-
ted because of the abundant clinical training facilities
available in the Medical Center and because of the exist-
ence of a national need for such transfer positions.
Transfer applications are accepted from well-qualified
students in the U.S. medical schools where limited facili-
ties require some students to transfer elsewhere for clinical
training. Applications are also accepted from students in
U.S. schools of medicine who have a cogent reason for
requesting transfer and who have the full approval of the
dean of their current school.

Transfer application forms for our 1984 third-year
class are available on August 1, 1983. Application dead-
line is November 1, 1983. Those applicants selected for
interview will be invited to visit the Medical Center during
November 1983. All applicants will be notified of the
decision of the Committee on Admissions by December
31, 1983. Inquiries should be directed to:

Third-Year Class Transfer Program
Washington University School of Medicine
660 South Euclid Avenue—Campus Box 8077
St. Louis, Missouri 63110
Financial Information

COST OF EDUCATION, 1983-84 FIRST-YEAR CLASS

For a first-year matriculant, tuition and housing rates for the 1983-84 academic year are listed below. Although the University reserves the right to change the fees at any time without notice, any change will not become effective until the 1984-85 academic year. Other items listed provide an estimate of the expenses for a single student in the 36-week, first-year class. The total of these figures suggests a basic minimum budget of approximately $14,825.

Tuition (includes Student Health Service and Microscope Lending Plan) $9,800
Books, supplies, and instruments $1,210
Housing (single room, Olin Residence Hall) $1,665
Board (Medical Center cafeterias) $2,150

REGISTRATION AND PAYMENT OF TUITION, FEES, AND OTHER FINANCIAL OBLIGATIONS

All tuition and fee payments 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 on or before the date specified in the published calendar will result in a late registration fee of $50, to be added to the amount due. Any tuition and fee payments due from the student and not paid at the time of registration or on the specified due date accrue interest at the rate of one per cent above the prime interest rate in effect on the first business day of the month in which that payment is due. Any amounts not paid when due plus accrued interest thereon must be paid in full within three months of the original due date. If a student fails to settle such unpaid amounts within three months of the original due date, the School of Medicine will not release the student's academic record or progress reports pending settlement of the unpaid account. A student who has not satisfied all past due financial obligations to the University one month before the end of the academic year will not be allowed to progress to the next academic year or graduate.

REFUNDS

A student who withdraws from the School will receive a pro rata refund of tuition and appropriate fees. The refund will be based on the ratio of the class days enrolled (from the first day of classes to the day withdrawal permission is granted) to the total number of class days in the term for which tuition and fees were paid. If tuition and fees were paid entirely or in part by financial aid from the School, the refund will be applied first to the full repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the costs of tuition and fees must be refunded by the student to the School on the same pro rata basis as calculated for the tuition refund outlined above.

Student Health Service

The Student Health Service provides comprehensive health care, including hospitalization, for all students in the School of Medicine. Health insurance coverage for dependents of students can be arranged.

Microscope Lending Plan

Microscopes which meet the technical requirements set by the faculty are provided to each student in the first- and second-year classes. The Plan saves the student the high cost of microscope purchase and makes available to him a superior quality instrument.

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.

At the time accepted students indicate they will matriculate in the School of Medicine, they may request an application for financial aid. The Graduate and Pro-
fessional School Financial Aid Service (GAPSFAS) Financial Statement and other financial aid material, information, and instructions will be sent to the students by return mail. The GAPSFAS Financial Statement for the Academic Year 1983-84 solicits information about the applicant and parents, including a detailed description of resources and liabilities. In addition, it requests information about the income, expenses, education, and employment history of the student's spouse (or spouse-to-be). The School asks that the statement be forwarded promptly, within two weeks from date of receipt, to GAPSFAS for processing.

Financial aid award decisions are made by the five-member Committee on Student Financial Aid, and applicants are notified of the award decision within two weeks of the date the processed Financial Statement is received from GAPSFAS. An official copy of the parents' and the applicant's U.S. individual income tax return completes the data required for financial aid consideration. 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 Guaranteed Student Loan (GSL) 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 of medical school 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 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.

Washington University School of Medicine Distinguished Student Scholarships

The School has established five full-tuition scholarships to be awarded annually to members of the entering first-year class. The scholarships will be awarded, without regard to financial need, to students of proven academic excellence. In early fall 1983 selected applicants to the School's 1984 first-year class will be invited to file applications for scholarship consideration. Selection 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 announcement of the 1984 scholarship recipients will be made on March 1, 1984.

The scholarships are subject to annual renewal. Recipients of these scholarships will be expected to maintain academic excellence. If a scholarship is not renewed, the student may file for financial aid from the School.

A scholarship recipient may not concurrently participate in the School's Medical Scientist Training Program, the National Health Service Corps Scholarship Program, or the Armed Forces Health Professions Scholarship Program. Scholars may apply to the School for financial aid in addition to the full-tuition scholarship. Additional aid would be determined on the basis of documented financial need.

Scholarship Funds

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.

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

Dr. Charles Drabkin Scholarship Fund. Created in 1964 to provide financial assistance to medical students.

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

George F. Gill Scholarship Fund. Instituted in memory of a former clinical professor of pediatrics.

Harvielle-Bailey Scholarship. Established in 1970 under the will of Miss Isabel Bailey Harvielle and Dr. Steele Bailey, Jr., alumni of the School.

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

Insurance Medical Scientist Scholarship Fund. Established for the training of promising scholars intent upon a career in research and academic medicine.

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

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.

George D. Kettelkamp Scholarship Fund. Established in 1969 by Mrs. Kettelkamp in memory of her husband, an alumnus of the School of Medicine.

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.

Lehmann Scholarship Fund. Established in 1982 by Mrs. John S. Lehmann to provide scholarship awards for deserving Washington University medical students.

Maudie 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.

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 postgraduate 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.

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.

William B. Parker Scholarship Fund. Established in 1976 by the School of Medicine in honor of William B. Parker's fifty-one years of service to the School.

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

Samuel Jennings Roberts Scholarship Fund. Created to provide scholarships for any students engaged in study leading to the degree 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.


School of Medicine Scholarship Fund. Created in 1970 to provide financial assistance for medical students.
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 Balbridge Shaw Scholarship Fund. Created in 1958 through the bequest of Roy A. Shaw in memory of his father, Dr. Alexander Balbridge Shaw.

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.

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.

Millicent 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.

Turshin Family Foundation Scholarship. Established in 1982 by Mr. and Mrs. Stanley M. Rosenblum to provide scholarship support to a female student of Oriental extraction.

Scholarship and Loan Funds

Isabel Valle Brookings Scholarship and Loan Fund. Established in 1957 by Isabel Valle Brookings (Mrs. Robert S.) for scholarships and loans in the School of Medicine.

Arpad Csapo, M.D., Memorial Scholarship and Loan 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.

Danforth Foundation Loan and Scholarship Fund. Provides financial assistance for medical students.

Danforth Medical Foundation Fund. Created through gifts from the Danforth Foundation and the late William H. Danforth to furnish loans, scholarships, or outright grants to talented and promising young men and women engaged in study or research in basic medical or clinical sciences.

Paul H. and Lila L. Guttman Student Aid Fund. Established in 1976 to provide financial assistance to qualified medical students.

Robert Wood Johnson Foundation Fund. Created in 1972 to provide financial assistance for students who are from rural backgrounds, members of specified minority groups, and women.

William H. and Ella M. Schewe Fund. Established to provide financial assistance to worthy students in the medical school.

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

Wilkinson Scholarship Fund. Created in 1968 by the bequest of Anna J. Wilkinson in honor of her husband, Dr. George F. Wilkinson. Medical and postdoctoral students are eligible for Wilkinson scholarships or loans.

Loan Funds

American Medical Association Loan Program. Makes available bank loans without collateral to eligible medical students, interns, or residents who are citizens of the United States. Applications for such loans are made through the Education and Research Foundation of the American Medical Association.

Ruth Elizabeth Calkins Scholarship Loan Fund. Established by Dr. Delevan Calkins in honor of his granddaughter.

Federally Insured Student Loan. Washington University acts as the lender for students awarded loans by the School of Medicine.

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.
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.

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.

Ophelia H. Kooden and Violet G. Sachs Loan Fund. Created in 1970 to provide loans for medical students in memory of the donors’ brother, Jess Klement Goldberg.

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 the transition from student to resident physician.

National Direct Student Loan. A federal program 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 a 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.

Robert Wood Johnson Foundation Student Loan Guarantee Program. Provides “a last-resort source of funds for educational expenses.”

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.

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 Microbiology.


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

J. Albert Key Fellowship Fund. Provides a stipend for a fellow in orthopedic 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.

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.

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

Student Research Fellowships. Awarded each year to students who undertake special research projects under the direction of a faculty member. They carry a stipend. Application should be made to the Committee on Fellowships and Awards, which supervises the program.

Awards and Prizes

Alpha Omega Alpha Book Prize. Awarded at the end of the fourth year to a member of that class who has performed outstandingly for the entire medical course.

Alexander Berg Prize. Awarded to the student presenting the best results in research in bacteriology.

Jacques J. Bronfenbrenner Prize. Provided by Dr. Bronfenbrenner’s students in memory of his inspiration as a teacher and scientist, and awarded to the member of the graduating class who, in the judgment of the Chairman of the Department of Medicine, has done the most outstanding work in infectious diseases or related fields.

Dr. Richard Brookings and Dr. Robert Carter Medical School Prizes. Provided for medical students through a bequest of Robert S. Brookings.

Kehar S. Chouke Prize. Awarded at the end of the first year to a medical student who has demonstrated superior scholarship in anatomy.

CIBA Award for Outstanding Community Service. Recognizes a sophomore student who has performed laudable extracurricular activity within the community.

Carl F. and Gerty T. Cort Prize in Biochemistry. Awarded at the end of the first year to the member of the class who has demonstrated superior scholarship in biochemistry.

Edmund V. Cowdry Prize in Histology. Established in 1969 to honor Dr. Cowdry; awarded to a freshman medical student who has performed meritoriously in microscopic anatomy.

Antoinette Frances Dames Prize in Physiology and Biophysics. Awarded annually to a member of the first-year class who has demonstrated superior scholarship in these fields.

George F. Gill Prizes. One prize awarded at the end of the first year to a member of the class who has demonstrated superior scholarship in anatomy; one prize awarded to a member of the graduating class who has demonstrated superior scholarship in pediatrics.

Alfred Goldman Book Prize. Created in 1972 as an annual award to be given to a student in the School of Medicine who, in the opinion of the faculty, has done outstanding clinical or research work in diseases of the chest or pulmonary physiology.
Dr. J. E. Kirk Scholastic Award. Established in 1975 and awarded to a graduating student of high scholastic standing.

Louis and Dorothy Kovitz Senior Prize in Surgery. Senior award prize in surgery recognizing a member of the senior class who has shown the most outstanding ability, zeal, and interest in surgical problems.

Lange Medical Publications Book Awards. Given to members of all four classes for high scholastic standing and achievement in research.

Irwin Levy Memorial Fund. Established in 1980 by friends of Dr. Levy as a tribute to his commitment to clinical teaching. Provides a prize for the student who presents the best performance in the neurology and neurological surgery clerkship.

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

Howard A. McCordock Book Prize. Awarded at the end of the second year to a member of that class for general excellence in pathology.

Edward Massie Prize for Excellence in Cardiology. Awarded to the member of the graduating class who, in the judgment of the Director of the Division of Cardiovascular Disease of the Department of Medicine, has done the most outstanding clinical or basic research work in the field of cardiovascular disease.

Medical Center Alumni Scholarship Prize. Given annually to a student who has shown excellence in his work during the preceding year.

Medical Fund Society Prizes. One prize awarded annually to a student of the senior class who has excelled in the study of internal medicine; one prize awarded annually to a student of the senior class who has excelled in the study of surgery. No individual is eligible for both prizes.

Missouri State Medical Association Award. A scroll and a U.S. Savings Bond presented annually to an honor graduate of the senior class.

C. V. Mosby Company Book Awards. Made to five members of the graduating class for high general scholastic standing and research achievement.

James L. O'Leary Neuroscience Prize. Awarded annually to students who demonstrate the best accomplishments in the neuroscience course.

James L. O'Leary Prize for Research in Neuroscience. Given annually to a predoctoral or postdoctoral student for the most original and important accomplishment in neuroscience research.

St. Louis Internists Club Book Prize. Awarded to the graduating senior who has done the most significant research in any area of internal medicine.

St. Louis Pediatric Society Senior Prize. Presented to the senior student showing the greatest promise in clinical pediatrics.

Sandoz Award. Given annually to a graduating student who has made a meritorious contribution to psychiatric research.

Sidney I. Schwab Prize in Psychiatry. Awarded at the end of the fourth year for general excellence in psychiatry.

John R. Smith Memorial Fund Prize. Created in 1982 to be awarded annually to a medical student who has done meritorious clinical and/or research work in the Division of Cardiovascular Diseases of the Department of Medicine.

Margaret G. Smith Award. Given to a woman medical student for outstanding achievement in the first two years of medical school.

Samuel D. Soule Award in Obstetrics and Gynecology. Presented to a member of the junior or senior class for meritorious achievement in either basic or clinical investigation in obstetrics and gynecology.

Upjohn Achievement Award. Given to the senior student who has done the most meritorious work during his medical school career in the field of metabolism.

Washington University School of Medicine Academic Achievement Award. Given annually to a student who has exhibited to an unusual degree the qualities of industry, perseverance, determination, and enthusiasm in the first-year academic program.

Samson F. Wennerman Prize. Donated by his wife, Zelda E. Wennerman, and awarded annually to that senior student who has demonstrated promise in surgery.

Hugh M. Wilson Award for Meritorious Work in Radiology. Given annually to a graduating medical student in recognition of outstanding work in radiology-related subjects, either clinical or basic science.

James Henry Yalem Prize in Dermatology. Established by Charles Yalem in memory of his son and awarded annually to a member of the senior class for outstanding work in dermatology.
Student Life

HOUSING

The Apartment and Housing Referral Services, located in the Millbrook Building on the West Campus, Box 1059, Washington University, St. Louis, Missouri 63130, telephone (314) 889-5092, maintains listings of housing appropriate for married and single students.

The Spencer T. Olin Residence Hall has accommodations for approximately 250 single men and women. This building, made possible by generous gifts from Spencer T. Olin and alumni and friends of the School of Medicine, is located at 4550 Scott Avenue in the Medical Center. Olin Hall is planned for the convenience of students in the medical or paramedical sciences. Every effort is made to provide an atmosphere that not only aids them in meeting their study obligations, but also recognizes their privileges as graduate students.

The rates for rooms during 1983-84 are:

**School Year: September-June (Nine Months)**
- Two-room suite: $1,917
- Single room: $1,665
- Double room: $1,323
- Large single: $2,052

**Summer 1983: for Three Months**
- Two-room suite: $639
- Single room: $555
- Double room: $441
- Large single: $684

**Summer 1983: Weekly Rates for Student Visitor**
- Two-room suite: $78
- Single room: $69
- Double room: $60

**Daily Rates for Visitors**
- Two-room suite: $35
- Single room: $27
- Single room (prospective student): $23

Each occupant is required to pay a $50 security fee in addition to the room rental charge. This fee will be held by the University until termination of residence to cover losses resulting from possible damage to the room or the furniture. Any portion not so used will be refunded.

STUDENT HEALTH SERVICE

Entering students are given a complete medical examination and are provided with medical care as long as they are enrolled in the School of Medicine. Physicians are available at the Student Health Service, and a physician is on call for emergency care at Barnes Hospital. Essential costs of hospitalization are covered. The student or his family is responsible for meeting the costs of hospital care in excess of those paid by the Health Service. The responsibility of the Student Health Service for hospitalization will end 30 days after an individual ceases to be an officially enrolled student.
Except in certain emergencies, costs will not be covered for outpatient care that is not arranged through the Student Health Service.

PARKING

Parking is available on lots owned and operated by the School of Medicine. These lots are located near Olin Hall and various other sites within the Medical Center. The Busch lot, owned jointly by Barnes Hospital and the University, is located between Taylor and Newstead Avenues. An annual permit must be purchased for use of either of these two facilities. These permits are available to students—on a limited basis. Students also qualify to purchase monthly permits in the Washington University—Wayco Garage at the corner of Audubon and Euclid Avenues.

Free daytime parking is provided at a remote location (5 minutes away) in neighboring Forest Park with a shuttle transporting parkers to the Medical School. Security is provided.

RECREATIONAL AND CULTURAL OPPORTUNITIES

St. Louis is a city in the center of things, stylistically as well as geographically. Here, the industriousness of the North is tempered by the graciousness of the South, while Eastern respect for tradition is balanced by the pioneering spirit of the West.

A metropolitan area of more than 2.5 million people, St. Louis has one of the most diversified economies of any major U.S. city. Among other endeavors, its workers are engaged in the aerospace industry, automobile assembly, brewing, shoe manufacturing, and chemical production.

The city's cultural and recreational opportunities reflect a similar eclecticism. There are 26 institutions of higher learning in the area, as well as libraries, museums, professional drama companies, a dance society, opera theatre, and the second-oldest symphony orchestra in the nation. Frequent appearances by various popular recording artists round out the city's cultural opportunities.

St. Louis is served by 18 radio stations, and one educational and five commercial television channels. Two daily newspapers of opposing political views are published in the city—the morning Globe-Democrat and the evening Post-Dispatch.

For spectators, there are three major-league sports teams—the baseball and football Cardinals, and soccer Steamer. For participants, the four vibrant seasons make outdoor recreation a favorite pastime. Good country for hiking, camping, canoeing, and spelunking is just a short drive from the city.

The construction of the Gateway Arch, the proud symbol of the key role St. Louis played in the nation's westward expansion, sparked an urban renaissance in the 1960s, and the city is now enjoying the results. Within the past few years, the downtown business district has undergone a dramatic transformation, with the opening of a convention center, new hotels, and a riverfront entertainment district. Some of the city's historic residential neighborhoods, such as Lafayette Square and Soulard, have recently been rediscovered by modern homesteaders, who are restoring once-elegant townhouses to their former glory.

Washington University's School of Medicine is located in a district known as the Central West End—a diverse neighborhood which includes quiet private streets, high-rise apartment buildings, and many small shops, restaurants, and galleries. Under the auspices of the Washington University Medical Center Redevelopment Corporation, this area, too, is experiencing a resurgence of interest from both commercial and residential investors.

One of the city's major attractions, Forest Park, is bounded on the west by the campus of Washington University and on the east by the Washington University Medical Center, which includes the School of Medicine. Originally the site of the St. Louis World's Fair, this 1,400-acre expanse of greenery and recreation facilities has paths for running and cycling, courts for tennis and handball, a skating rink, fishing ponds, fields for football, baseball, and soccer, and three golf courses. Also located within the Park are the St. Louis Zoo, McDonnell Planetarium, Museum of the Missouri Historical Society, Jewel Box Floral Conservatory, City Art Museum, and Municipal Opera.

WASHINGTON UNIVERSITY MEDICAL CENTER ALUMNI ASSOCIATION

The Washington University Medical Center Alumni Association was organized to foster a spirit of class fellowship among its members, and to further the interests and standing of the School of Medicine. Membership is available to graduates, members of the faculty, former house officers of the Medical Center, and alumni and faculty from the School of Nursing, Health Administration and Planning, Occupational Therapy, and Physician Therapy programs.

In order to complement the aims and purposes of the School of Medicine, the Association sponsors a variety of programs including: student-alumni activities, recognition programs, alumni service programs, and other special events.

STUDENT-ALUMNI PROGRAMS: The Washington University Medical Center Alumni Association Student Loan Fund underscores the commitment to educate superbly qualified young men and women. Generous contributions made by members of the Association provide a special fund which offers short-term, no interest loans to medical students upon recommendation of the Office of Student Affairs.

A High School Honors Day and a Pre-Medical Exposure Program have been established to introduce exceptional students to career opportunities in Medicine.
To further alumni-student relationships, the Association coordinates a program designed to give freshmen and sophomore medical students the opportunity to spend a day on the job with a practicing physician.

Pairing graduates just beginning their residency training with alumni in various cities is another beneficial program. This serves to acquaint the residents with their new surroundings and enhances the spirit of fellowship.

**RECOGNITION PROGRAMS:** Alumni and friends of the School of Medicine who make unrestricted contributions of $100 to $499 to the School or any of its departments are recognized by membership in the Medical Century Club. A second level of this club is the prestigious Medical Dean's Committee. Alumni and friends contributing $500 to $999 each year to ongoing programs at the School of Medicine are honored by Dean's Committee membership.

In 1977 members of the Medical Eliot Society initiated the Alumni Endowed Professorships Program, designed to establish Alumni Professorships through collective $1,000 annual contributions from alumni. The first Alumni Professorship in Pharmacology was announced in 1982. The goal is to have an Alumni Professorship in each department at the School of Medicine.

Annually, Alumni-Achievement and Alumni-Faculty awards are presented at reunion. Nominations for the awards, based on professional achievement and service to the School of Medicine, are solicited from all Reunion alumni. Reunion Chairmen serve as the selection committee for the award recipients.

**ALUMNI-SERVICE PROGRAMS:** The interest in postgraduate education expressed by leaders of the Alumni Association provided a major impetus to the initial development of the Office of Continuing Medical Education. Alumni in practice felt the need for a formal means to renew their educational experience under the auspices of their alma mater. Since initiation of the Office of Continuing Medical Education in 1973, alumni have been unswerving in their professional and financial support for the Office of Continuing Medical Education.

Each year in February the Alumni Association sponsors the Annual Clinical Conference. Traditionally, outstanding members of the twenty-fifth reunion class are featured as faculty presenters.

Placement service is available to alumni and housestaff. Practice positions are listed with the Alumni Office. A variety of lectures and special seminars are offered to alumni and friends of the School of Medicine living in the St. Louis metropolitan area.

**SPECIAL ALUMNI PROGRAMS:** Alumni Reunion Days are in May and include a scientific program presented by the Office of Continuing Medical Education, individual class dinners, the Dean’s Luncheon, and a Century Club breakfast. The Annual Alumni Dinner Dance honors the 50-year reunion class and the members of the graduating senior class.

Specialty receptions are hosted at national medical meetings and include the introduction of Medical Center faculty and distinguished guests.

The Network Cities Program is being initiated in seven locations—Denver, Houston, Los Angeles, New York, St. Louis, San Diego, and San Francisco. The objectives of this program are to realize maximum private financial support, to enroll the most competent students and residents, and to increase national awareness of the School’s preeminence. A committee of volunteers from each area will be organized and trained to assist the School of Medicine in its efforts to increase major gift support and enact other programs to meet the stated objectives.

The Washington University Medical Center Alumni Association endeavors to acknowledge the rationale for the School’s development objectives, to add sufficiently to the School’s endowment, and to sponsor programs that will foster a spirit of fellowship by reacquainting alumni with the continued vitality of their alma mater.

**LECTURERSHIPS AND VISITING PROFESSORSHIPS**

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

- **Harry Alexander Visiting Professorship.** Established in 1964 by former house officers 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.
- **George H. Bishop Lectureship.** Supported by funds made available by friends interested in the advancement of neurology.
- **Estelle Brodman Lectureship Fund.** Established in 1961 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.
- **Glover H. Copher Lectureship in Cancer.** Founded in 1971 with endowment provided by Dr. Copher and friends.
- **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 Lectureship.** Established in 1982 by S.E. Freund in memory of his wife to provide a visiting lectureship in clinical oncology.
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.

Evarts A. Graham Memorial Lectureship. Established in 1959 with a reserve fund left by Dr. Graham for his successors.

Evarts A. Graham Visiting Professorship of Surgery. Established in 1968 by The Harry Freund Memorial Foundation to support an annual lecture in honor of Dr. Graham's contribution to surgery.

Samuel B. Grant Visiting Professorship. Created in 1963 to provide annually a visiting professor in the Department of Medicine.

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.

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 Orthopedic Surgery. Created in 1972 by patients, friends, colleagues, and former students in honor of Dr. McCarroll.


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.

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, graduate medical education, and commitment to patient care.

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

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

The Washington University School of Medicine was established in 1899 as a union of the two oldest medical schools west of the Mississippi River: the Missouri Medical College, a proprietary school organized and owned by the faculty, and the St. Louis Medical College, founded by the local medical society. The Missouri Medical College was strong in clinical teaching, while the St. Louis Medical College stressed research, particularly clinical research. When the two were united as the Medical Department of Washington University, they combined these strengths, with the result that today the Washington University School of Medicine emphasizes both the scientific and research bases of medicine and the application of that knowledge to patient care and clinical practice.

Reorganized after the famous Flexner Report of 1912, with the help of the Carnegie Foundation for the Advancement of Teaching and funds provided by St. Louis philanthropist and civic leader Robert Brookings, the School restructured its program, built a new campus and appointed an entirely new faculty who had been trained in the new “scientific” medicine. Among the features adopted by the reorganized school were: full-time teaching appointments, enlarged hospital and outpatient facilities, laboratory space for both preclinical and clinical departments, faculty time for research, and a teaching program which allowed undergraduate, graduate, and postgraduate students to have meaningful contact with distinguished faculty members in informal small group settings. These tenets have resulted in bringing together a faculty, staff, and alumni who have been awarded 14 Nobel Prizes in physiology and medicine, as well as many other honors, appointments, and elections to important professional offices. Four faculty members have been elected to the National Academy of Sciences, six are members of the Academy’s Institute of Medicine and many more are members of advisory boards of foundations and governmental granting agencies.

Over the years, the Washington University School of Medicine and its affiliated hospitals have worked and grown together, and in 1962 these several institutions formalized their relationships and established what is now termed the Washington University Medical Center. The Center consists of the Washington University School of Medicine, Barnes Hospital, The Jewish Hospital of St. Louis, St. Louis Children’s Hospital, Barnard Hospital, and the Central Institute for the Deaf. Integral units of the Medical Center include the world-famous Mallinckrodt Institute of Radiology, the Biomedical Computer Center, and the Irene Walter Johnson Institute of Rehabilitation. Extensive basic and clinical programs are carried on in the various institutions in the Medical Center. In 1981, Principal Investigatorships on one or more federal research grants were held by 223 faculty members. Twenty-five Program Project and Center Grants are held in the fields of cancer, general clinical research, thrombosis, diabetes, arthritis, renal diseases, asthma, stroke, glau-
coma, drug abuse, lipid research, emphysema, heart disease, genetics, reproduction, alcoholism, neurobiology, and affective disorders.

New methods of offering health care have been developed through such means as a prepaid health maintenance organization, the Medical Care Group of St. Louis, which provides comprehensive health care for twenty-eight thousand patients. The Queeny Tower is a multi-purpose building and includes several floors of doctors' offices in addition to acute-care and limited-care patient facilities and accommodations for patients undergoing outpatient medical evaluation. The institutions in the Medical Center have more than a quarter of a million clinic and emergency room visits annually. Patients come to the Center from the metropolitan St. Louis area and the surrounding regions in Missouri and Illinois. Patients with especially difficult diagnostic and therapeutic problems are referred from throughout the Midwest and beyond.

The Washington University School of Medicine has a unique full-time faculty system. In 1983 the School employed 721 full-time, salaried faculty members in its eighteen preclinical and clinical departments. The clinical departments are further greatly strengthened by 803 part-time faculty members. The latter group of physicians includes men and women who practice their medical specialties in St. Louis and are members of one or more of the staffs of the four hospitals in the Center. Medical students and resident physicians also receive extensive and valuable clinical training in programs at the St. Louis City Hospital, St. Louis County Hospital, and Cochran Veterans Administration Hospital, which are served by full-time and part-time faculty members of the School of Medicine.

The student body of the School of Medicine numbers approximately 530 medical students. Programs are also conducted for students in health administration, occupational therapy, physical therapy, radiologic technology, and pediatric nurse practice. The Division of Biology and Biomedical Sciences has extensive graduate training programs for students seeking the Doctor of Philosophy degree in areas of developmental, cellular and systemic biology, evolutionary biology and ecology, molecular biology, neural sciences, and plant biology. The outstanding Washington University School of Dental Medicine is adjacent to the School of Medicine. Unaffiliated with Washington University but located close to the Medical Center is the St. Louis College of Pharmacy.

Each year the School of Medicine and the Washington University Medical Center Alumni Association, through the Division of Continuing Medical Education, offer many short postgraduate training courses for physicians and other health professionals. These programs provide medical alumni and practicing physicians in St. Louis and the Midwest with the opportunity to keep abreast of rapidly changing medical concepts, information, techniques, and treatment.

In summary, the Washington University School of Medicine and the several institutions in the Washington University Medical Center are committed to providing patients with high-quality medical care in a concerned, compassionate way, to educating superbly qualified young men and women in the health professions, and to increasing medical knowledge through research.

Teaching Facilities

THE SCHOOL OF MEDICINE

The Washington University School of Medicine and the Medical Center are located along the eastern edge of Forest Park in St. Louis. Along the western edge of the park is the West Campus of the University. A regularly scheduled shuttle bus, operated for the benefit of students and faculty, brings the two campuses within 10 minutes of each other. Spread over two city blocks, the School of Medicine is separated by Euclid Avenue, with preclinical departments predominating on the eastern side.

The focal point of teaching facilities is the McDonnell Medical Sciences Building. The McDonnell Building, with 300,000 square feet of the most technologically advanced research laboratories and classroom space in the country, was made possible by James Smith McDonnell, a generous benefactor of Washington University. Dedicated in the fall of 1970, it is the center of activity for entering medical students. Rising nine floors above ground, it contains administrative offices and two lecture halls on the first floor. Multidisciplinary teaching laboratories for first- and second-year students, and offices and research laboratories for the seven existing basic science departments and the Division of Biology and Biomedical Sciences are located on the upper floors. Modern centralized animal quarters are housed in the basement.
The older structures, the North and South Buildings, in which centered the work of several Nobel Laureates, have been extensively renovated. Along with the Cancer Research Building, they continue to provide space for laboratories, offices, the library, and some departmental facilities.

West of Euclid Avenue but connected by a pedestrian bridge are the major clinical departments of the School of Medicine, housed in eight buildings. Here the medical school facilities are closely intertwined physically (and programmatically) with Barnes and Children's Hospitals. Located here are the following facilities owned and operated by Washington University.

Edward Mallinckrodt Institute of Radiology, one of the largest and best-equipped in the world, houses two functioning cyclotrons and diagnostic, therapeutic, and research activities of the Department of Radiology. It is connected on most of its floors with the adjoining Barnes and Barnard Hospitals, and through them with other hospitals of the group, thus providing easy access for all inpatients.

Renard Hospital, with consolidation of Psychiatric patient-care services in the West Pavilion, this recently renovated 8-story structure provides additional office and laboratory space for the Department of Psychiatry.

David P. Wohl, Jr., Memorial Hospital (ten floors) opened in 1953, and until 1980 housed 80 medical patients. A project is nearing completion renovating Wohl Hospital into badly needed research and office space, principally for the Departments of Medicine and Surgery. In addition, an ambulatory cancer center has been developed on the third floor of Wohl Hospital and the adjacent Barnard Hospital.

St. Louis Maternity Hospital houses offices and research laboratories for the Department of Obstetrics and Gynecology. A new Perinatal Center and laboratories for research in the physiology of reproduction are located in this building.

Irene Walter Johnson Institute of Rehabilitation is a center for training personnel in rehabilitation procedures, for treatment of disabled persons in the St. Louis metropolitan area, and for research related to chronic diseases.

Oscar Johnson Institute for Medical Research occupies the top five floors of the McMillan Hospital.

McMillan Hospital houses offices and research laboratories for the Departments of Neurology and Neurological Surgery, Ophthalmology, and Otolaryngology.

West Building contains offices and research laboratories for the Department of Preventive Medicine and Public Health, as well as for the Department of Pathology.
William Greenleaf Eliot Division of Child Psychiatry, located about a mile from the Medical Center at 367 North Taylor Avenue, conducts an advanced teaching program in child psychiatry and is the focus for research and treatment in child psychiatry.

CLINICAL SCIENCES RESEARCH BUILDING

The Clinical Sciences Research Building, consisting of 382,000 gross square feet of space, will provide major research facilities for the Departments of Medicine, Surgery, Radiology, Pathology, Psychiatry, Preventive Medicine, and Anesthesiology. Rising ten stories, the new structure will house major animal care facilities, animal surgery, and seven floors of research laboratories for the above listed departments.

Further, the Clinical Sciences Research Building will be the central portion of a series of enclosed pedestrian bridges that will link the Medical Center together. For the first time, Jewish Hospital on the north, the new Children's Hospital on the west, and finally the Wohl Buildings and Barnes Hospital to the south will be connected by enclosed environmentally controlled bridges.

Biomedical Computer Laboratory

The Biomedical Computer Laboratory (BCL) and the closely related Computer Systems Laboratory (CSL) are embraced within the Institute for Biomedical Computing, which spans computing research activities at both the School of Medicine and the School of Engineering and Applied Science.

The BCL focuses on collaborations with research investigators throughout the Washington University School of Medicine and its affiliated hospitals in the application of advanced computer techniques to problems in biology and medicine. This often requires work in areas stretching from basic physiology to mathematical models to equipment design. Our orientation is interdisciplinary with the recognition that effective communication for workers with differing backgrounds comes only through extended collaboration and mutual respect. The vigorous development and evolution of specialized computer systems for use in the solution of research and clinical problems has continued to be the central focus of BCL activities.

One class of computer applications requires strong coupling of the computer to its environment for digital signal processing. These applications typically involve the use of commercially available processors in conjunction with specialized hardware designed and built locally. Both BCL and CSL have pursued many such applications by taking the computers to the investigator's laboratory or the patient's bedside. The development of advanced, specialized hardware is a particular strength of CSL where custom-designed very-large-scale integrated circuits represent a major interest.

For those classes of applications dominated by information processing requirements, provisions have matured from telephone lines linking BCL computers to the IBM System at the Washington University Computing Facilities, through development and support of a minicomputer-based MUMPS system, to the establishment of independent groups such as the Medical Computing Facility and the Medical Computing Service Group which serve the local medical complex. Diverse needs continue to be met by these various options while collaborative work with the Department of Computer Science continues on more advanced information-processing developments.

The BCL enjoys collaboration with most departmental divisions within the medical school but also finds support and enrichment through close ties with other facilities throughout the University.
The School of Medicine Library is one of the largest medical libraries in the Midwest. It contains a collection of more than 189,000 volumes and subscribes to over 2,200 serials. Special holdings include a rare book collection, the School's historical archives and memorabilia, and manuscript copies of the scientific papers of such outstanding men of medicine as Doctors William Beaumont, Joseph Erlanger, E.V. Cowdry, Evarts Graham, and others. A collection of over 900 audiovisual titles is maintained and may be used in the Library's Audio Visual Center.

The primary purpose of the Library is to provide information, services, and materials to the faculty, researchers, students, and staff of the Medical Center. In addition, the Library responds to requests for information from health professionals throughout the city, state, and nation, and from local hospitals. It is an active participant in the seven-state Midcontinental Regional Medical Library Program under the auspices of the National Library of Medicine.

The Library is deeply involved in computer research and use. It runs, at cost, a serials control system (PHILSOM) for a number of medical libraries throughout the United States. The Library's cataloging is done in conjunction with the national computer network at the Ohio College Library Center (OCLC), Inc., in Columbus. The serials, cataloging, and circulation control programs have been combined into an integrated on-line system giving patrons and staff immediate access to information about the Library's collection.

Computer terminals are used for searching the Library's catalogs of books and journals. Two terminals are available for computer-assisted instruction, and remote computer data bases (including MEDLINE, Toxline, and Chemical Abstracts) are searched by the reference staff on request.

Library hours are 8 a.m. to 12 midnight on weekdays; 8:30 a.m. to 6 p.m. on Saturdays; and 1 p.m. to 10 p.m. on Sundays. A student reading room is open 24 hours a day. In the summer and on holidays, special hours are maintained.

Further information can be found in the “Library Guide,” “Library Newsletter,” and special pamphlets on computer services.

Facilities Owned by Washington University and Shared with Barnes Hospital

David P. Wohl, Jr., Memorial–Washington University Clinics are administered by Barnes Hospital and handle about 150,000 outpatient visits a year. Five floors of the building are devoted to the Clinics and five floors to research, including the Division of Health Care Research. This building is owned by the School of Medicine, with all patient-care services being operated by Barnes Hospital.
THE MEDICAL CENTER, ITS HOSPITALS AND INSTITUTIONS

The School of Medicine is part of a medical center of nearly 2,000 beds and over 10,000 employees, providing nearly 632,969 days of care and more than 415,000 ambulatory care visits each year. Organized formally in 1962, the umbrella organization now known as the Washington University Medical Center consists of a confederation of six strong, private institutions committed to the pursuit of excellence in health care, teaching, and research. Students receive clinical instruction and gain experience in all divisions of the Medical Center.

Over the past 15 years, with the growing confidence of working together, the Washington University Medical Center has undertaken increasingly complex projects. Evidence of this is the massive redevelopment project under way in the 36-block area surrounding the Medical Center. Working closely with the neighborhood, the Washington University Medical Center Redevelopment Corporation will, over a nine-year period, provide impetus for new office buildings, laboratories, apartment buildings, commercial areas, renovated single dwellings, and many public improvements. To date, fifty-six million dollars worth of construction has been completed or commissioned.

Barnes Hospital is the largest hospital in the Medical Center. It is independently owned and, through special agreement, operates outpatient clinics in buildings owned by the University. The contiguous facilities provide a major source of clinical experience for medical students. Barnes Hospital is licensed for approximately 1,208 beds, and includes teaching facilities for all clinical departments except Pediatrics. All activities of the School of Medicine and Barnes Hospital are closely integrated, and the hospital staff is composed exclusively of members of the faculty of Washington University School of Medicine.

The eighteen-story Queeny Tower has five nursing floors and two self-care floors, plus five floors of doctors' offices. The addition of four floors to the East Pavilion and a companion structure, the entirely new eighteen-story West Pavilion, has resulted in a facility that houses over 730 patient-care beds, over 50 operating rooms, a chronic renal dialysis unit, a 110-seat amphitheatre, doctors' offices, and additional facilities for the Mallinckrodt Institute of Radiology.

The combined East-West Pavilion, jointly owned by Barnes Hospital and the University, is one of the largest, most sophisticated tertiary medical facilities in the world. A large central diagnostic laboratory provides modern diagnostic patient services.

Barnard Free Skin and Cancer Hospital is independently owned but is operated by Barnes Hospital. It is a 44-bed hospital for the care and treatment of patients who suffer from skin diseases and cancer or who are undergoing special tests in the Clinical Research Center.

St. Louis Children's Hospital, governed by its own directors from its earliest days, has been an integral part of the Medical Center and a leader in the development of academic pediatrics. Its professional staff are members of the faculty of Washington University School of Medicine, and the medical director is also professor and head of the Department of Pediatrics at Washington University. Considerable clinical service and research are conducted at Children's. Of particular interest is the recently created Ranken-Jordan Center of Metabolic Diseases.

Currently, a new Children's Hospital (235 beds) is under construction approximately one block north of the present facility. This new building, which will be completed and occupied in the spring of 1984, will largely supplant the older facilities and will consolidate a major amount of pediatric clinical and research activities.

Jewish Hospital of St. Louis contains 628 beds. Its departments represent each of the major specialties. The Aaron Waldheim Outpatient Clinics provide all facets of health care to the community, while the Yalem Research Building contains important research facilities for the Hospital and School of Medicine. The nine-story Sydney M. Shoenberg pavilion provides inpatient rooms, surgical suites, and facilities for radiology. A new 1200-car parking garage spans Parkview Place.

Central Institute for the Deaf, an internationally known institution, provides facilities for research into hearing problems, maintains a school for deaf and speech-handicapped children, provides outpatient clinics for children and adults, and engages in a program of professional education for scholars in the fields of audiology otolaryngology and education of the deaf.

OTHER INSTITUTIONS

In addition to the above facilities which make up the Washington University Medical Center, the following hospitals are affiliated with the School of Medicine, and various members of the staffs hold University appointments.

The three City Hospitals:

- St. Louis City Hospital, with 600 beds.
- Robert Koch Hospital, with 465 beds.
- Harry S. Truman Restorative Center, with 250 beds.
- Malcolm Bliss Mental Health Center, with 150 beds.

Ellis Fischel State Cancer Hospital, Columbia, Missouri, with 113 beds.

St. John's Mercy Hospital, with 859 beds.

St. Louis Veterans Administration Hospitals, with 1028 authorized beds.

St. Louis County Hospital, with 200 beds.

St. Louis Shriners Hospital for Crippled Children, with 80 beds.

St. Louis State Hospital, with 440 beds.

St. Luke's Hospitals, with 644 beds.
Department of Anatomy and Neurobiology

The anatomical sciences are presented in four required courses: gross anatomy and cell biology, offered in the first semester; and microscopic anatomy and neural science, taught in the second semester. The course in neural science is taught conjointly with the Department of Physiology and Biophysics. Gross anatomy is taught essentially as a laboratory course, but with some lectures dealing with anatomical principles and with human growth and development. Cell biology emphasizes fundamental processes characteristic of all cells as well as special features of unique cell types. The course in microscopic anatomy consists largely of cell and tissue biology, with laboratory sessions paralleling the lectures in these areas. Neural science is taught mainly from an experimental point of view, with particular emphasis upon the development and organization of selected neural systems. Throughout all four courses attention is paid to the results of recent investigations and to major developments in each field. In addition, the department offers a series of graduate courses which may be taken as electives by senior students. The department is well equipped for special work in several areas, including gross anatomy, electron microscopy, tissue culture, neurobiology, cell biology, and developmental and reproductive biology.

FIRST YEAR

Bio 501. Human Anatomy
The course is based largely on the dissection of the human body. Lectures on functional and topographic anatomy emphasize the principles of organization of the various systems of the body. Lectures on developmental anatomy stress organogenesis as an adjunct to understanding the normal and abnormal anatomy. An extensive museum of labeled dissected specimens is housed in the dissection room for ready reference by students who encounter abnormalities or variations in their dissections. Frequent use of x-ray films, cineradiography films, fresh organs, 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. Occasional attendance at autopsies is recommended. Credit 6 units.

Bio 506. Microscopic Anatomy
The structure of cells, tissues, and organs is studied with regard to the functional significance of the morphological features. The laboratories consist of the study of prepared slides, of preparations of fresh tissues, and of electron micrographs. A microscope will be provided for each student. Credit 4 units.

Bio 5061. Cell Biology
An in-depth survey of cell organelles from a point of view best described as biophysical and biochemical cytology. The course is taught jointly with members of the Physiology and Biophysics Department and the Department of Biological Chemistry. It is organized in the following sections: modern cell biological techniques, the cytoskeleton, the biology of mitosis, membrane molecular transport, membrane bulk transport, the extracellular matrix, and cell-cell interactions. Three lectures each week are supplemented with demonstrations and small group conferences. The latter focus on problem sets and discussion of recent and/or classical publications. Credit 4 units.
Bio 554. Neural Sciences
This course, taught conjointly by the Departments of Anatomy and Neurobiology and of Physiology and Biophysics, provides a broad introduction to modern neurobiology. Cellular aspects of neurobiology and a comprehensive overview of the structure and function of major systems in the central and peripheral nervous systems. Class time of two half days a week throughout the second semester. A microscope will be provided for each student. Credit 5 units.

RESEARCH
Bio 590. Research Opportunities
These are offered in the following areas:
Growth and differentiation of muscle. (Dr. Bischoff)
Developmental biology of nervous tissue. (Dr. M. Bunge)
The development of the nervous system, regeneration, and response to injury. (Dr. R. Bunge)

Anatomy and physiology of the somatosensory system. (Dr. Burton)
Insulin, renin, and growth factor gene organization and expression. (Dr. Chirgwin)
Organization and physiology of the retina. (Dr. A. Cohen)
Structure and function of neurotransmitter receptors. (Dr. J. Cohen)
Neurogenesis and synapse formation. (Dr. Fischbach)
Growth and differentiation of neuroblastoma and other cultured cell lines. (Dr. Goldstein)
Studies on neurotransmitter receptors in the developing nervous system. (Dr. Gottlieb)
Growth and differentiation of sympathetic neurons in culture. (Dr. Johnson)
The structure and function of the cerebral cortex. (Dr. Jones)
Central control of blood pressure. (Dr. Loewy)
The structure and function of the skin. (Dr. Menton)
Cross-sectional anatomy. (Dr. Peterson)
The organization of the olfactory and limbic systems. (Dr. Price)
Physiology of posture and movement control. (Dr. Thach)
Cell growth and radiation effects. (Dr. Tolmach)
Axonal transport, cytoskeleton structure, and nerve regeneration. (Dr. Willard)
Structure, function, and development of cerebral cortex. (Dr. Woolsey)

ELECTIVES
The department offers a number of graduate-level courses which 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. These course descriptions are presented in the section on Biology and Biomedical Sciences.

Bio 428. Developmental Neurobiology
Bio 457. Somatosensory System
Bio 551, 552. Topics in Neurobiology
Bio 561. Topics in Molecular Neurobiology
Bio 562. Neural Control of Posture and Movement
Bio 563, 564. Techniques in Neural Sciences
Bio 567. Advanced Tutorials in Neural Science

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 and Sciences.
Faculty of the Department of Anatomy and Neurobiology

Professor Emeritus and Lecturer


Beaumont-May Institute of Neurology Scholar in Anatomy and Professor


Professors

Mary B. Bunge, B.S., Simmons College, 1953; M.S., University of Wisconsin, 1955; Ph.D., 1960.

Theodore J. Cicero, B.S., Villanova University, 1964; M.S., Purdue University, 1966; Ph.D., 1968. (See Department of Psychiatry.)

Adolph I. Cohen, B.S., City College of New York, 1948; M.A., Columbia University, 1950; Ph.D., 1954. (See Department of Ophthalmology.)


Boyk K. Hartman, A.B., University of Kansas, 1962; M.D., 1966. (See Department of Psychiatry.)

Edward G. Jones, M.B., Ch.B., University of Otago, 1962; Ph.D., Oxford University, 1968; M.D., University of Otago, 1970. (See Department of Neurology and Neurological Surgery.)

Roy R. Peterson, A.B., University of Kansas, 1948; Ph.D., 1952.

W. Thomas Thach, Jr., A.B., Princeton University, 1959; M.D., Harvard University, 1964. (See Department of Neurology and Neurological Surgery.)

Leonard J. Tolmach, B.S., University of Michigan, 1943; Ph.D., University of Chicago, 1951. (See Department of Radiology.)

Thomas A. Woolsey, B.S., University of Wisconsin, 1965; M.D., Johns Hopkins University, 1969. (See Department of Physiology and Biophysics.)

Associate Professors

C. Robert Almli, B.S., Michigan State University, 1966; M.A., 1968; Ph.D., 1970. (See Occupational Therapy.)


Harold Burton, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1968. (See Department of Pathology.)

Milton N. Goldstein, B.S., Western Reserve University, 1946; M.S., 1947; Ph.D., 1952. (See Department of Pathology.)

Ursula W. Goodenough, A.B., Barnard College, 1963; M.A., Columbia University, 1965; Ph.D., Harvard University, 1969. (Also Faculty of Arts and Sciences.)

David I. Gottlieb, B.A., State University of New York, Binghamton, 1964; M.A., University of Wisconsin, 1969; Ph.D., Washington University, 1971. (See Department of Biological Chemistry.)

Nobutaka Hirokawa, M.D., University of Tokyo, 1971; Ph.D., University of Tokyo, 1978.

Arthur D. Loewy, B.A., Lawrence University, 1946; Ph.D., University of Wisconsin, 1969.

David N. Menton, B.S., Mankato State College, 1959; Ph.D., Brown University, 1966. (See Department of Pathology.)


Robert H. Waterston, B.S.E., Princeton University, 1965; M.D., University of Chicago, 1972; Ph.D., 1972. (See Department of Genetics.)

Mark B. Willard, B.A., Oberlin College, 1965; Ph.D., University of Wisconsin, 1971. (See Department of Biological Chemistry.)

Assistant Professors

Mary Ann Boyle, B.S., University of Kansas, 1970; M.S., Ed., 1980; Ph.D., 1982. (See Occupational Therapy.)

Mary L. Carlson, B.S., University of Wisconsin, 1961; M.A., Northwestern University, 1964; Ph.D., Tulane University, 1967.


William A. Frazier, A.B., Johns Hopkins University, 1969; Ph.D., Washington University, 1973. (See Department of Biological Chemistry.)

Mary L. Johnson, B.S., Washington State University, 1964; M.D., Johns Hopkins University, 1968. (See Departments of Neurology and Neurological Surgery and Pediatrics.)

Patti M. Nemeth, B.S., University of Arizona, 1969; Ph.D., University of California, 1977. (See Department of Neurology.)

Elsie S. Rousch, B.S., Madison College, 1943; M.S., University of Wisconsin, 1947; Ph.D., Washington University, 1950. (See Occupational Therapy.)

Clifford B. Saper, B.S., M.S., University of Illinois, 1972; M.D., Washington University, 1977; Ph.D., 1977. (See Department of Neurology.)

Research Assistant Professor

W. Steven Adair, B.A., University of California, Los Angeles, 1970; M.S., California State University, San Diego, 1972; Ph.D., Wesleyan University, 1977. (Also Faculty of Arts and Sciences.)

Steven M. Rothman, M.D., State University of New York, Upstate, 1973. (See Departments of Pediatrics and Neurology and Neurological Surgery.)

Research Instructor

Patrick M. Wood, A.B., Centre College of Kentucky, 1961; M.S., Purdue University, 1965; Ph.D., 1968.
Department of Anesthesiology

According to the American Board of Anesthesiology, this specialty may be described as a practice of medicine which encompasses (1) the management of procedures for rendering a patient insensible to pain during surgical procedures, (2) the support of life functions under the stress of anesthetic and surgical manipulations, (3) the clinical management of the patient, unconscious from whatever cause, (4) the management of problems in pain relief, (5) the management of problems in cardiac and respiratory resuscitation, (6) the application of specific methods of inhalational therapy, and (7) the clinical management of various fluid, electrolyte, and metabolic disturbances.

With these objectives in mind, this department is dedicated to presenting to the student, as opportunities develop, (1) clinical applications of certain anatomic relationships, e.g., regional nerve blocks, (2) applications of principles of respiratory physiology, e.g., mechanics of ventilation under various circumstances, cardiorespiratory resuscitation, (3) application of pharmacologic knowledge related to sedative, narcotic, and anesthetic drugs, and to compounds affecting the autonomic nervous system, (4) clinical problems related to acid-base, fluid, and electrolyte balance in surgical patients, and (5) principles underlying the approaches to the emerging concept of "acute medicine."

After the second year of medical school, preceptorships in anesthesiology are available for eight-week periods by individual application. Each preceptee is assigned to a staff anesthesiologist and gains experience in the performance of clinical anesthesia, participates in conferences and seminars, and joins in ward rounds in the recovery room and intensive care unit.

Faculty of the Department of Anesthesiology

Professor and Acting Head of Department

Professors
Leonard W. Fabian, B.S., University of Arkansas, 1950; M.D., 1951.
Albert Roos, M.D., University of Groningen, 1940. (See Department of Physiology and Biophysics.)

Professor (Clinical)
C. R. Stephen, B.S., McGill University, 1938; M.D.C.M., 1940.

Associate Professor Emeritus
Glenn R. Weygandt, B.S., University of Missouri, 1945; M.D., Washington University, 1947.

Associate Professors
Milton L. Cobb, B.A., Baylor University, 1964; M.D., University of Texas (Southwestern), 1968. (See Department of Pediatrics.)
James A. Felts, B.S., DePauw University, 1943; M.D., Northwestern University, 1946.
A. Ercument Kopman, M.D., Istanbul University, 1947.

Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Department of Physiology and Biophysics and Biomedical Computer Laboratory.)

Associate Professor (Clinical)

Assistant Professors
Nabil Abboud, B.A., Christian Brothers College, 1963; M.D., St. Joseph’s University, 1970. (Jewish Hospital.)
Spomenko Bauer, M.D., University of Zagreb Faculty of Medicine, 1968. (Jewish Hospital.)


Gary E. Hirshberg, A.B., Princeton University, 1968; M.D., Hahnemann Medical College, 1972. (See Department of Pediatrics.)

James J. Jenkins, B.A., Duke University, 1966; M.D., University of North Carolina, 1970. (Jewish Hospital.)

Terri G. Monk, B.S., Wayne State University, 1973; M.D., University of Nebraska, 1977.

Kenneth S. Moss, M.D., Washington University, 1976. (Jewish Hospital.)

Tern G. Roa, B.S., University of the Philippines, 1964; M.D., 1969.

Instructors

Krishna Chunduri, M.B., M.R. Medical College, Gu-garbha, 1974. (Jewish Hospital.)

Michael Drake, B.A., St. Louis University, 1975; M.D., Indiana University, 1979. (Jewish Hospital.)

William J. Gallagher, B.A., Holy Cross College, 1943; M.D., Cornell University, 1947.

Barry A. Graff, B.A., MacMurray College, 1972; M.D., St. Louis University, 1976. (Jewish Hospital.)

Robert B. Holloway, B.S., LeMoyne College, 1952; M.D., Meharry Medical College, 1956. (St. Louis V.A. Hospitals.)


Leander K. Lee, B.S., Tarkio College, 1972; M.D., University of Nebraska, 1980.
Department of Biological Chemistry

The department offers a general introductory course, an advanced course relating the subject to biology and medicine, and several specialized courses in the major aspects of biochemistry. Students of medicine and in the Graduate School of Arts and Sciences may enroll in the courses or pursue research work under the direction of the staff. Facilities in research are provided in carbohydrate, lipid, nucleic acid, protein, and steroid biochemistry, and varying emphasis on enzymology, metabolism, physical chemistry, structural studies, or biochemical genetics. Some summer research scholarships are offered to students of medicine.

FIRST YEAR

Bio 451. General Biochemistry
Involves the basic concepts of biochemistry. Designed for qualified undergraduate, medical, and graduate students. This course or an equivalent course is a prerequisite for advanced courses. Lectures only. Credit 4 units.

Bio 531. Advanced Biochemistry
A discussion of the biochemistry of organized systems, with special emphasis on problems relevant to medicine. Extensive reading of original literature will be required. The course will consist of four parts: (1) metabolic regulation, including a study of hormonal control; (2) structure and function of membranes and organelle biogenesis; (3) gene expression in higher organisms, including malignant transformation; (4) biochemistry of specialized organs or tissues; for example, connective tissue, bone, blood clotting, etc. Credit 4 units.

RESEARCH

Bio 590. Research Opportunities
These are offered in the following areas of biochemistry:
- X-ray analysis of protein structure; structure and mechanism of enzymes, lipoproteins.  
  (Dr. Banaszak)
- DNA sequence analysis and genetic engineering of bacterial DNA; transcriptional control of bacterial operons.  
  (Dr. Barnes)
- Biochemical investigation of metabolic disorders of carbohydrate metabolism.  
  (Dr. B. Brown)
- Studies of pathways of carbohydrate metabolism in mammalian tissues.  
  (Dr. D. Brown)
- Enzymology of replication of yeast chromosomal DNA.  
  (Dr. Burgers)
- Mechanism of enzyme reactions.  
  (Dr. Drysdale)
- Studies of mobility on animal cell surfaces and of interactions between surface and cytoskeleton.  
  (Dr. Elson)
- Structure, function, and topography of cell-surface macromolecules responsible for chemotaxis and cell cohesion.  
  (Dr. Frazier)
- Actin and actin binding proteins. Enzyme kinetic theory and enzyme mechanisms. Protein-protein interactions.  
  (Dr. Frieden)
- Cell-cell recognition in normal and malignant cells. Growth control and mechanism of mitogen action.  
  (Dr. Glaser)
- Regulation of gene expression in the intestine; compartmentalization of enterocyte proteins.  
  (Dr. Jeffrey I. Gordon)
- Computer methods in biochemistry and mass spectrometry. Modelling the assembly and motion of cell structures.  
  (Dr. Holmes)
- Regulation of blood coagulation, functional properties of coagulation proteases, protease inhibitors, and heparin.  
  (Dr. Jackson)
- Structure of the oligosaccharides of soluble and membrane glycoproteins and their interactions with lectins.  
  (Dr. R. Kornfeld)
- Membrane biochemistry of prokaryotes and eukaryotes.  
  (Dr. Silbert)
  (Dr. Strauss)
Department of Biological Chemistry

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.

Bio 5301. Laboratory Computer Programming
Bio 5351. Molecular Biology
Bio 537. Protein Chemistry and Enzyme Mechanisms
Bio 538. Structure and Function of Cell Membranes and Surfaces
Bio 540. Cell Surface Receptors
Bio 5451. Introductory Biophysical Chemistry
Bio 548. Nucleic Acids and Protein Biosynthesis

Faculty of the Department of Biological Chemistry

Professor and Head of Department
Luis Glaser, B.A., University of Toronto, 1953; Ph.D., Washington University, 1956.

Distinguished Service Professor Emeritus

Professors
Leonard J. Banaszak, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Physiology and Biophysics.)
David H. Brown, B.S., California Institute of Technology, 1942; Ph.D., 1948. (See Administration.)
Thomas F. Deuel, A.B., Princeton University, 1957; M.D., Columbia University, 1961. (See Department of Medicine.)
George R. Drysdale, B.S., Birmingham-Southern College, 1948; M.S., University of Wisconsin, 1950; Ph.D., 1952.

Carl Frieden, B.A., Carleton College, 1951; Ph.D., University of Wisconsin, 1955.
Craig M. Jackson, B.S., Washington State University, 1965; Ph.D., University of Washington, 1967. (See Department of Medicine.)
Rosalind H. Kornfeld, B.S., George Washington University, 1957; Ph.D., Washington University, 1961. (See Department of Medicine.)
Stuart A. Kornfeld, A.B., Dartmouth College, 1958; M.D., Washington University, 1962. (See Department of Medicine.)
Philip W. Majorus, M.D., Washington University, 1961. (See Department of Medicine.)
Garland R. Marshall, B.S., California Institute of Technology, 1962; Ph.D., Rockefeller University, 1966. (See Department of Physiology and Biophysics.)
F. Scott Mathews, B.S., University of California, 1948; Ph.D., University of California, 1955. (See Department of Physiology and Biophysics.)
Blake W. Moore, B.S., University of Akron, 1948; Ph.D., Northwestern University, 1952. (See Department of Psychiatry.)
William D. Phillips, B.A., University of Kansas, 1948; Ph.D., Massachusetts Institute of Technology, 1951. (Also Faculty of Arts and Sciences.)
William R. Sherman, A.B., Columbia University, 1951; Ph.D., University of Illinois, 1955. (See Department of Psychiatry.)
David F. Silbert, A.B., Harvard University, 1958; M.D., 1962.
Robert E. Thach, A.B., Princeton University, 1961; Ph.D., Harvard University, 1964. (Also Faculty of Arts and Sciences.)
Joseph J. Volpe, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Departments of Neurology and Neurological Surgery and Pediatrics.)
James C. Warren, A.B., University of Wisconsin, 1950; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Obstetrics and Gynecology.)

Professor (Adjunct)
Howard A. Schneiderman, B.A., Swarthmore College, 1948; Ph.D., Harvard University, 1952.

Associate Professors
Oscar P. Chibon, B.S., Arkansas State Teachers College, 1955; M.S., University of Arkansas, 1958; Ph.D., Florida State University, 1963. (Also Faculty of Arts and Sciences.)
Sarah C.R. Elgin, B.A., Pomona College, 1967; Ph.D., California Institute of Technology, 1971. (See Department of Biology.)
William A. Frazier, A.B., Johns Hopkins University, 1969; Ph.D., Washington University, 1973. (See...
Department of Biological Chemistry

Department of Anatomy and Neurobiology.

David I. Gottlieb, B.A., State University of New York, Binghamton, 1964; M.A., University of Wisconsin, 1969; Ph.D., Washington University, 1971. (See Department of Anatomy and Neurobiology.)

William E. Holmes, A.B., Princeton University, 1953; Ph.D., University of Pennsylvania, 1960. (See Biomedical Computer Laboratory.)

John J. Jeffrey, Jr., B.S., College of the Holy Cross, 1958; Ph.D., Georgetown University, 1965. (See Department of Medicine.)

Arnold W. Strauss, B.A., Stanford University, 1966; M.D., Washington University, 1970. (See Department of Pediatrics.)

Assistant Professors

Wayne M. Barnes, A.B., University of California, 1969; Ph.D., University of Wisconsin, 1974.


John A. McDonald, B.S., University of South Florida, 1965; M.S., University of Florida, 1967; Ph.D., Rice University, 1973; M.D., Duke University Medical School, 1973. (See Department of Internal Medicine, Jewish Hospital.)

Mark B. Willard, B.A., Oberlin College, 1965; Ph.D., University of Wisconsin, 1971. (See Department of Anatomy and Neurobiology.)

Research Assistant Professor

Richard Wrenn, B.S., Virginia Polytechnic and State University, 1972; M.S.E.E., Washington University, 1975; D.S.C., 1979. (See Electrical Engineering.)

Instructors


Dan Cassel, B.Sc., Hebrew University of Jerusalem, 1972; Ph.D., Hebrew University of Jerusalem, 1977.

Gregory Grant, B.S., Iowa State University, 1971; Ph.D., University of Wisconsin, 1975. (See Department of Medicine.)

William H. Holland, A.B., Washington University, 1950. (See Department of Psychiatry.)


Lecturer

Walter G. Wiest, A.B., Brigham Young University, 1948; Ph.D., University of Wisconsin, 1952. (See Department of Obstetrics and Gynecology.)
James S. McDonnell
Department of Genetics

The James S. McDonnell Department of Genetics was formed in the fall of 1975 to develop a program of preclinical and graduate instruction in genetics. A medical genetics course in the second semester of the first year is designed to introduce advanced aspects of human and medical genetics. (Clinical training in genetics is offered in the fourth year by the Division of Medical Genetics of the Departments of Medicine and Pediatrics.)

The faculty of this new department is currently being recruited. As the department expands, most major areas of active genetic investigation and interest will be represented, and a broad, comprehensive program of research and graduate training opportunities will be developed. Advanced courses in human genetics and immunogenetics are offered in the second semester. Additional graduate courses are being developed. Opportunities for research training and experience are available at all levels.

**FIRST YEAR**

**Bio 550. Medical Genetics**
Lectures and clinical conferences on human and medical genetics that include population and quantitative genetics, clinical cytogenetics, biochemical genetics and metabolic defects, counseling, and immunogenetics. Lectures and clinical conferences only. Credit 2 units. Prerequisite, an introductory genetics course or permission of the instructor. (Dr. Levine)

**RESEARCH**

**Bio 590. Research Opportunities**
These are offered in the following areas of genetics:
- Mechanisms of gene transposition and plasmid-host cell interactions. (Dr. Berg)
- Genetics of psychiatric disease. (Dr. Cloninger)
- Molecular-genetic relationships of products of the major histocompatibility gene complexes. (Dr. Cullen)
- Genetics of psychiatric disease, behavioral genetics. (Dr. Gottesman)
- The genetic and immunologic basis for transplantation reactions. (Dr. Graff)
- Experimental population genetics. (Dr. Hartl)
- Genetic disorders of amino acid metabolism. (Dr. Hillman)
- Population and biochemical genetics of enzyme polymorphisms. (Dr. Johnson)
- Genetic specification of membrane structure. (Dr. Levine)
- Molecular organization of eukaryotic chromosomes. (Dr. Olson)
- Human population genetics and genetic epidemiology. (Dr. Rao)
- Genetics of psychiatric disease. (Dr. Reich)
- Immunogenetics and biochemical genetics of the major histocompatibility gene complexes. (Dr. Shreffler)
- Genetics of lysosomal storage disease. (Dr. Sly)
- Human population genetics. (Dr. Suarez)
- Population and developmental genetics of parthenogenetic Drosophila. (Dr. Templeton)
- Genetics of muscle development in the nematode. (Dr. Waterston)
- Theoretical population genetics. (Dr. Yokoyama)

**ELECTIVE**

**Bio 522. Immunogenetics**
Genetic and immunologic aspects of variant systems detected by immunologic methods: blood groups, allo-types, and histocompatibility antigens. Genetic dissection of immunologic mechanisms. (Dr. Shreffler)

**Research Opportunities** (Course Number M20 900)
Development of muscle using electron microscopy, genetics, and biochemical approaches. (Dr. Waterston)

*Note*—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.
Faculty of the James S. McDonnell Department of Genetics

James S. McDonnell Professor of Genetics and Head of Department

Professors
C. Robert Cloninger, B.A., University of Texas, 1966; M.D., Washington University, 1970. (See Department of Psychiatry.)
Irving I. Gottesman, B.S., Illinois Institute of Technology, 1953; Ph.D., University of Minnesota, 1960. (See Department of Psychiatry.)
Daniel L. Hartl, B.S., University of Wisconsin, 1965; Ph.D., 1968. (Also Faculty of Arts and Sciences.)
Richard E. Hillman, A.B., Brown University, 1962; M.D., Yale University, 1965. (See Department of Pediatrics.)
George B. Johnson, B.A., Dartmouth College, 1964; M.A., 1966; Ph.D., Stanford University, 1972. (Also Faculty of Arts and Sciences.)
R. Paul Levine, A.B., University of California, Los Angeles, 1949; Ph.D., 1951.
Theodore Reich, B.S., McGill University, 1959; M.D., 1963. (See Department of Psychiatry.)
William S. Sly, M.D., St. Louis University, 1957. (See Departments of Medicine and Pediatrics.)
Alan R. Templeton, A.B., Washington University, 1969; M.A., University of Michigan, 1972; Ph.D., 1972. (Also Faculty of Arts and Sciences.)

Associate Professors
Douglas E. Berg, B.S., Cornell University, 1964; Ph.D., University of Washington, 1969. (See Department of Microbiology and Immunology.)
Susan E. Cullen, B.S., College of Mount St. Vincent, 1965; Ph.D., Albert Einstein College, 1971. (See Department of Microbiology and Immunology.)

Assistant Professors
Ian W. Duncan, B.Sc., University of British Columbia, 1974; Ph.D., University of Washington, 1978. (Also Faculty of Arts and Sciences.)
H. Mark Johnston, B.A., University of Wisconsin, 1974; Ph.D., University of California, Berkeley, 1980.
Maynard V. Olson, B.S., California Institute of Technology, 1965; Ph.D., Stanford University, 1970.
Shozo Yokoyama, B.S., Miyazaki University, 1968; M.S., Kyushu University, 1971; Ph.D., University of Washington, 1977. (See Department of Psychiatry.)

Research Associate Professors
Miroslav Hauptfeld, M.D., University of Zagreb, 1963.
Vera Hauptfeld, Ph.D., Charles University, 1968.

Instructor
Joseph W. Hoffmann, B.A., Washington University, 1970; M.Sc., University of Missouri, 1975; Ph.D., Massachusetts Institute of Technology, 1981. (See Department of Pediatrics.)
John Milliken
Department of Medicine

The general medicine teaching services of the department are located at Barnes Hospital, Jewish Hospital, and Veterans Hospital (John Cochran Division) under the following directors:

Barnes Hospital, Dr. Kipnis
House Staff Training Program, Dr. Hammerman
Jewish Hospital, Dr. Peck
House Staff Training Program, Dr. Lefrak
Veterans Hospital, Dr. Chase

In addition, for the purposes of both teaching and research, the Department of Medicine is divided into specialty divisions at Barnes Hospital and Jewish Hospital under the following directors:

Bone and Mineral Diseases, Dr. Avioli
Cardiovascular Diseases, Drs. Sobel, Kleiger
Dermatology, Dr. Eisen
Endocrinology and Metabolism, Dr. Daughaday
Gastroenterology, Drs. Alpers, Stenson
Hematology-Oncology, Drs. Majerus, S. Kornfeld, T. Deuel
Immunology and Allergy Diseases, Dr. C. Parker,
Infectious Diseases, Drs. Medoff, Little
Laboratory Medicine, Dr. McDonald
Medical Genetics, Dr. Sly
Pulmonary Diseases, Drs. Pierce, Senior
Renal Diseases, Drs. Klahr, Hruska
Rheumatology, Dr. Atkinson

Instruction in Medicine is provided during all four years of the medical curriculum, beginning with human genetics and an introductory course in the first year. Teaching in the second year has two main objectives: the correlation of the basic sciences with the 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 prepared for supervised clinical study of individual patients. A junior clerkship of 12 weeks, divided into two six-week periods, is served on one of the medical services supervised by the department. In the final year, students may elect a subinternship in general medicine or select any of a series of elective courses offered in the various medical subspecialties.

FIRST YEAR
Topics in Clinical Medicine
This interdepartmental course is designed to stimulate student interest in clinical medicine through carefully selected and presented discussions of both the clinical and basic science features of a number of illnesses. The course director involves faculty from the several clinical departments in structuring the direction, content, and presentation of the subject. (Dr. Kipnis and Staff)
SECOND YEAR
Teaching by the Department of Medicine is designed to (1) prepare the student for the transition from the preclinical sciences to the study of the sick patient at the bedside, (2) help him analyze the manifestations of disease in terms of the altered mechanisms responsible for these manifestations, and (3) introduce him to the techniques of examination which are used regularly on all clinical services with the beginning of junior clerkships. This instruction is at times undertaken jointly with members of other clinical departments, and is coordinated when practicable with subject matter presented by the Department of Pathology.

(a) Pathophysiology
Selected topics in clinical medicine are discussed in detail to illustrate the application of biochemical, physiological, and anatomical information in the understanding of pathological states. Cardiovascular and renal, neurological, gastrointestinal, hematological, metabolic, nutritional, and developmental diseases are reviewed by an interdepartmental faculty. Emphasis is placed on the use of fundamental information in approaching clinical problems as a way of thinking in preparation for a lifetime of medicine, during which much new information will constantly be acquired. (Department of Medicine Staff)

(b) Preparation for Clinical Medicine
PCM is a multidisciplinary, clinical data collection and problem-solving course designed to prepare students for meaningful participation in third year clinical activities as a member of the health care team. Centrally coordinated, the clinical aspects of Human Sexuality, Psychiatry, Pediatrics, Surgery, Ophthalmology, Otolaryngology, Obstetrics, Gynecology, Radiology, Growth and Development, and Neurology are integrated with generic clinical data collection and problem-solving skills. A variety of instructional formats are used including lecture, demonstration, film and video tape, supervised peer examination, evaluation of clinical subjects, simulating patient care situations, and computer-assisted instruction as well as supervised interaction with patients in both the ambulatory and hospital setting. Data collection, data processing, and problem solving are the desired skills; a view that the patient as a social being interacting with his illness, family, environment, and physician is the desired attitude.

During the 269 hours of instruction, the mean student-faculty ratio is less than 6:1. (Dr. Tutur and Staff)

THIRD YEAR
General Medicine
Supervised study of patients on the medical nursing divisions of Barnes Hospital (both Blue and Red), Jewish Hospital, and St. Louis Veterans Administration Hospital. Students are assigned in rotation as clinical clerks to the patients admitted to these services. Teaching is provided by attending physicians, house officers, consultants, and at regularly scheduled conferences. Formal instruction will be given in medical therapeutics during the junior clerkship. Students serve for six weeks on two of the five services. (Drs. Chase, Kipnis, Peck, and Staff)

(a) Clinical Pathological Conference
Abstracts of the clinical records of patients upon whom postmortem examinations have been performed are presented in advance to members of the third- and fourth-year classes and to members of the medical staff. At each conference the diagnosis is discussed in detail by the clinical staff before the anatomical findings are presented by the pathologists. (Dr. Kipnis and Medical Staff, Dr. Kissane and Pathology Staff)

FOURTH YEAR ELECTIVES
Medical Subinternship
Medical subinternships, in multiples of six weeks, are offered to a limited number of students on the following medical services: Barnes Hospital Blue Service, Jewish Hospital, St. Louis Veterans Administration Hospital, and St. Luke's Hospital. Duties and responsibilities, including nights on call, will be those of an intern, with the proviso that requirements of Missouri state law must be met (e.g., orders must be countersigned by a licensed physician, etc.). The workload will be lighter than that for interns to insure ample time for reading about patients. Instruction and supervision will be provided by the appropriate chief of service, attending physicians, consultants, and house officers. Attendance at scheduled teaching conferences is required. The subinternship should be especially valuable to students who plan to take straight medical internships and to those who plan to go directly into a specialty residency program without first serving an internship of any kind (e.g., neurology, psychiatry, etc.). (Drs. Chase, Kipnis, Paine, Peck, and Staff)

Clinical Pathological Conference
Thursday, 12-1 p.m., September to June. (Dr. Kipnis and Medical Staff, Dr. Kissane and Pathology Staff)

Arthritic and Rheumatic Diseases
(a) Clinical Rheumatology. Barnes, Jewish, and VA six weeks, all day. Students will participate in consultative service and clinic and inpatient practices. Laboratory experience also available. (Dr. Atkinson and Staff)

(b) Research.
1. Immunogenetics of complement proteins and the biochemistry and function of cell surface receptors for immunoglobulins and complement. (Dr. Atkinson)
2. Antigenic specificity and pathogenicity of monoclonal antibodies of DNA are being studied in the mouse models of SLE, as well as alterations of those antibodies with idiotypies. (Dr. Hahn)
3. Structure of the human major histocompatibility complex (HLA) antigens. Mechanisms of HLA and disease associations. (Dr. Schwartz)
4. Students to participate in research procedures which include quantitation of the cell functions of chemotaxis, phagocytosis, and lysosomal enzyme release, isolation of cell receptors for chemotactic factors and purification of enzymes involved in neutrophil activation. (Dr. Spilberg)
Cardiovascular Disease

(a) Clinical Cardiology. Barnes Hospital, six weeks, all day. Students will participate as members of Cardiovascular Division clinical team, both in the Cardiac Diagnostic Laboratory and Coronary Care Unit. Particular emphasis will be placed on clinical diagnosis, electrocardiography and the noninvasive techniques.

(b) Clinical Cardiology. St. Luke's Hospital, six weeks, all day. Students are assigned to Cardiology Division in the cardiology intensive care unit, heart station, echo laboratory, nuclear cardiology laboratory and catheterization laboratory.

(c) Clinical Cardiology. Jewish Hospital, six weeks, all day. Students have experience in seeing patients on the cardiology consult service and cardiac catheterization service, reading electrocardiograms, and participating in activities of the Coronary Care Unit and the Graphics Laboratory. In addition, students may observe procedures in the cardiac catheterization laboratory.

(d) Cardiac Catheterization and Hemodynamics. Highly specialized elective. Six weeks. Students will attend cardiac catheterization procedures and conferences; will perform complete “workups” of patients in preparation for catheterization, etc.; and will observe all hemodynamic and angiographic procedures.

(e) Electrocardiography. Jewish Hospital. Course designed to give the student familiarity with concepts involved in the interpretation of electrocardiography.

(f) Cardiac Arrhythmias and Clinical Electrophysiology. Jewish Hospital. Provides the student with exposure and teaching in the diagnosis and treatment of complex cardiac rhythm disturbances.

(g) Research. Minimum of 12 weeks, all day.
   1. Lipids in cultured myocardial cells. (Dr. Ahumada)
   2. External assessment of myocardial metabolism and ischemic injury with positron-emitting isotopes. (Dr. S. Bergmann)
   3. Experimental analysis of mechanisms of arrhythmia. (Dr. Corr)
   4. Exercise physiology. (Dr. Ehsani)
   5. Hemodynamics, myocardial mechanics, and ventricular function (cardiac catheterization). (Dr. Ludbrook)
   6. Ultrasonic assessment of cardiac metabolism. (Dr. Perez)
   7. Detection, quantification, and assessment of the mediation of myocardial ischemic injury. (Dr. Sobel)

Dermatology

(a) Clinical Clerkship. Students participate in both inpatient and outpatient care. Stress is placed on the dermatologic variations normally encountered, identification of common skin diseases, dermatologic clues to systemic disease, etc. Instruction is given in cutaneous histopathology and clinical mycology.

(b) Research. Minimum of 12 weeks, all day.
   1. Biochemistry and regulation of mammalian connective tissue degradation. (Drs. Bauer, Cooper, Eisen, Grant, Jeffrey, Seltzer, Stricklin, and Welgus)
   2. Origins of DNA replication in mammalian cells. (Dr. G. Goldberg)
   3. Physiology and immunology of pathogenic fungi; molecular basis of morphogenesis and cellular differentiation in Histoplasma capsulatum; and host-parasite interaction and experimental therapeutics in the systemic mycotic infections. (Dr. Kobayashi)

Gastroenterology

(a) Clinical Gastroenterology. Six weeks, all day. Students participate in the study of patients with a spectrum of digestive diseases, have responsibility for patients on whom consultations have been requested, receive instruction in specialized diagnostic techniques, and participate in the conferences and clinics run by the Division.

(b) Research. Minimum of 12 weeks, all day.
   1. Research on intestinal protein metabolism. (Dr. Alpers)
   2. Research on lymphocyte function in human disease. (Dr. R. MacDermott)
   3. Clinically applied research on viral hepatitis. (Dr. Perrillo)

General Internal Medicine

(a) Clerkship in Primary Care in General Internal Medicine is designed to provide the student with first-hand experience in general internal medicine practice in a model ambulatory care setting, the Medical Care Group of St. Louis (MCG). The major component of the clerk-
ship is direct patient care under the supervision of senior internists who are members of the group.

(Drs. J. Garrett, L. Kahn, and Staff)

Genetics
(a) Research. Minimum of 12 weeks, all day.
1. Investigation of inherited amino acid transport defects, enzyme replacement therapy, and lysosomal storage diseases.

(Dr. Majerus)

Hematology and Oncology
(a) Clinical Hematology and Oncology. Six weeks, all day. Students receive intensive instruction in morphology, specialized diagnostic techniques, and management of patients with hematologic and oncologic disorders. Two separate clerkships are offered.

(Drs. S. Kornfeld, Majerus, Denes)

(b) Clinical Hematology/Oncology. Barnes Hospital. Six weeks, all day. Activities include the work-up, evaluation, and treatment primarily of inpatients undergoing experimental chemotherapy for hematologic malignancy and/or selected solid tumors. Emphasis is placed on attempts to develop curative therapy utilizing bone marrow transplantation as a myeloprotective device.

(Dr. Phillips)

(c) Clinical Oncology. Cochran VA Hospital. Six weeks, all day. Students receive major exposure to management of non-small cell and small cell lung cancer and of carcinoma of the colon, prostate, head, and neck. General oncological topics such as pain management, hypercalcemia of malignancy, malignant effusions, and neurooncology will be treated.

(Dr. Abbey)

(d) Clinical Hematology/Oncology. Jewish Hospital. Six weeks, all day. Students will participate on inpatient consultation service, but equal emphasis will be given to the care of outpatients with cancer and hematologic disease. One afternoon/wk will be spent at Marilyn Fixman Breast Center, a multidisciplinary center specializing in diseases of the breast. Opportunity available to rotate to offices of private practitioners on staff.

(Dr. A. Lyss)

(e) Research. Minimum of 12 weeks, all day.

(Dr. N. Baenziger)

2. Biochemistry and mechanisms of action of the platelet-derived growth factor (PDGF).

(Dr. T. Deuel)

3. Studies of neutrophil physiology, cryopreservation of bone marrow stem cells, and effector mechanism in tumor immunity.

(Dr. Herzig)


(Drs. R. Kornfeld, S. Kornfeld)

5. Biochemistry of platelets, regulation of lipid metabolism in tissue culture; mechanism of platelet thrombus formation.

(Dr. Majerus)

6. Construction of systems using recombinant DNA technology to allow expression of barley alpha-amylase and study of organization and expression of steroid-hormone regulated genes.

(Dr. Rogers)

7. Biochemical studies of interactions of plasma protease inhibitors with coagulation protease.

(Dr. Tollefsen)

Hypertension
Research. Individualized research project and/or participation in a community hypertension program.

(Dr. Perry)

Immunology
(a) Allergy and Clinical Immunology. Students will participate in the allergy consult service at Barnes and Jewish Hospitals. They will be primary consult and will present each patient to the allergy fellows on call and the attending physician.

(Dr. Wedner)

(b) Research. Minimum of 12 weeks, all day.
1. The biology of mouse macrophage clones in culture: monokine secretion, cell activation, antigen presentation.

(Dr. Little)

Infectious Disease
(a) Clinical Infectious Diseases. Study of ward and private patients. Barnes Hospital, six weeks, all day.

(Dr. Medoff)

(b) Research.
1. Integration-function of oncogenic virus DNA.

(Dr. Gelb)

2. Effective therapy for fungal infections, control of membrane permeability of fungi, normal and transformed animal cells, alteration and control of immunologic response to infection and tumors, drug studies on bacterial pathogens.

(Dr. Medoff)

Laboratory Medicine
(a) Clinical Laboratory Medicine. Proper use of the laboratory in clinical medicine, basic operation of each area, daily activities and reading assignments, participation in rounds and conferences.

(Dr. McDonald)

(b) Research.
1. Antigens and immunity in human lung carcinomas. Projects include: detection and analysis of relevant human lung carcinoma plasma membrane antigens using monoclonal antibodies, purification, and characterization of these antigens, establishment and application of in vitro immunologic assays involving these antigens, analysis of the immunologic suppression in lung cancer patients.

(Dr. Bell)

2. The possible role of insulin in the regulation of intracellular calcium homeostasis.

(Dr. Chan)

3. Regulation of the immune response as governed by gene products of the human major histocompatibility complex.

(Dr. Gebel)


(Dr. Kobayashi)


(Dr. Krogstad)
6. Electrolyte partition in biological fluids.  
   (Dr. Ladenson)

7. Development of rapid techniques for recognition and identification of anaerobic bacteria in body fluids, analysis of nutritional requirements of anaerobic bacteria, development of standardized susceptibility testing methods for anaerobic bacteria, and in vitro assays of new antimicrobial agents.  
   (Dr. Murray)

8. Mechanism of insulin action at the cellular level and application of cellular research in diagnosis and treatment of diabetics.  
   (Dr. McDonald)

9. Relationship between IgG subclass restriction to many pyogenic infections.  
   (Dr. Nahm)

10. Applicability and appropriateness of analytical techniques and theoretical concepts underlying the field of medical decision analysis are investigated.  
    (Dr. Parvin)

11. Research elective designed to familiarize student with fundamental concepts and techniques of histocompatibility and transplantation immunology. (Dr. Rodey)

12. The mechanism of adhesion to and activation of platelets by collagen and the role of von Willebrand factor in this process.  
   (Dr. Santoro)

13. Arachidonic acid metabolism by isolated pancreatic islets from the rate and the role of arachidonate metabolites in the modulation of peptide hormone secretion.  
    (Dr. Turk)

Metabolism and Endocrinology

(a) Clinical Clerkship. Students see inpatients and outpatients with endocrine and metabolic disease and participate in the rounds and conferences of the Metabolism Division.  
   (Drs. Avioli, Daughaday, and Staff)

(b) Bone and Mineral Metabolism. Jewish Hospital. Designed to acquaint student with clinical, radiological, and pathological manifestations of generalized disorders of the skeleton and to expose him to current concepts of therapy.  
   (Drs. Avioli, S. Birge, Chase, T. Hahn, and Whyte)

(c) Research. Minimum of 12 weeks, all day.

1. Research will involve the study of the mechanisms of action of vitamin D.  
   (Drs. Avioli, S. Birge, Chase, T. Hahn, and Whyte)

2. Pituitary physiology: growth hormone, prolactin.  
   (Dr. Daughaday)

3. Polypeptide hormone receptors in endocrine research; theoretical background developed. Radio-receptor assay experience will be provided and clinical applications of assays will be emphasized.  
   (Dr. Gavin)

4. The pathophysiology of hypercholesterolemias. Cultured human skin fibroblasts and arterial endothelial and smooth muscle cells are used to study the cholesterol metabolism and the interaction of lipoproteins with tissues in well-defined familial hypercholesterolemias.  
   (Dr. Ostlund)

5. Studies of the insulin gene and regulation of insulin gene expression in human diabetes and experimental animals.  
   (Dr. Permutt)
Pharmacology/Medicine

Role of endogenous eicosanoids on cellular transport and renal vascular tissue. Phospholipid and complex lipid metabolism in relation to renal injury. (Dr. Morrison)

Pulmonary Disease and Function

(a) Medical Aspects of Pulmonary Disease. A full-time elective, periods one through eight. Elective offered at both Barnes and Cochran V.A. Hospital.

(Drs. Pierce, Tuteur, and Staff)

(b) Pulmonary Medicine. Six weeks. Students will work up patients and participate in teaching conferences and work rounds. Jewish Hospital.

(Drs. Senior, Lefrak, and Staff)

(c) A full-time elective in Intensive Care Medicine offered in the MICU at Jewish Hospital, periods one through eight.

(Dr. Lefrak and Staff)

(d) A full-time elective in intensive care medicine offered in the MICU and RICU at Barnes Hospital

(Dr. Schuster and Staff)

(e) Research

1. Clinical research in various aspects of chronic obstructive pulmonary disease.

(Dr. Pierce)

Renal Disease

(a) Clinical Nephrology. Barnes Hospital, six weeks, all day. Study of patients with renal disease and electrolyte disorders.

(Dr. Klahr and Staff)

(b) Clinical Nephrology. Jewish Hospital. Students will be provided opportunity to evaluate patients on the renal consultant service, participate in daily clinical nephrology rounds, and participate in combined rounds.

(Dr. Hruska)

(c) Mixed clinical and research electives.

1. Micropuncture of superficial and deep nephrons and the physiology of urinary acidification.

(Dr. Buerkert)

2. Studies on physiology of isolated renal tubular segments with an emphasis on acid-base metabolism and influence of pH on transport.

(Dr. Lee Hamm)


(Drs. Hammerman & Cohn)

4. Effects of uremia on isolated muscle protein synthetic and catabolic rates; effects of vitamin D, catecholamines, and insulin on in vitro muscle metabolism; and gastrointestinal abnormalities associated with chronic renal disease, hemodialysis, and renal transplantation.

(Dr. Harter)

5. Cellular mechanisms of parathyroid hormone action. Renal phospholipid metabolism and effects of parathyroid hormone.

(Dr. Hruska)


(Dr. Klahr)

7. Role of chemotaxis in osteoclast recruitment and the pathophysiology of renal osteodystrophy, cellular control of osteoclast function, effects of vitamin D analogues, calcitonin, and PTH on osteoclast. (Dr. Malone)


(Dr. K. Martin)

9. The effects of uremia on energy production in skeletal muscle cells utilizing nuclear magnetic resonance (NMR).

(Dr. V. Melzer)

10. Studies on the biochemical control of parathyroid hormone mitochondrial dysfunction and renal prostacycline synthesis.

(Dr. Morrissey)


(Dr. Purkerson)

12. Radioimmunoassay for parathyroid hormone. Role of the liver in the metabolism of parathyroid hormone. Studies investigate interrelationships between vitamin D metabolites and parathyroid metabolism.

(Dr. Slatopolsky)
Faculty of the John Milliken Department of Medicine

Adolphus Busch Professor and Chairman of Department
David M. Kipnis, A.B., Johns Hopkins University, 1945; M.A., 1949; M.D., University of Maryland, 1951.

John E. and Adaline Simon Professor and Associate Chairman of Department

Sydney M. and Stella H. Shoemberg Professor
Louis V. Avioli, B.A., Princeton University, 1953; M.D., Yale University, 1957.

Professors Emeriti
Carl G. Harford, A.B., Amherst College, 1928; M.D., Washington University, 1933. (See Medical Care Group.)
Virginia Minnich, B.S., Ohio State University, 1937; M.S., Iowa State College, 1938.
Edward H. Reinhard, A.B., Washington University, 1953; M.D., 1939. (See Department of Radiology.)
Robert E. Shank, A.B., Westminster College, 1935; M.D., Washington University, 1939. (See Department of Preventive Medicine and Public Health.)

Professors
Eugene A. Bauer (Dermatology), B.S., Northwestern University, 1963; M.D., 1967.
Elmer B. Brown, Jr., A.B., Oberlin College, 1946; M.D., Washington University, 1950. (See Administration.)
Hugh Chaplin, Jr., A.B., Princeton University, 1943; M.D., Columbia University, 1947. (See Department of Pathology.)
Philip E. Cryar, B.A., Northwestern University, 1962; M.D., 1965. (Also Clinical Research Center.)
William H. Danforth, A.B., Princeton University, 1947; M.D., Harvard University, 1951. (See Administration.)
William H. Daughaday, A.B., Harvard University, 1940; M.D., 1943.

Thomas F. Deuel, A.B., Princeton University, 1957; M.D., Columbia University, 1961. (See Department of Biological Chemistry.)
Arthur Z. Eisen (Dermatology), A.B., College of the Holy Cross, 1958; Ph.D., Georgetown University, 1965. (See Department of Biological Chemistry.)
John J. Jeffrey, Jr. (Dermatology), B.S., University of Pennsylvania, 1958; Ph.D., Harvard University, 1960. (See Department of Microbiology and Immunology.)
M. Kenton King, B.A., University of Oklahoma, 1947; M.D., Vanderbilt University, 1951. (See Administration and Department of Preventive Medicine and Public Health.)
Saulo Klahr, B.S., College of Santa Librada, 1954; M.D., Universidad Nacional de Colombia, 1959.
Robert E. Kleiger, B.A., Yale University, 1956; M.D., Harvard University, 1960.
George S. Kobayashi (Microbiology), B.S., University of California, 1952; Ph.D., Tulane University, 1963. (See Department of Microbiology and Immunology.)
Rosalind H. Kornfeld, B.S., George Washington University, 1957; Ph.D., Washington University, 1961. (See Department of Biological Chemistry.)
Stuart A. Kornfeld, A.B., Dartmouth College, 1958; M.D., Washington University, 1962. (See Department of Biological Chemistry.)
J. Russell Little, Jr., A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Medical Genetics and Immunology.)
Philip A. Ludbrook, M.B., B.S., University of Adelaide, 1963. (See Department of Radiology.)
Jay M. McDonald, B.S., Tufts University, 1965; M.D., Wayne State University, 1969. (See Department of Pathology.)(Director of Diagnostic Laboratories, Barnes Hospital.)
Philip W. Majerus, M.D., Washington University, 1961. (See Department of Biological Chemistry.)
Gerald Medoff, A.B., Columbia College, 1958; M.D., Washington University, 1962. (See Department of Microbiology and Immunology.)
Charles W. Parker (Howard Hughes Medical Institute Investigator in Medicine), M.D., Washington University, 1953. (See Department of Microbiology and Immunology.)
H. Mitchell Perry, Jr., M.D., Washington University, 1946.
John A. Pierce, M.D., University of Arkansas, 1948.
Glenn E. Rodey, B.S., Ohio University, 1957; M.D., Ohio State University, 1961. (See Department of Pathology.)
David Schlessinger (Microbiology), B.A., University of Chicago, 1955; B.S., 1957; Ph.D., Harvard University, 1960. (See Department of Microbiology and Immunology.)
Gustav Schonfeld, A.B., Washington University, 1956; M.D., 1960. (See Department of Preventive Medicine and Public Health.)
Barry A. Siegel, A.B., Washington University, 1965; M.D., 1969. (See Department of Radiology.)
Eduardo Slatopolsky, M.D., University of Buenos Aires, 1959.
William S. Sly, M.D., St. Louis University, 1957. (See Departments of Genetics and Pediatrics.)
John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration and Department of Preventive Medicine and Public Health.)

Professor (Adjunct)
Robert M. Donati, B.A., St. Louis University, 1955; M.D., 1959. (Chief of Staff, Veterans Administration Hospital.)

Research Professor
Irene E. Karl, B.S., University of Wisconsin, 1937; M.A., 1938; Ph.D., 1940.

Professors Emeriti (Clinical)
Clinton W. Lane (Dermatology), A.B., St. Mary's College, 1916; M.D., St. Louis University, 1921.
Edward Massie, A.B., Washington University, 1931; M.D., 1935.
Professors (Clinical)

L. J. Fiance, A. B., Washington University, 1931; M. D., 1935.


Ralph V. Gieselmann, M. D., Washington University, 1947.

Neville Grant, A. B., Yale University, 1950; M. D., Columbia University, 1954.


Michael M. Karl, B. S., University of Wisconsin, 1936; M. D., University of Louisville, 1938.

Marvin E. Levin, A. B., Washington University, 1947; M. D., 1951.

Virgil Loeb, Jr., M. D., Washington University, 1944.

William V. Miller (Visiting Staff), A. B., University of Missouri, 1962; M. D., 1966. (See Department of Pathology.)

G. Charles Oliver, A. B., Harvard University, 1953; M. D., 1957.

Robert Paine, M. D., Harvard University, 1944.

Laurence A. Sherman, B. A., B. S., University of Chicago, 1956; M. D., Albany Medical College, 1964. (See Department of Pathology.)

Franz U. Steinberg, M. D., University of Berne, 1938. (See Departments of Preventive Medicine and Public Health and Surgery.)

Associate Professors

John P. Atkinson (Howard Hughes Medical Institute Investigator in Medicine), A. B., University of Kansas, 1965; M. D., 1969. (See Department of Microbiology and Immunology.)

C. Elliott Bell, Jr., B. S., Tulane University, 1960; M. D., 1964. (See Department of Pathology.)

Dennis M. Bier, B. S., LeMoyne College, 1962; M. D., New Jersey College of Medicine, 1966. (See Department of Pediatrics.)


John E. Buerkert, B. S., University of San Francisco, 1963; M. D., Marquette University, 1968.

Lewis R. Chase, A. B., Princeton University, 1960; M. D., Harvard University, 1964. (Chief, Washington University Medical Service, Cochrane V. A. Hospital.)

Peter B. Corr (Pharmacology). Established Investigator of the American Heart Association; B. S., Union University, 1971; Ph. D., Georgetown University, 1975. (See Department of Pharmacology.)

David N. Dietzler (Clinical Chemistry), A. B., Washington University, 1957; Ph. D., 1963. (See Department of Pathology.)

Ali A. Ehsani, M. D., Tehran University, 1965. (See Department of Preventive Medicine and Public Health and Irene W. Johnson Institute of Rehabilitation.)

Anthony P. Fletcher, B. M., University of London, 1943; B. S., 1943; M. D., 1949.

Lawrence D. Gelb, B. S., University of Michigan, 1963; M. D., Harvard University, 1967. (See Department of Microbiology and Immunology.)

Samuel B. Guze, M. D., Washington University, 1945. (See Administration and Department of Psychiatry.)

Bevra H. Hahn, B. S., Ohio State University, 1960; M. D., Johns Hopkins University, 1964.

Theodore J. Hahn, Jr., A. B., Princeton University, 1960; M. D., Johns Hopkins University, 1964.

Herschel R. Harter, B. S., Marquette University, 1962; M. D., Georgetown University, 1966.

Geoffrey P. Herrig (Leukemia Society of America Scholar in Medicine), B. S., University of Cincinnati, 1963; M. D., Western Reserve University, 1967.

Keith A. Hruska, Established Investigator of the American Heart Association; B. S., Creighton University, 1965; M. D., 1969.

Craig M. Jackson, B. S., Washington State University, 1963; Ph. D., University of Washington, 1967. (See Department of Biological Chemistry.)

Donald J. Krogsrud, A. B., Bowdoin College, 1965; M. D., Harvard University, 1969. (See Department of Pathology.) (Director of Microbiology Laboratory, Barnes Hospital.)

Ronald Krone (John E. Simon Scholar in Medicine), M. D., University of Chicago, 1966.

Anthony Kulczycki, Jr., A. B., Princeton University, 1966; M. D., Harvard University, 1970. (See Department of Microbiology and Immunology.)

Jack H. Ladenson (Clinical Chemistry), B. S., Pennsylvania State University, 1964; Ph. D., University of Maryland, 1971. (See Department of Pathology.)


John A. McDonald, Established Investigator of the American Heart Association; M. B., B. S., University of London, 1970. (See Department of Pharmacology.)

Patrick R. Murray (Clinical Microbiology), B. S., St. Mary's College, 1969; Ph. D., University of California, 1974. (See Department of Pathology.)

Richard E. Ostlund, Jr., B. S., University of Utah, 1966; M. D., 1970.


Robert P. Perrillo, B. S., Fordham University, 1966; M. D., Georgetown University, 1970.

Mabel L. Purkerson, A. B., Erskine College, 1951; M. D., Medical College of South Carolina, 1956. (See Administration and Department of Pediatrics.)

John C. Rogers, B. S., University of Nebraska, 1966; M. S., 1968; M. D., 1968.

Julio V. Santiago, B. S., Manhattan College, 1963; M. D., University of Puerto Rico, 1967. (See Department of Pediatrics.)

Benjamin D. Schwartz (Howard Hughes Medical Institute Investigator in Medicine), B. A., Columbia College, 1965; Ph. D., Albert Einstein College of Medicine, 1971; M. D., 1972. (See Department of Microbiology and Immunology.)

Isaia Spilberg, B. S., University of San Marcos, 1956; M. D., 1963.

Peter G. Tuteur, A. B., Johns Hopkins University, 1962; M. D., University of Illinois, 1966.


Research Associate Professors

Norma A. Fletcher, M. S., Technical University, 1949; Ph. D., University of Copenhagen, 1965.
James G. Miller, A.B., St. Louis University, 1964; M.A., Washington University, 1966; Ph.D., 1969. (See Biomedical Computer Laboratory.) (Also Faculty of Arts and Sciences.)

**Associate Professors Emeriti**

James W. Bagby (Dermatology), A.B., University of Missouri, 1930; B.Sc.Med., 1931; M.D., Washington University, 1933.
Paul O. Hagemann, A.B., Washington University, 1930; M.D., 1934.
Stanley F. Hampton, A.B., Washington and Lee University, 1930; M.D., Washington University, 1934.
Morris D. Marcus (Dermatology), M.D., Washington University, 1930; M.D., 1934.
Harold Scheff, M.D., University of Toronto, 1931.

**Associate Professors (Clinical)**

Jack Barrow, M.D., Washington University, 1946.
Morton A. Binder, B.S., Yale University, 1948; M.D., Columbia University, 1951.
Benjamin A. Borowsky, M.D., Washington University, 1958.
Arnold Dankner, M.D., Washington University, 1947.
Arthur H. Gale, B.S., Washington University, 1955; M.D., University of Missouri, 1959.
John J. Garrett, M.D., Harvard University, 1951. (See Medical Care Group.)

Siddhesh Gowda, M.B., B.S., Medical College Bellary Mysore, 1969.
Owen S. Kantor, M.D., University of Missouri, 1968.
Charles Kilo, M.D., Washington University, 1959.
Philip E. Korenblat, M.D., University of Arkansas, 1960.
David M. Lieberman, M.D., Vanderbilt University, 1949.
Harvey Liebhaber, A.B., New York University, 1953; M.D., 1957.
Herbert Lubowitz, A.B., Clark University, 1954; M.D., Washington University, 1958.
Edward J. Miller, B.A., St. John’s University, 1958; M.D., St. Louis University, 1962.
James F. Nickel, A.B., University of Oklahoma, 1944; M.D., Washington University, 1948.
Mary L. Parker, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (See Department of Preventive Medicine and Public Health.) (University Health Service.)
Ernest T. Rousse, B.S., Alabama Polytechnic Institute, 1939; M.D., Washington University, 1943.
Llewellyn Sale, Jr., A.B., Yale University, 1936; M.D., Washington University, 1940.
Burton A. Shatz, A.B., Washington University, 1940; M.D., 1943.
James C. Sisk (Dermatology), A.B., Washington University, 1943; M.D., 1946.
Ross B. Sommer, A.B., Miami University, 1949; M.D., Cornell University, 1949.
J. Allen Thiel, B.S., Rockhurst College, 1956; M.D., St. Louis University, 1960.

Stanley M. Wald, M.D., Washington University, 1946.
Alvin S. Wenneker, A.B., Washington University, 1949; M.D., 1953.

**Assistant Professors**

Elsa Bello-Reuss, B.A., University of Chile, 1957; M.D., 1964. (See Department of Physiology and Biophysics.)

Steven R. Bergmann (Medical Physiology), B.A., George Washington University, 1972; Ph.D., Hahnemann Medical College, 1977.

Edward J. Camphell, B.S., Purdue University, 1969; M.D., Washington University, 1972.
Kwock-Ming Chan, Ph.D., University of South Dakota, 1977. (See Department of Pathology.)
William E. Clutter, B.S., Ohio State University, 1972; M.D., 1975. (Also Clinical Research Center.)

Mark E. Frisse, B.S., University of Notre Dame, 1974; M.D., Washington University, 1978.

Howard M. Gehel (Clinical Immunology), B.S., University of Illinois, 1973; Ph.D., University of Missouri, 1976. (See Department of Pathology.)

Edward M. Geltman, B.S., Massachusetts Institute of Technology, 1967; M.D., New York University, 1971. (See Department of Radiology.)

Gregory I. Goldberg (Dermatology), M.Sc., Moscow State University, 1969; Ph.D., Weizmann Institute of Science, 1977. (See Department of Microbiology and Immunology)


Gregory A. Grant (Dermatology), B.S., Iowa State University, 1971; Ph.D., University of Wisconsin, 1975. (See Department of Biological Chemistry.)


Guner B. Gulmen, M.D., Hacettepe University, 1969. (See Medical Care Group.)

Curt H. Hagedorn, A.B., Rutgers College, 1972; M.M.S., Rutgers Medical School, 1974; M.D., Washington University, 1976.


John O. Holloszy, M.D., Washington University, 1957. (See Department of Preventive Medicine and Public Health.)


Donald K. King, A.B., Fairfield University, 1966; M.D., Johns Hopkins University, 1970.

John O. Holloszy, M.D., Washington University, 1957. (See Department of Preventive Medicine and Public Health.)


Donald K. King, A.B., Fairfield University, 1966; M.D., Johns Hopkins University, 1970.


John O. Holloszy, M.D., Washington University, 1957. (See Department of Preventive Medicine and Public Health.)


Donald K. King, A.B., Fairfield University, 1966; M.D., Johns Hopkins University, 1970.


John O. Holloszy, M.D., Washington University, 1957. (See Department of Preventive Medicine and Public Health.)

Ida K. Mariz, A.B., Washington University, 1940.

Dwight E. Matthews, B.A., DePauw University, 1973; Ph.D., Indiana University, 1977. (See Department of Biological Chemistry.)


Jeremiah J. Morrissey, B.A., MacMurray College, 1969; Ph.D., St. Louis University, 1974.

Theodore W. Munns, B.S., Bradley University, 1963; Ph.D., St. Louis University, 1970.

Alice K. Robison, A.B., University of California, 1962.

Bellur Seetharam, B.S., Mysore University, 1961; M.S., Bangalore University, 1965; Ph.D., 1972.

Jo L. Seltzer (Dermatology), A.B., Washington University, 1963; Ph.D., 1969.

Assistant Professors Emeriti (Clinical)

Joseph C. Edwards, A.B., University of Oklahoma, 1930; M.D., Harvard University, 1934.

James H. Hutchinson, Jr., B.S., Arkansas A & M College, 1942; M.D., University of Arkansas, 1945.

Robert C. Kingsland, A.B., Washington University, 1933; M.D., 1937.

M. Norman Orgel, B.S., College of the City of New York, 1929; M.A., Harvard University, 1930; M.D., Washington University, 1934.


Keith S. Wilson, A.B., Williams College, 1930; M.D., Washington University, 1934.

Assistant Professors (Clinical)


Parveen Ahmed, M.B.B.S., Karachi University, 1970. (See Department of Pathology.)

Morris Alex, B.S., University of Missouri, 1942; M.D., Washington University, 1943.

France Alexander, A.B., Indiana University, 1950; M.D., 1953.


Grace E. Bergner, A.B., Washington University, 1939; M.D., 1943.

John W. Berry, B.S., University of Toledo, 1943; M.D., St. Louis University, 1946.


Leslie M. Brandwin, B.S., City College of New York, 1967; M.D., St. Louis University, 1971.

Robert M. Bruce, A.B., Washington University, 1964; B.S., University of Minnesota, 1968; M.D., 1968.

Francis J. Catanzaro, M.D., Washington University, 1948.


Robert Kopp, Jr., A.B., Washington University, 1948; M.D., 1952.

Duane E. Cozart, Ph.B., University of Chicago, 1947; A.B., Washington University, 1949; M.D., Medical College of Virginia, 1959.


John D. Davidson, A.B., Washington University, 1948; M.D., 1952.


William A. Emerson, B.S., University of North Carolina, 1974; M.D., University of Utah, 1976; Ph.D., 1977.


George D. Wilner, B.S., Northwestern University, 1962; M.D., 1965. (See Department of Pathology.)

Gary R. Zuckerman, B.S., St. Louis College of Pharmacy, 1958; D.O., Kansas City College of Osteopathic Medicine, 1963.

Research Assistant Professors

Joseph J. H. Ackerman (Chemistry), B.A., Boston University, 1971; Ph.D., Colorado State University, 1977.


Hans M. Ambos


Janina M. Brajtburg, M.S., University of Lodz, 1959; Ph.D., 1968.


Buddhiraju V. Kumar, B.S., Osmania University, 1963; M.S., 1965; Ph.D., 1972.
Melvin L. Goldman, A.B., Washington University, 1939; M.D., 1943.
John M. Grant, A.B., Princeton University, 1950; M.D., Washington University, 1954.
William K. Hall (Dermatology), B.S., Yale University, 1939; M.D., Harvard University, 1942.
Bernard Hulbert, B.A., University of Wisconsin, 1938; M.D., 1941.
John J. Kelly, B.S., Rockhurst College, 1959; M.D., St. Louis University, 1963.
John H. Kisel, B.S., Georgetown University, 1967; M.D., Harvard University, 1971.
Norman P. Knowlton, Jr., B.S., Harvard University, 1942; M.D., 1945.
Ralph F. Kuhlman, M.D., University of Illinois, 1964. (Also Student Health Service.)
Warren M. Lonergan, A.B., Westminster College, 1926; M.D., Vanderbilt University, 1940.
Thomas F. Martin, B.S., St. Louis University, 1961; M.D., 1965.
Gordon Newton, M.D., University of Arkansas, 1958.
David W. Orthals, B.S., St. Louis University, 1966; M.D., Washington University, 1970.
James W. Owen, Jr., M.D., Washington University, 1946.
Daniel E. Potts, B.S., Baylor University, 1968; M.D., Washington University, 1972.
Kenneth C. Price, M.D., University of Washington, 1951.
Vincent J. Proskey, M.D., University of Detroit, 1934; M.D., Marquette University, 1964.
Gary A. Ratkin, B.A., Rice University, 1963; M.D., Washington University, 1967. (See Department of Radiology.)
Lester T. Reese (Dermatology), M.D., Tulane University, 1966.
Harold K. Roberts, B.A., Ohio State University, 1935; M.D., 1939.
Leon R. Robison, B.A., Oberlin College, 1963; M.D., Case Western Reserve University, 1968.
All Salimi, M.D., University of Tehran, 1965.
Alan R. Spivack, A.B., Washington University, 1960; M.D., St. Louis University, 1964.
Paul M. Stein, A.B., University of Rochester, 1967; M.D., St. Louis University, 1971.
Elliot A. Wachter (Dermatology), B.S., College of William and Mary, 1942; M.D., St. Louis University, 1945.
John A. Wood, M.D., Oklahoma University, 1968.
Herbert B. Zimmerman, M.D., Washington University, 1951.

Instructors

Greta Camel, A.B., University of Wisconsin, 1946; M.D., 1949.
Ray E. Clouse, B.S., Purdue University, 1973; M.D., Indiana University, 1976.
Thomas W. Cooper (Dermatology), A.B., Johns Hopkins University, 1972; M.D., Washington University, 1976.
Kwangsup S. Kim, M.D., Seoul National University, 1963. (See Medical Care Group.)
Robert H. Marcus, A.B., University of California, Berkeley, 1970; M.D., Chicago Medical School, 1974. (See Department of Surgery.)
Kevin T. McCusker, B.S., University of North Dakota, 1973; M.D., Kansas University, 1976.
Donna E. Reece, B.A., University of Texas, 1973; M.D., Baylor College of Medicine, 1978.
James J. Spadaro, Jr., B.S., Louisiana Tech University, 1973; M.D., Louisiana State University, 1976.
Elizabeth A. Stoddard, B.S., Montana State University, 1954; M.D., Washington University, 1957. (See Department of Preventive Medicine and Public Health.)
Sherri C. Swanson (Dermatology), M.D., University of California, 1978.

Research Instructor Emeritus
Teofil Khein, M.D., University of Budapest, 1934.

Research Instructors
Ronald L. Gingerich, B.A., Goshen College, 1970; Ph.D., Indiana University, 1975. (See Department of Pediatrics.)
D. Jane Hamilton, B.S., Baylor University, 1956; M.S., Washington University, 1961. (Also Clinical Research Center.)
Shuan S. L. Huang, B.S., National Taiwan University, 1966; M.S., 1972; Ph.D., University of Oklahoma, 1977.
Norma J. Janes, B.S., Millikin University, 1953; M.S., State University of Iowa, 1964. (Also Clinical Research Center.)
Shakuntla S. Seetharam, B.Sc., University of Lucknow, 1961; M.Sc., 1963; Ph.D., Madras University, 1974.
Victor W. Shen, B.S., Tunghai University, Taiwan, 1968; M.S., University of Texas, 1974; Ph.D., 1976.
Elizabeth Warren-Bouton, R.N., Canberra Hospital School of Nursing, 1967; B.S., St. Louis University, 1975; M.S., 1977.

Instructors Emeriti (Clinical)
Harry Agress, B.S., Washington University, 1932; M.D., 1932.
Louis F. Atkin, B.S., University of Illinois, 1923; M.D., Washington University, 1927.
Edward W. Cannady, A.B., Washington University, 1927; M.D., 1931.
Norman W. Drey, A.B., Princeton University, 1932; M.D., Washington University, 1936.
Alfred Fleishman, B.S., Washington University, 1935; M.D., 1935.
Alex R. Gronau, M.D., University of Naples, 1935.
Lee B. Harrison, A.B., University of Utah, 1925; M.D., Washington University, 1927.
J. Ted Jean, A.B., Indiana University, 1924; M.D., Washington University, 1928.
Richard W. Maxwell, A.B., Groenville College, 1932; M.D., University of Chicago, 1937.
John W. Seddon, Ph.B., Yale University, 1931; M.D., Washington University, 1935.

Instructors (Clinical)
Ingrid R. Albert (Dermatology), A.B., Barnard College, 1967; M.D., Albert Einstein College of Medicine, 1971.
Frederick D. Bauschard (Dermatology), A.B., Allegheny College, 1964; M.D., University of Pittsburgh, 1968.
Daniel B. Bauwens, B.S., University of Nebraska, 1971; M.D., Washington University, 1975.
Aaron Birnbaum, M.D., Washington University, 1948.
Robert A. Brinkman, B.S., Creighton University, 1972; M.D., Washington University, 1976.
Jeffrey S. Brooks (Podiatry), B.S., University of Missouri, 1969; D.P.M., New York College of Podiatric Medicine, 1974.
John M. Cary, A.B., Central College, 1954; M.D., St. Louis University, 1958.
Margaret Chieff, M.D., University of New Zealand, 1937.
Gail L. Clark, B.S., Adelphi University, 1969; M.D., St. Louis University, 1974.
Frank Cohen, M.D., University of Toronto, 1939.
Rand E. Danker, B.A., University of Pennsylvania, 1974; M.D., Baylor College of Medicine, 1978.
David Feldman, M.D., Washington University, 1943.
Branka F. Ford, B.A., New York University, 1965; M.D., McMaster University, 1978. (See Medical Care Group.)
B. Todd Forsyth, M.D., Washington University, 1947.


Ronald K. Grady, B.S., Purdue University, 1956; M.S., 1957; M.D., Washington University, 1966.


Charlotte A. Harris, B.S., Michigan State University, 1973; M.D., Cornell University, 1977. (See Medical Care Group.)

Anne Herron, M.B., B.Ch., Dublin University, 1965.


Bruce J. Hookerman (Dermatology), A.B., Dartmouth College, 1964; M.D., St. Louis University, 1968.


Richard F. Huck, B.S., Notre Dame University, 1947; M.D., Washington University, 1948.

Myron H. Jacobs, B.A., Vanderbilt University, 1965; M.D., Louisiana State University, 1969.

Gary L. Jones, M.D., Baylor College of Medicine, 1977.

Robert C. Kolodny, B.A., Columbia University, 1965; M.D., Washington University, 1969. (See Department of Psychiatry.)

Daniel K. Lane (Dermatology), B.A., Princeton University, 1955; M.D., Washington University, 1959.

Steven A. Lauter, B.S., Wayne State University, 1968; M.D., 1971.

Ellis S. Lipsitz, A.B., Yale University, 1940; M.D., St. Louis University, 1943.


Jay M. Marion, B.S., University of Missouri, 1973; M.D., Vanderbilt University, 1977.

David B. Marrs (Dermatology), B.A., Rice University, 1967; M.D., University of Texas Southwestern Medical School, 1978.

Jerald Maslanko, M.D., Emory University, 1975. (See Medical Care Group.)

Joan H. Mass, B.S., Washington University, 1971; M.D., Temple University, 1977. (See Medical Care Group.)


Lamar H. Ochs, A.B., Washington University, 1941; M.D., 1944.

Glenn P. O'Donnell, B.A., University of Kansas, 1972; M.D., Autonomous University of Guadalajara, 1977. (See Medical Care Group.)


Robert F. Owen, B.A., Princeton University, 1948; M.D., Yale University, 1952.

John A. Powell (Dermatology), B.S., University of Notre Dame, 1967; M.D., University of Michigan, 1971.


Scott R. Sale, B.A., Williams College, 1972; M.D., St. Louis University, 1976.

Lawrence E. Samuels (Dermatology), B.A., University of Texas, 1972; M.D., Washington University, 1976.


Susan B. Schneider, A.B., Swarthmore College, 1973; M.D., Yale University, 1977.

John S. Schoenatg (Dermatology), A.B., University of Missouri, 1956; M.D., Washington University, 1960.

John B. Shapleigh II, M.D., Washington University, 1946.


Clark E. Sisk (Dermatology), B.A., Stanford University, 1974; M.D., Washington University, 1978.

John S. Skinner, M.D., Washington University, 1940.

David Smuckler, B.S., Georgetown University, 1974; M.D., 1978.


William K. Sullivan, B.S., United States Military Academy, 1966; M.D., University of Missouri, 1974.

Arnold S. Tepper, B.S., St. Louis College of Pharmacy, 1966; M.D., University of Missouri, 1970.

Wanda T. Terrell, A.B., Washington University, 1975; M.D., 1979. (See Medical Care Group.)


Sharon F. Tiefenbrunn (Dermatology), A.B., Washington University, 1971; M.D., 1975.


Dolores T. Tucker (Dermatology), B.S., St. Mary's of Notre Dame, 1958; M.D., Washington University, 1974.


Hugh R. Waters, B.S., Northwestern University, 1942; M.D., Washington University, 1945.


Herbert C. Wiegand, A.B., Washington University, 1940; M.D., 1943.
Elsie Winstead, B.S., East Carolina University, 1973; M.D., University of North Carolina, 1977. (See Medical Care Group.)
Jacob M. Zeffren, B.A., Yeshiva University, 1971; M.D. St. Louis University, 1975.

Research Associates
Teresa L. Andreone, B.S., John Carroll University, 1973; M.S., University of Iowa, 1976; Ph.D., 1982.
Dunell E. Cohn, B.A., Swarthmore College, 1965; M.A., University of California, 1967; Ph.D., City University of New York, 1975.
Michaei Crowley, B.S., University of Missouri, 1974; Ph.D., University of Florida, 1982.
Fanny M. Ebling, B.S., College of Guayaquil, 1954; Ph.D., University of Guayaquil, 1959.
Ruth L. Fischbach, B.S., R.N., Cornell University—New York Hospital School of Nursing, 1963; M.S., Boston University, 1975.
Walter T. Gregory, B.S., St. Louis University, 1960.
V. Michael Holers (Howard Hughes Medical Institute Research Associate), B.S., Purdue University, 1973; M.D., Washington University, 1978.
Annemarie Kronberger, B.S., University of Vienna, 1965; Ph.D., University of Salzburg, 1978.
Katherine D. Little, B.S., Illinois Wesleyan University, 1952; M.S., University of Rochester, 1954; Ph.D., 1957.
Ikuro Maruyama, M.D., Kagoshima University, 1972.
Patricia M. McKevitt, B.A., Clarke College, 1967; M.S.W., Washington University, 1969.
Jagdish M. Mehta, B.S., Gujarat University, 1960; M.S., 1962; M.S., University of Missouri, 1966; Ph.D., 1968.

Jozef Mruk, M.D., Medical Academy of Krakow, 1975.
Helen Quill (Howard Hughes Medical Institute Research Associate), B.A., Trinity College, 1968; Ph.D., Massachusetts Institute of Technology, 1979.
Suresh D. Shah, B.S., Gujarat University, 1956; M.S., 1959; M.S., St. Louis University, 1972. (Also Clinical Research Center.)
Esther M. Sternberg (Howard Hughes Medical Institute Research Associate), B.Sc., McGill University, 1972; M.D., 1974.
Bakula L. Trivedi, M.S., Sarvajanik Science College, 1961.
Carol A. Weerts, R.N., St. John’s Hospital School of Nursing, 1960; B.S., Washington University, 1965; B.S., 1975; M.A., Webster College, 1980.
Research Assistants
Howard L. Christopherson, B.S., University of Minnesota, 1949; M.S., 1953.
Frieda R. Chyn, A.B., University of Missouri, 1971.
Margaret W. Erlanger, B.A., University of Iowa, 1932; M.S., 1938.
Thomas Howard, Sr.
Milan D. Kapadia, B.S., Gujarat University, 1972; M.D., Indore University, 1974.
Jane C. Lewis, B.S., Central Missouri State University, 1971.
Dale F. Osborne, B.S., Louisiana State University, 1971.
Claire K. Pedersen, B.S., Quincy College, 1948.
Betty F. Perry, A.B., Washington University, 1945.
Alice L. Rand, B.S., Cornell University, 1980.

Assistants (Clinical)
Kathleen M. Garcia, B.S., University of California, 1976; M.D., Harvard University, 1980. (See Medical Care Group.)
Department of Microbiology and Immunology

This department, in collaboration with the Division of Infectious Diseases, Department of Medicine, teaches a two-semester introductory course in microbiology and infectious diseases for first-year medical students and for graduate students. The course is concerned particularly with principles of microbial physiology and genetics, and of immunology and, through a limited survey of pathogenic bacteria, viruses, and fungi, attempts to prepare medical students for more advanced study of infectious diseases. The department also offers a number of advanced elective research activities. A limited number of summer research fellowships are available.

FIRST YEAR

Medical Microbiology I

Lectures and Laboratory. This course presents the basic principles relating to the growth and reproduction of bacteria and viruses and to the immune response of the host to pathogens and other antigenic stimuli. The course is divided into four segments: Microbial Physiology and Genetics, Immunology, Virology, and Host Response to Pathogens. In Microbial Physiology and Genetics, mechanisms of DNA alteration and gene regulation in prokaryotes are emphasized. In Immunology, structure, function, and biosynthesis of antibodies, and the elements of cell-mediated responsiveness are emphasized. Medical students with sufficient background in one of these two segments may be exempted from that segment of the course and may choose an elective to replace it. In Virology, a survey of the clinically important viruses is made, and their interaction with the host is considered. In the Host Response segment, the beneficial and detrimental aspects of non-specific response and specific immune response are considered. Normal, deficient, and inappropriate responses are examined. The use of antibiotics to supplement host response and the mechanism of action of antibiotics is also studied. During class time, a minielective period is scheduled toward the end of the semester. During this period, students may choose to pursue any one of a number of topics in some depth in small seminar groups led by various faculty members. Alternatively, independent studies may be pursued during this time period. Credit 6 units.

Individuals other than medical students may register for individual segments of the course; see listing for the Division of Biology and Biomedical Sciences, under: Bio 517, Immunology (2 units); Bio 5231, Microbial Physiology and Genetics (1 unit); Bio 529, Animal Virology (1 unit); Bio 5331, Host Response to Pathogens (2 units).

Medical Microbiology II

Lectures and Laboratory. This course is an integrated presentation of descriptive information on a wide range of pathogenic microorganisms including bacteria, viruses, fungi, and parasites, with considerations of the effect of these organisms on the human host. Study of the pathophysiology of infectious disease is organized to emphasize mechanisms of infection, and identification of organisms and means of treatment are also considered. The laboratories will consist of active discussion groups and demonstrations for most of the term, but in the final two weeks small teams of students led by a clinical fellow will work up current infectious disease cases and identify the causative agents using a wide range of microbiological techniques. Credit 5 units.

RESEARCH

Bio 590.

These electives acquaint the student with the analyses that are used in present-day biomedical research, especially at the molecular level. (Staff)

Processing and decay of RNA in E. coli and mammalian cells, normal and malignant. Differentiation-activation of unexpressed genes in mammalian cells. (Dr. Apirion)

Immunogenetics of complement proteins and the biochemistry and function of cell surface receptors for immunoglobulins and complement. (Dr. Atkinson)

Mechanisms and evolution of gene transposition and of antibiotic resistance in bacteria. (Dr. Berg)

Biochemical polymorphism of Iγ gene products is studied with the aim of relating structure to immunoregulatory function. (Dr. Cullen)

B cell subsets, mechanisms of antibody diversity. (Dr. Davie)

Structure and biosynthesis of antibodies, immunoglobulin gene expression in hybridoma cells. (Dr. Fleischman)

Biochemistry of tumor viruses, varicella-zoster, and hepatitis B virus. (Dr. Gelb)
Mechanisms of action of immune response genes.  
(Dr. Kapp-Pierce)

Biochemistry and genetics of macromolecule regulation: 
mRNA metabolism in bacteria; regulation of metabolism 
in cultured mammalian cells.  
(Dr. Kennell)

Interactions of IgE and IgE receptors, structure of IgE 
and Fc receptors, mechanisms of immediate hypersensitiv- 
ity.  
(Dr. Kulczycki)

Differentiation and function of mononuclear phagocytes.  
(Dr. Lin)

The structure and biosynthesis of lymphocyte cell surface 
antigens and lymphocyte triggering mechanisms. The 
effects as adjuvants in modulating the immune response.  
(Dr. Little)

Development of therapy for intracellular bacterial and 
fungal infections.  
(Drs. Kobayashi, Medoff)

Tumor immunotherapy. Establishment of animal models 
of human malignancy.  
(Dr. Medoff)

Molecular biology of multigene families.  
(Dr. Huang)

Cellular immunology; immediate hypersensitivity.  
(Dr. Parker)

Gene expression in animal RNA viruses (vesicular stomati- 
tis virus, poliovirus) with special emphasis on the regula-
tion of viral RNA polymerase activities and the role of 
defective interfering virus particles in the establishment 
and maintenance of persistent viral infections.  
(Dr. Perrault)

Mechanisms regulating immune responses in tissue cul-
ture systems.  
(Dr. Pierce)

Biochemistry and replication of oncogenic adenoviruses.  
(Dr. Raskas)

Interactions between RNA animal viruses and their host 
cells. Emphasis on maturation and assembly of viral 
proteins. The immune response to viruses: formation and 
properties of infectious viral-antibody complexes.  
(Dr. M. Schlesinger)

Structure and replication of enveloped RNA animal 
viruses.  
(Dr. S. Schlesinger)

Ribosome formation; processing and turnover of RNA in 
bacteria and mammalian cells.  
(Dr. D. Schlessinger)

Structure of histocompatibility and immune response 
region associated antigens. Molecular mechanisms under-
lying HLA-disease association.  
Mechanisms of HLA-
disease associations.  
(Dr. Schwartz)

Bacterial plasmid gene function, especially resistances to 
heavy metals such as mercury, arsenic, cadmium, and 
silver. A combined approach to these resistances includ-
ing genetic analysis with transposon mutagenesis and 
gene cloning, physiological studies of the basis of resis-
tances, and biochemical analysis of the enzymes or other 
cellular proteins responsible.  
(Dr. Silver)

Clinical microbiology, anaerobes, endogenous infections; 
terries and enteric infections.  
(Dr. Sonnenwirth)

**ELECTIVES**

At present the primary enrollees in these 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. Emphasis is 
placed on the organization and function of living systems 
at the molecular level. The courses combine formal lec-
tures with student-directed seminars. In the latter, each 
student has an opportunity to integrate various disci-
plines of modern molecular biology into the area of 
biochemistry or medicine that is of particular interest to him. 
Those courses most relevant to the field of microbiology 
are listed under the Division of Biology and Biomedical 
Sciences.

**Bio 521. Cellular Aspects of the 
Immune Response**

The mechanisms of regulation of immune responses by 
antigen, macrophages, T cells, B cells, and their products 
will be discussed. The material covered will vary in 
emphasis from year to year and will stress critical analysis of 
the literature. Credit 2 units. Prerequisite: BIO 5051 and 
consent of instructor. (Also Pathology.)  
(Dr. Pierce and Staff)

**Bio 528. Cell Development in Animals and in Culture**

Lectures and student seminars on the fate of individual 
cell types in animals and in cell culture. Principles of cell 
renewal exemplified in muscle, chondrocytes, and hemo-
poiesis. Cell culture, including growth factors, hormonal 
factors, cyclic nucleotide effects, and genetics of cultured 
cells. Programmed cell death discussed along with the 
relation of differentiation to cell division, the role of 
cell-cell interactions, and studies of teratomas. Credit 3 
units.  
(Drs. D. Schlessinger, Lieberman)
Bio 534. Gene Expression and Differentiation in Eukaryotic Cells
Emphasis will be on nuclear events which are relevant to gene expression. Material covered will include examples mainly from Drosophila, mouse, chicken, and cells in tissue culture. We shall cover the cell cycle, mitosis, meiosis, organization of chromatin and chromosomes, the content of the nucleus, chromosomal proteins, nuclear RNA, polytenic chromosomes, the transcription machinery, expression of RNA genes in pro- and eukaryotes, nucleolus, turnover and processing of RNA in the nucleus and cytoplasm, expression of the globin genes and genes induced by steroid hormones, teratomas, somatic cell genetics, nuclear cytoplasmic relationships, plasmids, and cloning of eukaryotic genes in bacteria. Credit 3 units.

(Dr. Apirion)

Bio 539. Topics in Animal Virology
The course will consist of readings and seminars in specific areas of animal virology. The topics will vary from year to year. Credit 2 units.

(Drs. M. Schlesinger, S. Schlesinger)

Bio 541. Molecular Biology of Prokaryotes
Growth, metabolism, and genetics of the bacterial cell, including transport mechanisms, the regulation of gene expression and protein synthesis and the molecular biology of virus infection by virulent and temperate bacteriophages. The conceptual and experimental bases for present knowledge, as well as major problems to be solved, will be emphasized. About 15 hours of lecture followed by seminar presentations on selected topics by each student. Credit 2 units.

(Dr. Kennell)

Bio 546. Antibodies: Structure, Function, and Formation
The principal features of the structure and function of antibody molecules will be examined in lectures, assigned reading of current research papers, and in student seminar presentations. Emphasis will be placed on the genetic and molecular events which govern the appearance of antibodies during the immune response.

(Drs. Fleischman and Little, Prof. Simms)

Bio 5051. Foundations in Immunology I
This course is designed for graduate students as an in-depth introduction to immunology. Topics will include: antibody structure and genetics, cellular immunology, complement, transplantation immunology, and clinical immunology. Credit 3 units. (Dr. Kapp-Pierce)

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.
Faculty of the Department of Microbiology and Immunology

Professor and Head of Department
Joseph M. Davie, A.B., Indiana University, 1962; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Pathology.)

Professors
David Apirion, M.S., Hebrew University of Jerusalem, 1960; Ph.D., University of Glasgow, 1963.
David E. Kennell, A.B., University of California, 1955; Ph.D., Tulane University, 1963. (See Department of Medicine.)
George S. Kobayashi, B.S., University of California, 1952; Ph.D., Tulane University, 1963. (See Department of Medicine.)
J. Russell Little, Jr., A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Medicine.)
Gerald Medoff, A.B., Columbia College, 1958; M.D., Washington University, 1962. (See Department of Medicine.)
Charles W. Parker, M.D., Washington University, 1953. (See Department of Medicine.)
Carl W. Pierce, A.B., Colgate University, 1962; Ph.D., University of Chicago, 1966; M.D., Case Western Reserve University, 1967. (See Department of Pediatrics.)
Hesovel J. Raskas, B.S., Massachusetts Institute of Technology, 1962; Ph.D., Harvard University, 1967. (See Department of Pediatrics.)
Milton J. Schlesinger, B.S., Yale University, 1951; M.S., University of Rochester, 1953; Ph.D., University of Michigan, 1959.
Sondra Schlesinger, B.S., University of Michigan, 1956; Ph.D., 1960.
David Schlesinger, B.A., University of Chicago, 1955; B.S., 1957; Ph.D., Harvard University, 1961. (See Department of Medicine.)
Simon D. Silver, B.A., University of Michigan, 1957; Ph.D., Massachusetts Institute of Technology, 1962. (Also Faculty of Arts and Sciences.)

Alexander C. Sonnenwirth, A.B., University of Nebraska, 1950; M.S., Purdue University, 1953; Ph.D., Washington University, 1960. (See Department of Pathology.)

Associate Professors
John P. Atkinson, A.B., Kansas University, 1965; M.D., 1969. (See Department of Medicine.)
Douglas E. Berg, B.S., Cornell University, 1964; Ph.D., University of Washington, 1969. (See Department of Genetics.)
Susan E. Cullen, B.S., College of Mt. St. Vincent, 1965; Ph.D., Albert Einstein College, 1971. (See Department of Genetics.)
Julian B. Fleischman, B.S., Yale University, 1955; Ph.D., Harvard University, 1960.
Lawrence D. Gelb, B.S., University of Michigan, 1963; M.D., Harvard University, 1967. (See Department of Medicine.)
Judith A. Kapp-Pierce, B.A., Miami University, 1965; M.S., Indiana University, 1969; Ph.D., Harvard University, 1976. (See Department of Pathology.)

Benjamin D. Schwartz, B.A., Columbia College, 1965; Ph.D., Albert Einstein College, 1971; M.D., 1972. (See Department of Medicine.)
Ernest S. Simms

Assistant Professors
Henry V. Huang, A.B., Occidental College, 1972; Ph.D., California Institute of Technology, 1977.
Anthony Kuleycki, Jr., A.B., Princeton University, 1966; M.D., Harvard University, 1970. (See Department of Medicine.)
Hsiusen Lin, M.D., Taiwan University, 1960; Ph.D., University of Chicago, 1968. (See Department of Radiology.)
Richard B. Markham, A.B., Harvard University, 1969; M.D., Albert Einstein College of Medicine, 1972. (See Department of Medicine.)
Jacques Perrault, B.S., McGill University, 1964; Ph.D., University of California, 1972.

Research Assistant Professors
Josephine E. Clark-Curtiss, B.S., St. Mary's College, 1968; Ph.D., Medical College of Georgia, 1974.
Gregory I. Goldberg, M.Sc., Moscow State University of USSR, 1969; Ph.D., Weizmann Institute of Science, 1977. (See Department of Medicine.)

Instructor

Research Assistants
John Courtney, A.B., University of Illinois, 1953.
Richard J. McDonald
Department of Neurology and Neurological Surgery

Neurology and neurological surgery concern themselves 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 course in neural sciences provided by the Departments of Anatomy and Neurobiology and of Physiology and Biophysics. In the second year, the department presents the course in Pathophysiology of Nervous System Disorders. Here are demonstrated the interrelationships between knowledge derived from basic investigative and clinical sources. In addition, there are lectures and exercises with patients in neurological physical diagnosis. A full-time four-week clerkship in the third year, with collaborative teaching by both Neurology and Neurological Surgery services, introduces the phenomenology of the diseased nervous system. In the fourth year, there are opportunities for clinical externships and many varieties of research experience.

Several informal organizational groups of faculty members are established for specialized research and teaching purposes. They include:

- James L. O'Leary Laboratory of Experimental Neurology and Neurological Surgery, Dr. Jones (Director).
- Division of Pediatric Neurology, Dr. Prensky (Director), Drs. Carroll, Deuel, Dodge, Dodson, Johnson, Rothman, Volpe, Noetzel.
- Division of Clinical Neuropharmacology, Dr. Ferrendelli (Director), Drs. Clifford, Dodson, Lothman, Wooten.
- Division of Neuromuscular Diseases, Dr. Brooke (Director), Drs. Carroll, Eliasson, Nemeth.

Groups concerned with particular neurological illness research areas include:

- Cerebral Circulation and Metabolism, Drs. Collins, Grubh, Herscovitch, Powers, Raichle.
- Convulsive Disorders, Drs. Clifford, Dodson, Ferrendelli, Goldring, Lothman, Prensky, Vastola.
- Demyelinating Diseases, Drs. Agrawal, Trotier.
- Disorders of Movement, Professor Clare, Drs. Landau, Montgomery, Sahrman, Thach.
- Memory Aging, and Dementia, Drs. Berg, Cohen, Danziger, Hughes, Raichle, Botwinick, Storandt.
- Metabolic Diseases of Children, Drs. Dodson, Prensky.

SECOND YEAR
Pathophysiology of Nervous System Disorders (part of course in pathophysiology)
A collaborative sequence concerned with mechanisms of disease of the nervous system. Lectures and seminar-symposia. (Drs. Eliasson, Thach, and combined Neurology-Neurosurgery Staff)

Neurological Examination in Clinical Diagnosis (part of interdepartmental course in clinical diagnosis)
Lectures, demonstrations, and practice examinations of neurological patients. (Dr. Eliasson and Staff)

THIRD YEAR
Combined Neurology-Neurosurgical Clerkship
A full-time, four-week clerkship is provided on the neurology services at Barnes and City Hospital-Starkloff Memorial and the Barnes Hospital neurosurgical service. Patients are assigned to students who follow them with the resident staff and discuss them regularly in conferences with the senior neurological and neurosurgical staff. Students also work in the neurology and neurosurgical clinics under staff supervision. (Drs. Eliasson, Landau, Goldring, and Staff)

FOURTH YEAR ELECTIVES
Research
A 6- to 12-week elective is available in many areas such as neuroanatomy, neurophysiology, cerebral metabolism and circulation, neurochemistry, neuropharmacology, etc. Facilities are available for qualified students in any year to undertake original research in the laboratories of the department or in the clinics and wards. (Drs. Goldring, Landau, and combined Neurology-Neurosurgery Staff)

Clinical Neurology
House Neurology
A six-week subintern elective on the Starkloff Hospital neurology service provides direct patient responsibility as a member of the housestaff team. Organized conferences and readings with housestaff members and staff are provided. (Dr. Hughes and Staff)

Consult Neurology
A six-week consult elective is offered at Barnes Hospital. The student works directly with the consult resident and senior staff covering consultations at Barnes and Jewish Hospitals. Selected reading assignments on current topics in neurology. (Dr. Eliasson and Staff)

Consult Neurology
A six-week consult elective organized in the same manner is offered at Starkloff Hospital. (Dr. Hughes and Staff)

Clinical Neurosurgery
The goal of the six-week clerkship at Barnes Hospital is to provide an overview of neurological surgery. Responsibilities include patient workup, pre- and post-operative care, and attendance at selected neurosurgical operations. Daily teaching rounds are held with a member of the attending staff. Students also work in the Neurosurgical Clinic and attend the weekly staff conferences. (Dr. Goldring and Staff)
Staff Conferences

Students are invited to attend the Conjoint Neurological Conference (neuropathology, neuroradiology, medical neurology, pediatric neurology, and neurological surgery) held on Wednesday afternoon. The conference is held in West Pavilion Auditorium at 1:30 p.m. except on the second Wednesday of each month, when it is held at City Hospital-Starkloff Memorial at 1:45 p.m. in the third-floor conference room. The format of the conferences includes clinical presentations, symposia, and CPCs. Neurosurgery Grand Rounds are held weekly at 7:15 a.m. on Wednesday in the Neurosurgery conference room, 511 McMillan Hospital. Neuropathology brain-cutting conferences are held weekly in the Pathology Department on Monday at 1:00 p.m. and in the Starkloff Hospital morgue biweekly on Monday at 11:15 a.m. In alternate weeks a seminar in pathophysiology is held in 3 West. Dr. Brooke conducts a rehabilitation conference in the rehabilitation satellite unit on 11400 Barnes at noon on Monday. Professor’s rounds, dealing systematically with major problem areas of clinical neurology, are held at noon on Tuesday in the Barnes 11400 classroom. Professor’s rounds in Neurosurgery are held at 8:00 a.m. on Saturday in the Neurosurgical ICU on 10400.

Faculty of the Department of Neurology and Neurological Surgery

Co-Heads of Department
Sidney Goldring, William Landau

NEUROLOGY
Andrew B. and Gretchen P. Jones
Professor of Neurology and Head

Professor and Vice Chairman of Neurology
Sven G. Eliasson, Ph.D., University of Lund, 1952; M.D., 1954.

Seay Professor of Clinical Neuropharmacology
James A. Ferrendelli, A.B., University of Colorado, 1958; M.D., 1962. (See Departments of Pharmacology and Ophthalmology.)

Allen P. and Josephine B. Green Professor of Pediatric Neurology
Arthur L. Prensky, A.B., Cornell University, 1951; M.D., New York University, 1955. (See Department of Pediatrics.)

A. Ernest and Jane G. Stein Professor of Developmental Neurology
Joseph J. Volpe, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Departments of Biological Chemistry and Pediatrics.)

Professors
Harish C. Agrawal (Neurochemistry), B.Sc., Allahabad University, 1957; M.Sc., 1959; Ph.D., 1964. (See Departments of Pathology and Pediatrics.)
Jack Botwinick (Psychology), Ph.D., New York University, 1953; M.A., Brooklyn College, 1950. (See Department of Psychology.)
Department of Neurology and Neurological Surgery

Michael H. Brooke, M.B., B.Ch., Cambridge University, 1958. (See Department of Preventive Medicine and Public Health and Irene Walter Johnson Institute of Rehabilitation.)

Ronald M. Burde, B.S., Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964. (See Departments of Ophthalmology and Neurological Surgery.)


Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Pediatrics.)

Edward G. Jones (Neuroscience). M.B., Ch.B., University of Otago, 1962; Ph.D., Oxford University, 1968; M.D., University of Otago, 1970; George H. and Ethel R. Bishop Scholar in Neuroscience in Neurology and Neurological Surgery. (See Neurological Surgery and Department of Anatomy and Neurobiology.)

Alan L. Pearlman, A.B., State University of Iowa, 1958; M.D., Washington University, 1961. (See Department of Physiology and Biophysics.)

Marcus E. Raichle, B.S., University of Washington, 1960; M.D., 1967. (See Department of Radiology.)

W. Thomas Thach, Jr., A.B., Princeton University, 1959; M.D., Harvard University, 1964. (See Department of Anatomy and Neurobiology.)

Jean Holowach Thurston (Neurochemistry). B.A., University of Alberta, 1938; M.D., 1941. (See Department of Pediatrics.)

Edward E. Vastola, B.S., Yale University, 1945; M.D., Columbia College of Physicians and Surgeons, 1947. (Starkloff Hospital.)

Professors (Clinical)


Associate Professors

James E. Carroll, B.S., University of Louisville, 1966; M.D., 1969. (See Department of Pediatrics and Irene Walter Johnson Institute of Rehabilitation.)

Lawrence A. Cohen, B.S., Western Reserve University, 1948; M.D., 1954; M.A., Northwestern University, 1951. (See Department of Physiology and Biophysics.)


Ruthmary K. Deuel, B.A., Mount Holyoke College, 1956; M.D., Columbia College of Physicians and Surgeons, 1961. (See Department of Pediatrics.)

W. Edwin Dodson, A.B., Duke University, 1963; M.D., 1967. (See Department of Pediatrics.)

Charles P. Hughes, B.A., Yale University, 1960; M.D., Case Western Reserve University, 1964. (Starkloff Hospital.)

Martha Storandt (Psychology). Ph.D., Washington University, 1966; A.B., 1960. (See Department of Psychology.)


Associate Professors (Clinical)

Joseph M. Dooley, Jr., B.S., St. Louis University, 1954; M.D., 1958.

E. Robert Schultz, A.B., Southeast Missouri State College, 1952; B.S.Med., University of Missouri, 1953; M.D., Washington University, 1955. (See Department of Psychiatry.)


Assistant Professors

David B. Clifford, B.A., Southwestern University, 1971; M.D., Washington University, 1975. (Starkloff Hospital.)

Peter Herscovitch, B. Eng., McGill University, 1971; M.D., C.M., 1975. (See Department of Radiology.)

Mary J. Johnson, B.S., Washington State University, 1964; M.D., Johns Hopkins University, 1968. (See Departments of Anatomy and Neurobiology and Pediatrics.)

Eric William Lothman, B.A., Duke University, 1969; Ph.D., 1974; M.D., 1975. (Starkloff Hospital.)

Erwin B. Montgomery, Jr., B.S., State University of New York, Buffalo, 1972; M.D., 1976.
Patti M. Nemeth (Myochemistry), B.S., University of Arizona, 1969; Ph.D., University of California, 1977. (See Department of Anatomy and Neurobiology.)

Michael Noezel, A.B., Yale, 1973; M.D., University of Virginia, 1977. (See Department of Pediatrics.)

William J. Powers, A.B., Dartmouth College, 1971; M.D., Cornell University, 1975. (See Department of Radiology.)

Steven M. Rothman, M.D., State University of New York, Upstate, 1969. (See Departments of Anatomy and Neurobiology and Pediatrics.)

Shirley A. Sahrmann (Neurophysiology), B.S.P.T., Washington University, 1958; M.A., 1971; Ph.D., 1973. (See Department of Physiology and Biophysics and Program in Physical Therapy.)

Clifford B. Saper, Ph.D., Washington University, 1977; M.D., 1977. (See Department of Anatomy and Neurobiology.)

Research Assistant Professor Emeritus
Joe Inukai (See Neurological Surgery.)

Research Assistant Professors
Lloyd N. Simpson (See Neurological Surgery.)

Arthur W. Toga, B.S., University of Massachusetts, 1974; M.S., St. Louis University, 1975; Ph.D., 1978.

Assistant Professors (Clinical)
Octavio de Marchena, A.B., Johns Hopkins University, 1972; M.D., 1976.

William B. Hardin, B.S., Rice University, 1953; M.D., University of Texas Medical School at Galveston, 1957.

Robert P. Margolis, B.S., Kent State University, 1971; M.D., St. Louis University, 1975.


Instructor

Instructor (Clinical)
Robert J. Mueller, M.D., Washington University, 1936; M.S., University of Michigan, 1942.

Research Assistants


Emily M. Santori, B.S., Cornell University, 1977; Ph.D., Vanderbilt University, 1982.

JoAnne D. Scarpellini, B.S., Indiana State University, 1953.

Jeanne M. Smith (See Neurological Surgery.)

NEUROLOGICAL SURGERY
Professor and Head
Sidney Goldring, B.S., Washington University, 1943; M.D., 1947.

August A. Busch, Jr., Professor
Henry G. Schwartz, A.B., Princeton University, 1928; M.D., Johns Hopkins University, 1932.

Professors
Ronald M. Burde, B.S., Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964. (See Departments of Ophthalmology and Neurology.)

William S. Coxe, B.S., Hampden-Sydney College, 1945; M.D., Johns Hopkins University, 1948.

Mokhtar Gado, M.B., B.Ch., Cairo University, 1953; D.M.R.E., 1960. (See Department of Radiology.)

Robert L. Grubb, Jr., A.B., University of North Carolina, 1961; M.D., 1965. (See Department of Radiology.)

Edward G. Jones (Neuroscience), M.D., Ch.B., University of Otago, 1962; Ph.D., Oxford University, 1968; M.D., University of Otago, 1970; George H. and Ethel R. Bishop Scholar in Neuroscience in Neurology and Neurological Surgery. (See Neurology and Department of Anatomy and Neurobiology.)

Assistant Professor

Research Assistant Professor Emeritus
Joseph Inukai (See Neurology.)

Research Assistant Professor
Lloyd N. Simpson (See Neurology.)

Research Assistants
Issac A. Edwards

Jeanne M. Smith (See Neurology.)
Department of Obstetrics and Gynecology

The student's involvement in obstetrics and gynecology consists of a thorough exposure to the basic concepts in reproductive biology and an active participation in the delivery of medical care to women with gestations normal or at risk, congenital anomalies of pelvic viscera, structural disorders secondary to difficult childbirth, reproductive endocrinopathies and infertility, and gynecologic malignancies. The junior clerkship is conducted at Barnes Hospital, Jewish Hospital, and St. Louis County Hospital, with the majority of the students stationed at Barnes. Senior electives may be taken at Barnes Hospital or in the many affiliated hospitals in St. Louis. Regularly held conferences in reproductive biology, perinatal medicine, ob-gyn pathology, and oncology supplement the student's education.

SECOND YEAR

The sophomore is introduced to obstetrics and gynecology with lectures in reproductive biology which apply the pelvic anatomy and physiology taught in the first year, physiology of tubal transport and ovarian control, myometrial function, placental perfusion, steroidogenesis, genetics, and prenatal diagnosis.

THIRD YEAR

Students are assigned to a resident-staff team, and the residents and staff physicians serve as preceptors during the student's six-week stay in the department. Every woman seen in the office or cared for in the hospital by the team of physicians is considered in her entirety. Attention is paid to the manner in which her social and economic situation has modified her response to disease. Environmental manipulation, in addition to traditional medical care, is prescribed to improve her health. The team method ensures that personalized care is given by arranging for the same group of physicians to meet a woman's health needs during each visit. The residents in a team function like a group in obstetrics and gynecology practice, and the student works like an intern in the specialty. He sees patients in the office with his resident group, attends deliveries, assists in surgery, goes to conferences, and takes night call with them as a part of the team.

FOURTH YEAR

Seniors wishing to take an externship or research elective can choose from a variety of courses:

- **Ob-Gyn Subinternship**
  - Endocrinology-Infertility Subinternship
    - In the office and hospital, the extern participates in the study and treatment of women with reproductive endocrine disorders and infertility. He presents patients in conferences, has assigned reading, and obtains experience in the techniques of steroid and gonadotropin quantitation as well as various manipulative procedures.
    
    (Dr. Warren)
  - Pathology Subinternship
    - The elective elucidates the principles of anatomic pathology as applied to operative material in obstetrics and gynecology. The extern examines gross and microscopic specimens in the Ob-Gyn Pathology Laboratory and reviews pertinent literature with a senior pathologist.
    
    (Dr. Gersell)
  - Gyn Oncology Subinternship
    - This elective concerns itself with the diagnosis and treatment of malignant tumors of the female reproductive tract. The extern is involved in all aspects of the care of women with gyn malignant tumors. This experience will include the surgical treatment, radiation-therapy, and chemotherapy.
    
    (Dr. Camel)
  - Perinatal Medicine Subinternship
    - Electronic and biochemical surveillance of the human fetus and mother before and during parturition. The extern is involved in the care of women with gestations at risk (i.e., diabetes, hypertension, toxemia, renal disease, fetopelvic disproportion, etc.).
    
    (Dr. Arias)
  - Ob-Gyn Preceptorship
    - The student spends six weeks with a clinical faculty member who is in private practice. He makes hospital rounds and operates with his preceptor at Barnes and other community hospitals. He becomes familiar with the experiences of the private practitioner.
    
    (Dr. Warren)
Endocrinologic Function and Disease During Pregnancy Subinternship

While on elective, the senior student will participate in clinical and/or research activities leading to a basic understanding of the endocrinology of pregnancy and endocrine dysfunction during pregnancy. He will present patients in conferences, have assigned reading, and obtain experience in clinical research techniques. (Dr. Rigg)

Genetics Subinternship

This elective involves clinical exposure to preconceptional and preamniocentesis counseling, methods of prenatal diagnosis (genetic amniocentesis, diagnostic ultrasound, amniography, etc.) and physical diagnosis of genetic disease. Laboratory experience in cytogenetic techniques such as amniotic fluid, lymphocyte, bone marrow, and tissue culture is also included. (Dr. Crane)

Obstetric Anesthesiology

In this clinical elective, students receive instruction in the fundamentals of obstetric pain relief and newborn infant management and resuscitation. The pharmacology of sedatives, tranquilizers, narcotics, local anesthetics, inhalation, and intravenous drugs is demonstrated by practical application, emphasizing fetal-maternal implications in the management of labor. Special local anesthetic blocks such as caudal, lumbar epidural, and saddle spinal, Experience is also gained in the management of general anesthesia for minor gynecologic procedures such as postpartum tubal ligations. (Dr. Jones)

General Ob-Gyn Subinternships

St. Louis County Hospitals

The externship in each of these affiliated hospitals allows the student a greater degree of participation and responsibility in the care of patients. There is a wealth of clinical material in each of these facilities. (Dr. Siemers)

RESEARCH ELECTIVES

Molecular Aspects of Endocrinology and Population Control

The research involves the study of the topography of macromolecular steroid binding sites, evaluation of the role of steroid "receptor" proteins in molecular mechanisms of steroid action, and the synthesis of affinity-labeling steroids and anti-steroids and their application to disease states and population control. (Dr. Warren)

Radioimmunoassay

Radioimmunoassay is now the most widely applied in vitro assay procedure. This elective is designed to acquaint the student with basic theoretical considerations as well as with technical and practical applications of assays of value in obstetrics and gynecology. The student will be given opportunity to develop, evaluate, and apply clinically an assay of choice. (Dr. Wiest)

Regulation of Placental Hormone Synthesis

Our laboratory is concerned with studying the factors regulating the biosynthesis of protein hormones in the placenta, human placental lactogen (hPL), and human chorionic gonadotropin (hCG). The appearance of these hormones in maternal serum differs markedly. For these studies the template mRNAs have been isolated and we are generating complementary DNAs to the corresponding mRNAs. These DNA probes will be used to assay gene activities in normal and pathological tissues. Students will be concerned with the concepts and techniques of molecular biology as applied to the above research. (Dr. Boime)

Sperm Biochemistry and Andrology

Research is performed which is aimed at the understanding and control of the molecular events which allow for sperm penetration of the ovum. Investigations into male infertility centering on sperm motility, bacteriological considerations, and freezing of semen are also conducted. (Dr. Polakoski)

Bio-Organic Chemical Endocrinology

The mechanism of steroid hormone action at the molecular level is approached by producing new progesterone and estrogen analogs by organic synthesis. The student can work at the organic synthetic or biochemical level. Isolation of uterine estrogen and progesterone receptor proteins by a newly synthesized affinity chromatography system is in progress. Also, new steroids containing alkylating functional groups are synthesized and have a dual research role: to serve as tools with which to probe the steroid-macromolecular binding phenomenon and to produce biologically active steroids with persistent hormone activity or hormone blocking action. Physiochemical methods are used to study steroid-protein interaction. (Dr. Sweet)
Faculty of the Department of Obstetrics and Gynecology

Professor and Head of Department
James C. Warren, A.B., University of Wichita, 1930; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Biological Chemistry.)

Professor Emeritus

Professors
Fernando Arias, M.D., National University of Bogota, 1958; Ph.D., Tulane University, 1965.
Irving Boime, B.S., St. Louis College of Pharmacy, 1964; M.S., Purdue University, 1966; Ph.D., Washington University, 1970. (See Department of Pharmacology.)
H. Marvin Camel, M.D., Creighton University, 1950.
Ernst R. Friedrich, M.B., University of Berlin, 1951; M.D., University of Heidelberg, 1954.
Frederick Sweet, B.S., City University of New York, 1960; Ph.D., University of Alberta, 1968.
Walter G. Wiest, A.B., Brigham Young University, 1948; Ph.D., University of Wisconsin, 1952. (See Department of Biological Chemistry.)

Professors Emeriti (Clinical)
A. Norman Arneson, B.S., Texas Christian University, 1924; M.D., Washington University, 1928. (See Department of Radiology.)
John E. Hobbs, A.B., Southwest Missouri State Teachers College, 1923; M.D., Washington University, 1927.
Melvin A. Roblee, B.S., Washington University, 1923; M.D., 1925.
Samuel D. Soule, M.D., Washington University, 1928.

Professors (Clinical)
Charles R. Gulick, A.B., Central College, 1940; M.D., St. Louis University, 1943.
William H. Masters, B.S., Hamilton College, 1938; M.D., University of Rochester, 1943.

Associate Professor Emeritus
George J. L. Wulff, Jr., A.B., Washington University, 1929; M.D., 1933.

Associate Professors
James P. Crane, A.B., Indiana University, 1966; M.D., 1970.
Ming-Shian Kao, M.D., National Taiwan University Medical College, 1961.
David W. Keller, B.S., Canisius College, 1960; M.D., University of Buffalo, 1964.
Kenneth V. Polakoski, B.S., Wisconsin State University, 1966; M.S., University of Georgia, 1971; Ph.D., 1972.
Jacques Sauvage, B.S., University of Liege, 1953; M.D., 1957.

Associate Professors (Clinical)
S. Michael Freiman, A.B., Montana State University, 1951; M.D., Washington University, 1955.
Frank B. Long, Jr., M.D., Washington University, 1947.

Assistant Professors
Michael J. Gast, B.S., University of Illinois, 1970; M.D., Ohio State University, 1973; Ph.D., Washington University, 1981.
Alfred B. Knight, B.S., Massachusetts Institute of Technology, 1968; M.D., Case Western Reserve University, 1972.
Research Assistant Professors

Chang-chen Chin, B.S., National University, 1944; Ph.D., Oklahoma State University, 1967.
Sau Wai Cheung, B.S., New Asia College, 1966; M.S., University of Louisville, 1969; Ph.D., Indiana University, 1975.

Assistant Professors (Clinical)

Arthur T. Esslinger, M.D., Washington University, 1940.
Kevin C. Morin, M.B., B.Ch., National University of Ireland, 1921.
Willard C. Scrivner, B.S., Washington University, 1926; M.D., 1930.
Helman C. Wasserman, A.B., Johns Hopkins University, 1928; M.D., Washington University, 1932.

Assistant Professors Emeriti (Clinical)

Andrew Galakatos, B.S., St. Louis College of Pharmacy, 1960; M.D., University of Missouri, 1965.
Jacob Klein, B.S., Muhlenberg College, 1964; M.D., Jefferson Medical College, 1968.
Laurence E. Maze, M.D., Washington University, 1948.
James Pennoyer, B.S., Hobart College, 1933; M.D., University of Rochester, 1939.
Edward G. Peskin, B.A., University of Wisconsin, 1970; M.D., Washington University, 1974. (See Medical Care Group.)
Jonathan R. Reed, B.A., Fisk University, 1956; M.D., Meharry Medical College, 1965.

Instructors (Clinical)

Scott Barrett, Sr., M.D., Meharry Medical College, 1938.
Scott R. Barrett, Jr., M.D., Howard University, 1975.
Joe E. Belew, A.B., Central College, 1953; M.D., St. Louis University, 1957.
Bruce L. Bryan, B.S.M.E., Purdue University, 1973; M.D., Washington University, 1977.
Shih-Chung Chang, M.D., Chung-Shan Medical College, 1968.
Lauren E. Clark-Rice, A.B., University of California, 1973; M.D., University of Missouri, 1977.
Raymond P. Davidson, B.S., Washington University, 1974; M.D., 1978.
Ira C. Gall, B.S., University of Cincinnati, 1948; M.D., 1951.

Joseph Hazan, M.D., Ege University Medical School, 1971.
Randall L. Heller, Jr., B.S., University of Missouri, 1964; Ph.D., 1968; M.D., University of Texas, 1976.
Godofredo M. Herzog, B.S., Louisiana State University, 1953; M.D., Washington University, 1957.
William L. Holcomb, B.S., Purdue University, 1970; M.D., Indiana University, 1975.
Darwin C. Jackson, B.S., Ohio State University, 1972; M.D., Washington University, 1976.
Michael K. Johnson, B.S., Ohio State University, 1970; M.D., St. Louis University, 1975.
James W. Kessel, M.D., University of Chicago, 1975; Ph.D., California Institute of Technology, 1963.
Justin F. Kramer, M.D., University of Michigan, 1949.
F. Delbert Moeller, B.S., Muskingum College, 1965; M.D., Ohio State University, 1969.
Sam Montazee, M.D., Shiraz Medical School, 1961.
Gerald Newport, A.B., Washington University, 1948; M.D., 1953.
Chinda Vamvas Rojansathit, M.D., Siriraj Medical School, 1967.
Albro C. Tobey, Jr., B.S., Butler University, 1965; M.D., Trinity College, University of Dublin, 1972.
Parker H. Word, B.S., Virginia State College, 1941; M.D., Howard Medical School, 1944.
Mitchell Yanow, M.D., Washington University, 1941.
Department of Ophthalmology

Instruction begins in the second year with methods of examination of the eye. Emphasis is on the use of the ophthalmoscope. There are also several lectures on various aspects of ocular disease. During the third year, students are assigned to an ophthalmology clerkship for one week. In the fourth year, six-week and twelve-week clinical or research electives are offered.

SECOND YEAR
Ophthalmology
Lectures and demonstrations in the basic principles of ophthalmology. (Dr. Smith and Staff)

THIRD YEAR
Ophthalmology
Students rotate through the Eye Clinic for a one-week clinical clerkship. (Dr. Smith and Staff)

FOURTH YEAR ELECTIVES
Clinical Clerkship in Ophthalmology
One student rotates through the Department of Ophthalmology for either a six-week period or a twelve-week period. He is given instruction in the basic principles of ophthalmologic examination and assists in the workup of eye patients at Washington University Medical Center (Barnes Hospital). He is expected to present cases at rounds and conferences. This elective is geared to the student who plans to enter the specialty of ophthalmology.

Clinical Neuro-Ophthalmology
The student will be introduced to the basic evaluation of a patient with either afferent or efferent visual system problems. The student will at first evaluate patients accompanied by a resident or fellow, and ultimately with developed competency will undertake initial evaluation by himself. Course includes required reading and self-assessment examinations.

RESEARCH ELECTIVES
Experimental and clinical research in glaucoma. (Drs. Kass, Krupin)
Experimental and diagnostic ophthalmic pathology. (Dr. M. Smith)
Experimental research in ocular physiology. (Dr. Moses)
Research in cornea and diabetes. (Dr. Waltman)
Experimental research in anatomy and physiology. (Dr. Cohen)
Experimental research in visual physiology. (Dr. R. Miller)
Experimental neuropathology. (Dr. R. Burde)
Computer application in visual fields. (Dr. W. Hart)
Research in intraocular lenses. (Dr. D. Meltzer)
Research in aqueous humor dynamics. (Dr. T. Krupin)
Faculty of the Department of Ophthalmology

Professor and Head of Department
Bernard Becker, A.B., Princeton University, 1941; M.D., Harvard University, 1944.

Professors
Ronald M. Burde, B.S., Massachusetts Institute of Technology, 1960; M.D., Jefferson Medical College, 1964. (See Department of Neurology and Neurological Surgery.)
Adolph I. Cohen, B.S., City College of New York, 1948; M.A., Columbia University, 1950; Ph.D., 1954. (See Department of Physiology and Biophysics.)
James A. Ferrendelli, A.B., University of Colorado, 1958; M.D., 1962. (See Departments of Pharmacology and Neurology and Neurological Surgery.)
Theodore Krupin, A.B., Washington University, 1964; M.D., St. Louis University, 1968.
Robert F. Miller, M.D., University of Utah, 1967. (See Department of Physiology and Biophysics.)
Robert A. Moses, A.B., Johns Hopkins University, 1938; M.D., University of Maryland, 1942.
Morton E. Smith, B.S., University of Maryland, 1956; M.D., 1960. (See Department of Pathology.)
Stephen R. Waltman, B.S., Massachusetts Institute of Technology, 1961; M.D., Yale University, 1964.

Professors (Clinical)
James E. Miller, B.S., Tulane University, 1946; M.D., the Medical College of Alabama, 1949. (See Department of Pediatrics.)
Edward Okun, B.S., Dartmouth College, 1952; M.D., University of Vermont, 1956.

Associate Professors
William M. Hart, Jr., Ph.D., University of Maryland, 1970; M.D., 1970.
Elise F. Meyers, B.A., Indiana University, 1947; M.D., 1950. (See Department of Anaesthesiology.)

Associate Professors Emeriti (Clinical)
Howard R. Hildreth, M.D., Washington University, 1928.
Theodore E. Sanders, B.S., University of Nebraska, 1931; M.D., 1933.

Associate Professors (Clinical)
George M. Bohigian, A.B., Washington University, 1961; M.D., St. Louis University, 1965.
Jack Hartstein, B.S., University of Missouri, 1953; M.D., University of Cincinnati, 1955.
Glen P. Johnston, A.B., Washington University, 1953; M.D., 1956.
Jack Kayes, B.A., Yale University, 1953; M.D., Washington University, 1957.
Terence G. Klingele, M.D., University of California, 1970.
Benjamin Milder, M.D., Washington University, 1939.
Harry D. Rosenbaum, M.D., Washington University, 1934.
Bernd Silver, B.S., University of Louisville, 1952; M.D., 1956.

Assistant Professors
Lawrence A. Gans, B.A., Columbia University, 1972; M.D., Case Western Reserve University, 1977.
Melvin Haber, B.S., Rutgers University, 1956; M.D., New York Medical College, 1963.
David W. Meltzer, A.B., Princeton University, 1965; Ph.D., University of Rochester, 1970; M.D., Ph.D., University of Miami, 1975.
Malcolm M. Slaughter, B.S., City College of New York, 1967; M.S., Fordham University, 1972; Ph.D., 1977.
Mitchel L. Wolf, B.A., Yeshiva College, 1964; M.D., Albert Einstein College of Medicine, 1968.

Research Assistant Professor

Assistant Professors Emeriti (Clinical)
Edmund B. Als, M.D., Washington University, 1934.
Daniel Bisno, B.A., University of Wisconsin, 1927; M.D., Johns Hopkins University, 1931.
Lawrence T. Post, Jr., M.D., Washington University, 1948.

Assistant Professors (Clinical)
Neva P. Arribas, M.D., Manila Central University, 1954.
Ronald C. Bilchik, B.S., University of Toledo, 1963; M.D., Washington University, 1967.
James C. Bobrow, B.A., Yale University, 1966; M.D., Johns Hopkins University, 1970.

Isaac Boniuk, B.S., Dalhousie University, 1958; M.D., 1962.

Dean B. Burgess, A.B., Occidental College, 1963; M.D., University of California, 1967.

Samuel A. Canaan, Jr., A.B., State University of Iowa, 1942; M.A., Columbia University, 1948; M.D., Meharry Medical College, 1954.

Richard F. Escoffery, M.B., B.S., University of West Indies Medical School, 1969.


M. Gilbert Grand, B.S., Tufts University, 1964; M.D., Yale University, 1968.


Matthew Newman, A.B., Vanderbilt University, 1956; M.D., Columbia University, 1959.


Arthur W. Stickle, Jr., M.D., University of Oklahoma, 1943.

Philip Venable, B.S., Wayne State University, 1955; M.D., 1960.

Charles E. Windsor, A.B., Carleton College, 1956; M.D., University of Rochester, 1960.

Instructor

Martha J. Farber, B.S., Rensselaer Polytechnic Institute, 1972; M.D., SUNY Downstate Medical Center, 1978.

Research Instructors

Walter J. Grodzki, D.D.S., St. Louis University, 1944.

Elaine Miller, A.B., Judson College, 1944; M.D., Medical College of Alabama, 1949. (See Department of Pediatrics.)


Instructors (Clinical)


Philip L. Custer, B.S., Vanderbilt University, 1974; M.D., 1978.

Bruce S. Frank, S.B., Massachusetts Institute of Technology, 1972; M.D., Washington University, 1976.

Ruth S. Freedman, A.B., Washington University, 1938; M.D., 1942.


Robert L. Lamberg, B.S., University of Missouri, St. Louis, 1972; M.D., Washington University, 1976.


Maxwell Rachlin, M.D., University of Toronto, 1942.


Mickey L. Salmon, M.D., Louisiana State University, 1959.

William L. Walter, B.A., DePauw University, 1950; M.D., Ohio State University, 1954.

Assistant

Clemens H. Jacques, B.S., University of California, 1949; O.D., 1949. (See Medical Care Group.)


Research Assistants


Nels J. Holmberg, B.S., Oklahoma State University, 1963; M.S., 1966.

Otolaryngology is presented to students during their sophomore, junior, and senior years. A clinical pathologic correlation lecture series is presented to sophomores. In the junior year, each student spends one week on one of the services in East Pavilion or St. Louis Veterans Administration. 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 Thursdays, and an introduction to audiology as well as to basic ENT research.

Senior students who show a special interest may take a rotating elective in ENT suited to their interests. Some possibilities include research or clinical work. Ample research facilities and ongoing projects are available. Clinical exposure could include oncologic diseases related to the head and neck, otologic diseases, otoneurology, audiology, or middle-ear surgery.

SECOND YEAR
Otolaryngology and Physical Diagnosis
Clinical pathologic correlative lectures in otolaryngology are given to the entire class. (Dr. Thawley)

THIRD YEAR
Otolaryngology Clerkship
Practical instruction in diagnosis and treatment. One week. (Dr. Thawley)

FOURTH YEAR ELECTIVES
Clinical Clerkship
A six-week rotation which stresses outpatient diagnosis and management of ENT problems. Lectures, field trips, office practice, hospital care, and operating room exposure round out the rotation. Two students are accepted for each rotation. Students may select multiple options. (Dr. Thawley)

RESEARCH ELECTIVES
Metabolism of the inner ear. Physiological and biochemical aspects. (Dr. Thalmann)
Otoneurology labs. (Dr. Stroud, Dr. Smith)
Clinical Audiology. (Bob Loomis)
Inner ear microanatomy and pathology. (Dr. Bohne)
Department of Otolaryngology

Edward H. Lyman, B.S., Washington University, 1937; M.D., 1937.
Wayne A. Viers, B.S., Phillips University, 1952; M.D., University of Oklahoma, 1956.
Joseph W. West, M.D., Duke University, 1944.

Assistant Professor
Richard Hayden, B.S., Mount Allison University, 1968; M.Sc., Edinburgh University, 1970; M.D.C.M., McGill University, 1974.
Harlan R. Muntz, B.S., Miami University, 1973; M.D., Washington University School of Medicine, 1977.
Margaret W. Skinner, A.B., Wellesley College, 1956; M.A., Case-Western Reserve University, 1960; Ph.D., Washington University School of Medicine, 1976.
Peter G. Smith, B.S., Clemson University, 1967; Ph.D., Purdue University, 1972; M.D., Medical University of South Carolina, 1976.

Research Assistant Professor

Isolde Thalmann, B.S., Washington University, 1969; A.M., 1972; Ph.D., California Western University, 1982.

Assistant Professors Emeriti (Clinical)
Alfred J. Cone, B.S., State University of Iowa, 1921; M.D., 1923; M.S., 1927.
Herbert M. Smit, M.D., St. Louis University, 1933.

Assistant Professors (Clinical)
Wallace P. Berkowitz, B.S., University of Notre Dame, 1963; M.D., Boston University, 1967.
Jeffrey Fierstein, B.A., Dartmouth College, 1967; M.D., Albert Einstein College of Medicine, 1971.
Donald R. Ingram, M.D., University of Illinois, 1956.
Philip L. Martin, B.A., St. Louis University, 1968; M.D., 1968.
Lloyd Thompson, B.A., Union College, 1960; M.D., Howard University, 1964.
Supote Phipatanakul, M.D., Chulalongkorn Hospital Medical School, 1965.

Instructor Emeritus
Marion P. Bryan, A.B., Washington University, 1931.

Research Instructors

Instructors (Clinical)
Larry Dobbs, B.S., Hendrix College, 1968; M.D., University of Arkansas, Medical Sciences, 1972.
Albert F. Ruehl, B.S., Washington University, 1961; M.S., 1964; M.D., St. Louis University School of Medicine, 1973.

Research Associates
William Clark, B.A., University of Michigan, 1949; M.S., 1973; Ph.D., 1975 (Also Central Institute for the Deaf).
Gertraude Thallinger

Research Assistants
Charles D. Carr
Department of Pathology

Modern pathology is concerned with the molecular and ultrastructural basis of disease. Historically, morphologic studies provided the foundations of our concepts of disease, and ultrastructural studies continue to add to our understanding, but modern pathology utilizes virtually all of the tools of basic sciences. Pathologists are involved in diagnostic, teaching, and research activities.

In addition to the sophomore year of pathology, the department conducts numerous combined conferences which third- and fourth-year students attend as part of individual clinical clerkships. These are described below.

Students, usually in their fourth year, may elect to participate in advanced courses or clerkships in autopsy or surgical pathology or laboratory medicine, or to pursue research in experimental pathology.

The department offers a course of study leading to the Ph.D. degree. Medical students who desire to combine graduate and medical programs of study should consult Dr. Michael Lieberman.

For the purpose of teaching, research, and service, the department is divided into specialty divisions under the following directors:

Autopsy Pathology, Dr. McKeel
Graduate Programs in Experimental Pathology, Dr. Baenziger
Laboratory Medicine, Dr. McDonald
Neuropathology, Dr. Nelson
Pediatric Pathology, Dr. Kissane
Surgical Pathology, Dr. W. Bauer

SECOND YEAR

Bio 515, 516. General Pathology

This course is a comprehensive study of the cellular and molecular basis of disease. Lectures, gross and microscopic demonstrations, laboratory work, tutorials, case studies, and experimental pathology seminars are all utilized. The course is divided into six sections, each consisting of a six-week period of study that is correlated with the subject matter concurrently presented in the sophomore pathophysiology course.

The sections consist of (1) general pathology and infectious diseases, (2) cardiovascular, pulmonary and renal diseases, (3) metabolic, endocrine, and gastrointestinal diseases, (4) hematology and oncology, (5) neuropathology, and (6) development, pediatric, obstetric, and gynecologic diseases.

THIRD AND FOURTH YEARS

Clinical Pathological Conference

The clinical history and treatment of patients who have died are discussed before the class by the physicians and surgeons of the departments concerned. These conferences afford the students an opportunity to interpret the clinical observations in light of the postmortem findings. One hour a week during the year.

Laboratory Medicine Conference

One hour each week for six weeks during Internal Medicine rotations at Barnes Hospital. Problem cases and general principles of Laboratory Medicine are discussed.

Tumor Conference

One hour each week for twelve weeks during the surgery and obstetrics and gynecology clerkships. Problem cases are presented for illustration and discussion of all aspects of neoplastic disease.

RESEARCH

Bio 590.

The department encompasses all of the major areas of investigation in experimental pathology. Examples include:

Production of monoclonal antibodies against B lymphocyte. (Dr. Ahmed)
Lymphokines: Structure and mechanisms of action. (Dr. Aune)
Examination of glycoprotein oligosaccharides and their role in endocytosis and cellular recognition. (Dr. Baenziger)
Kinetics and hormonal aspects of neoplastic cell growth. (Drs. Bauer, Meyer)
Plasma membrane tumor associated antigens and immunity to them in human lung cancer. (Dr. Bell)
Mechanism of antigen recognition by cytolytic T lymphocytes. (Dr. Braciale)
The possible role of insulin in the regulation of intracellular calcium homeostasis. (Dr. Chan)
Experimental analysis of gastrin secretion by rat pyloric antral cells in vitro. (Dr. DeSchrayer)
The coordination and interregulation of the pathways of carbon and energy metabolism \textit{in vitro} using \textit{Escherichia coli} as a model system. (Dr. Dietzler)

Functional and biochemical characterization of human T lymphocyte subpopulations and identification of human immune response genes. (Dr. Gebel)

Structure and function of endocrine cells of the gastrointestinal tract and pancreas. (Dr. Greider)

Immunologic aspects of lymphoreticular disease. (Dr. Griffith)

Renal pathology, pediatric pathology. (Dr. Kissane)

Rapid diagnostic methods for the detection of opportunistic systemic fungal infections. (Dr. Kobayashi)

Mechanism of antimicrobial action and resistance. (Dr. Krogstad)

Experimental pulmonary diseases. (Dr. Kuhn)

Experimental diabetes mellitus, tissue culture of islets, transplantation of islets. (Dr. Lacy)

Distribution of electrolytes and trace metals in blood. (Dr. Ladenson)

Chemical carcinogenesis and enzymology of DNA repair, chromatin structure, DNA methylation and cloning. (Dr. Lieberman)

Biochemistry of human mitochondrial DNA replication. (Dr. Low)

Experimental diabetes: biochemical studies of insulin release mechanisms \textit{in vitro}. (Dr. M. McDaniel)

Biology of breast cancer. (Dr. McDivitt)

Cellular mechanism of insulin and related hormone action with emphasis on the role of intracellular divalent cations. (Dr. McDonald)

Human and experimental pituitary neoplasms: pathogenetic mechanisms, cell biology, cytology, diagnosis, and treatment. (Dr. McKeel)

Analysis of predictability of clinical laboratory diagnostic tests. (Dr. Murray)

Analysis of human lymphocyte subsets. (Dr. Nahm)

Pathogenesis of cerebral microcirculatory injury: response of the autonomic nervous system to injury; pathology and pathogenesis of lesions associated with vitamin E deficiency; pathogenesis of skeletal muscle injury. (Dr. Nelson)

The application of biostatistics and computer technology to the solution of data analysis problems in Laboratory Medicine. (Dr. Parvin)

Mechanisms regulating immune responses in tissue culture systems. Cellular immunology with particular emphasis on genetic control of antibody responses. (Dr. Pierce and Kapp-Pierce)

Transplantation immunology. (Dr. Rodey)

The mechanism of adhesion to and activation of platelets by collagen and the role of von Willebrand factor in this process. (Dr. Santoro)

Relationships of high-energy phosphates and insulin action. (Dr. Siegfried)

Placental transport and surface membrane structure and function. (Dr. C. Smith)

Clinical microbiology, anaerobes, endogenous infections. (Dr. Sonnenwirth)

Metabolic bone diseases. (Dr. Teitelbaum)

Characterization of receptor ligand binding systems. (Dr. Valdes)

Pathogenesis of diabetic vascular disease. Cellular mechanisms of endocytosis and macromolecular transport by endothelium. (Dr. Williamson)

Immunohistochemistry of fibrinopeptide. (Dr. Wilner)

**ELECTIVES**

**Advanced Special Pathology**

A series of seminars discussing timely selected topics in special pathology of human disease, augmented by illustrative cases and emphasizing clinicopathologic correlations. Reading lists will be circulated and active discussion is encouraged. If the size of the group makes it practical to do so, each student will prepare and conduct a session on a subject of his choice. (Dr. Kissane)

**Autopsy Pathology**

A full-time elective, periods 4-8. Students assist in performing autopsies and participate fully in anatomic pathology research-related conferences, as well as in the mechanisms of diseases journal club. (Dr. McKeel and Staff)

**Selected Topics in Immunology and Immunopathology**

This will be a seminar course covering topics in immunology and immunopathology with emphasis both on areas of current research interest in immunology and on areas applicable to the understanding of human disease states. The subject matter can be selected so as to suit student interests but will also include organization of the immune system, immune deficiency and immunosuppression, cellular interaction in the immune response, patterns of immunological disease and diseases with immunological features, tolerance, and autoimmunity. (Dr. T. Braciale)
Neuropathology Seminar
Clinical pathological correlations of neurological diseases will be investigated by the case study method using current and documented material. Participants will partake in gross neuropathological examinations and will be assigned selected cases for discussion of clinical data and gross and microscopic pathological findings, especially in relationship to evolution and mechanism of disease processes. Topics covered will include vascular, infectious, demyelinating, and neuronal diseases, as well as neoplasms of the nervous system. (Dr. Nelson)

Clinical Laboratory Medicine
A full-time elective, periods three and five. Designed to acquaint the student with the proper use of the laboratory in clinical medicine and to expose the student to the basic operation of each area of the laboratory. (Dr. McDonald and Staff)

Anatomic Pathology—Jewish Hospital
This elective is designed to reacquaint students who have had some clinical experience with the morphological basis of disease, and to permit them to relearn normal morphological relationships. During the elective students will learn to perform gross autopsy dissections, and will be taught how to select appropriate tissue samples for further microscopic, histochemical, immunofluorescent, and electron microscopy study. Subsequently, they will learn how to perform these procedures under supervision of members of the Anatomic Pathology Staff and how to interpret their results. Following completion of appropriate studies, an in-depth report of clinical pathological correlations will be prepared for each autopsy performed. This elective is considered appropriate for students who intend careers in Internal Medicine, Surgery and Radiology. (Dr. McDivitt and Staff)

Laboratory Medicine—Jewish Hospital
Intensive elective training in Laboratory Hematology: Includes training in immunochemistry, coagulation and special as well as routine laboratory hematology procedures. Emphasis will be placed on laboratory procedures and their relationship with patient diagnosis and management. (Dr. Wilner)

Surgical Pathology—Jewish Hospital
This elective is designed to acquaint the student with the discipline of Surgical Pathology and to permit him to develop basic skills in histopathological interpretation. This elective will be offered to only one student per period in order to permit maximum interaction with the Surgical Pathology Staff and House Officers. During the course of the elective, the student will be taught to function as a junior House Officer. He will participate in the examination and dissection of gross specimens, take operating room calls, learn frozen section diagnosis, and formulate histopathological diagnoses, all in conjunction with members of the Senior Staff. Since the Laboratory of Surgical Pathology at Jewish Hospital processes a broad range of medical biopsy material as well as specimens derived from busy surgical subspecialty practice, the elective is considered desirable for students who plan careers in internal medicine and surgery as well as for those who intend to enter the field of pathology. (Dr. McDivitt)

Surgical Pathology
Surgical pathology offers an elective for a 6-week period under Surgical Pathology I. Students participate fully in activities of the Division of Surgical Pathology and they are responsible for dissection and description of gross specimens and microscopic diagnosis under supervision of the senior staff of the Division. Students attend morning conferences with the Director, surgical and medical grand rounds, tumor and subspecialty conferences.

In addition, Surgical Pathology II includes rotations through subspecialties: Neuropathology, Hematopathology, Dermatopathology, ENT Pathology, and Gynecologic Pathology. (Dr. Bauer and Staff)

Oncology
The Division of Surgical Pathology also offers an Oncology course for a 6-week period under the guidance of Walter C. Bauer, M.D. This elective is designed to expose the student to all aspects of neoplastic disease. Students will follow the clinical course of a variety of cancer patients, correlating clinical response with mode of treatment, state of disease, and pathologic evaluation. Students will make rounds with the medical oncologists and will follow treatment with surgery, irradiation, and chemotherapy. Correlation of the results of radiologic examinations, exfoliative cytology, and tumor kinetic studies with extent of disease and response to treatment will be studied. Students will represent in detail the treatment, rationale for therapy, and observed response on at least one patient per week. (Dr. Bauer)

In addition to the above, the department offers a number of advanced courses in the Division of Biology and Biomedical Sciences. These courses are listed below, but are described in the offerings of the Division of Biology and Biomedical Sciences.

Bio 504. Environmental Pathology
Bio 518, 519. Pathology Research Seminar
Bio 520. Methods in Experimental Pathology
Bio 544. Mechanisms of Neoplasia

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.
Faculty of the Department of Pathology

Edward Mallinckrodt Professor and Head of Department
Paul E. Lacy, B.A., Ohio State University, 1945; M.D., 1948; M.S., 1948; Ph.D., University of Minnesota, 1955.

Professors Emeriti
Lauren V. Ackerman (Pathology and Surgical Pathology), A.B., Hamilton College, 1927; M.D., University of Rochester, 1932. (Also Consultant.)
Ruth Silverberg, M.D., University of Breslau, 1931. (Also Lecturer.)

Professors
Walter C. Bauer, B.S., Ohio State University, 1946; M.D., Washington University, 1954.
Hugh Chaplin, Jr., A.B., Princeton University, 1943; M.D., Columbia University, 1947. (See Department of Medicine.)
Joseph M. Davie, A.B., Indiana University, 1949; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Microbiology and Immunology.)
Marie H. Greider, B.S., Ohio State University, 1949; M.S., 1955; Ph.D., 1960.
Gerald Kessler, B.S., City College of New York, 1950; M.S., University of Maryland, 1952; Ph.D., 1954. (Jewish Hospital.)

John M. Kissane, A.B., University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pediatrics.)
Charles Kuhn, A.B., Harvard University, 1955; M.D., Washington University, 1959.
Michael Kyriakos, B.S., City College of New York, 1958; M.D., Albert Einstein College of Medicine, 1962.
Robert W. McDivitt, M.D., Yale Medical School, 1956. (Jewish Hospital.)
Jay McDonald, B.S., Tufts University, 1963; M.D., Wayne State University, 1969. (See Department of Medicine.)
John S. Meyer, A.B., Yale University, 1952; M.D., Washington University, 1956. (Jewish Hospital.)
James S. Nelson, M.D., St. Louis University, 1957. (See Department of Pediatrics.)

John W. Olney, B.A., University of Iowa, 1956; M.D., 1963. (See Department of Psychiatry.)
Carl W. Pierce, A.B., Colgate University, 1962; M.D., University of Chicago, 1966; Ph.D., 1966. (See Department of Microbiology and Immunology.) (Jewish Hospital.)

Heschel J. Raskas, B.S., Massachusetts Institute of Technology, 1962; Ph.D., Harvard University, 1967. (See Department of Microbiology and Immunology.)

Glenn E. Rodey, B.S., Ohio University, 1957; M.D., Ohio State University, 1961. (See Department of Medicine.)
Carl H. Smith, B.A., Swarthmore College, 1955; M.D., Yale University, 1959. (See Department of Pediatrics.)
Morton E. Smith, B.S., University of Maryland, 1956; M.D., 1960. (See Department of Ophthalmology.)
Alexander C. Sonnenwirth, A.B., University of Nebraska, 1950; M.S., Purdue University, 1953; Ph.D., Washington University, 1960. (See Department of Microbiology and Immunology.) (Jewish Hospital.)

Steven L. Teitelbaum, B.A., Columbia University, 1960; M.D., Washington University, 1964. (Jewish Hospital.)
Richard Torack, B.S., Seton Hall University, 1948; M.D., Georgetown University, 1952.

Professors (Visiting Staff)
Frederick G. Germuth, Jr., A.B., Johns Hopkins University, 1942; M.D., 1945.
Frederick T. Kraus, B.A., College of William and Mary, 1951; M.D., Washington University, 1955.
William V. Miller, A.B., University of Missouri, 1962; M.D., 1966. (See Department of Medicine.)
Department of Pathology

Laurence A. Sherman, B.A., B.S., University of Chicago, 1956; M.D., Albany Medical College, 1964. (See Department of Medicine.)

Associate Professors

Harish C. Agrawal, B.Sc., Allahabad University, 1957; M.Sc., 1959; Ph.D., 1964. (See Departments of Pediatrics and Neurology and Neurological Surgery.)


C. Elliott Bell, Jr., B.S., Tulane University, 1960; M.D., 1964. (See Department of Medicine.)


Katherine DeSchryver, M.D., University of Louvain, 1971.

David N. Dietzler, A.B., Washington University, 1957; Ph.D., 1963. (See Department of Medicine.)

Milton N. Goldstein, B.S., Western Reserve University, 1946; M.S., 1947; Ph.D., 1952. (See Department of Anatomy and Neurobiology.)

Phyllis M. Hartroft, B.S., University of Michigan, 1949; M.A., University of Toronto, 1951; Ph.D., 1954.

Judith A. Kapp-Pierce, B.A., Miami University, 1965; M.S., Indiana University, 1969; Ph.D., Harvard University, 1976. (See Department of Microbiology and Immunology.)

(Western Reserve University.)

Jack H. Ladenson, B.S., Pennsylvania State University, 1964; Ph.D., University of Maryland, 1971. (See Department of Medicine.)

Michael L. McDaniel, B.A., Southern Illinois University, 1963; M.S., University of North Dakota, 1966; Ph.D., St. Louis University, 1970.


George D. Wilner, B.S., Northwestern University, 1962; M.D., 1965. (See Department of Medicine.) (Jewish Hospital.)

Assistant Professors

Thomas M. Aune, B.S., Southwestern at Memphis, 1973; Ph.D., University of Tennessee, 1976 (Jewish Hospital.)

Kwok-Ming Chan, B.S., Hong Kong Baptist College, 1971; Ph.D., University of South Dakota, 1977. (See Department of Medicine.)


Samir K. El-Mofty, B.D.S., Cairo University, 1959; M.Sc., University of Pennsylvania, 1966; Ph.D., Temple University, 1975. (Also School of Dental Medicine.)


Howard M. Gebel (Clinical Immunology), B.S., University of Illinois, 1973; Ph.D., University of Missouri, 1976. (See Department of Medicine.)


Carlos J. Goldenberg, M.D., Universidad Nacional de Buenos Aires, 1967.


Donald J. Krogsd, A.B., Bowdoin College, 1965; M.D., Harvard Medical School, 1969. (See Department of Medicine.)

Michael L. Landt, B.S., Whitworth College, 1970; Ph.D., University of Oregon, 1976. (See Department of Pediatrics.)

Robert L. Low, A.B., University of California, 1970; Ph.D., University of Chicago, 1975; M.D., 1977.

David N. Menton, B.S., Mankato State College, 1959; Ph.D., Brown University, 1966. (See Department of Anatomy and Neurobiology.)

Joseph P. Miletich, B.S., Michigan State University, 1972; M.D., Washington University, 1979; Ph.D., 1979. (See Department of Medicine.)

Stephen A. Moser, B.S., California State University, 1969; M.S., 1972; Ph.D., Ohio State University, 1976. (Jewish Hospital.)

Patrick Murray, B.S., Saint Mary's College, 1969; Ph.D., University of California, 1974. (See Department of Medicine.)
Moon Nahm, A.B., Washington University, 1970; M.D., 1974. (See Department of Medicine.)

Curtis Parvin, B.S., Michigan State University, 1974; M.S., University of Minnesota, 1976; Ph.D., 1980. (See Department of Medicine.)

Daniel Santa Cruz, M.D., University of Buenos Aires, 1971.

Samuel Santoro, B.S., Emory University, 1972; M.D., Vanderbilt University, 1979; Ph.D., 1979. (See Department of Medicine.)


Barry A. Siegfried, B.S., Washington University, 1972; M.D., 1976. (See Department of Medicine.)

E. Kaye Smith, B.S., Webster College, 1957; M.S., St. Louis University, 1963; D.V.M., Kansas State University, 1965.

John W. Turk, A.B., Washington University, 1965; M.D., 1976; Ph.D., 1976. (See Department of Medicine.)

Roland Valdes, Jr., B.S., University of Miami, 1969; M.S., California State University, 1972; Ph.D., University of Virginia, 1976. (Jewish Hospital.)

Assistant Professor (Clinical)


Research Assistant Professor

Kun-hwa Hsieh, B.S., National Taiwan University, 1965; Ph.D., University of California, 1973. (Jewish Hospital.)

Assistant Professors (Visiting Staff)

John D. Bauer, B.S., University of Innsbruck, 1938; L.R.C.P. and S., University of Glasgow, 1944; M.D., Marquette University, 1947.

Luis Q. Del Rosario, M.D., University of Santo Tomas, 1954.

Valgard Jonsson, B.S., North Dakota State University, 1958; M.S.P.H., University of North Carolina, 1961; Ph.D., 1965.

Richard A. Kahn, A.B., University of Missouri, 1966; M.S., 1968; Ph.D., Georgetown University, 1972.

Kathleen S. McLaughlin, B.S., St. Louis University, 1960; M.D., Washington University, 1964.

Robert W. Oglivie, B.A., University of Utah, 1943; M.D., 1946.

Donald J. Parker, B.S., Duquesne University, 1959; M.S., 1964; Ph.D., Kansas State University, 1967.


Luis Tumialan, M.D., University of San Marcos, 1965.

Andres J. Valdes, B.S., Institute de Santa Clara, 1949; M.D., University of Havana, 1957.

Instructors


Mary Anne Rudloff, B.A., University of North Carolina, 1971; M.D., Washington University, 1979. (Jewish Hospital.)


Research Instructors


Katherine C. Chang, B.S., University of Taiwan, 1969; Ph.D., University of Iowa, 1974.


Jeffrey P. Lake, B.A., Washington and Jefferson College, 1971; M.S., Idaho State University, 1973; Ph.D., Montana State University, 1977. (Jewish Hospital.)

Craig M. Sorensen, B.S., University of Illinois, 1976; Ph.D., Washington University, 1980. (Jewish Hospital.)


Instructors (Visiting Staff)

Tomas Aquino, S.B., Santa Clara Institute, 1949; M.D., University of Havana, 1957; Ph.D., University of Chicago, 1967.


Virgilio P. Dumadag, M.D., Far Eastern University Institute of Medicine, 1961.

Rodolfo A. Latorre, M.D., University of the East, Ramon Magsaysay Memorial Medical Center, 1961.

Manuel Marban, A.A., Xavier University, 1959; M.D., University of Santo Tomas, 1964.


Carlos Perez-Mesa, M.D., University of Havana, 1950.


Ursula Scafferd, B.S., Howard University, 1942; M.D., 1945.

Gregorio Sierra, B.S., Institute of Manzanillo, 1945; M.D., University of Havana, 1954.

Research Assistants

Maria Chraplyvy, B.S., St. Louis University, 1964; M.S., 1967.


Dorothy J. Fiete, B.S., Marymount College, 1958.

Mary P. Leckie, B.S., University of Toledo, 1967.

Joan Lee, B.S., Taiwan Christian College, 1960; M.S., Oklahoma State University, 1967.

Santiago Plurad, B.S., University of Philippines, 1952; M.S., Iowa State University, 1962; Ph.D., University of Missouri, 1967.
Edward Mallinckrodt Department of Pediatrics

The primary aim of the Department of Pediatrics in the teaching program 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 will have an appreciation of pediatric problems regardless of his future choice of a career in medicine.

The major clinical and research facilities are in the St. Louis Children's Hospital and the St. Louis Maternity Hospital. The former has a bed capacity of 182 and accepts children through adolescence with all types of medical problems. Hospital admittances average 8,000 annually. The Pediatric Outpatient Division averages about 80,000 visits a year. In the Medical Center the yearly number of newborn infants averages more than 3,000.

SECOND YEAR
The student is introduced to pediatrics and to the full-time staff through a series of lectures designed to acquaint him with the concepts of human growth and development, genetics, and the effects of age and maturity on reactions to injury and disease. A second series of talks highlights the important disorders commonly encountered in infants and children. The unique aspects of the physical examination of the infant and child are presented during the course in physical diagnosis. Members of the department also participate in the sophomore course in pathophysiology.

THIRD YEAR
A clerkship of six weeks is scheduled where the student participates in the following:

1. Care of inpatients and outpatients, sharing responsibility with intern or resident.
2. Daily rounds and bedside conferences with house staff and attending physician.
3. Special conferences on various facets of pediatrics.
4. Tutorial with junior faculty.
5. Weekly grand rounds.

FOURTH YEAR
This year is devoted to elective time which may be spent according to the individual preferences of the student, who may serve as an intern substitute or in the research laboratory or combine clinical and laboratory work. The following electives are offered:

General Pediatrics
General Clinical Pediatrics—St. Louis Children's Hospital
The student will be assigned patients on the Infectious Diseases or General Pediatric Division for initial evaluation and continuing care. The student works as an extern and is expected to take night call every third night. Students work directly under the supervision of the senior resident and teaching rounds are conducted by the faculty. The elective will provide experience in the management of many pediatric medical conditions including a wide variety of infectious diseases, failure to thrive, acute asthma, poisoning, immune deficiency diseases, and gastrointestinal disorders.

(Drs. Granoff, Keating, Shackelford)

General Clinical Pediatrics—St. Louis County Hospital
The student will participate as an active member of the pediatric care team at the St. Louis County Hospital and will be directly supervised by the senior resident. Night
call is every third night during the six-week period. The elective is designed to provide the student with a general pediatric experience with emphasis on ambulatory care and neonatology. (Dr. Keller)

**Pediatric Ambulatory Services**

The student is given an opportunity to make a weekly schedule for this six-week clerkship. General pediatric clinic, subspecialty clinics, and practicing pediatricians' offices are offered daily as opportunities to the student for this clerkship. Consulting pediatricians discuss and supervise the diagnosis and management of each patient with the student. All students may be assigned in rotation to the Emergency Room where they will learn the care of the acutely ill child and the management of pediatric emergencies. They will examine and treat patients under the supervision of senior residents. (Dr. Middelkamp)

**Primary Care in General Pediatrics**

This clerkship is designed to provide the student with firsthand experience in general pediatric practice in a model ambulatory care setting, the Medical Care Group of St. Louis (MCG). The major component of the clerkship is direct patient care under the supervision of senior physicians who are members of the group. 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 in an alternate delivery system. The MCG is a teaching and research prepaid group practice located on the Medical School campus. (An optional alternate facility is located in St. Louis County.) (Drs. Kahn, Turner)

**Genetics**

**Clinical Genetics**

This will be a six-week clinical elective in which the students see consultations referred to the Division of Medical Genetics, work in Medical Genetics Clinic, attend daily Genetics rounds, and participate in the scheduled seminars. (Drs. Sly, Taysi)

**Research Electives**

Students can participate in current research in the area of molecular genetics of inherited disease. Projects may include analysis of DNA from affected kindreds as a means for gene identification, gene transfer using viral recombinant DNA vectors into primary human cell cultures, or animal model studies. (Dr. Hoffmann)

This course offers a period of research experience participating in studies of 1) lysosomal storage disorders, particularly mucopolysaccharidosis, 2) fundamental mechanisms of intracellular transport of macromolecules (receptor-mediated endocytosis), and 3) molecular genetic analysis of human genetic disorders using recombinant DNA techniques. (Dr. Sly)

Chromosome disorders: research involves application of newer banding techniques to identification of human chromosomes. Problems include correlation of chromosomal aberrations with phenotype differentiation. A second interest is correlating chromosome findings with malignancy in human tumors or leukemic bone marrow. (Dr. Taysi)

**Neonatology**

**Clinical Elective**

The time is spent at St. Louis Children's Hospital in the intensive care nursery learning the care of severely ill newborns and prematures. During the entire six weeks, daily teaching rounds will be held on the Intensive Care Unit at Children's Hospital. Interested students may arrange to spend time at Maternity Hospital learning the examination and care of normal newborn and premature infants, as well as those with less severe illness that do not require intensive care. Students will be offered considerable responsibility in patient care and may participate in the transportation of ill patients from other hospitals to St. Louis Children's Hospital. Opportunities are available for clinical research in perinatal medicine. (Drs. Hillman, Marshall, Thach)
Sudden Infant Death Syndrome (SIDS)—Medical and Psychological Aspects

Dr. Hillman, as a neonatologist, will join the St. Louis SIDS Information and Counseling Project Service Coordinator and others to present both the medical and psychological aspects of the problem. Topics to be covered: pathological and epidemiological facts, current research, crisis intervention skills, the family network—intervention medicine, death, and grief. (Dr. Hillman)

Pediatric Cardiology

Clinical Elective—Inpatient

The student works as a subintern and is assigned selected patients on the Pediatric Cardiology ward.

(Drs. Goldring, Hartmann, Hernandez, Strauss)

Clinical Elective—Outpatient

The student will see patients attending all of the outpatient clinics including both new referrals and follow-up visits. The student will also be responsible for the interpretation of electrocardiograms, echocardiograms, and 24-hour Holter monitor examinations performed in the cardiology non-invasive laboratory.

(Drs. Goldring, Hartmann, Hernandez, Strauss)

Research Elective (minimum 12 weeks)

Students will participate in on-going research concerning the pathophysiology and epidemiology of childhood hypertension (Dr. Goldring) or in the molecular basis of compartmentation of newly synthesized proteins (Dr. Strauss). The basic science elective is conducted in the biochemistry department and involves recombinant DNA technology, cloning of various DNA fragments, and cell biological techniques.

Pediatric Endocrinology and Metabolism

This elective is designed to include broad clinical experience in pediatric endocrine and metabolic problems. The student has the opportunity to evaluate many of the pediatric endocrine patients and to see some adult patients during weekly rounds. Emphasis is placed on the practical management of common problems. The student attends rounds and clinics (endocrine, metabolic, and diabetic) and the joint metabolic seminar and rounds held with the medical service. A large number of patients with varied problems are studied in depth during any six-week period.

(Drs. Bier, Blethen, Granoff, Hillman, Santiago, Weldon, White)

Pediatric Hematology and Oncology

During this elective students will see a variety of children with hematologic disorders and malignancies. The student will follow patients in the hematology-oncology clinic, work up inpatient consultations, and attend daily hospital rounds on the hematology-oncology patients. The course also includes formal instruction on interpretation of peripheral blood and bone marrow morphology and teaching rounds and conferences.

(Drs. Brodeur, Distelhorst, Land, Vietti, Zarkowsky)

Pediatric Infectious Diseases

Research Electives

A variety of clinical and laboratory opportunities are available. The work is focused on Haemophilus influenzae infections in children—epidemiology, immune response, and prevention through immunization. We are characterizing the outer membrane proteins of this organism, their immunogenicity, and the role of antibody directed against these proteins in prevention of infection. We also are interested in genetic determinants of human antibody responses to polysaccharide antigens, and their possible relationship to susceptibility to disease. Also in progress is work on the pathogenesis of Haemophilus influenzae.

(Drs. Barenkamp, Granoff, Munson)

We are doing an immuno-epidemiologic study of chickenpox and shingles ("St. Louis Zoster Watch") and see many patients per week with these infections. Lab work is aimed at correlating individual proteins of Varicella-Zoster Virus with antigenic determinants of antibody and cell-mediated immunity, and developing a chickenpox protein subunit vaccine. (Dr. Gardner)

We are involved in studies of the humoral immune response of young children to polysaccharide antigens. Techniques utilized in these studies include isoelectric focusing, radioimmunoassays, affinity purification of antibodies, and production of hybridoma antibodies.

(Pediatric Neurology)

The student participates as a full member of the neurology service team and is directly responsible for a proportion of the patients on the service under the direction of the senior resident. He is expected to take night call every third or fourth night, during which time he is responsible for the medical care of the entire unit, as well as for emergency admissions. The student will also attend Dr. Dodge's outpatient clinic one day a week, during which time he will be able to evaluate outpatient problems.

(Pediatric Renal Disease)

This course is designed to provide the student with a wide exposure to all aspects of pediatric renal disease and an opportunity to explore a desired aspect of the field in depth. The student will be an integral part of the Renal Team and as such will see a large number of 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 journal clubs which are conducted weekly in conjunction with the Renal Divisions, Barnes and Jewish Hospitals. Formal conferences are held regularly in association with Dr. John Kissane (renal pathology). Attendance at the weekly pediatric grand rounds and pediatric case confer-
ences is encouraged. The student will be required to present one or two in-depth reviews of areas of interest to him either in renal physiology or clinical topics.

(Drs. Cole, Robson, Schnaper)

Seminar Elective

Developmental Neurobiology

This course covers selected topics in the development of the nervous system. While emphasis is given to the neurochemical aspects of brain growth and maturation, there are also discussions of the neurophysiological and functional development of the brain. The relationship between chemical, physiological, and functional development and underlying anatomical changes is stressed. The course is conducted as a seminar with papers assigned prior to each meeting. Members of the Departments of Pediatrics and Neurology and Neurological Surgery are present at these discussions to clarify obscure points and to add additional information when possible.

(Dr. Agrawal)

Clinical Chemistry Laboratory

Research Electives

Placental amino acid transfer—in vitro tissue incubation, regulation, and relation to needs of the fetus. Composition and function of trophoblast plasma membrane.

(Dr. Smith)

Faculty of the Department of Pediatrics

Professor and Head of Department

Philip R. Dodge, M.D., University of Rochester, 1948. (See Department of Neurology and Neurological Surgery.)

Allen P. and Josephine B. Green Professor of Pediatric Neurology

Arthur L. Prensky, A.B., Cornell University, 1951; M.D., New York University, 1955. (See Department of Neurology and Neurological Surgery.)

A. Ernest and Jane G. Steinz Professor of Developmental Neurology

Joseph J. Volpe, B.A., Bowdoin College, 1960; M.D., Harvard University, 1964. (See Departments of Neurology and Neurological Surgery and Biological Chemistry.)

Professor Emeritus

Donald L. Thurston, B.S., Vanderbilt University, 1934; M.D., 1937.

Professors

Harish C. Agrawal, B.Sc., Allahabad University, 1957; M.S., 1959; Ph.D., 1964. (See Departments of Neurology and Neurological Surgery and Pathology.)

Dennis M. Bier, B.S., LeMoyne College, 1962; M.D., New Jersey College of Medicine, 1966. (See Department of Medicine.)

David Goldring, A.B., Washington University, 1936; M.D., 1940.

Alexis F. Hartmann, Jr., B.S., Washington University, 1947; M.D., 1951.

John C. Herweg, B.S., Drury College, 1943; M.D., Washington University, 1945. (See Administration.)

Richard E. Hillman, A.B., Brown University, 1962; M.D., Yale University, 1965. (See Department of Genetics.)

Lawrence I. Kahn (Health Care Research), A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945. (See Department of Preventive Medicine and Public Health and Medical Care Group.) (Also Pediatric Nurse Practitioner Program.)


John M. Kissane, A.B., University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pathology.)


William H. McAlister, B.S., Wayne State University, 1950; M.D., 1954. (See Department of Radiology.)

J. Neal Middelkamp, B.S., University of Missouri, 1946; M.D., Washington University, 1948.

James S. Nelson, M.D., St. Louis University, 1957. (See Department of Pathology.)

Stephen H. Polmar, B.S., Union College, 1961; Ph.D., Case Western Reserve University, 1966; M.D., 1967. (See Department of Microbiology and Immunology.)
Edward Mallinckrodt Department of Pediatrics

Alan M. Robson, M.B.B.S., University of Durham, 1959; M.D., 1964. (See Department of Medicine.)
Julio V. Santiago, B.S., Manhattan College, 1963; M.D., University of Puerto Rico, 1967. (See Department of Medicine.)
Gary D. Shackelford, B.A., Northwestern University, 1964; M.D., Washington University, 1968. (See Department of Radiology.)
William S. Sly, M.D., St. Louis University, 1957. (See Departments of Medicine and Genetics.)
Carl H. Smith, B.A., Swarthmore College, 1955; M.D., Yale University, 1959. (See Department of Pathology.)
Arnold W. Strauss, B.A., Stanford University, 1966; M.D., Washington University, 1970. (See Department of Biological Chemistry.)
Jessie L. Ternberg, A.B., Grinnell College, 1946; Ph.D., University of Texas, 1950; M.D., Washington University, 1953; Sc.D. (hon.), Grinnell College, 1972. (See Department of Surgery.)
Jean H. Thurston, B.A., University of Alberta, 1938; M.D., 1941.
Teresa J. Vietti, A.B., Rice University, 1949; M.D., Baylor University, 1953. (See Department of Radiology.)
Clarence S. Weldon, A.B., University of Michigan, 1951; M.D., Johns Hopkins University, 1955. (See Department of Surgery.)
Virginia V. Weldon, A.B., Smith College, 1957; M.D., University of Buffalo, 1962. (See Administration.)

Professors Emeriti (Clinical)
Joseph C. Jaudon, A.B., Washington University, 1926; M.D., 1933.
Park J. White, A.B., Harvard University, 1913; M.D., Columbia University, 1917.

Professors (Clinical)
Maurice J. Keller, A.B., Yale University, 1936; M.D., Columbia University, 1940.
James E. Miller, B.S., Tulane University, 1946; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology.)
George Sato, M.D., Washington University, 1947.

Associate Professor Emeritus
Dorothy J. Jones, A.B., Oberlin College, 1930; M.D., Washington University, 1934. (See Pediatric Nurse Practitioner Program.) (Also Lecturer.)

Associate Professors
James E. Carroll, B.S., University of Louisville, 1966; M.D., 1969. (See Department of Neurology and Neurological Surgery and Irene Walter Johnson Institute of Rehabilitation.)
Ruthmary K. Deuel, B.A., Mount Holyoke College, 1956; M.D., Columbia University College of Physicians and Surgeons, 1961. (See Department of Neurology and Neurological Surgery.)
W. Edwin Dodson, A.B., Duke University, 1963; M.D., 1967. (See Department of Neurology and Neurological Surgery.)
Barbara M. Herjanie, B.A., Northwestern University, 1943; B.S., Western Michigan College, 1946; M.D., University of Michigan, 1950. (See Department of Psychiatry.)
Antonio Hernandez, Jr., A.A., University of the Philippines, 1949; M.D., Manila Central University, 1954.
Laura S. Hillman, B.A., Carleton College, 1964; M.D., Yale University, 1968.
Charles B. Manley, Jr. (Genitourinary Surgery), A.B., University of Missouri, 1955; M.D., 1958. (See Department of Surgery.)
Helen Palkes (Psychology), B.S.,
Penelope G. Shackelford, B.S.,
University of Wisconsin, 1964; M.D.,
Washington University, 1968.
Marilyn J. Siegel, A.B., Washington
University, 1965; M.D., State University
of New York, Downstate, 1969. (See
Department of Radiology.)
Paul S. Simons, B.A., University of
Texas, 1963; M.D., Washington
University, 1967. (See Medical Care
Group.)
Kutay Taysi, M.D., Ankara University
School of Medicine, 1961.
Bradley T. Thach, A.B., Princeton
University, 1964; M.D., Washington
University, 1968.
James K. Turner, A.B., Washington
University, 1949; M.D., 1953. (See
Medical Care Group.)
Harold Zarkowsky, A.B., Washington
University, 1957; M.D., 1961.
Associate Professors Emeriti
(Clinical)
Helen M. Aff, B.S., Washington
University, 1934; M.D., 1934.
Max Deutch, M.D., Washington
University, 1926.
Stanley L. Harrison, B.S., Washington
University, 1928; M.D., 1930.
Frederick A. Jacobs, B.S., Washington
University, 1927; M.D., 1928.
Sol Londe, B.S., Washington University,
1925; M.D., 1927.
Bernard Schwartzman, A.B.,
Washington University, 1931; M.D., 1935.
Frank S. Wissmath, A.B., Washington
University, 1939; M.D., 1943
Associate Professors (Clinical)
C. Read Boles, A.B., Washington
University, 1940; M.D., 1943.
Robert H. Friedman, M.D.,
Washington University, 1948.
Gene H. Grabau, B.S., St. Louis
College of Pharmacy, 1937; M.D.,
Washington University, 1942.
Marshall B. Greenman, B.S., University
Kenneth A. Koerner, A.B., Washington
University, 1935; M.D., 1941.
Maurice J. Lounsley, Jr., A.B.,
Washington University, 1946; M.D., 1950.
John C. Martz, A.B., University of
Missouri, 1938; M.D., Washington
University, 1942.
Helen E. Nash, A.B., Spelman College,
1942; M.D., Meharry Medical
College, 1945.
Frederick D. Peterson, A.B., Knox
College, 1953; M.D., Washington
University, 1957.
Warren G. Sherman, B.A., University of
Missouri, 1965; M.D., Tulane
University, 1969.
Argyrios A. Tsfutis, M.D., Aristotelion
University of Thessalonika, 1934.
Assistant Professors
Stephen J. Barenkamp, B.A., Carleton
University, 1973; M.D., University of
Martin J. Bell, B.A., New York
University, 1959; State University of
New York, Downstate, 1963. (See
Department of Surgery.)
Sandra L. Binthen, B.S., University of
Chicago, 1961; Ph.D., University of
California, Berkeley, 1965; M.D., Albert
Einstein College of Medicine, 1975.
Richard J. Bower, B.S., Northern
Illinois University, 1965; M.D.,
University of Virginia, 1969. (See
Department of Surgery.)
Garrett M. Brodeur, B.A., St. Louis
University, 1971; M.D., Washington
University, 1975.
Max H. Burgdorf, A.B., Washington
University, 1970; M.D., 1974. (See
Medical Care Group.)
Milton L. Cobb, B.A., Baylor
University, 1965; M.D., University of
Texas Southwestern Medical
School, 1968. (See Department of
Anesthesiology.)
Clark W. Distelhorst, B.A., Ohio State
University, 1968; M.D., 1971.
Felton J. Earls, B.S., Howard
University, 1963; M.D., 1967. (See
Department of Psychiatry.)
Tessa D. Gardner, B.S., Massachusetts
Institute of Technology, 1968; M.D.,
Harvard University, 1972.
Alice B. Granoff, B.A., University of
Texas, Austin, 1959; M.D., University of
Texas Southwestern Medical
School, 1963.
Gary E. Hirschberg, A.B., Princeton
University, 1968; M.D., Hahnemann
Medical College, 1972. (See Department of
Anesthesiology.)
Barbel Holtmann, B.S.Ed., A.B.,
University of Missouri, 1964; M.D.,
1968. (See Department of Surgery.)
Mary I. Johnson, B.S., Washington
State University, 1964; M.D., Johns
Hopkins University, 1968. (See
Departments of Anatomy and
Neurobiology and Neurology and
Neurological Surgery.)
Michael L. Landt (Laboratory
Medicine), B.S., Whitworth College,
1970; Ph.D., University of Oregon, 1976.
(See Department of Pathology.)
Jeffrey L. Marsh, B.A., Johns Hopkins
University, 1967; M.D., 1970. (See
Department of Surgery.)
Robert S. Munson, B.A., University of
Michael J. Noetzel, A.B., Yale University, 1973; M.D., University of Virginia, 1977.

Mabel L. Purkerson, A.B., Erskine College, 1951; M.D., Medical College of South Carolina, 1956. (See Administration and Department of Medicine.)


Steven M. Rothman, M.D., State University of New York, Upstate, 1973. (See Departments of Anatomy and Neurobiology and Neurology and Neurological Surgery.)

Gregory A. Storch, A.B., Harvard University, 1969; M.D., New York University School of Medicine, 1973.

Zila Welner, M.D., Hebrew University, 1961. (See Department of Psychiatry.)

Neil H. White, B.S., State University of New York, Albany, 1971; Albert Einstein College of Medicine, 1975.

Michael P. Whyte, B.A., New York University, 1968; M.D., State University of New York, Downstate, 1972. (See Department of Medicine.)

Research Assistant Professors

Ruth E. Birch, B.S., University of Illinois, 1974; M.S., University of Chicago, 1977; Ph.D., 1979.

Fred I. Chasalow, B.S., Stevens Institute of Technology, 1964; Ph.D., Brandeis University, 1971.

Ronald L. Gingerich, B.A., Goshen College, 1970; Ph.D., Indiana University, 1975. (See Department of Medicine.)

Assistant Professors Emeriti (Clinical)

Martin Calodney, B.S., College of the City of New York, 1930; M.D., New York University, 1936.

Samuel W. Golub, B.S., Washington University, 1941; M.D., 1941.

Edith C. Robinson, A.B., Randolph-Macon College, 1927; M.S., University of South Carolina, 1928; M.D., Johns Hopkins University, 1932.

Assistant Professors (Clinical)

Edward T. Barker, A.B., Princeton University, 1953; M.D., Washington University, 1957.


Gerald J. Duling, B.S., Xavier University, 1955; M.D., St. Louis University, 1959.

Ira J. Friedman, B.S., University of Arkansas, 1956; M.D., 1960.

Elliott F. Gellman, B.A., State University of Iowa, 1957; M.D., University of Missouri, 1961.


Henry L. Knock, A.B., Johns Hopkins University, 1949; M.D., 1953.

Stanley B. Lyss, A.B., Harvard University, 1958; M.D. Washington University, 1962.

Richard Margolis, B.S., College of William and Mary, 1947; M.D., Western Reserve University, 1951.


Homer E. Nash, Jr., B.S., Morehouse College, 1948; M.D., Meharry Medical College, 1951.

Paul H. Painter, M.D., St. Louis University, 1947. (See Division of Child Psychiatry.)


Steven J. Plax, A.B., University of Missouri, 1957; M.D., 1961.


Alfred S. Schwartz, A.B., Amherst College, 1932; M.D., Johns Hopkins University, 1936.

Mary A. T. Tillman, M.D., Howard University, 1960.

Zila Welner, M.D., Hebrew University, 1961. (See Department of Psychiatry.)

George T. Wilkins, Jr., B.S., University of Illinois, 1956; M.D., 1957.

Kathleen Winters, B.S., Winthrop College, 1946; M.D., Medical College of South Carolina, 1955.

Instructors
John Gilster, (Dental Medicine), D.D.S., Washington University, 1944.
Donald V. Huebener (Dental Medicine), D.D.S., Washington University, 1969. (See Department of Radiology.)
H. William Schnaper, B.A., Yale University, 1971; M.D., University of Maryland, 1975.

Instructor Emeritus (Clinical)
Joseph A. Bauer, M.D., Washington University, 1926.

Instructors (Clinical)
Christos A. Antoniou, M.D., University of Athens, 1958.
Jean M. Auguste, B.A., Lycee T. l'Ouverture, 1950; M.D., Medical School of Haiti, 1956.
Jill M. Baer, B.S., University of Kentucky, 1972; M.D., 1975.
Pardeep Bhanot, M.B.B.S., Medical College of Amritsar, 1974.
Huldah C. Blamoville, B.S., Queens College, 1959; M.D., Mebarry Medical College, 1965.
Ray S. Davis, M.D., University of Louisville, 1978.
Sandra J. Dodson, B.S., Cornell University, 1970; M.D., Northwestern University, 1976.
Clara E. Escuder, B.A., Queens College, 1975; M.D., Cornell University, 1979.
Florentina U. Garcia, M.D., University of the Philippines, 1965.
Roman E. Hammes, B.A., University of Iowa, 1950; M.D., 1954.
Nancy E. Holmes, B.A., University of Kansas, 1972; M.D., University of Missouri, 1976.
Carl S. Ingber, A.B., University of Rochester, 1968; M.D., Boston University, 1972.
Sheldon Kessler, M.D., St. Louis University, 1951.
Richard L. Lazaroff, B.A., Brown University, 1974; M.D., St. Louis University, 1978.
Robert D. Lins, A.B., University of Missouri, 1965; M.D., 1969.
Elaine Miller, A.B., Judson College, 1944; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology.)
Eugenia M. Pierce, M.D., St. Louis University, 1958.
Joseph L. Portnoy, M.D., University of Kansas, 1974.
Robert L. Quaas, B.A., Syracuse University, 1965; B.S., University of South Dakota, 1973; M.D., University of Chicago, 1975.
Edward Mallinckrodt Department of Pediatrics

Seymour M. Schiansky, M.D., Chicago Medical School, 1950.
Jeffrey I. Schulman, B.A., Yale University, 1970; M.D., University of Kentucky, 1974.
Orestes S. Valdes, B.S., Instituto de Santa Clara, 1947; M.D., University of Havana, 1954.
Barbara N. Voege, B.S., University of Illinois, 1950; M.D., Washington University, 1957.
Patria B. Wolff, B.A., University of Minnesota, 1968; M.D., 1972. (See Medical Care Group.)
H. Benjamin Zwirn, M.D., University of Basel, 1954.

Assistants
Marion H. Baker, (Health Services), R.N., St. John's Hospital, 1946; P.N.P., Cardinal Glennon Memorial Hospital for Children, 1973. (See Medical Care Group.)
Jeanette M. Broering, (Health Services), B.S.N., St. Louis University, 1974; P.N.P., Cardinal Glennon Memorial Hospital, 1976. (See Medical Care Group.)
Kevyn F. Schroeder (Health Services), B.S., St. Louis University, 1975; P.N.P., Washington University, 1976.
Mary J. Straka, (Health Services), R.N., Holy Cross School of Nursing, 1966; B.S.N., St. Louis University, 1970; P.N.P., Cardinal Glennon Memorial Hospital, 1971; M.S.N., St. Louis University, 1978; (Also Pediatric Nurse Practitioner Program.)

Research Assistants
Charles E. Crawford, Jr., B.S., Washington University, 1956.

Assistants (Clinical)
Marietta O. Belen, M.D., Far Eastern University, 1963.
Hsin-Chin Shih, M.D., Kaoshiung Medical College, 1964.
Nareshkumar Solanki, B.M., B.S., University of Nairobi, 1975.
David H. Weed, B.S., Ohio State University, 1972; M.D., 1975.

Lecturers
Dorothy J. Jones, A.B., Oberlin College, 1930; M.D., Washington University, 1934. (Also Pediatric Nurse Practitioner Program.)
Edward Mallinckrodt Department of Pharmacology

It is the purpose of the pharmacology course, through discussions of existing drugs, to develop general principles which will be applicable as well to drugs of the future. Pharmacology draws heavily on biochemistry, physiology, and microbiology for an understanding of drug action. It looks toward pathology, medicine, and surgery for its uses.

The laboratory portion of the course is closely coordinated with the lecture material and is designed to demonstrate and emphasize pertinent pharmacological principles and to employ agents, equipment, and skills relevant to current medical practice.

A selection of mini-courses (Special Topics), dealing in depth with more advanced concepts of pharmacology and related topics, is integrated into the medical pharmacology course. Small groups of students regularly meet with the faculty to review and discuss the details and interpretation of original literature articles.

SECOND YEAR
Bio 507, 508. Pharmacology
(a) Lectures, conferences, panel discussions. (b) Laboratory course. Credit 7 units for the year.

(Dr. Covey and Staff)

RESEARCH
Bio 590.
The facilities of the research laboratories are available to those who wish to carry on an original investigation on problems of their own or on those the department is prepared to suggest.

Neurochemistry; regulation of metabolism; quantitative histochemistry; micro-analytical methods. (Dr. Berger)

Biosynthesis and processing of placental and pituitary peptide hormones. (Dr. Boime)

Problems in the biochemical development of rat kidney; transport mechanisms in rat kidney; renal histochemistry. (Dr. Burch)

Experimental analysis of mechanisms of dysrhythmia; electrophysiology; membrane chemistry, and autonomic neural effects. (Dr. Corr)

Synthesis and biological characterization of “suicide substrates” as potential inhibitors of androgen and estrogen biosynthesis in normal and carcinogenic tissue. Computer-assisted drug design. (Dr. Covey)

Neurochemistry of seizures; neuropharmacology of anticonvulsant and psychotropic drugs; role of cyclic nucleotides in nervous tissue function and metabolism. (Dr. Ferrendelli)

Secretion of macromolecules. Serum albumin biosynthesis and secretion. (Dr. Geller)

Purification and properties of the drug-metabolizing enzymes. Glutathione-dependent enzymes of metabolism and detoxication. (Dr. Hunter)

The biosynthesis and chemical and biological characterization of leukotrienes and other arachidonate metabolites. (Dr. Jakschik)
Normal and abnormal development of the sympathetic nervous system; physiology and pathophysiology of the sympathetic nervous system. (Dr. Johnson)

Mechanism of insulin action in regulating the phosphorylation of glycogen synthase in cultured mammalian skeletal muscle cells. (Dr. Lawrence)

Neurochemistry; regulation of metabolism; quantitative histochemistry; the chemistry of individual human and muscle fibers. (Dr. Lowry)

Pineal-hypothalamic pituitary interactions in the regulation of pituitary function. (Dr. Martin)

Energy metabolism in nerve, axonal flow, and the biochemistry of sensory neurons. (Dr. McDougal)

Synthesis, assembly, and function of the acetylcholine nicotinic receptor. (Dr. Merlie)

Regulation of endogenous renal hormones and their effects on renal blood flow and excretory function. (Dr. Morrison)

Pharmacology and biochemistry of prostaglandins, thromboxanes, and prostacyclins. (Dr. Needelman)

Biology of cytotoxic lymphocytes and mechanisms of immune damage. (Dr. Russell)

Pharmacology and biochemistry of neurotransmission in the basal ganglia. (Dr. Wooten)

**ELECTIVES**

**Bio 364. Principles of Drug Action**

A brief study of pharmacology and pharmacodynamics. This course discusses the biological, chemical, and molecular basis of action of drugs in general and of selected specific drugs in detail. Topics covered will include general pharmacologic principles; receptor theory; drug kinetics; distribution and metabolism; drugs which inhibit cellular growth, e.g., antibiotics, anticancer; endocrine drugs; both the autonomic and central action of drugs; drugs which act on the cardiovascular and renal systems; and elements of psychoactive drugs and of drug abuse. (Dr. Lawrence and Staff)

Descriptions of the following courses are shown in the Division of Biology and Biomedical Sciences:

**Bio 5031. Endocrine Physiology and Pharmacology.**

**Bio 509, 510. Current Topics in Pharmacology**

**Bio 540. Cell Surface Receptors**

**Bio 555. Neuropharmacology**

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

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**Faculty of the Edward Mallinckrodt Department of Pharmacology**

**Professor and Head of Department**


**Distinguished Professor Emeritus and Lecturer**

**Oliver H. Lowry**, B.S., Northwestern University, 1932; Ph.D., University of Chicago, 1937; M.D., 1937.

**Professor Emeritus and Lecturer**

**Helen B. Burch**, B.S., Texas University for Women, 1926; M.S., Iowa State University, 1928; Ph.D., 1935.

**Professors**

**Irving Boime**, B.S., St. Louis College of Pharmacy, 1964; M.S., Purdue University, 1966; Ph.D., Washington University, 1970 (See Department of Obstetrics and Gynecology.)

**James A. Ferrendelli**, A.B., University of Colorado, 1958; M.D., 1962. (See Departments of Neurology and Neurological Surgery and Ophthalmology.)

**F. Edmund Hunter, Jr.**, B.S., Mount Union College, 1938; Ph.D., University of Rochester, 1941.

**Eugene M. Johnson, Jr.**, B.S., University of Maryland, 1966; Ph.D., 1970.

**David B. McDougal, Jr.**, A.B., Princeton University, 1945; M.D., University of Chicago, 1947.

**Associate Professors**

**Peter B. Corr**, B.S., Union University, 1971; Ph.D., Georgetown University, 1973. (See Department of Medicine.)


**Research Assistant Professor**

**St. Barbara A. Jakshik**, B.S., Duquesne University, 1963; M.S., 1965; Ph.D., Washington University, 1974.


**Aubrey R. Morrison**, M.B., B.S., University of London, 1970. (See Department of Medicine.)

**Assistant Professors**

**John C. Lawrence, Jr.**, A.B., Duke University, 1971; Ph.D., University of Virginia, 1978.


Department of Physiology and Biophysics

The department offers instruction to medical and graduate students. A course in the second semester of the first year of the medical curriculum is designed to provide students with a foundation for their further study of clinical and applied physiology. In addition, advanced courses open to medical and graduate students provide for more detailed study of specific areas of physiology and biophysics.

The following research interests are represented in the department at the present time: macromolecular structure as studied by x-ray crystallography and other physical methods, the mechanism of action of polypeptide hormones, transport across cell membranes, epithelial transport, intracellular transport, secretion and uptake of macromolecules, and renal physiology, neurophysiology, contractile activation of muscle, peripheral circulation, respiration, and the application of computer techniques to biological problems. The interests in neurophysiology concern principally membrane phenomena in nerve fibers, the physiology of synapse, and the function of receptors and sensory systems. Electron microscopy of nerve and muscle is used to relate structure and function in these tissues.

FIRST YEAR

Bio 502. General Physiology
Lectures, demonstrations, and laboratory experiments are utilized to provide a basis for understanding general physiological mechanisms and the functional organization of physiological systems that are of immediate or potential importance in medicine. Credit 8 units. (Staff)

Bio 554. Neural Sciences
An integrated course dealing with the anatomy and physiology of the nervous system at the cellular level, leading on to a consideration of sensory and motor systems. Credit 5 units.

Bio 506L. Cell Biology
A course offered jointly with the Department of Anatomy and Neurobiology, covering fundamental aspects of cell morphology and function.

RESEARCH

Bio 590.
The department offers a variety of research opportunities, particularly in the following areas: macromolecular structure as studied by x-ray crystallography; synthesis and biological activities of polypeptides; membrane transport; lysosomes and intracellular transport; neurophysiology, including nerve membrane, muscle, synaptic transmission, sensory systems (especially auditory and visual), electron microscopy of neural tissues, and biochemical regulation in neurons; circulation; respiration; renal physiology; and the application of computer sciences to physiological problems. (Staff)

RESEARCH

“A” ELECTIVES
See catalog for Division of Biology and Biomedical Sciences for “A” electives.

Research Opportunities (Course No. M75 900)
Mechanisms of salt and water transport by renal tubules, using electrophysiological and flux techniques.
(Dr. Elsa Bello-Reuss)

Neurophysiology of vision, including the effects of visual deprivation and the function of synaptic transmitters in the visual system. Experiments involve recording from single cells in the visual system, observing their response to light, locating the positions of the cells subsequently by histology, and testing the behavior of the animal where appropriate.
(Dr. Nigel W. Daw)

Physiology of cell membranes: kinetics, energetics, and pharmacology of active and passive movements of ions (Na⁺, K⁺, Mg²⁺) across membranes of nerve and muscle cells.
(Dr. Paul De Weer)

Mechanisms of sensory transduction in muscle receptors.
(Dr. Y. Fukami)

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.
(Dr. John E. Heuser)

Neurophysiology: mechanisms of transduction in sensory receptors, especially mechanoreceptors in muscle.
(Dr. Carlton C. Hunt)

Electrophysiology, biophysics, and neuroanatomy of the auditory system making substantial use of digital computers in experimental control, data processing, and mathematical modeling.
(Dr. Duck O. Kim)
The molecular basis of biological recognition is being investigated in a number of systems; dopamine, enkephalin, thyroliberin, angiotensin, and bradykinin. A variety of techniques including NMR theoretical modeling, synthetic production of analogs by solid phase synthesis, and receptor binding studies are utilized to characterize both the conformations in solutions and when bound to the receptor. (Dr. Garland R. Marshall)

Research involves determination of protein structures by x-ray diffraction methods to correlate physiological properties of certain protein molecules to their three dimensional molecular structure. Flavocytochrome b$_2$ from baker's yeast and several related electron transport proteins are under investigation. Methods employed include biochemical preparation and characterization, protein crystallography and extensive use of computers, both for structure determination and for manipulation of molecular models. 

(Dr. F. Scott Mathews)

Design of specialized computer equipment for biomedical applications, such as auditory data collection, analysis, modeling and for molecular modeling. Research in peripheral auditory mechanisms. Development of theory of asynchronous circuits and systems.

(Dr. Charles E. Molnar)

Current research includes a microelectrode and neuroanatomical study of the visual cortex of the normal mouse and the reeler mutant, an autosomal recessive that results in a specific abnormality in the laminar positions of cell bodies in the cortex. 

(Dr. Alan L. Pearlman)

The formation and maintenance of synaptic connections in the mammalian nervous system.

(Dr. Dale Purves)

Gating currents and calcium release in skeletal muscle. Active transport studies in squid giant axon.

(Dr. Robert F. Rakowski)

Emphasis on the use of electrophysiological techniques (conventional and ion-selective intracellular microelectrodes) to identify and characterize transepithelial transport mechanisms at the single membrane level.

(Dr. Luis Reuss)

Neurophysiology of the lamprey brain and spinal cord.

(Dr. Carl M. Rovainen)

Transmembrane movements of H ions. Membrane permeability to weak acids. Regulation of intracellular pH, using electrophysiological methods.

(Dr. Albert Roos)

Molecules and structures that account for the specificity of synapse formation, especially at the neuromuscular junction.

(Dr. Joshua R. Sanes)

Regulation of receptor biosynthesis and deployment. Mechanism of receptor internalization and recycling. Physiologic role of receptors which recognize sugar residues on proteins and on other cells.

(Dr. Philip D. Stahl)

Computer-based acquisition and analysis of biologic signals via digital signal processing techniques.

(Dr. Lewis J. Thomas, Jr.)

RESEARCH

Bio 590. Research Opportunities

Neurophysiology of Vision: visual deprivation, neurotransmitters. (N.W. Daw)

Functional organization of the visual system. (A.L. Pearlman)

Biophysics and morphology of the peripheral auditory system. (D.O. Kim, C.E. Molnar)

Biophysics and physiology of mechanoreceptors in muscle. (C.C. Hunt, Y. Fukami)

Function and maintenance of synaptic connections in the mammalian nervous system. (D. Purves)

Nature of specificity of synapse function. (J.R. Sanes)

Developmental neurobiology. (J.W. Lichtman)

Neurophysiology of the lamprey central nervous system. (C.M. Rovainen)

Gating currents and Ca release in skeletal muscle. (R.F. Rakowski)

Movements of Na$^+$, K$^+$, and Mg$^{2+}$ (P. De Weer) and H$^+$ (A. Roos) across nerve and muscle membranes, and of water and ions across epithelia (L. Reuss) including renal tubules. (E. Bello-Reuss)

Receptor-mediated cell uptake; receptor regulation and translocation. (P.D. Stahl)

Three-dimensional cell visualization for capturing macromolecular mechanisms using of electron microscopy. (J.E. Heuser)

Design of computer equipment for biological use. (C.E. Molnar)

Computer-based acquisition and analysis of biological signals. (L.J. Thomas, Jr.)

X-ray crystallography. Structure of electron transport proteins. (F.S. Mathews)

Molecular basis of recognition of biological compounds using NMR, analog synthesis, computer modeling, and other methods. (G.R. Marshall)
Electives
Descriptions of the following courses may be found under the Division of Biology and Biomedical Sciences.

Bio 458. Biophysics of the Ear
Bio 459. Vision
Bio 525. Fundamental Concepts in Cell Membrane Physiology and Biophysics
Bio 526. Selected Topics in the Physiology and Biophysics of Cell Membranes
Bio 5451. Introductory Biophysical Chemistry
Bio 558. Formation and Maintenance of Synaptic Connections
Bio 559. Nerve, Muscle, and Synapse
Bio 562. Neural Control of Posture and Movement

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

Faculty of the Department of Physiology and Biophysics

Edward Mallinckrodt, Jr.,
Professor and Head of Department
Carlton C. Hunt, B.A., Columbia University, 1939; M.D., Cornell University, 1942.

Professors Emeriti
Hollowell Davis, A.B., Harvard University, 1918; M.D., 1922; Sc.D. (hon.), Colby College, 1954; Sc.D. (hon.), Northwestern University, 1962; Sc.D. (hon.), Washington University, 1973. (See Department of Otolaryngology.) (Also Lecturer.) (Also Central Institute for the Deaf.)
Arthur S. Gilson, Jr., B.S., Dartmouth College, 1919; A.M., Harvard University, 1922; Ph.D., 1924.
Stanley Lang, Ph.B., University of Chicago, 1948; B.S., 1949; M.S., 1951; Ph.D., 1953.

Professors
Jerome R. Cox, Jr. (Biomedical Engineering), S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Biomedical Computer Laboratory.) (Also School of Engineering and Applied Sciences.)
Nigel W. Dav, B.A., Trinity College, Cambridge, 1956; M.A., 1961; Ph.D., Johns Hopkins University, 1967. (See Department of Ophthalmology.)
Paul J. De Weer, B.S., University of Louvain, 1959; M.D., 1963; M.S., 1964; Ph.D., University of Maryland, 1969.
Garland R. Marshall, B.S., California Institute of Technology, 1962; Ph.D., Rockefeller University, 1966. (See Department of Biological Chemistry.)
F. Scott Mathews, B.S., University of California, 1955; Ph.D., University of Minnesota, 1959. (See Department of Biological Chemistry.)
Charles E. Molnar, B.S.E.E., Rutgers University, 1956; M.S.E.E., 1957; Sc.D., Massachusetts Institute of Technology, 1966. (Also Computer Systems Laboratory.)
Alan L. Pearlman, A.B., State University of Iowa, 1958; M.D., Washington University, 1961. (See Department of Neurology and Neurological Surgery.)
Dale Purves, A.B., Yale University, 1960; M.D., Harvard University, 1964.
Luis Reuss, B.A., University of Chile, 1957; M.D., 1964.
Albert Roos, M.D., University of Groningen, 1940. (See Department of Anesthesiology.)

Associate Professors
Leonard J. Banaszak, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Biological Chemistry.)
Harold Burton, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1965. (See Department of Anatomy and Neurobiology.)
Yasushi Fukami, M.D., Kyoto University, 1957; Ph.D., 1961.
Duck O. Kim, B.S., Seoul National University, 1968; M.S., Rose Polytechnic Institute, 1969; D.Sc., Washington University, 1972. (Also Computer Systems Laboratory.)
Robert F. Miller, M.D., University of Utah, 1967. (See Department of Ophthalmology.)

Carl M. Rovainen, B.S., California Institute of Technology, 1962; Ph.D., Harvard University, 1967.
Philip D. Stahl, B.S., West Liberty State College, 1964; Ph.D., West Virginia University, 1967.

Edward Mallinckrodt, Jr.,
Professor and Head of Department
Carlton C. Hunt, B.A., Columbia University, 1939; M.D., Cornell University, 1942.
Thomas A. Woolsey, B.S., University of Wisconsin, 1965; M.D., Johns Hopkins University, 1969. (See Department of Anatomy and Neurobiology.)

Assistant Professors
Elsa Bello-Reuss, B.A., University of Chile, 1957; M.D., 1964. (See Department of Medicine.)

Robert F. Rakowski, B.Ch.E., Cornell University, 1964; M.Eng., 1966; Ph.D., University of Rochester, 1972.

Research Assistant Professors
T. M. Balasubramanian, B.S., University of Madras, 1962; B.S., University of Bombay, 1965; M.S., 1968; Ph.D., St. Louis University, 1974.

Nobutaka Hirokawa, M.D., University of Tokyo, 1971; Ph.D., University of Tokyo, 1978.

Instructor
Shirley A. Sahrmann, B.S.P.T., Washington University, 1958; A.M., 1971; Ph.D., 1973. (See Departments of Neurology and Neurological Surgery and Program in Physical Therapy.)
Department of Preventive Medicine and Public Health

The department offers instruction during the first and second years of the curriculum and provides other learning experiences in elective courses in the fourth year. In the clinical clerkships of other departments, students have experience in rehabilitation in the Irene Walter Johnson Institute of Rehabilitation. In the first semester of the first year, the course Medicine in Modern Society provides background information, and students are encouraged to participate in discussions of important and evolving issues of medical care. A course in statistical methods in medicine given in the second semester affords a basis for understanding quantitative assessment in biology and medicine and prepares the student for critical evaluation of reports in the medical literature. Interested students may choose to participate in more intensive study of certain of these subject areas in the departmental elective offerings.

Opportunities for clinical and/or research experiences are provided by the following organizational units within the department or cooperating with it:
- Division of Applied Physiology, Dr. John Holloszy
- Division of Biostatistics, Dr. D. C. Rao
- Division of Health Care Research, Dr. Lee Benham
- Nutrition Research Laboratories, Dr. Robert Shank
- Dr. Ruth Brennan
- Irene Walter Johnson Institute of Rehabilitation, Dr. Michael Brooke
- Lipid Research Center, Dr. Gustav Schonfeld

FIRST YEAR
Medicine in Modern Society
This is planned as a series of 12 weekly lectures and discussions on topics selected to afford characterization of medicine as a profession of singular importance to modern society. There will be an attempt to identify some of the challenges or problems which confront the profession, as well as possible avenues leading to resolution and new accomplishments.

Topics to be covered include description of the physician's role, career choices within the profession, the organization of medical care, regulation of physician and hospital services, the economics of medical care, assessment of risk-benefit in choice of diagnostic or treatment procedures, the interface between medicine and the law, and ethical considerations in the practice of medicine.
(Drs. Kahn, Benham, Vavra, and Shank)

Introduction to Biostatistics
This introduction to the principles and methods of biostatistics emphasizes the concepts of statistical methodology as being essential to proper application and interpretation of statistical methods. Elementary statistical techniques illustrating the use of statistical principles in experimentation are discussed. Second semester. (Drs. McGue and Spitznagel)

SECOND YEAR

SECOND YEAR
Summer Traineeships in Physical Disability and Rehabilitation
See Institute of Rehabilitation. (Dr. Brooke)

FOURTH YEAR

ELECTIVES
Clerkship in Primary Care I
This clerkship is designed to provide the student with firsthand experience with medical practice, in much the same manner that clerkships in other medical disciplines provide patient-care experience in supervised settings. The clerkship uses the clinical setting the Medical Care Group of St. Louis (MCG), a teaching and research prepaid group practice.

Students will join individual physicians in the Medical Care Group of St. Louis or in their private practices, and will work in their offices caring for patients under supervision. Preventive, social, and continuing aspects of medical practice will be emphasized. It is hoped that this elective will give the student an overview of medical practice in internal medicine and in pediatrics, and will provide an opportunity for the student to see comprehensive medical care as it is practiced in St. Louis and as it exists in a group practice model: the Medical Care Group.
(Drs. Garrett and Kahn)

Family Practice Preceptorship
The Division of Health Care Research will monitor this elective. The student wishing such an experience should find the practitioner with whom he wishes to work and request that this physician send Dr. John J. Garrett of the School of Medicine (1) a copy of his (the physician's) curriculum vitae, (2) an outline of the program he will offer the student, and (3) a letter of good standing. The student's performance. The student must provide (1) a summary of his experience in the practice and a critical analysis of its usefulness in his medical education, and (2) at least six case summaries describing patients whose care he participated in and/or a report of a primary care research project in which he took part, i.e., a brief paper.
(Drs. Garrett and Kahn)

Exercise in Preventive Medicine and Medicine.
Exercise testing will include exercise electrocardiography, exercise echocardiography, measurement of O2 uptake capacity, noninvasive cardiac output measurement, and radionuclide studies during exercise. In addition, there will be opportunity to participate in exercise training as a component of treatment of patients with ischemic heart disease, hypertension, diabetes, and chronic uremia. (Drs. Holloszy, Elsani, and Hagberg)

Physical Disability and Rehabilitation
The student will become familiar at first hand with the techniques for defining the extent of physical disability and with various approaches to its treatment. Emphasis will be placed on methods used in physical, occupational, and speech therapy, and on the specialized contribution
to be made by rehabilitation social work, nursing, and vocational testing and counseling. Supervised visits may be arranged to specially related outside facilities and agencies (Visiting Nurses Association, Special School District, Shriner’s Hospital, Central Institute for the Deaf, manufacturers of prosthetics and orthotic devices). All the above will be accomplished in relation to selected patients assigned to the student for his supervision of their rehabilitation programs. In general, these will include inpatients on the Pediatrics, Medical Neurology, Neurosurgical, Orthopedic, and Plastic Surgery Services. Special emphasis on any one or any combination of the above services can be arranged to suit the interests of individual students.

In addition to the programs available at the Rehabilitation Institute, the student may choose to spend part of the elective at Jewish Hospital on the Rehabilitation Service. (Dr. Brooke)

Inpatient Rehabilitation Care—Jewish Hospital

This department offers a six-week elective course to senior medical students. The Department operates a 55 in-bed service for patients with physical disabilities, under the supervision and guidance of four full-time physicians. The case material is varied by the large number of patients with spinal cord or head injuries, strokes, Parkinson’s disease, and arthritis. The Department holds an Amputee Clinic twice a month and does all the electromyographic examinations for Jewish Hospital. It conducts a program of respiratory rehabilitation for patients with C.O.P.D. in cooperation with the Division of Pulmonary Diseases.

The medical students serve as externs; they are intimately involved in the total care of the physically disabled patient. They will gain experience in the prescription of a rehabilitation program and will follow and observe their patients in physical therapy, occupational therapy, speech therapy, or whatever other activity is applicable. Above all, they gain experience in the over-all management of the patient with physical disability including medical and surgical complications. They work actively with the orthopedic, neurological, urological, and plastic surgery consultants who serve this unit. The details of the program will be adapted to fit the particular interests of the individual student. (Dr. Steinberg and Staff)

HEALTH ADMINISTRATION AND PLANNING (HAP)

As a specialty, health administration looks at medical care from an institutional and organizational perspective. Rational health administration requires expert knowledge in many areas including: law, finance, planning, and organizational behavior.

The goals of this six-week elective are:
1. To give the medical student an overview of the specialty of health administration, including some contact with the supporting disciplines of hospital and health law, hospital accounting and finance, organizational behavior, health planning, and health regulation.
2. To provide first-hand contact with selected local institutions and their administrators.
3. To allow students to investigate particular subjects of interest to them.

At the beginning of the elective the student will discuss his/her particular background and interest with the HAP Faculty. A plan of study will then be formulated in the context of the resources actually available through HAP. Throughout the period there will be weekly review sessions and at the end of the elective, the student will be expected to submit a report.

The purpose of the elective is not to make administrators out of physicians but rather it is anticipated at the end of the six weeks that the student will be able to communicate with those persons who see medicine from an organizational viewpoint and will recall what to ask and what to expect from consultation with hospital and health administrators. (Dr. Hepner and Staff)
Faculty of the Department of Preventive Medicine and Public Health

Professor and Acting Head of Department
Gustav Schonfeld, A.B., Washington University, 1956; M.D., 1960. (See Department of Medicine.)

Danforth Professor
Robert E. Shank, A.B., Westminster College, 1935; M.D., Washington University, 1939. (See Department of Medicine.)

Professor and Director of Applied Physiology Division
John O. Holloszy, M.D., Washington University, 1957. (See Department of Medicine.)

Professor and Director of Division of Biostatistics
Dakebaru C. Rao, B.S., Indian Statistical Institute, 1967; M.S., 1968; Ph.D., 1971. (See Departments of Psychiatry and Genetics.)

Professor Emeritus
C. Howe Ellett (Public Health), A.B., Stanford University, 1927; M.D., University of Colorado, 1930; Ph.D., Johns Hopkins University, 1934.

Professors
Michael H. Brooke (Rehabilitation), M.B., B.Ch., Cambridge University, 1958. (See Department of Neurology and Neurosurgical Surgery and Irene Walter Johnson Institute of Rehabilitation.)

Lawrence I. Kahn (Health Care Research), A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945. (See Department of Pediatrics and Medical Care Group.) (Also Pediatric Nurse Practitioner Program.)

M. Kenton King, B.A., University of Oklahoma, 1947; M.D., Vanderbilt University, 1951. (See Administration and Department of Medicine.)

Genetic Epidemiology
After being introduced to current approaches in Genetic Epidemiology, interested students will be supervised on research projects dealing with methodological developments and applications of these techniques. Topics to be covered include: path analysis, variance components, segregation analysis, linkage, and genetic counseling.

(Dr. Rao and Staff)

Lipoprotein Metabolism
Opportunities are available for interested students to participate in research projects dealing with normal and disordered lipoprotein transport. Included are studies of the effects of diabetes, uremia, diets, and drugs on human lipoprotein levels, composition, and structure; regulation of apoprotein synthesis in cultured rat hepatocytes; and immunologic properties of apoproteins using monoclonal antibodies.

(Dr. Schonfeld)

Topics in Medical Economics
This course is designed to expose students to economic issues in the medical sector. Students will pursue a selected research topic under an economist's supervision. Emphasis will be placed on policy issues concerning the effective allocation of medical expenditures. Examples of topics which can be considered are: the economics of excess capacity in surgery; the economics of prepaid group practice; the cost effectiveness of therapy for hypertension; cost differences of therapies for a given medical problem as a function of physicians' specialties; responsiveness of physician to alternative incentive schemes; and criteria to be used in determining the allocation of resources among the medical subsectors.

(Dr. Benham)
Associate Professors

Lee Benham (Health Care Research). B.A., Knox College, 1962; Ph.D., Stanford University, 1970. (Also Faculty of Arts and Sciences.)

Ali A. Ehsani, M.D., Tehran University, 1965. (See Department of Medicine.)


J. Philip Miller (Biostatistics). A.B., Washington University, 1965. (See Biomedical Computer Laboratory.)

Mary L. Parker, B.S., Florida State University, 1946; M.S., 1949; M.D., Washington University, 1953. (University Health Service.)

John P. Rice (Biostatistics). B.A., Cornell University, 1969; M.A., Washington University, 1972; Ph.D., 1975. (See Psychiatry.)

Edward L. Spitznagel, Jr. (Biostatistics and Health Care Research). B.S., Xavier University, 1962; M.S., University of Chicago, 1963; Ph.D., 1965. (Also Faculty of Arts and Sciences.)

Instructors

Susy Alias (Rehabilitation), B.Sc., University of Kerala. 1964; M.D., Calcutt Medical College, 1969. (Jewish Hospital.)

Mae E. Gordon (Biostatistics), B.A., Portland State University, 1967; M.S., University of Wisconsin, 1970; Ph.D., 1978. (See Department of Ophthalmology.)

A. Donna King (Social Work), B.A., Western Maryland College, 1960; M.S.W. Washington University, 1966. (See Medical Care Group.)

Curtis Parvin (Biostatistics), B.S., Michigan State University, 1974; M.S., University of Minnesota, 1976; Ph.D., 1980. (See Departments of Pathology and Medicine.)


Kenneth B. Schechtmam (Biostatistics), B.S., City College of New York, 1967; M.S., Purdue University, 1971; M.A., Washington University, 1978; Ph.D., 1978.

Elizabeth A. Stoddard (Rehabilitation), B.S., Montana State University, 1954; M.D., Washington University, 1957. (See Department of Medicine.)

In Sook Sunwoo (Rehabilitation). M.D., Woo Sok University, 1959. (Jewish Hospital.)

Research Assistants


Lecturer

Instruction in psychiatry is given in the last three years of the medical course. Emphasis is on teaching 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. Recognition of current limitations of knowledge combined with an appreciation of what is known leads to a spirit of constructive skepticism. This attitude permits the student to study psychiatry in depth and broadly without preconceived theories.

SECOND YEAR
Introduction to Clinical Psychiatry
Emphasis is upon (a) effective interviewing in preparation for medical history taking, (b) evaluation of behavioral and emotional factors in patients with various kinds of illnesses, (c) the diagnosis and natural history of the major psychiatric disorders, (d) critical evaluation of conceptual and methodologic problems in psychiatry and psychology. Lectures, demonstration interviews, discussions.

THIRD YEAR
Psychiatry Clerkship
Students in groups of about 15 spend six weeks on the inpatient services of Barnes, Jewish, and Bliss Hospitals.

FOURTH-YEAR ELECTIVES
Outpatient and Community Psychiatry
This is a flexible clerkship tailored to the student's interests. Adult psychiatric patients in the Washington University Psychiatric Clinic present a variety of psychological and interpersonal problems similar to those encountered in the office practice of a psychiatrist, an internist, or a family physician. Students have an opportunity to learn a variety of treatment techniques under supervision.

Students also manage patients in a community mental health center located in an inner-city area. There, students see how psychiatry works with social agencies, schools, and other institutions utilizing paramedical personnel in the detection and treatment of mental illness.

Clinical Psychiatry in Barnes Hospital
This is a senior course providing the student with an opportunity to learn clinical psychiatry by functioning as an extern on a six-week rotation. The student participates in a role similar to that of a first-year resident and attends all rounds and conferences for first-year psychiatry residents. The student takes night call approximately every fifth or sixth night. Supervision is by the chief resident and the director of the inpatient service. This rotation is particularly desirable for students going into family practice, general internal medicine, general pediatrics, or other nonpsychiatry specialties. The rotation provides an excellent opportunity to learn firsthand about psychiatric diagnosis, psychopharmacology, community resources, familial interventions, and further insights into the current literature.

Clinical Psychiatry in a Community Mental Health Center
This elective course provides students with opportunities to become key medical members of psychiatric treatment teams dealing with evaluation of patients in an emergency room, selective admissions of certain cases, and diagnosis and management of particular patients. Supervision is provided by the full-time supervising psychiatrist in charge of wards to which the student may be assigned. The student participates in teaching sessions arranged for first-year psychiatric residents in training at the Malcolm Bliss Mental Health Center.

Child Psychiatry, Children's Hospital, and the Washington University Child Guidance Clinic
This clerkship in child psychiatry gives students an appreciation of the intricacies of diagnosis and treatment of emotionally disturbed children. The clerkship involves working up a small number of preadolescent as well as adolescent children under the supervision of senior staff members. Didactic teaching is available, as well as individual supervision of patients. Students gain an appreciation of both drug treatment and the limitations of drug treatment. They are exposed to the roles of community agencies such as settlement houses, juvenile courts, and various private agencies with which a child psychiatrist must work. Students also gain appreciation of the roles of nurse, social worker, teacher, and occupational therapist in collaboration with individuals of these disciplines.

Clinical Psychiatry in a Community Mental Health Center
This elective course provides students with opportunities to become key medical members of psychiatric treatment teams dealing with evaluation of patients in an emergency room, selective admissions of certain cases, and diagnosis and management of particular patients. Supervision is provided by the full-time supervising psychiatrist in charge of wards to which the student may be assigned. The student participates in teaching sessions arranged for first-year psychiatric residents in training at the Malcolm Bliss Mental Health Center.

Child Psychiatry, Children's Hospital, and the Washington University Child Guidance Clinic
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“A” ELECTIVES

Human Sexuality

Human sexuality is a 19-hour practical introduction to human sexual function and dysfunction encountered in practice. Lectures and small group discussions are designed to increase physicians' comfort with and tolerance of sexual topics in the clinical setting. As part of the core curriculum of the second year, the course is offered as an “A” elective to a limited number of fourth-year students. (See course schedule for lecture times.) (Dr. G. Murphy)

Psychoanalysis

Introduction to Psychoanalytic Theory and its application to medicine and psychiatry: the psychoanalytic theory of personality will be discussed in a seminar in which the clinical practice aspects of the theory would be related to clinical medicine and psychiatry. A bibliography will be distributed and reading of basic books encouraged. Clinical material will be used to demonstrate the psychoanalytic theory and its applications. Seminars will be held in the Psychoanalytic Institute Building, 4524 Forest Park, Room 10. (Dr. A. Kaplan)

“B” ELECTIVES

Outpatient and Community Psychiatry

This is a flexible clerkship where effort is made to tailor the activities to the students' interests. Students have primary responsibility for diagnosis and treatment of adult psychiatric clinic patients under direct supervision. Students completing the clerkship have indicated their enjoyment of the opportunity for independent patient management.

An opportunity is provided for the student to obtain experience with a variety of community psychiatric services available in the metropolitan area. The student also manages patients in a community mental health clinic located in an inner-city area. The student will work with local agencies. Location of first meeting will be specified in a mailout. (Drs. Taylor and E. Smith)

Clinical Psychiatry in a Community Mental Health Center—Inpatient Service

Opportunity to become key medical member of psychiatric treatment team dealing with evaluation of patients in emergency room; selective admissions of certain patients; diagnosis and management of particular patients. Individual supervision provided by Director of Training and supervising psychiatrist instructor in charge of ward student is assigned to. Student shall participate in teaching sessions arranged for first-year psychiatric residents. (Dr. M. Herjanie)

RESEARCH

Emphasis is on anatomy and function of biochemically defined neuron systems in the CNS: 1) Immunohistochemical localization of enzymes involved in biosynthesis and degradation of biogenic amines and acetylcholine. 2) Neurogenic and pharmacologic regulation of vascular permeability and blood flow. 3) Measurement of brain proteins in plasma during neurological disease. (Dr. B. Hartman)

Our research concerns the mechanisms and actions of excitotoxic amino acids such as glutamate (Glu), aspartate, and kainate in the central nervous system. It ranges from human studies of Chinese Restaurant Syndrome to basic animal studies of Glu roles in neurotransmission, endocrinology, neuropathology, and development. Our techniques include neurohistopathological methods, such as electron microscopy, autoradiography, and immunohistochemistry as well as biochemical methods such as radioimmunoassay and receptor binding and reuptake studies. (Drs. Olney and M. Price)

1) Theoretical studies of the inheritance of symptoms, syndromes, and diseases. 2) Family studies of affective disorder. 3) Family and linkage study of manic depressive illness. (Dr. Reich)

1) The effect of probenecid on the use of tricyclic antidepressants (TAD)—a combined clinical and chemical study to determine the effects of probenecid on TAD. 2) The use of PET VI (Positron Emission Tomography) in patients with anxiety neurosis, and in other selected psychiatric illnesses. 3) Analysis in detail of primary and secondary depression, and the ways in which they are defined, and the ways in which they differ. These secondary depressions will be compared with primary depression as a benchmark. (Dr. E. Robins)
Faculty of the Department of Psychiatry

Spencer T. Olin Professor and Head of Department
Samuel B. Gaze, M.D., Washington University, 1945. (See Administration and Department of Medicine.)

Wallace Renard Professor
Eli Robbins, A.B., Rice University, 1940; M.D., Harvard University, 1943.

Professor Emeritus
Saul Rosenzweig (Medical Psychology), A.B., Harvard University, 1929; M.A., 1930; Ph.D., 1932. (Also Psychology.)

Professors
Theodore J. Cicero (Neuropharmacology), B.S., Villanova University, 1964; M.S., Purdue University, 1966; Ph.D., 1968. (See Department of Anatomy and Neurobiology.)
C. Robert Cloninger, B.A., University of Texas, 1966; M.D., Washington University, 1970. (See Department of Genetics.)
Irving I. Gottesman (Psychiatric Genetics), B.S., Illinois Institute of Technology, 1953; Ph.D., University of Minnesota, 1960. (See Department of Genetics.)
Boyd K. Hartman, A.B., University of Kansas, 1962; M.D., 1966. (See Department of Anatomy and Neurobiology.)
John E. Helzer, M.D., University of Utah, 1967.
Mariana Herjanic, M.D., Zagreb University, 1956. (Malcolm Bliss Hospital.)
Blake W. Moore (Biochemistry), B.S., University of Akron, 1948; Ph.D., Northwestern University, 1952. (See Department of Biological Chemistry.)
George E. Murphy, B.S., Oregon State College, 1949; M.D., Washington University, 1952.
John W. Oney, B.A., Iowa University, 1956; M.D., 1963. (See Department of Pathology.)
Dabeeru C. Rao (Biostatistics), B.S., Indian Statistical Institute, 1967; M.S., 1968; Ph.D., 1971. (See Departments of Genetics and Preventive Medicine and Public Health.)
Theodore Reich, B.S., McGill University, 1959; M.D., 1963. (See Department of Genetics.)

Lee N. Robins, (Sociology), B.A., Radcliffe College, 1942; M.A., 1943; Ph.D., 1951. (Also Faculty of Arts and Sciences.)
William R. Sherman (Biochemistry), A.B., Columbia University, 1951; Ph.D., University of Illinois, 1955. (See Department of Biological Chemistry.)
Kathleen Smith, B.S., University of Arkansas, 1944; M.D., Washington University, 1949. (Malcolm Bliss Hospital.)

Research Professor
Mitchell Taibleson (Mathematics), S.M., University of Chicago, 1960; Ph.D., 1962. (Also Faculty of Arts and Sciences.)

Professors Emeriti (Clinical)
Margaret C. L. Gildea, B.S., University of Chicago, 1923; M.D., Yale University, 1936.

Professors (Clinical)
Alex H. Kaplan, B.S., College of City of New York, 1932; M.D., St. Louis University, 1936.
Patricia L. O'Neal, A.B., Washington University, 1944; M.D., 1948.
Frank O. Shobe, A.B., Washington University, 1938; M.D., 1942.

Associate Professors
Brian K. Suarez (Genetics), B.A., San Fernando Valley State College, 1967; M.A., University of California, Los Angeles, 1972; Ph.D., 1974. (See Department of Genetics.)
Richard D. Wetzel (Medical Psychology), B.A., Concordia College, 1959; B.D., Concordia Seminary, 1963; Ph.D., St. Louis University, 1974.

Associate Professors (Clinical)
John M. Anderson, B.S., Colorado State University, 1938; M.D., Meharry Medical College, 1958. (Malcolm Bliss Hospital.)
Jack L. Croughan, B.A., University of Kansas, 1964; M.D., Kansas University, 1968.
Robert B. Deutchman, B.A., University of Virginia, 1949; M.D., 1953.
Edward H. Kowert, A.B., Washington University, 1940; M.D., 1943. (Malcolm Bliss Hospital.)
Wanda M. Lamb, B.S., University of Missouri, 1946; M.D., Washington University, 1948.
Thomas F. Richardson, B.A., Millikin University, 1959; M.D., Washington University, 1963.
Earl R. Schultz, A.B., Southeast Missouri State College, 1952; B.S. Med., University of Missouri, 1953; M.D., Washington University, 1955. (See Department of Neurology and Neurosurgical Surgery.)
Harold D. Wolff, A.B., Washington University, 1952; B.S., University of Missouri, 1953; M.D., State University of Iowa, 1955.

Assistant Professors
Mary L. Carlson (Neurobiology), B.S., University of Wisconsin, 1961; M.A., Northwestern University, 1964; Ph.D., Tulane University, 1967.

Robert M. Carney (Medical Psychology), B.A., University of Missouri, St. Louis, 1969; M.S., Eastern Kentucky University, 1972; Ph.D., Washington University, 1978.


Terry A. Fuller, B.S., University of Notre Dame du Lac, 1970; M.D., Washington University, 1974.

Barry A. Hong (Medical Psychology), B.A., Concordia Senior College, 1969; M.Div., Concordia Seminary, 1972; Ph.D., St. Louis University, 1978.

John W. Knesevich, A.B., Indiana University, 1971; M.D., McGill University, 1974.


Patrick J. Lustman (Medical Psychology), B.S., University of Illinois, 1972; M.S., University of Wisconsin, 1974; Ph.D., Michigan State University, 1980.


Michele Van Eerdewegh, M.D., Free University of Brussels, 1970.

Shozo Yokoyama (Genetics), B.S., Miyazaki University, 1968; M.S., Kyushu University, 1971; Ph.D., University of Washington, 1977. (See Department of Genetics.)

Research Assistant Professors

Paul P. Hipps (Biochemistry), B.S., Lakeland College, 1966; Ph.D., North Dakota State University, 1971.

William H. Holland (Electronics), A.B., Washington University, 1950. (See Department of Biological Chemistry.)


Elizabeth M. Smith (Social Work), B.A., University of Nebraska, 1960; M.S.W., 1962; Ph.D., Washington University, 1978.

Assistant Professors Emeriti

Robert M. Bell, M.D., St. Louis University, 1928.

Hyman H. Fingert, B.A., State University of New York, 1931; M.D., 1934.

Reese H. Potter, A.B., University of Kansas, 1931; B.S., University of Missouri, 1933; M.D., Washington University, 1935.

Assistant Professors (Clinical)

Bernardo G. Aleksander, M.D., University of Buenos Aires, 1959. (Malcolm Bliss Hospital.)

Ahmad Ardekani, M.D., Pahlavi University, 1974. (Malcolm Bliss Hospital.)


Michael D. Bieri, B.A., University of Kansas, 1968; M.D., Washington University, 1972. (Malcolm Bliss Hospital.)

Robert D. Brookes, A.B., DePauw University, 1934; M.D., Washington University, 1938.

Lincoln B. Calvin, B.Ed., Illinois State University, 1942; M.D., Meharry Medical College, 1951. (Malcolm Bliss Hospital.)


Bun Tee Co, Jr., B.S., University of Santo Tomas, 1963; M.D., 1967. (Malcolm Bliss Hospital.)

Juan C. Corvalan, M.D., Argentina National University, 1965.

Mary E. Cox, A.B., Washington University, 1941; M.D., 1944.

Felipe Crimi, M.D., National University of Cordoba, 1946. (Malcolm Bliss Hospital.)

Alejandro M. Datiun, A.A., University of Santo Tomas, 1951; M.D., 1965. (Malcolm Bliss Hospital.)

Mary Davis, B.A., Ohio State University, 1947; M.D., Washington University, 1952.

Pluridel C. Deza, M.D., University of Santo Tomas, 1956. (Malcolm Bliss Hospital.)


Fred W. Gaskin, B.S., University of Minnesota, 1966; M.D., 1968.
Wilbur H. Gearhart, B.S., Butler University, 1949; M.D., Hahnemann Medical College, 1950.

James N. Haddick, A.B., University of Missouri, 1942; M.A., 1942; M.D., Washington University, 1943.

Julian C. Hall, (Social Work), B.S., University of Louisville, 1949; M.S., 1951; D.S.W., Washington University, 1968. (Malcolm Bliss Hospital.)

Robert S. Hicks, A.B., Hendrix College, 1951; M.D., University of Arkansas, 1958.


Natarajan Lakshminarayanan, M.B., University of Madras, 1960; M.S., 1960; M.D., 1967. (Malcolm Bliss Hospital.)


Lynn J. McLaughlin (Medical Psychology), B.A., Gonzaga University, 1965; M.S., St. Louis University, 1968; Ph.D., 1972. (Malcolm Bliss Hospital.)

Jay Meyer, A.B., Washington University, 1956; M.D., St. Louis University, 1960.


Earni Pal, M.B.B.S., Andhra University, 1965. (Malcolm Bliss Hospital.)


Allahyar Samadali, M.D., Pahlavi University, 1973. (Malcolm Bliss Hospital.)


Reed E. Simpson, B.A., Wabash College, 1972; M.D., Washington University, 1976. (Malcolm Bliss Hospital.)


Alberto Soto, B.S., Instituto de Santiago, 1951; M.D., Havana University, 1960.


John Sweet, B.A., University of Michigan, 1964; M.D., University of Missouri, 1968. (Malcolm Bliss Hospital.)

Leonard J. Wiedershine, A.B., Washington University, 1943; M.D., 1946.


Instructors
Kathryn G. Bennett (Social Work), B.A., University of Kansas, 1938; M.S.W., Smith College, 1940. (Jewish Hospital.)


Deborah E. Wald (Social Work), B.A., University of Hawaii, 1975; M.S.W., Washington University, 1975. (Jewish Hospital.)

Charles F. Zoromski, B.A., St. Louis University, 1974; M.D., 1978

Research Instructor
Joanna L. Carl (Biochemistry), B.S., Drury College, 1959; A.M., Washington University, 1962

Instructors (Clinical)

Anna K. Bradley (Social Work), B.S., University of Missouri, 1956; M.S.W., Washington University, 1958. (Malcolm Bliss Hospital.)

Bonita Cade (Medical Psychology) B.A., University of Michigan, 1974; M.A., Roosevelt University 1976; Ph.D., Iowa State University, 1981; J.D., Washington University, 1982. (Malcolm Bliss Hospital.)

John P. Canale, B.A., Syracuse University, 1972; M.D., Upstate Medical Center, 1977.

Morris D. Fishbein (Medical Psychology), B.A., Tulane University, 1976; M.A., University of Missouri, 1979; Ph.D., 1981. (Malcolm Bliss Hospital.)

Tamar Frishberg, M.D., Vinnizza Medical School, 1961. (Malcolm Bliss Hospital.)

Randy L. Hammy (Medical Psychology), B.A., Washington University, 1970; Ph.D., 1975. (Jewish Hospital.)

Abid Hussain, M.D., Omania University, 1974. (Malcolm Bliss Hospital.)


Judith A. McGee (Medical Psychology), B.A., Long Island University, 1969; M.S., St. Louis University, 1975; Ph.D., 1979. (Malcolm Bliss Hospital.)

John F. Mueller (Social Work), B.S., Washington University, 1947; M.S.W., 1952. (Malcolm Bliss Hospital.)


Ronald A. Oliver (Medical Psychology), B.A., University of Rhode Island, 1968; M.A., Xavier University, 1970; Ph.D., Iowa State University, 1973. (Malcolm Bliss Hospital.)

Mary M. Randlett, (Medical Psychology), B.A., University of Toledo, 1968; M.A., University of Missouri, 1970; Ph.D., Iowa State University, 1978. (Malcolm Bliss Hospital.)

Kenneth L. Russ (Medical Psychology), A.B., University of Rochester, 1963; M.S., University of Pittsburgh, 1969; Ph.D., 1970. (Jewish Hospital.)

Michael N. Stake (Medical Psychology), B.A., Long Beach State University, 1970; M.A., Arizona State University, 1974; Ph.D., 1976. (Malcolm Bliss Hospital.)

Lenore Teter, A.B., Immaculate College, 1971; M.D., Temple University, 1978. (Malcolm Bliss Hospital.)

Lecturers
Virginia Johnson-Masters (Human Sexuality), D.Sc. (Hon.), University of Louisville, 1978.

Robert C. Kolodny (Human Sexuality), B.A., Columbia University, 1965; M.D., Washington University, 1969. (See Department of Medicine.)

William H. Masters (Human Sexuality), D.Sc. (Hon.), Hamilton College, 1938; M.D., Rochester University, 1943; Sc.D. (Hon.), Hamilton College, 1973. (See Department of Obstetrics and Gynecology.)

Michael Merbaum (Medical Psychology), B.A., Drake University, 1956; M.A., University of Missouri, 1957; Ph.D., University of North Carolina, 1961. (Also Psychology.)
WILLIAM GREENLEAF ELIOT DIVISION OF CHILD PSYCHIATRY

The Division of Child Psychiatry offers a varied teaching program for residents in psychiatry and fellows in child psychiatry through the St. Louis Children's Hospital, its Child Psychiatry Clinic at 369 North Taylor Avenue, and the Hawthorn Children's Psychiatric Hospital. Trainees are assigned to these various units, where they participate in diagnostic evaluations and see patients in treatment under supervision.

**Director and Blanche F. Ittleson Professor**
Felton J. Earls (Child Psychiatry), B.S., Howard University, 1963; M.D., 1967. (See Department of Pediatrics.)

**Professor**

**Associate Professor**
Barbara M. Herjanic (Child Psychiatry), B.A., Northwestern University, 1943; B.S., Western Michigan College, 1946; M.D., University of Michigan, 1950. (See Department of Pediatrics.)

**Assistant Professor Emeritus**

**Assistant Professors**
Cynthia L. Janes (Medical Psychology), B.A., University of Oklahoma, 1965; Ph.D., 1970.
Martha J. Sellers (Medical Psychology), Ph.D., Harvard University, 1979.
Zila Welner (Child Psychiatry), M.D., Hebrew University Hadassah Medical School, 1961. (See Department of Pediatrics.)

**Assistant Professors (Clinical)**
Paul H. Painter (Child Psychiatry), M.D., St. Louis University, 1947. (See Department of Pediatrics.)
Emel A. Sumer (Child Psychiatry), M.D., University of Istanbul, 1957.

**Instructor Emeritus**
Louetta Berger (Psychiatric Social Work), B.S., University of Wichita, 1941; M.S.W., Washington University, 1946.

**Instructors (Clinical)**
Jagdish C. Suri (Child Psychiatry), B.Sc., Lucknow University, 1954; M.B.B.S., King George's Medical College, 1959; M.D., Lucknow University, 1964. (Hawthorn Children's Psychiatric Hospital.)
Vinod Suri, M.D., Punjab University, 1962. (Hawthorn Children's Psychiatric Hospital.)
Eliza E. Wochnik (Child Psychiatry), M.D., Medical Academy of Warsaw, 1962. (Hawthorn Children's Psychiatric Hospital.)
Department of Radiology

The Department of Radiology is located primarily in the 13-story Mallinckrodt Institute of Radiology, but also occupies space in the West Pavilion of Barnes Hospital, Barnard Hospital, St. Louis Children’s Hospital, and the Washington University Clinic Building. The department provides diagnostic radiology, nuclear medicine, and radiation oncology services to Barnes Hospital and St. Louis Children’s Hospital.

Clinical facilities for the Division of Radiation Oncology are located on the ground floor of the Institute and in Barnard Hospital. Therapy equipment consists of an advanced 35 MV linear accelerator, 20 MV linear accelerator, 6 MV linear accelerator, 4 MV linear accelerator, and Cobalt 60 therapy. There are also facilities and an ample stock of Cesium 137 sources for both interstitial and intracavitary therapy.

The first floor of the Institute houses administrative and business offices, a film library, consulting viewing rooms, and the 135-seat Scarpellino Auditorium.

Fifty-five examination rooms for diagnostic radiology are available in the Institute and the newly constructed West Pavilion. Institute facilities are located on the second floor (chest, musculoskeletal radiology, and mammography), third floor (neuroradiology, vascular radiology, ultrasound, and genitourinary radiology), fourth floor (gastrointestinal and genitourinary radiology), and the fifth floor (pediatric radiology). Cardiac radiology and the Division of Nuclear Medicine are located on the ninth floor of the West Pavilion. The tenth floor of the West Pavilion is dedicated entirely to outpatient services. The modern features of the Institute include five CT scanners, two digital subtraction systems, and an NMR system to be operational in 1983.

The sixth floor of the Institute contains the Division of Radiation Sciences, which also utilizes two medical cyclotrons in Barnard Hospital. Additional research facilities are located on the seventh floor (nuclear medicine), ninth floor (diagnostic radiology), tenth floor (cancer biology), sixth floor of Barnard Hospital (radiation oncology), and the 4S11 Forest Park building (cancer biology).

Administrative, teaching, and support functions occupy the eighth and eleventh floors. The twelfth floor is occupied by sophisticated computer facilities that are utilized for clinical, research, and teaching applications.

The undergraduate teaching program is designed to present both diagnostic and therapeutic radiology to students as part of the clinical clerkship experience. Every effort is made to provide an opportunity to correlate radiologic and clinical findings through interdepartmental conferences, consultations, and group discussions.

SECOND YEAR

Twenty-six hours of lecture are devoted to an introduction to radiology. The majority of the course is devoted to diagnostic radiology including computed tomography, ultrasound, and nuclear medicine. Radiation biology and radiation oncology are also introduced.

ELECTIVES
RESEARCH ELECTIVES

Opportunities are available to carry out research in the laboratories under the guidance of the staff in the fields of diagnostic radiology, therapeutic radiology, radiation physics, and nuclear medicine.

SUMMER ONCOLOGY CLERKSHIP FOR FRESHMAN STUDENTS

A ten-week summer clerkship program is available for freshman medical and dental students. The students participate in the clinical activities of the Division of Radiation Oncology and are exposed to the fundamental concepts of cancer biology and clinical radiation therapy in a series of lectures, seminars, and case presentation conferences. They have the opportunity to conduct some laboratory research or clinical investigation under the direction of the staff members of the sections of Clinical Radiation Oncology and Cancer Biology. (Dr. Simpson)
FOURTH YEAR ELECTIVES

Clerkship in Radiation Oncology

A six-week elective in which the student has the opportunity to see patients being evaluated and treated in Radiation Oncology. Emphasis is on techniques of cancer diagnosis and localization, selection of therapy, indications for irradiation and techniques on treatment planning, simulation, and irradiation of a variety of tumors. There are several conferences in which the students participate, including new case-planning conferences, a clinical physics conference, a protocol conference, and interdepartmental conferences with the departments of Pediatrics, Obstetrics and Gynecology, Surgery, and Pathology. (Drs. Marks or Perez)

Radiology Electives—Mallinckrodt Institute

A six-week elective which emphasizes the role of radiology in the solution of clinical diagnostic problems. Each student on the rotation will spend two weeks on each of three subspecialty sections within the department (abdomen, bone and joint, cardiac, chest, neuroradiology, nuclear medicine, pediatric radiology, radiation oncology, and Queeny Tower radiology) under the supervision of a senior faculty member. The student will have a chance to observe special procedures as well as routine radiological examinations. Conferences intended to complement the subspecialty approach to radiology round out this six-week experience. (Dr. Aronberg)

Additional six-week clerkships in diagnostic radiology are offered at Jewish Hospital (Dr. Hyman Senturia) and St. Luke’s Hospital (Dr. Mayes).

Clinical Nuclear Medicine

A six-week elective in which the student will be exposed to the full range of techniques, including organ imaging with radionuclides, nuclear hematology, in vitro tests, and radionuclide therapy. The student will be responsible for planning appropriate isotope studies in patients referred to the department in conjunction with the staff. Opportunity exists to learn instrumental techniques, including new ones such as computer applications. Participation in clinical and laboratory research projects may also be arranged if desirable. There are daily conferences and scan interpretation sessions. (Dr. B. Siegel)
Hsiu-san Lin (Cancer Biology), M.D., Taiwan University, 1960; Ph.D., University of Chicago, 1968. (See Department of Microbiology and Immunology.)
Robert C. McKnight, B.S., Florida State University, 1957; M.D., Washington University, 1961. (See Department of Medicine.)
Mijenko V. Pilepich, M.D., University of Zagreb. 1965.
Klaus Sartor, M.D., University of Tubingen, 1965.
Marilyn J. Siegel, A.B., Washington University, 1965; M.D., State University of New York, 1969. (See Department of Pediatrics.)
Todd H. Wasserman, A.B., University of Rochester, 1968; M.D., University of Rochester School of Medicine and Dentistry, 1972.

Associate Professor Emeritus (Clinical)
A. Norman Arneson, B.S., Texas Christian University, 1924; M.D., Washington University, 1928. (See Department of Obstetrics and Gynecology.)

Associate Professors (Clinical)
Mark D. Eagleton, Jr., A.B., Amherst College, 1947; M.D., Washington University, 1950.
Sumner Holtz, M.B., St. Louis University, 1948.
Noah Susman, A.B., Washington University, 1948; M.D., 1952. (Jewish Hospital.)

Assistant Professors
Frederick G. Abrath (Radiation Physics), B.S., University of Wisconsin, 1967; Ph.D., North Texas State University, 1974.
Dennis M. Bale, B.S., University of Santa Clara, 1968; M.D., Medical College of Wisconsin, 1975.
Dien-ming Ben Chen, B.S., Fu Jen University, 1969; M.S., State University of New York, 1972; Ph.D., Vanderbilt University, 1977.
Judy M. Destouet, B.S., University of Southwestern Louisiana, 1969; M.D., Baylor College of Medicine, 1975.
Edward M. Geltman, B.S., Massachusetts Institute of Technology, 1967; M.D., New York University, 1971. (See Department of Medicine.)

Fernando R. Gutierrez, M.D., University of Valladolid, 1974.
Donald V. Huesker (Dental Medicine), D.D.S., Washington University, 1969. (See Department of Pediatrics.) (Also School of Dental Medicine.)
Michael R. Kilbourn, B.S., University of Michigan, 1975; Ph.D., University of Illinois, 1979.
Bharath A. K. Kumar, M.B.B.S., Andhra University Medical College, 1969.
Tom R. Miller, B.S., California Institute of Technology, 1966; M.S., Stanford University, 1969; Ph.D., 1971; M.D., University of Missouri, 1976.
Gordon L. Phillips, B.A., University of Oklahoma, 1966; M.D., 1971. (See Department of Medicine.)
Alan J. Tiefenbrunn, A.B., Washington University, 1970; M.D., 1974. (See Department of Medicine.)
Michael W. Vannier, B.S., Colorado State University, 1971; B.S.M.E., University of Kentucky, 1971; M.D., 1976.
Gary E. VanZant (Cancer Biology), B.S., University of Nebraska, 1966; M.S., 1968; Ph.D., New York University, 1973.
Philip J. Weisman, B.A., Yale University, 1968; M.D., 1972.
Assistant Professors (Clinical)
Robert J. Bagian, B.S., University of Kentucky. 1965; Ph.D., University of California, 1970; M.D., Washington University, 1976.
Enrique Cubillo, M.D., University of Madrid, 1962.
James W. Dean, Jr., B.A., University of Louisville. 1958; M.D., 1962.
Guillermo C. Geisse, B.A., University of Chile. 1957; M.D., 1965.
MacDonald B. Logie, B.S., Northwestern University, 1965; M.D., 1967.
Christopher J. Moran, B.S., University of Notre Dame. 1970; M.D., St. Louis University. 1974.
Wayne A. Simril, A.B., Culver-Stockton College. 1941; M.D., Washington University, 1944.
Chandrakant C. Tailor, M.B.B.S., Maharaja Sayajirao University of Baroda, 1972.

Instructors
William J. Powers, (Radiation Sciences). A.B., Dartmouth College. 1971; M.D., Cornell University, 1975. (See Department of Neurology and Neurological Surgery.)

Research Instructor
Kondaparam S. Sampathkumaran, B.S., Bangalore University, 1970; M.S., 1972; M.S., McMaster University, 1976.

Instructors (Clinical)
Stephen F. Albert, A.B., Washington University, 1964; M.D., St. Louis University, 1968.
Daniel J. Leary, Jr., B.S., St. Louis University, 1962; M.D., Washington University, 1966.
Gary H. Omell, M.D., University of Tennessee, 1967.
Gary A. Ratkin, B.A., Rice University, 1963; M.D., Washington University, 1966. (See Department of Medicine)
Naris Rujanavech, M.D., Faculty of Medicine, Siriraj Hospital, 1972.

Frederick K. Zivinuka, B.S., St. Procopius College, 1961; M.S., Marquette University, 1964; M.D., University of Wisconsin, 1970.

Research Associates
Karen I. Beetham, B.A., St. Olaf College. 1968; M.S., University of Iowa, 1971; Ph.D., 1974.
Mark A. Green, B.S., Rose-Hulman Institute of Technology, 1978; Ph.D., Indiana University, 1982.
Fyllis L. Otsuka, B.S., Purdue University, 1974; Ph.D., University of California, San Diego, 1980.

Research Assistants
Dean M. Coulter, B.S., Weber State College. 1967; M.S., Utah State University, 1975.

Lecturer
Armand Diaz (Radiologic Technology). R.N., R.T., Havana University School of Medicine. 1948. (See Program in Radiologic Technology)

Consultant
The Department of Surgery includes general surgery, plastic and reconstructive surgery, orthopedic surgery, urological surgery, cardiothoracic surgery, and pediatric surgery. The formal instruction begins in the second year with an introductory course designed to provide the student with an understanding of the clinical and research characteristics of general surgery and the surgical specialties.

In the third year, students are assigned clinical clerkships where they have an opportunity to participate in the care of surgical patients. The clerkship lasts for twelve weeks and may be spent at a hospital in the Washington University Medical Center or an allied hospital. Students attend daily patient rounds with the house staff and attending staff. Seminars and teaching conferences are scheduled on a regular basis.

In the fourth year, students may select a subinternship or an elective, most of which are for periods of six to eighteen weeks. During the subinternship or preceptorship, the student is assigned to a staff member for instruction in the diagnosis and management of surgical problems. Electives are available in pediatric surgery, thoracic and cardiovascular surgery, orthopedic surgery, neurosurgery, urological surgery, oncological surgery, transplantation surgery, and emergency room surgery.

**SECOND YEAR**

**Introduction to Surgery**

This course consists of 6 two-hour lectures in general surgery, cardiothoracic surgery, plastic surgery, urological surgery, orthopedic surgery, and pediatric surgery. The surgical faculty presents the lectures which are designed to familiarize the student with the clinical and investigative opportunities of the various surgical disciplines.

**THIRD YEAR**

**Surgical Wards**

The majority of this 12-week course is devoted to general surgery. Students are assigned to rotations at either Barnes Hospital, Jewish Hospital, Children's Hospital, or the John Cochran Veterans Administration Hospital. Students are active participants in the care of their assigned patients. Formal conferences consist of case presentations to the faculty, core lectures in surgical pathophysiology, ward rounds, and departmental and divisional rounds.

**FOURTH YEAR**

The senior students are offered clinical rotations either as subinternships or electives.

**Surgical Preceptorships and Subinternships**

Each student is assigned to a senior general surgeon. The student sees patients in the clinic and takes case histories, performs physical examinations, and follows patients admitted to the hospital. (Dr. Wells)

**Pediatric Surgery Elective**

Emphasis is placed on the diagnosis and treatment of the surgical diseases which develop in the pediatric age group. There are frequent morning and evening rounds and participation in operative procedures. Diagnostic x-rays are reviewed on a daily basis, and the student is encouraged to attend the conferences given by the Division of Pediatric Surgery and the Department of Pediatrics. (Dr. Ternberg and Staff)

**Cardiothoracic Surgery**

The students participating in the clinical rotation on the cardiothoracic surgical service will be assigned duties comparable to that of an intern. They will share night call under supervision of the first-and-second year residents in rotation with the ward interns. They may select operative cases on which to scrub and are at liberty to spend time within the cardiac catheterization laboratory with members of the cardiopulmonary bypass team, or on any particular problem of acute pulmonary or hemodynamic nature in the Intensive Care Unit. (Dr. Weldon and Staff)

**Plastic and Reconstructive Surgery Elective**

The clinical clerkship is available for six to twelve weeks. Plastic Surgery is divided into five services. The student will rotate on each service for one week. After four weeks, he can elect the services on which his remaining time will be spent. Each service provides a unique oppor-
Faculty of the Mary Culver Department of Surgery

Bixby Professor of Surgery, Chairman, Department of Surgery
Samuel A. Wells, Jr., M.D., Emory University, 1961.

DIVISION OF CARDIOTHORACIC SURGERY

Head of Division
James L. Cox, M.D., University of Tennessee, 1967.

Professors
Richard E. Clark, B.S.E., Princeton University, 1956; M.D., Cornell University, 1960; M.S., University of Virginia, 1962.
Clarence S. Weldon, A.B., University of Michigan, 1951; M.D., Johns Hopkins University, 1955. (See Department of Pediatrics.)

Professors (Clinical)
Thomas L. Ferguson, B.S., Duke University, 1947; M.D., 1947.
Charles L. Rooper, A.B., University of Colorado: M.D., 1953.

Associate Professor
John P. Connors, A.B., Holy Cross College, 1961; M.D., Georgetown University, 1965. (Jewish Hospital.)

Associate Professor (Clinical)
Martin Bergman, A.B., Washington University, 1942; M.D., 1945.

Research Associate Professor
Ignacio Christlieb, B.A. Colegio Frances de Preparatoria, 1945; M.D., National Autonomous University of Mexico, 1952.

Assistant Professors

Research Assistant Professor
Race Li-Chan Kao, B.S., National Taiwan University, 1965; M.S., University of Illinois, 1972.

Clinical Instructors
Halifax C. King, B.S., Howard University, 1967; M.D., Meharry Medical College, 1974.

Urology Elective
A six-week clinical clerkship is designed to provide the student an understanding of the more common problems in clinical urology. The student is taught basic diagnostic procedures and participates in the management of surgical and non-surgical urologic patients. The experience involves direct care of patients in the clinics, as well as the urologic admissions to the hospital. Daily morning and evening rounds of all patients on a particular service are conducted by the responsible resident. Two additional teaching rounds for the house staff and students are held weekly. In addition, the student attends daily x-ray conferences, the weekly staff conference, and the weekly research seminar. (Dr. Schoenecker and Staff)

Orthopedic Surgery Elective
Clinical clerkship electives are available for six weeks, during which time the student attends conferences and out-patient clinics. Students become an active part of the orthopedic team and may spend part of their time at the Shrine's Hospital for Crippled Children, Veterans Hospital and Barnes Hospital, the exact program to be worked out on an individual basis with the chairman of the division. (Dr. Weeks and Staff)

Renal Transplantation Elective
This orientation course is designed to offer the student an overview of the entire field of organ transplantation. The student is an integral part of the renal transplantation team and assumes appropriate responsibilities under supervision. (Dr. Anderson and Staff)

DIVISION OF GENERAL SURGERY

Harry Edison Professor of Surgery
Gordon W. Philpott, B.S., Yale University, 1957; M.D., Washington University, 1961. (Jewish Hospital.)

Professors
Charles B. Anderson, A.B., Johns Hopkins University, 1958; M.D., Yale University, 1962.
Harvey R. Butcher, Jr., A.B., Central College, 1941; M.D., Harvard University, 1944.
Laurence Cheung, M.D., National Defense Medical Center, 1968. (St. Louis V.A. Hospital.)
William W. Monafo, A.B., Harvard University, 1953; M.D., Tufts University, 1957.

Professors Emeriti (Clinical)
Eugene M. Bricker, M.D., Washington University, 1934.
J. G. Probsstein, M.D., Loyola University, 1917.

Associate Professors
Thomas H. Covey, Jr., A.N., West Virginia University, 1957; M.D., Harvard University, 1961. (Jewish Hospital.)
Edward E. Etheredge, B.A., Yale University, 1961; M.D., 1965; Ph.D., University of Minnesota, 1974.


David W. Scharp, M.D., Washington University, 1970

Research Associate Professors


Associate Professors (Clinical)

Ralph J. Graff, A.B., Washington University, 1957; M.D., 1957. (See Department of Genetics.)

Falls B. Hershey, B.S., University of Illinois, 1939; M.D., Harvard University, 1943.


C. Alan McAfee, B.S., Washington State College, 1938; M.D., Harvard University, 1942.

Lawrence W. O’Neal, M.D., Washington University, 1946.

Leo A. Suchar, A.B., Washington University, 1936; M.D., 1940.

William D. Shiebler, M.D., Washington University, 1953.

Richard G. Sisson, A.B., Harvard University, 1943; M.D., Yale University, 1946.

James M. Stokes, M.D., Washington University, 1948.


Assistant Professors

Gregorio Sierad, B.S., St. Louis University, 1965; M.D., University of Puerto Rico, 1972.

Robert J. Sine, B.A., Williams College, 1964; M.A.T., Harvard University, 1965; M.D., Vanderbilt University, 1972. (See Department of Medicine.)

Research Assistant Professors


Assistant Professors (Clinical)


Kenneth J. Bennett, M.D., Tulane University, 1965.

Richard V. Bradley, M.D., Washington University, 1952.

Cyril J. Costello, B.S., University of Texas, 1935; M.D., 1939.

Robert C. Donaldson, A.B., University of Missouri, 1941; M.D., Washington University, 1944. (St. Louis V.A. Hospitals.)


Alvin Goldfarb, A.B., Washington University, 1940; M.D., 1943.


Shale Rifkin, M.D., Washington University, 1948.

Andrew D. Spencer, A.B., Indiana University, 1951; M.D., 1954.

Instructor


Instructors (Clinical)

Robert R. Anselmeaux, M.D., Washington University, 1940


Arthur R. Dalton, B.S., University of Missouri, 1939; B.S.Med., Northwestern University, 1940; M.D., 1941.

Robert D. Fry, A.B., Oklahoma City University, 1968; M.D., Washington University, 1972.


Jay W. Haines, B.A., Trinity University, 1970; M.D., Chicago Medical School, 1974.

Fleming B. Harper, M.D., Medical College of Virginia, 1947.


Eugene N. Mitchell, B.S., St. Louis University, 1955; M.D., University of Missouri, 1960.

Julian C. Mosley Jr., B.S., St. Louis University, 1966; M.D., Washington University, 1972.

George A. Oliver, A.B., Washington University, 1948; M.D., 1952.


Joseph C. Peden, Jr., B.S., Harvard University, 1940; M.D., 1943.

Mather Pfeiffer, Jr., A.B., Yale University, 1941; M.D., Harvard University, 1944.

George B. Rader, M.D., Washington University, 1951.

Frank O. Richards, A.B., Talladega College, 1944; M.D., Howard University, 1947.

César F. Sarmiento, M.D., Cebu Institute of Medicine, 1968.


Belmont R. Thiele, M.D., St. Louis University, 1948.

Instructors Emeriti (Clinical)

Virgil O. Fish, M.D., Washington University, 1930

George C. Wee, M.D., University of Louisville, 1931.

Assistants (Clinical)

Marry Culver Department of Surgery

Leslie F. Bond, A.B., University of Illinois, 1948; M.D., Meharry Medical College, 1952.

Katherine Crawford, B.S., Michigan State College, 1943; M.D., Woman’s Medical College of Pennsylvania, 1946.

James R. Criscione, B.S., Youngstown University, 1943; M.D., St. Louis University, 1951.

Samuel Lugo, B.S., St. Louis University, 1954; M.D., 1958.

Lester J. Nathan, B.A., University of Nebraska, 1949; M.D., University of Nebraska, 1952.

Robert Rainey, B.S., Yale University, 1944; M.D., Washington University, 1947.

DIVISION OF ORAL AND MAXILLOFACIAL SURGERY

Head of Division
John J. Delfino

Professor
Louis Alshuler, D.D.S., Ohio State University, 1945.


Assistant Professors
Nicholas R. Iula, B.S., Muhlenberg University 1974; D.D.S., Temple Health Science Center, 1978.
Herman Turner, D.D.S., St. Louis University, 1946; M.S., Georgetown University, 1951.

Lecturer
Leroy W. Peterson, D.D.S., University of Michigan, 1940.

DIVISION OF ORTHOPEDIC SURGERY

Head of Division

Professor Emeritus
Fred C. Reynolds, A.B., Washington University, 1931; M.D., 1934. (Also Professor in Clinical Surgery.)

Associate Professors
Lee T. Ford, M.D., University of Tennessee, 1940.


Research Associate Professor
David J. Simmons, B.A., Boston University, 1954; M.A., Clark University, 1956; Ph.D., University of Chicago, 1959.

Associate Professors (Clinical)

Harry C. Morgan, B.A., University of Missouri, 1949; B.S., 1951; M.D., Harvard University, 1953.

Assistant Professors

Wayne J. Daum, B.S., John Carroll University, 1967; M.D., St. Louis University, 1971.


William B. Strecker, B.A., University of Missouri, 1971; M.D., St. Louis University, 1975.

Research Assistant Professors
Jean E. Childers, B.A., Cornell University, 1965; Ph.D., Rice University, 1970.


Leo A. Whiteside, B.S., University of Oklahoma, 1965; M.D., University of Texas, 1969.

Assistant Professor Emeritus (Clinical)
J. Otto Lottes, Ph.B., St. Louis College of Pharmacy, 1926; Ph.G., 1928; A.B., University of Missouri, 1934; B.S., 1935; M.D., University of Louisville, 1937.

Assistant Professors (Clinical)


Earl P. Holt, Jr., A.B., Duke University, 1942; M.D., 1945.


George E. Scheer, B.A., Municipal University of Wichita, 1940; M.D., Washington University, 1943.

Instructors (Clinical)

Vilray P. Blair, Jr., University of Virginia, 1935; Washington University, 1939.


Robert L. Pierron, M.D., University of Missouri, 1975. (Shriner’s Hospital for Crippled Children.)


John J. Sheridan, B.A., University of Notre Dame, 1965; M.D., Washington University, 1969. (Shriner’s Hospital for Crippled Children.)


Research Instructor

Assistant Professors (Clinical)
John F. Armor, B.A., Rice University, 1954; M.D., Yale University, 1958.

Kyu Sop Cho, M.D., Yon-Sei University, 1954.

DIVISION OF PEDIATRIC SURGERY
Head of Division
Jessie L. Ternberg, M.D.

Professor
Jessie L. Ternberg, A.B., Grinnell College, 1946; Ph.D., University of Texas, 1950; M.D., Washington University, 1953; Sc.D. (hon.), Grinnell College, 1972. (See Department of Pediatrics.)

Associate Professors
Martin J. Bell, B.A., New York University, 1959; M.D., State University of New York, Downstate, 1963. (See Department of Pediatrics.)
Richard J. Bower, B.S., Northern Illinois University, 1965; M.D., University of Virginia, 1969. (See Department of Pediatrics.)

Research Assistant Professor

Research Associate

DIVISION OF PLASTIC AND RECONSTRUCTIVE SURGERY
Head of Division
Paul M. Weeks, M.D.

Professors
Paul M. Weeks, A.B., Duke University, 1954; M.D., University of North Carolina, 1958. (See Irene Walter Johnson Institute of Rehabilitation.)

Professor Emeritus (Clinical)
Minot P. Fryer, A.B., Brown University, 1936; M.D., Johns Hopkins University, 1940; D.S.C., Brown University, 1972.

Associate Professors
Barbel Holtmann, B.S.Ed., A.B., University of Missouri, 1964; M.D., 1968. (See Department of Pediatrics.)
Jeffrey L. Marsh, B.A., Johns Hopkins University, 1967; M.D., 1970. (See Department of Pediatrics.)

Assistant Professor
Vernon Young, B.A., University of Kentucky, 1966; M.D., 1970.

Assistant Professors (Clinical)
George H. Zografakis, M.S., Rutgers University, 1955; M.D., State University of New York, Upstate, 1959.

Instructors (Clinical)
Richard Shatz, B.A., University of Missouri, 1968; M.D., St. Louis University, 1972.
Bruce L. White, M.D., Washington University, 1964.

Consultant in Speech Pathology in Surgery (Plastic and Reconstructive Surgery)
Richard Merson, Ph.D., University of Wisconsin, 1970. (Also School of Dental Medicine.)

DIVISION OF UROLOGY
Head of Division
William R. Fair, M.D.

Professors
Saul Boyarsky, B.S., University of Vermont, 1943; M.D., 1946.
William J. Catalona, B.S., Otterbein College, 1964; M.D., Yale University, 1968.
Charles B. Manley, Jr., A.B., University of Missouri, 1955; M.D., 1958. (See Department of Pediatrics.)

Professor (Clinical)
Robert K. Royce, B.S., University of Missouri, 1939; M.D., Washington University, 1942.

Associate Professor
Mani Menon, B.S., St. Thomas College, 1964; M.D., Madras University, 1969.

Associate Professor Emeritus (Clinical)
Carl A. Wattenberg, A.B., University of Kansas, 1934; M.D., 1937.
Mary Culver Department of Surgery

Associate Professors (Clinical)
Morris Abrams, B.S., University of Illinois, 1934; M.D., 1937.
M. Richard Carlin, B.A., Dartmouth College, 1944; M.D., Yale University, 1947.

Assistant Professors
Leonard D. Gaum, M.D., Dalhousie University, 1972.
Dov Kadmon, M.D., Hebrew University Hadassah Medical School, 1970.

Research Assistant Professors
Warren D. Heston, Ph.D., University of Colorado, 1968.
Richard F. Parrish, B.S., Southern Illinois University, 1969; M.S., 1970; Ph.D., Iowa State University, 1976.

Timothy L. Ratliff, B.S., University of Texas, 1971; M.S., East Texas University, 1974; Ph.D., University of Arkansas, 1977.
Franz U. Steinberg, M.D., University of Berne, 1938. (See Departments of Medicine and Preventive Medicine and Public Health.)

Assistant Professors (Clinical)
Richard P. Parsons, B.D., Missouri Valley College, 1954; M.D., Washington University, 1958.

Instructors (Clinical)
Lawrence M. Aronberg, A.B., Washington University, 1932; M.D., 1936.
Saul Klein, M.D., Syracuse University 1959.
Neal Neuman, M.D., St. Louis University, 1971.

Research Associate
Rose Boyarsky, B.S., University of Vermont, 1944; M.A., Columbia University, 1946; Ph.D., Duke University, 1969.

Research Assistant
Carl Mahle, B.S., University of Maryland, 1974.
BIOMEDICAL COMPUTER LABORATORY

The Biomedical Computer Laboratory (BCL) and the closely related Computer Systems Laboratory (CSL) are embraced within the Institute for Biomedical Computing which spans computing research activities at both the School of Medicine and the School of Engineering and Applied Science.

The BCL focuses on collaborations with research investigators throughout the Washington University School of Medicine and its affiliated hospitals in the application of advanced computer techniques to problems in biology and medicine. This often requires work in areas stretching from basic physiology through mathematical models to equipment design. Our orientation is interdisciplinary with the recognition that effective communication for workers with differing backgrounds comes only through extended collaboration and mutual respect. The vigorous development and evolution of specialized computer systems for use in the solution of research and clinical problems has continued to be the central focus of BCL activities.

One class of computer applications requires strong coupling of the computer to its environment for digital signal processing. These applications typically involve the use of commercially available processors in conjunction with specialized hardware designed and built locally. Both BCL and CSL have pursued many such applications by taking the computers to the investigator’s laboratory or the patient’s bedside. The development of advanced, specialized hardware is a particular strength of CSL, where custom-designed very-large-scale integrated circuits represent a major interest.

For those classes of applications dominated by information processing requirements, provisions have matured from telephone lines linking BCL computers to the IBM System at the Washington University Computing Facilities, through development and support of a minicomputer based MUMPS system, to the establishment of independent groups such as the Medical Computing Facility and the Medical Computing Service Group which serve the local medical complex. Diverse needs continue to be met by these various options while collaborative work with the Department of Computer Science continues on more advanced information-processing developments.

The BCL enjoys collaboration with most departmental divisions within the medical school but also finds support and enrichment through close ties with other facilities throughout the University.

BMed 582. Biophysical Measurements
(Same as EE 582)
Specific variables measured in life-science research and in clinical medicine such as force, displacement, pressure, biopotentials, ion and gas concentrations, flows, etc., are examined and techniques for converting them to electrical signals are discussed. Prerequisites: EE 482 or equivalent, elementary electromagnetic theory. Credit 3 units. (Prof. Shipton)

BMed 693. Physical and Mathematical Principles of Tracer Kinetics
Theoretical foundations of tracer kinetic methods. Topics covered are differential equations for conservation of tracer mass, applications of elementary linear systems theory, stochastic and compartmental models, methods of accounting for tracer recirculation and methods of data-processing. (Dr. Larson)

Introduction to Programming a Laboratory Computer
Topics covered are: generalized description of digital computer architecture, organization and implementation; introduction to a minicomputer operating system; programming techniques and structure; and input/output programming. The PDP-11 minicomputer with the RSX-11 M operating system is used for laboratory workshops. Prior knowledge of FORTRAN is helpful but not required. (Dr. Blaine and Staff)

Computers in Medicine
This course will cover selected topics related to the spectrum of computer technologies (large-scale computers through microcomputers) used in both research and clinical medicine. Topics include medical information management, acquisition of laboratory data, large-scale computation, and language options. Only a minimal background in mathematics and electrical theory is assumed. Three class hours each week. Demonstrations and laboratory exercises provide an opportunity for "hands-on" experience. (Dr. Blaine and Staff)

Research Opportunities
Computer applications to patient care and biomedical research with emphasis on circulation and respiration. The range of opportunities spans medical information processing through physiological signal analysis. (Dr. Thomas)
Teaching and Research Divisions

Associate Professor and Director
Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Departments of Anesthesiology and Physiology and Biophysics.) (Also School of Engineering and Applied Science.)

Professors and Senior Research Associates
Jerome R. Cox, Jr., S.B., Massachusetts Institute of Technology, 1947; S.M., 1949; Sc.D., 1954. (See Department of Physiology and Biophysics.) (Also School of Engineering and Applied Science.)
Harold W. Shipton, C.Eng., Shrewsbury Technical College, 1949. (Also School of Engineering and Applied Science.)
Donald L. Synder, B.S., University of Southern California, 1961; M.S., Massachusetts Institute of Technology, 1963; Ph.D., 1966. (Also School of Engineering and Applied Science.)

Associate Director
G. James Blaine III, B.S., Washington University, 1959; M.S., 1961; D.Sc., 1974. (Also School of Engineering and Applied Science.)

Professors
Robert O. Gregory, B.S., Missouri School of Mines, 1948; M.S., Washington University, 1954; D.Sc., 1964. (Also School of Engineering and Applied Science.)

Associate Professors
R. Martin Arthur, B.A., Rice University, 1962; B.S., 1963; M.S., 1964; Ph.D., University of Pennsylvania, 1968. (Also School of Engineering and Applied Science.)

Research Associates
Kenneth W. Clark, B.S., St. Louis University, 1965; M.S., 1967.

James G. Dunham, B.S., Stanford University, 1973; M.S., 1973; Ph.D., 1977. (Also School of Engineering and Applied Science.)
A. Maynard Engebretson, B.S., University of Minnesota, 1958; M.S., Washington University, 1963; D.Sc., 1970. (Also Central Institute for the Deaf.)

James G. Miller (Physics), St. Louis University, 1964; M.A., Washington University, 1966; Ph.D., 1969. (See Department of Arts and Sciences.)

Assistant Professors
Rexford L. Hill, B.S., University of Cincinnati, 1964; M.S., 1966. (See Department of Radiology.)
J. Philip Miller (Biostatistics), A.B., Washington University, 1965. (See Department of Preventive Medicine and Public Health.)
THE MEDICAL CARE GROUP OF ST. LOUIS (MCG)

MCG is a prepaid group practice providing comprehensive health services to more than 29,000 people in the St. Louis area. Since its beginning in 1969, MCG's relationship with the School of Medicine has been as a teaching and research unit serving as a model practice setting within a medical school environment. It is housed in a separate facility on the medical school campus and also provides primary care services at two outlying facilities in St. Louis County. Inpatient care occurs in the hospitals of the Washington University Medical Center. The practice is a site for optional programs for advanced residents in general internal medicine and general pediatrics. An elective is available for senior medical students.

MCG is also a source of data for various clinical and health services research.

The practice is staffed by physicians who are members of the faculty of the School of Medicine in the departments of Internal Medicine, Pediatrics, Preventive Medicine, and Obstetrics and Gynecology. They are supported by medical and pediatric nurse practitioners as well as certified nurse midwives, physician's assistants, psychiatric social workers, a dietician, and an optometrist. Subspecialty care is delivered by other members of the faculty in the various clinical departments of the School of Medicine.

Director
Lawrence I. Kahn (Health Care Research). A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945. (See Department of Pediatrics and Preventive Medicine and Public Health.) (Also Pediatric Nurse Practitioner Program.)

Staff
Jill Baer, B.S., University of Kentucky, 1972; M.D., University of Kentucky, 1975. (See Department of Pediatrics.)

Marion H. Baker, R.N., St. John's Hospital, 1946; P.N.P., Cardinal Glennon Memorial Hospital for Children, 1973. (See Department of Pediatrics.)

Max H. Burgdorf, Jr., A.B., Washington University, 1970; M.D., 1974. (See Department of Pediatrics.)

Lauren Clark-Rice, B.S., University of California at Los Angeles, 1973; M.D., University of Missouri at Columbia. (See Department of Obstetrics and Gynecology.)

R. P. Davidson, B.S., Washington and Lee University, 1974; M.D., Washington University, 1978. (See Department of Obstetrics and Gynecology.)

Branka Ford, B.S., New York University, 1965; M.D., McMaster University, 1975 (See Department of Medicine.)

John J. Garrett, B.S., Niagara University, 1942; M.D., Harvard Medical School, 1951. (See Department of Medicine.)

Guner Gulmen, M.D., Hacettepe University Medical School, 1969. (See Department of Medicine.)

Carl G. Harford, A.B., Amherst College, 1928; M.D., Washington University, 1933. (See Department of Medicine.)

Charlotte Harris, B.S., Michigan State University, 1973; M.D., Cornell University, 1977. (See Department of Medicine.)

Will Holcomb, B.A., Purdue University, 1970; M.D., Indiana University, 1974. (See Department of Obstetrics and Gynecology.)

Clemens H. Jacques, B.S., University of California, 1949; O.D., 1949. (See Department of Ophthalmology.)

Kwangsup S. Kim, M.D., Seoul National University, 1963; Ph.D., 1970. (See Department of Medicine.)

Joan Mass, B.A., Washington University, 1971; M.D., Temple University, 1977. (See Department of Medicine.)

Patrick O'Donnell, B.A., University of Kansas, 1972; M.D., Autonomous University of Guadalajara, 1977. (See Department of Medicine.)

Edward G. Peskin, B.A., University of Wisconsin, 1970; M.M.S., Rutgers University, 1972; M.D., Washington University, 1974. (See Department of Obstetrics and Gynecology.)

Paul S. Simons, B.A., University of Texas 1963; M.D., Washington University, 1967. (See Department of Pediatrics.)

Kongsak Tanphaichitr, M.D., Srinakir Hospital Medical School, 1970. (See Department of Medicine.)

Wanda Terrell, A.B., Washington University, 1975; M.D., Washington University, 1979. (See Department of Medicine.)

Alice Trotter, B.A., Mount Holyoke College, 1962; M.D., Washington University, 1969. (See Department of Medicine.)

James K. Turner, A.B., Washington University, 1949; M.D., 1953. (See Department of Pediatrics.)

Patricia B. Wolff, B.A., University of Minnesota, 1968; M.D., 1972. (See Department of Pediatrics.)
BEAUMONT-MAY INSTITUTE OF NEUROLOGY

The Beaumont-May Institute of Neurology was established in 1955 by gifts from the Louis D. Beaumont Foundation, Mrs. Charles M. Rice, and Morton J. May. It is the purpose of the institute to foster basic and clinical research in neurology, with special reference to defects in the structure of the nerve cell which occasion important neurological disorders having a high incidence of prolonged disability.

DIVISION OF TUMOR SERVICES

The Division of Tumor Services was organized by the coordinating committee for the cancer education program. Cancer, like many other subjects in the medical curriculum, is taught in an interdepartmental manner. In the sophomore year, a six-week interdepartmental course in hematology and oncology is taught as part of the pathophysiology course by members of all clinical departments which participate in the division. In the junior year, students are assigned to the tumor clinics of the various services, where they gain firsthand experience with cancer.

Interdepartmental tumor conferences, held each week for members of the junior class, postgraduate students, visitors, and staff, serve as a forum to demonstrate some of the complex problems in diagnosis and therapy which arise in patients with malignant disease. Other tumor conferences are held at regular intervals by the various clinical departments.

In the senior year, students may elect periods of study which expose them to the theoretical and practical aspects of the epidemiology, diagnosis, treatment, and prognosis of various human neoplasms. This program is tailored to the particular interests of each student with the approval of the executive committee of the Division of Tumor Services. The oncological electives available to seniors include studies in any of the following fields: surgical pathology, neoplasms in children, surgical oncology, radiation therapy, hematologic neoplasms, and epidemiology of cancer.

TUMOR SERVICES AT WASHINGTON UNIVERSITY

Cancer Coordinator, Director of Division, and Chairman of Executive Committee
Gordon W. Philpott, M.D.

Executive Committee
Anesthesiology
William D. Owens
Cardiothoracic
Thomas B. Ferguson
Internal Medicine
Stuart A. Kornfeld
Dr. Alan Lyss
Neurology and Neurological Surgery
William S. Coxe
Obstetrics and Gynecology
H. Marvin Camel
Ming-Shian Kao
Ophthalmology
Morton E. Smith
Otolaryngology
Richard Hayden
Donald G. Sessions
Pathology
Walter C. Bauer
Pediatrics
Teresa J. Vietti
Vita J. Land
Plastics
R. Chris Wray

Radiology
Carlos A. Perez
John M. Bedwinek
James E. Marks
Joseph R. Simpson
Bruce J. Walz

Surgery
Harvey R. Butcher, Jr.
John D. Halverson
Gordon W. Philpott

Urology
William R. Fair
THE IRENE WALTER JOHNSON INSTITUTE OF REHABILITATION

The teaching of rehabilitation is conducted by the Department of Preventive Medicine and Public Health in collaboration with various specialty services. The Irene Walter Johnson Institute of Rehabilitation is a modern, five-story facility that is air-conditioned and well equipped for the care of disabled patients. Students of medicine, house officers, and students of paramedical services have an opportunity to affiliate with the institute.

Traineeship Elective

Traineeships in Physical Disability and Rehabilitation of eight weeks' duration may be elected during the interval between the end of spring semester and beginning of the fall semester by two students who have completed the first year of the medical school curriculum. Specific instruction is given by means of informal lectures, demonstrations, and seminars. The student becomes familiar with the techniques for defining the extent of physical disability and with various approaches to its treatment. Emphasis is placed on methods used in physical, occupational, and speech therapy, and on the specialized contributions to be made by rehabilitation, social work, nursing, and vocational testing and counseling. Opportunity is made available for special emphasis on the rehabilitation of hand injuries and for participating in research activities of the Rehabilitation Engineering Unit.

Interests of the students will be met by arranging experience in rehabilitation medicine at extramural facilities, including Jewish Hospital and Paraquad.

Director
Michael H. Brooke, M.B., B.Ch., Cambridge University, 1958. (See Departments of Neurology and Neurological Surgery and Preventive Medicine and Public Health.)

Assistant Director
James Carroll, B.S., University of Louisville, 1966; M.D., 1969. (See Departments of Neurology and Neurological Surgery and Pediatrics.)

Director of Milliken Hand Rehabilitation Center
Paul M. Weeks, A.B., Duke University, 1954; M.D., University of North Carolina, 1958. (See Department of Surgery.)

Director of the Cardiac Rehabilitation Center
Ali A. Ehsani, M.D., Tehran University, 1956. (See Departments of Medicine and Preventive Medicine and Public Health.)
Graduate Training

DIVISION OF BIOLOGY AND BIOMEDICAL SCIENCES

The Division of Biology and Biomedical Sciences, formed in the summer of 1973, was established because of the realization that training and research in modern biology transcend the limits of departmental structure. The faculty consists of members of preclinical departments of the School of Medicine—Anatomy and Neurobiology, Biological Chemistry, Genetics, Microbiology and Immunology, Pathology and Physiology, and Biophysics—and of the Department of Biology of the Faculty of Arts and Sciences. For purposes of graduate training, the Division is divided into the following programs: Integrative and Cell Biology, Molecular Biology, Neural Sciences, Plant Biology, and Population Biology.

The faculty in each of these programs participates in the presentation of divisional courses and sets the requirements for the Ph.D. degree within the programs. These courses are also available to medical students as senior electives. The Ph.D. requirements in all programs are highly flexible. They include courses which are adjusted to the student’s background and interest, qualifying examinations usually taken during the second year, execution of original research suitable for a dissertation, and defense of the thesis. Graduate students are admitted to the Division as students-at-large for the first year of their training. During the first year, advisors are appointed to assist students in selecting courses and to help them become acquainted with the various research programs in the Division. At the conclusion of the first year, it is expected that each student will make a decision as to which program he wishes to join; and, by choosing a research advisor, he will be located in one of the departments which make up the Division. Alternatively, graduate students may also select programs within the disciplines represented by the departments; the Ph.D. degree requirements for these students will be determined by the individual departments. In order to obtain expertise in teaching as well as research, all students serve as teaching assistants for two semesters during their graduate training.

Students in the Ph.D. program will receive full tuition remission and stipends at the level of $5,500. In many cases the award is made from an NIH training grant and is subject to the payback agreement and taxability provisions appropriate to such awards.

Applications for admission are due no later than January 15 for matriculation the following summer or fall. Admission is based on demonstrated ability, future promise, and the number of openings currently available. In general, a student should have completed undergraduate training in biology, chemistry, or physics at a high scholastic level and have completed most of the following courses: biology, genetics, chemistry (general, analytical, organic, and physical), physics, and calculus. It is possible for the student, in exceptional cases, to fill some lack of basic entrance requirements for the specific program by electing these courses in the beginning year of study. It is strongly recommended that the applicant take the Graduate Record Examination, both the aptitude and advanced portions. Additional information and the application for admission may be obtained by writing directly to the Office of Graduate Student Affairs, Box 8072, Washington University School of Medicine, 660 S. Euclid Avenue, St. Louis, Missouri 63110.

For the 1983-84 academic year, the tuition and health fee in the Graduate School of Arts and Sciences will be $4,100 a semester for full-time study. For students enrolled for fewer than twelve units, the rate is $330 a unit. Graduate students who are enrolled for more than six units per semester in courses at the Medical Center are required to participate in the Medical Center Student Health Service. The health fee is payable each semester at the time of registration. As noted above, these charges are usually covered by tuition remission.

The following graduate courses are offered by the Division of Biology and Biomedical Sciences. Those courses which are particularly relevant to any given department are cross-listed under that department in this Bulletin. The faculty member in charge of the course and his departmental affiliation are shown at the end of each course.
Bio 401. Vertebrate Physiology
This three credit-hour lecture series is an in-depth coverage of the functional anatomy and the integrated functions of the organ systems of mammals exclusive of the nervous and reproductive systems. Credit 3 units. James-Kracke (Biology)

Bio 404. Laboratory of Neurophysiology
Elements of the nervous system, neural analysis of sensory information, and organization of neural activity will be electrophysiologically studied by students to find out how some of the interesting experiments in neurophysiology are actually performed. Resting and action potentials, excitation transmission, sound- and photo-reception, organized activity of motoneurons, analysis of human and animal sounds, and psychological phenomena will be examined. Credit 3 units. Molnar (Biology)

Bio 405. Physiological Basis of Acoustical Communication
Lectures and seminars in hearing of various species of animals, from invertebrates to humans. Structural and functional adaptation to the environment in which their acoustic communication is performed is considered. Not only auditory physiology, but also sound production, acoustic communication, and echolocation in bats will be discussed. Credit 2 units. Suga (Biology)

Bio 408. Evolution of Man and Culture
The fossil evidence for human and non-human primate evolution. Classification and genetics in evolutionary perspectives, relations between biology and culture in ancient and modern populations. Credit 3 units. Templeton (Biology)

Bio 410. Molecular Virology
A comprehensive study of the virus world—including animal, plant, and bacterial viruses—with emphasis on the molecular biology of virus structure and replication. This course is for advanced undergraduate and graduate students. Graduate students are expected to read original papers and participate in discussion groups. Credit 3 units. Schlesinger, S. Schlesinger, Beachy (Microbiology/Immunology)

Bio 411. Phycology
A systematic treatment of the freshwater and marine algae. Emphasis primarily on morphology, physiology, taxonomy, and genetics of the major and minor algal groups. Certain aspects of recent research and present problems in phycology will be considered. Credit 4 units. Nichols (Biology)

Bio 412. Experimental Aquatic Biology
Studies of current research problems and research techniques devoted to aquatic flora and fauna. The course will include group or individual participation in a research problem or problems dealing with individual aquatic components of the aquatic environment or their interaction. Credit 4 units. Nichols (Biology)

Bio 413. Plant Molecular Biology
Discussion of molecular aspects of plant development, genetics of the organelles, host/symbiont interactions, plant genetic engineering. A nine-week course, second in a series of three beginning in the tenth week of the semester and continuing through the fourth week of spring semester. Credit 3 units. Lewis (Biology), staff

Bio 414. Physiology and Biochemistry of Plants
A discussion of those processes unique to plants. These include photosynthesis, symbiotic nitrogen fixation, nitrate reduction, sulfate reduction, osmoregulation, hormone metabolism, and photomorphogenesis. A nine-week course, last of a series of three, beginning in the fifth week of the semester. Credit 3 units. Staff (Biology)

Bio 415. Theoretical Population Genetics
A rigorous introduction to the theoretical basis of population genetics and evolutionary mechanisms. Quantitative genetics and population structure will be investigated first, followed by an examination of how selection, population structure, and ecological factors interact in determining the evolutionary fate of a population. Credit 3 units. Templeton (Biology)

Bio 416. Evolution
Individual areas of evolutionary biology will be discussed in depth. Topics will include the Biological Species concept, the hypothesis of selective neutrality of enzyme polymorphism, modern concepts in systematics, molecular approaches to the study of adaptation, the coevolution of insects and plants, and other topics of current evolutionary interest. Credit 3 units. Johnson (Biology)

Bio 417. Mathematical Ecology
The theory of the Leslie Matrix will be developed with respect to population growth, colonization, demography, and evolution of life history attributes. Matrix approaches will next be used to study species interactions and communities. Finally, the use and limitations of optimization models in ecology will be discussed. Credit 3 units. Templeton (Biology)

Bio 418. Population Genetics
An introduction to the basic principles of population and ecological genetics. The mechanisms of microevolutionary processes are discussed, and an integrated ecological and genetic approach is used to study the adaptive nature of the evolutionary process. Credit 3 units. Templeton (Biology)

Bio 419. Ecology
A survey of ecological principles underlying the spatial and temporal distribution of populations and biological communities. Credit 3 units. Sexton (Biology)
Bio 420I. Selected Topics in Life History: Strategies of Tetrapod Vertebrates
Lectures, discussions, and field trips devoted to the analysis of vertebrate life tables, growth, reproductive cycles, predation, and distribution in space and time, with special reference to amphibians and reptiles. Individual research projects will be required. Credit 3 units.

Sexton (Biology)

Bio 424. Immunology
The basic molecular and cellular aspects of the vertebrate immune response, emphasizing the specificity of antibody reactions, the molecular structure of antibodies, the genetic origin of their diversity, and the cellular basis of their formation. Other topics will include tolerance, autoimmunity, allergy, blood groups, immunogenetics, and tissue transplantation. Credit 3 units.

Fleischman (Microbiology and Immunology)

Bio 425I. Microbial Physiology
An in-depth coverage of selected topics in microbial physiology and molecular biology. Topics may vary from year to year but could include cell regulation and growth, bioenergetics, sporulation, bacterial genetics, plasmid structure, and recombinant DNA research. Credit 3 units.

Silver (Biology)

Bio 426. Developmental Neurobiology
Lectures and assigned reading, including original literature, will be used to explore in some detail the basic principles of the developing nervous system. Subjects will include basic neuroembryology, origin and differentiation of neurons and glia, axonal growth and guidance, trophic interactions, cortical development, synapse formation, plasticity, and regeneration. Credit 3 units.

M. Johnson, R. Bunge, D. Purves, J. Sanes (Anatomy & Neurobiology, Physiology)

Bio 429I. General and Comparative Endocrinology
Overview of major events in the history of endocrinology; neuroendocrine integration in vertebrates and invertebrates; survey of hormones and their effects. One endocrine system will be considered in detail in terms of its controls and its influences on developing and mature animals. Credit 3 units.

Moog (Biology)

Bio 435. History of Biology and Related Sciences, Antiquity through the Seventeenth Century
This course will cover the basic development of the life sciences from antiquity through the scientific revolution. Emphasis will be placed on the interaction of biology with physics, chemistry, cosmolagy, philosophy, and the social sciences. The course is approached from a Marxist perspective. Credit 3 units.

Allen (Biology)

Bio 436. History of Biology and Related Sciences from the Seventeenth Century to the Present
This course covers the development of the life sciences from the seventeenth through the mid-twentieth centuries. Emphasis will be placed on the development of biology and its interactions with physics, chemistry, astronomy, philosophy, and the social sciences. The course is approached from a Marxist perspective. Credit 3 units.

Allen (Biology)

Bio 437. Laboratory on DNA Manipulation
Isolation of DNA, use of restriction endonucleases, electrophoretic separation of DNA fragments, Southern blotting, in vitro labeling of nucleic acids, and DNA hybridization will be covered. A molecular cloning experiment employing colony hybridization will be performed by each student. Credit 3 units.

Chilton (Biology)

Bio 439I. History of Scientific Thought II: The Scientific Revolution, 1450-1750
The second in a three-part sequence covering the history of science from Hellenistic times to the present, this course concentrates on the crucial period in the development of modern science known as the "Scientific Revolution." It focuses on aspects of natural philosophy such as dynamics, statics, astronomy and cosmology, anatomy, physiology and medicine, and theories of the nature of light and matter. Emphasis will be placed on the relationship between science, commerce, philosophy, and politics during the period, and on the way scientific theories are influenced by society and, in turn, affect the society which produced them. Credit 3 units.

Hall/Allen (Biology)

Bio 439II. History of Scientific Thought III: 1750-present
Beginning with a summary of the effects and legacy of the so-called "scientific revolution" of the 17th century, the course will examine the development of Newtonianism in astronomy, chemistry, and biology. Other topics will include: the development of "Nature Philosophy" as a reaction to mechanistic science, the growth of natural history (particularly comparative anatomy and paleontology), the Darwinian revolution, organismic physiology and bacteriology, the revolution in physics following Planck, Einstein, and Bohr, the growth of embryology and heredity, eugenics, and modern genetic and evolutionary theory since the 1930s. Emphasis will be placed on the social and philosophical sides of science, as well as technical details. Credit 3 units.

Hall/Allen (Biology)

Bio 441. Problems in Developmental Biology
A variety of problems related to organismic development (such as cell-cell interactions, pattern formation, and the regulation of gene expression) will be examined, based largely on in-depth discussion of selected research papers. Credit 3 units.

Yao (Biology)

Bio 446. Biology of the Fungi
General aspects of the biology of the major fungal groups, including their development, genetics, cytology, metabolism, and ecology. Roles these microorganisms play in nature, research, medicine, and agriculture. Credit 3 units.

Maniotis (Biology)

Bio 448. Plant Systematics Workshop
A series of workshops, each consisting of laboratories and tutorials for advanced undergraduates and graduates contemplating careers in systematics, ecology, or natural history: Section 1—monographic studies; Section 2—cytotaxonomy; Section 3—palynology; Section 4—microtechnique; Section 5—chemosystematics. Credit 1 or 2 units for each section.

Staff (Biology)
Bio 451. General Biochemistry
A study of structure-function relationships as applied to carbohydrates, proteins, and lipids; intermediary metabolism of principal cellular components and general aspects of regulation. Credit 4 units.
Chilson, staff (Biology)

Bio 454. History of Genetics
A seminar dealing with selected topics in the history of genetics, focusing largely on the period since 1900. The first part of the seminar (weeks 1-7) will be devoted to exploration of specific topics (with primary and secondary source readings) such as: the background development of Mendel’s work, cytology (1860-1930); the biometrical movement, heredity, and evolution (1860-1900); Mendelism and Darwinism (1900-1940); biochemical genetics, molecular genetics, and the Eugenics Movement (1890-1940). The second part of the course will be devoted to presentation and discussion of student research papers. Credit 3 units.

Bio 457. Somatosensory System
This course is designed to correlate anatomical, physiological, and psychological information on tactile sensation, proprioception, and thermal and pain sensation. Emphasis will be placed on peripheral receptor mechanisms as well as central nervous system processing of afferent inputs in each somesthetic system. Credit 2 units.
Burton, Hunt, Jones (Anatomy/Neurobiology)

Bio 458. Neurobiology and Biophysics of the Ear
In this course, we discuss the following topics: structure of various components of the ear; acoustic phenomena in the ear canal that are biologically generated in the inner ear; biomechanics of the middle ear and the inner ear; neurobiology of the sensory hair-cells; biochemical control of the motion of cochlear partition; response patterns of single cochlear neurons to various sound stimuli; clinical applications of ear-canal acoustic phenomena and auditory evoked potentials; use of computers in conducting neurophysiological experiments and in systematically interpreting the data. Credit 3 units.
Kim, Molnar (Physiology and Biophysics)

Bio 459. Vision
A course bringing together the anatomy, physiology, and psychology of vision to provide an understanding of function. Properties of light and receptors will be covered, and analysis of form, movement, color, and depth in vertebrates, with some material on invertebrates. Credit 3 units.
Daw (Physiology), Cohen, Miller, Pearlman

Bio 467, 468. Seminar in Floristic Taxonomy
A survey of angiosperm families, their morphology, cytology, anatomy, palynology, chemistry, and evolution. Credit 1 unit.

Bio 471. Phytogeography
An introduction to the current and past geographical distributions of plants, emphasizing ecological, geological, and historical factors. Credit 3 units.

Bio 485. Physiological Ecology of the Vertebrates
An examination of the adaptations of organ and system physiology in the vertebrate which enable the animal to exploit difficult environments. Students will participate in a team project on behavioral thermoregulation involving biotelemetry of body temperature and location from free living vertebrates at Tyson. Credit 3 units.
Coles (Biology)

Bio 487, 488. Undergraduate Teaching
Exceptional undergraduates may serve as teaching assistants for laboratory and/or discussion sections in departmental courses. Normally, 2 or 3 credits are given per semester for teaching activity, subject to the approval of the course instructor and the Department. Credit for teaching may not be counted toward fulfilling biology degree requirements. Students who are asked to teach, or those who apply and are accepted by a course instructor, should fill out an application form to be obtained from the Biology Department office. Prerequisite, approval of instructor. Credit 2 or 3 units. Must be taken Credit/No Credit only.
Staff (Biology)

Bio 493. Seminar in Advanced Biology
This seminar will deal with topics which tend to cut across disciplinary lines within Biology. Topics, staff, and prerequisites will vary from semester to semester and will be announced during the prior preregistration period. Credit to be arranged.
Staff (Biology)

Bio 4931. Vertebrate Structure
A functional and comparative approach to the gross and microscopic anatomy of the vertebrates. The major organ systems, excluding the nervous system, will be examined. A special project will be assigned. Credit 4 units.
Krukowski (Biology)

Bio 500. Independent Work
Prerequisite, junior or senior standing and permission of the sponsor and the Department. Credit to be determined in each case. Maximum of 6 units may be applied toward upper division credits required for the major. If the work is to be submitted for honors, further requirements are a B+ average in biology courses, a B+ average in
related subjects required for a biology major, a B+ average overall, and registration for 3 units in each of 2 semesters; an honors thesis must be prepared. Credit/No credit only.

**Bio 501. Human Anatomy**
Study of the gross structure of the human body primarily by dissection. Consent of the instructor required. Credit 6 units. Peterson (Anatomy), staff

**Bio 502. General Physiology**
A basis for understanding general physiological mechanisms and the functional organization of physiological systems. Credit 8 units. Staff (Physiology)

**Bio 503. Endocrine Physiology and Pharmacology**
A lecture course for in-depth coverage of general endocrinology. Major areas covered will include neuroendocrinology, steroid hormones, reproduction, and metabolic fuel regulation. Each area will be discussed at the whole animal, cellular, and subcellular levels with particular emphasis on the integrative function of endocrine systems and on mechanisms of hormone action. Credit 3 units.

Martin (Pharmacology), Covey, Lawrence

**Bio 504. Environmental Pathology**
Lectures and seminars discussing the effect of modern industrial environment on man’s health. The adaptability of man, his ability to manipulate his environment and the effects of these manipulations in regard to health and disease will be discussed. Topics include acute and chronic diseases associated with air and water pollution, waste disposal, pesticide usage, transportation, radiation, and noise. Credit 2 units. Kuhn (Pathology), Schmidt, staff

**Bio 505. Foundations in Immunology**
This course is designed for graduate students as an in-depth introduction to immunology. Topics will include: antibody structure and genetics, cellular immunology, complement, transplantation immunology, and clinical immunology. Credit 3 units.

Kapp (Pathology and Microbiology/Immunology)

**Bio 506. Microscopic Anatomy**
An integrated study of structure-function relationships in cells, tissues, and organ systems of the human and other mammals. The student is provided with a microscope, slide collection, and portfolio of electron micrographs for study in the laboratory. Credit 5 units.

Menton (Anatomy), staff

**Bio 507, 508. Pharmacology**
Biological basis of drug action. The course is divided into three parts: general pharmacology, cardiovascular, pharmacology neuropharmacology. Bio 508 must be taken in the spring semester to complete the course. Credit 4 units.

Covey (Pharmacology), staff

**Bio 509, 510. Current Topics in Pharmacology**
Topics of current interest will be presented and discussed. Critical evaluation will be made of recent articles in the scientific literature. Required of all graduate students in the department. Credit 1 unit.

Russell (Pharmacology)

**Bio 511. Intracellular Transport of Macromolecules in Animal Cells**
A discussion of the organelles responsible for the movement of macromolecules in cells. Endoplasmic reticulum, the Golgi apparatus, secretory vesicles, plasma membrane, lysosomes. Part of the course will use the seminar format. Credit 2 units.

Stahl (Physiology and Biophysics)
Bio 512. Selected Topics in Developmental Biology
A lecture-seminar course devoted to an in-depth analysis of a restricted number of topics of major current interest in developmental biology. A series of guest lectures whose research is at the forefront of the area of interest will be invited to the campus to discuss their research activities with the class. These guest lectures will be supplemented by extensive readings from the current literature, lectures by local faculty, and informal discussions. Students will be evaluated on the basis of a research proposal they will prepare during the semester. Credit 2 units.
Kirk (Biology)

Bio 5141. Topics in Advanced Cell Biology
A course designed for advanced students in the area of cell biology and related fields. Lectures will stress recent advances in the field of eukaryotic cell biology. Emphasis will be placed on membranes, membranous organelles, and cell motility systems. Credit 3 units.
Goodenough (Biology), Heuser (Physiology/Biophysics)

Bio 515, 516. General Pathology
General introduction to abnormal biology and detailed consideration of pathology of organ systems. Continuous through two semesters, 312 hours; 9 hours per week. Not available for credit to those holding M.D. degrees. Credit 10 units for the year.
Kissane (Pathology)

Bio. 517. Introduction to Immunology
A short introduction to humoral and cell-mediated immunity for nonspecialists. Lectures in the first 10 weeks of medical school semester. Students intending to take more advanced courses in Immunology or who are preparing for preliminary examinations in Immunology should take Bio 5051. Credit 2 units.
Staff (Microbiology/Immunology)

Bio 518, 519. Pathology Research Seminar
Graduate students, MSTP students, postdoctoral trainees, and pathology faculty will present discussions of current research from the literature, or, when appropriate, from their own laboratories. Priority for presentation will be given to graduate and MSTP students. Credit: those wishing to obtain credit may do so (2 units/semester).
Baenziger (Pathology)

Bio 520. Methods in Experimental Pathology
Discussions and demonstration of routine and special microscopic techniques (light, phase, fluorescent, transmission, and scanning electron microscopy); other techniques (bio- and immunoassay, various physiologic correlates). Design of experiments using laboratory animals and autopsy specimens will be emphasized. Students will be expected to do a short research project of interest to them. Limited enrollment by permission of instructors. Graduate students should have had at least one course in histology and also, preferably, a course in pathology. Credit 2 units.
Hartroft, Greider (Pathology)

Bio 521. Cellular Aspects of Immune Response
The mechanisms of regulation of immune responses by antigen, macrophages, T cells, B cells, and their products will be discussed. The material covered will vary from year to year and will stress critical analysis of the literature. Credit 2 units.
Pierce (Pathology/Microbiology), Kapp, Sorenson, Lake, and Aune

Bio 5231. Microbial Physiology and Genetics
Molecular and cellular aspects of microbial growth and reproduction. Lectures (total 12 hours) in the first six weeks of the medical school semester. Credit 1 unit.
Staff (Microbiology/Immunology)

Bio 525. Fundamental Concepts in Cell Membrane Physiology and Biophysics
A lecture course devoted to theoretical principles underlying the physiological properties of biological membranes. Topics to be covered include: (1) a review of aqueous solution thermodynamics and properties of electrolyte solutions; (2) diffusion and osmosis; (3) electrodiffusion, with applications to membranes; (4) membrane potentials and interfacial potentials; (5) kinetics and selectivity of ion channels; and (6) kinetics and thermodynamics of carrier-mediated transport. Credit 3 units.
De Weer (Physiology/Biophysics), Rakowski, Reuss
Bio 526. Selected Topics in the Physiology and Biophysics of Cell Membranes
A seminar course devoted to in-depth analysis of selected readings. The topics to be covered include: movements of salt and water across cell membranes and epithelia; ion channels in biological and artificial membranes; kinetics of carrier mechanisms; and the chemistry and kinetics of the sodium pump. Credit 3 units.

De Weer (Physiology/Biophysics), Rakowski, Reuss

Bio 521. Topics in Immunology
Consideration of two or three changing topics in immunology. Background observations and current problems in the topic areas will generally be examined in a seminar format using primary literature. Each topic segment will be led by a different faculty member. Credit 2 units.

Pierce (Pathology & Microbiology), staff (Cell Program)

Bio 521. Development of Genetics
Genetics of developmental events, including sex determination, pattern formation, cell fate, and regulation of tissue specific genes. Emphasis will be placed on the use of genetics to investigate these phenomena in organisms such as yeast, Volvox, C. elegans, Drosophila, and mouse. Credit 3 units. Waterston (Genetics), staff

Bio 529. Animal Virology
A general introduction to animal and human viruses. Lectures in the second nine weeks of the fall semester. Prerequisite, consent of instructor. Credit 1 unit.

S. Schlesinger (Microbiology/Immunology)

Bio 531. Advanced Biochemistry
A discussion of the biochemistry of organized systems with special emphasis on problems relevant to medicine. Extensive reading of the original literature will be required. The course will consist of four parts: 1) Metabolic regulation, including a study of hormonal control; 2) structure and function of membranes and organelle biogenesis; 3) gene expression in higher organisms including malignant transformation; 4) biochemistry of blood clotting. Credit 4 units.

Staff (Biochemistry)

Bio 532. Biochemistry of Extracellular Matrix
An in-depth survey of the chemistry and metabolism of the principal components of the extracellular matrix, principally collagen, elastin, and the glycosaminoglycans. Chemical and physical properties of these molecules will be discussed, as well as aspects of their biosynthesis and degradation. Emphasis will be placed on the relationships between structural features and metabolic events involving these complex molecules and their physiologic function: the maintenance of the stable three-dimensional architecture of animal tissues. Credit 2 units.

Jeffrey (Biochemistry)

Bio 533. Host Response to Pathogens
Beneficial and detrimental aspects of non-specific and specific (immune) host responses to pathogenic stimuli. Normal, deficient, and inappropriate responses considered. Mechanisms of action of antibiotics used to supplement host response. Lectures in the last eight weeks of the medical school semester. Credit 2 units.

Staff (Microbiology/Immunology)

Bio 535. Molecular Biology
Basic principles of prokaryotic and eukaryotic molecular biology. Credit 2 units.

Gordon (Biochemistry)

Bio 536. Physical Chemistry of Macromolecules
Application of physical chemistry to the study of proteins, nucleic acids, and other natural and synthetic polymers. The thermodynamics of macromolecular solutions and the principles behind osmotic pressure, light scattering, viscosity, ultracentrifugation, diffusion, and electrophoresis experiments. Offered in alternate years. Credit 3 units.

Holtzer (Chemistry)

Bio 537. Protein Chemistry & Enzyme Mechanisms
Protein chemistry: sequence analysis; three-dimensional protein structure; peptide synthesis; development of enzyme kinetic theory, including concepts of regulatory enzymes; enzyme mechanisms. Credit 3 units.

Grant (Biochemistry and Medicine), staff

Bio 538. Structure & Function of Cell Membranes and Surfaces
Topics include contemporary cell membrane models; membrane structure as revealed by electron microscopy, X-ray analysis, etc.; physical properties of lipids and membrane proteins; model membranes and their applications; permeability and active transport in mammalian and bacterial systems; cell recognition, contact inhibition, and transformation; immunological characteristics of membranes. Credit 3 units.

R. Kornfeld (Biochemistry & Medicine)
Bio 539. Topics in Animal Virology

The course will consist of readings and seminars in specific areas of animal virology. The topics will vary from year to year. Credit 2 units.

S. Schlesinger (Microbiology/Immunology)

Bio 540. Cell Surface Receptors

Course will consist of discussion of cell surface components which allow cells to interact specifically with a variety of environmental substances such as drugs, neurotransmitters, protein hormones, toxins, and other cells. This course will include a consideration of cell-cell interactions, macromolecule receptors, and small molecule receptors. Credit 3 units.

Needleman (Pharmacology), Merlie, Frazier

Bio 541. Molecular Biology of Prokaryotes

About 15 hours of lecture followed by seminar presentations on selected topics by each student. Growth, metabolism, and genetics of the bacterial cell including transport mechanisms, the regulation of gene expression and protein synthesis, and the molecular biology of virus infection by virulent and temperate bacteriophages. Classical and more recently developed experimental tools, such as genetic engineering as well as the conceptual bases for present knowledge, will be emphasized. Credit 2 units.

Kennell (Microbiology/Immunology)

Bio 5411, 5412. Topics in Gene Expression

A weekly journal club discussing articles of current interest in the field of gene expression. One unit credit, contingent on one presentation per semester.

Chirgwin (Anatomy), Olson, Waterston (Genetics)

Bio 5421, 5422. Topics in Gene Expression

The course will cover the fundamentals of interactive computing and its application to the numerical modeling of physiological systems. The course will be illustrated using models developed by the faculty for use in teaching. The course will involve some “hands-on” computer projects. Credit 3 units.

Barry (Physiology/Biophysics)

Bio 5431. Computer Modeling of Physiological Systems

Three six-week sessions consisting of intensive lectures and discussion of current research. Topics will vary from year to year. Topics for fall, 1983: RNA Processing and translational control; DNA replication; regulation of nuclear events. Each session may be taken independently. Credit 3 units.

S. Elgin (Biology), Olson, Waterston (Genetics)

Bio 5432. Regulatory Phenomena in Cell and Molecular Biology

The first part of the course provides a basic background in neoplasia in man and animals as a framework for the application of concepts in cell and molecular biology to neoplasia. The major part of the course will be devoted to analyzing the role of chemical, physical, and viral carcinogens in the induction of cancer; promoters; the role of mutation and gene expression in neoplasia; changes in the cell surface; and metastasis. Credit 2 units.

Minimum of ten students.

Lieberman (Pathology), D. Schlessinger, staff

Bio 5441. Introductory Biophysical Chemistry

Applications of physical chemistry to biochemical problems at an introductory level. There will be three sections: multiple equilibria, spectroscopy, and kinetics, each comprising about one third of the course. One section may be taken individually for one credit. Credit 3 units.

Elson (Biochemistry)

Bio 548. Nucleic Acids & Protein Biosynthesis

This course will cover fundamental aspects of the structure, biosynthesis, and function of nucleic acids and the biosynthesis of proteins in eukaryotes and their viruses. Emphasis will be placed on mechanisms involved in the biosynthetic processes and the regulation thereof. Credit 3 units.

Olson (Genetics), Boime (Pharmacology)

Bio 550. Medical Genetics

Lectures and clinical conferences on human and medical genetics that include population and quantitative genetics, clinical cytogenetics, biochemical genetics and metabolic defects, counseling, and immunogenetics. Lectures and clinical conferences only. Credit 2 units.

Levine (Genetics)

Bio 551, 552. Topics in Neurobiology

A weekly seminar series on selected topics of current interest in neurobiology, such as synaptic and neuromuscular transmission, plasticity in the nervous system, the structure and function of receptors, etc. 9 a.m., Saturdays. Open to graduate and medical students. No credit.

Staff (Anatomy/Neurobiology).

Bio 554. Neuropharmacology

Applications of physical chemistry to biochemical problems at an introductory level. There will be three sections: multiple equilibria, spectroscopy, and kinetics, each comprising about one third of the course. One section may be taken individually for one credit. Credit 3 units.

Ferrendelli (Pharmacology)

Bio 555. Neuropharmacology

Basic and intermediate neuropharmacology for graduate and medical students. This course covers principles and details of neurotransmission in nervous tissue and mechanisms of action of neurotransmitters. Credit 3 units.

Ferrendelli (Pharmacology)
Bio 559. Nerve, Muscle, and Synapse
The ionic basis of the resting, action, and after potentials and the mechanisms of synaptic transmission. Students will be expected to present 2 to 4 one-hour seminars based on assigned original papers. Credit 3 units.

Rovainen (Physiology/Biophysics)

Bio 560. Aspects of Higher Cerebral Function
An intensive lecture and reading course in selected areas of cerebral anatomy, physiology, and behavior, with emphasis on the primates, including man. Given by local faculty and distinguished visitors. 2-3 lectures or discussions per week. 2 units credit.

Jones (Neurology and Neurological Surgery)

Bio 561. Topics in Molecular Neurobiology
This course will consist of lectures and seminars on selected areas in which the function of the nervous system is being studied at the molecular level. Among topics considered will be: behavior in simple organisms, continuous neuronal lines, intraxonal transport, transmitter receptors, transmitter biosynthesis, cell recognition, and filamentous proteins of the nervous system. Credit 2 units.

Willard (Anatomy/Neurobiology)

Bio 563. Techniques in Neural Sciences
First semester of a year-long laboratory course for first-year students in the Neural Sciences Program. Experiments include light and electron microscopy, immunocytochemistry, cable analysis of muscle fibers with intracellular recordings, and neuromuscular transmission. Credit 4 units.

Rovainen (Physiology/Biophysics), Staff (Neural Sciences Program)

Bio 566. Sensory Receptors
Advanced seminar course on structure and function of visual, auditory, vestibular, cutaneous, and muscle receptors. Credit 2 units.

Hunt (Physiology/Biophysics)

Bio 567. Advanced Tutorials in Neural Sciences
Directed readings and discussions for graduate students on selected topics in advanced neural science. Topics and specific instructors to be listed at Registration. Each tutorial will last for 6 weeks. Credit 1-3 units, depending on how many sessions taken.

Woolsey (Anatomy/Neurobiology), Staff (Physiology/Biophysics), (Biology), (Pharmacology)

Bio 568. Introduction to Principles of Neuropharmacology
Basic principles of pharmacodynamics, action of drugs affecting the nervous system, especially autonomic nervous system, receptor binding, etc. Note: This course will commence in the first week after the New Year Holiday. Credit to be conferred in the second semester. Credit 2 units.

E. Johnson (Pharmacology)

Bio 572. Seminar in Plant Biology: Plant Biochemistry
Discussion of current research and concepts of morphogenesis, growth, and development. Credit 2 units.

Varner (Biology)

Bio 574. Systematics & Ecology of Monocotyledoneae
The course will survey all monocotyledoneous groups of plants with systematic emphasis given to the familial level. A review of modern evolutionary theories for the class Monocotyledoneae will be presented. The course outline will follow the system of Cronquist. Particular emphasis will be given to the families Cyperaceae, Gramineae, Bromeliaceae, Zingiberaceae, Marantaceae, Palmae, Cyclanthaceae, Araceae, Liliaceae, and Iridaceae, for which instructors have a special interest. The morphology, systematics and ecology of each family will be discussed, with special emphasis given to their phenological behavior, pollination, and fruit-dispersal biology when sufficient information is available. Credit 2 units.

Croat (Biology)

Bio 575. Advanced Studies in Plant Systematics
Seminars in specific topics including anatomy, chemotaxonomy, cytology, ecotaxonomy, embryology, nomenclature, palynology, phytogeography, and bibliography. Credit 1 unit a semester.

Staff (Biology)

Bio 580. Seminar in Population Biology
This weekly seminar, covering topics in both population genetics and ecology, will be taken by graduate students in this program each semester. Research and literature reports will be given by staff, visitors, and graduate students. Credit 2 or 3 units.

Staff (Biology)

Bio 581. Seminar in Techniques in Field Biology
Planning and presentation of techniques in selected areas of population biology. Coordinated with Bio 484. Credit 3 units

Staff (Biology)

Bio 590. Research
Credit to be arranged.

Staff (Biology)

Bio 591. Seminar in Biology and Biomedical Sciences
These seminars cover the recent literature in various areas not included in other courses, or in more depth than other courses. A list of topics to be covered for the next semester is published shortly before registration time. Credit to be arranged.

Staff

Note—The number preceding the course title indicates that the course carries credit in the Graduate School of Arts and Sciences.
PROGRAM IN BIOMEDICAL ENGINEERING

This course of graduate study is designed to provide education and training for students wishing to apply principles of modern engineering and mathematics to theoretical and practical problems in biology and medicine. Students and faculty of both the School of Engineering and Applied Science and the School of Medicine participate in the program.

Every student seeking an advanced degree in engineering must be admitted to one of the participating departments of the Sever Institute of Technology, the graduate division of the School of Engineering and Applied Science. The program permits the student to earn a certificate in biomedical engineering in addition to the M.S. or D.Sc. degree in a chosen engineering field. Students who are not candidates for a degree are welcome to take courses as electives.

Graduate study plans are tailored to the individual's needs and interests, and provide essential background in the related areas of life and medical sciences. Students with diverse undergraduate backgrounds may be admitted provided they have adequate preparation and experience in mathematics and the physical sciences. Areas of specialization include sensory communications, electrocardiography, flow and diffusion in biological systems, electrophysiology, technology in health care, modeling of biological systems, engineering of artificial organs, drug concentration control, and applications of advanced computer techniques to biology and medicine. Research facilities available to the program are located in the School of Engineering and Applied Science, the School of Medicine, and the Washington University Computer Laboratories. The faculty includes representatives from the Biomedical Computer Laboratory; the Departments of Biological Chemistry, Physiology and Biophysics, Preventive Medicine and Public Health, Radiology, Surgery, and Anatomy and Neurobiology in the School of Medicine; and the Departments of Computer Science, Chemical, Civil, Electrical, and Mechanical Engineering in the School of Engineering and Applied Science.

Complete course listings and information about application and degree requirements may be found in the Bulletin of the School of Engineering and Applied Science.

Biomedical Engineering course offerings:
Bio 4581. Neurobiology and Biophysics of the Ear
BMed 502. Mathematical Methods in Biophysics
BMed 547. Biological Mass and Momentum Transfer
BMed 560. Biomechanics
BMed 576. Sensory Communications
BMed 582. Biophysical Measurement
BMed 600. Research for Doctoral Dissertation
BMed 651. Science of Synthetic and Biological Polymers
BMed 660. Biomedical Applications of Small Digital Computers
BMed 693. Special Topics in Biomedical Engineering

For additional related courses, see Biomedical Computer Laboratory in this Bulletin and the Bulletin of the School of Engineering and Applied Science.

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Harold W. Shipton

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Richard E. Clark
Jerome R. Cox, Jr.
John L. Kardos
Charles E. Molnar
William F. Pickard
Marcus E. Raichle
Salvatore P. Sutera
Michel M. Ter-Pogossian
Curt Thies
Donald F. Wann
Reimut Wette
George I. Zahalak

Associate Professors
Stuart Boxerman
Richard A. Gardner
William F. Holmes
Lewis J. Thomas, Jr.

Senior Research Associate
Norbert S. Mason

Research Associate
Kenneth B. Larson
Allied Health Professions

Programs are conducted by the School of Medicine in health administration, occupational therapy, physical therapy, radiologic technology, and pediatric nursing practice. All courses are approved by the American Medical Association or other certifying agencies, and graduates qualify for certifying examinations. For further information, write to the director or educational director listed under the particular program, 660 South Euclid Avenue, St. Louis, Missouri 63110.

HEALTH ADMINISTRATION AND PLANNING PROGRAM

The Philosophy

The faculty of the Health Administration Planning 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 planning unique to the health care field. Additionally, 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 will ultimately be involved. 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 specific management skills but an understanding of the many complexities unique to the health care sector.

Curriculum and Sequence of Study

Required courses constitute 50 percent of the course sequence for the master of health administration degree, offering vital exposure to the generic knowledge in the health administration and planning area. In addition to the elective courses available within the Health Administration and Planning 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. The student's previous academic work, employment experience, and ultimate performance goals enter into the individual's personalized curriculum.

As a means of furthering interdisciplinary study, up to fifteen semester hours of HAP courses are open to interested graduate students from other areas of Washington University. There is also a joint M.H.A.-J.D. degree between the Health Administration and Planning Program and the School of Law. In addition, there are joint degrees that are under development between the Health Administration and Planning Program and the graduate schools of Business Administration, the George Warren Brown School of Social Work, and the School of Architecture.

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 (M.H.A.) degree conferred by Washington University. The statute of limitations is five years from the date of matriculation to complete all requirements for the M.H.A. degree. Contingent upon graduation the student has the option of pursuing a 12-month postgraduate administrative residency. A certificate will be awarded by Washington University School of Medicine and the affiliated residency organization upon completion of the residency.

Administrative Residency

The 12-month optional postgraduate administrative residency will be served in a hospital, health agency, or health organization which 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 Washington University. The purpose of the residency 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 residency is strongly recommended, as this postgraduate clinical exposure is deemed necessary for adequate professional career preparation. The residency is completed under the direction of a well-qualified and experienced hospital administrator who is given an annual adjunct faculty appointment at Washington University School of Medicine.
The full-time faculty maintains close liaison with the administrative resident and the preceptor. An educational plan which outlines the resident’s activities for the coming year must be filed by the preceptor. The preceptor also sends two evaluation reports to the Director of HAP and shares the responsibility for recommending awarding of the certificate by Washington University School of Medicine and the residency site organization.

Within available resources an on-campus faculty member visits the residency site to meet with the preceptor and resident. HAP also sponsors an annual preceptors conference at Washington University. Interaction of these site and campus visits enables joint review of the resident’s progress, as well as evaluation and refinement of the administrative residency experience.

Admission Requirements
Washington University’s Health Administration and Planning Program is committed to nondiscriminatory practices in selection of applicants regarding race, sex, age, religion, or national origin. The faculty and staff are affirmatively committed to recruiting, enrolling, and educating students from minority groups who have the potential for graduate study.

A minimum of a bachelor’s degree from an accredited university or college acceptable to Washington University School of Medicine is required, as is completion of the Graduate Record Examination (Aptitude Test) or the Graduate Management Aptitude Test. No specific undergraduate major field of study is required for admission into the program; however, introductory courses in accounting, economics, statistics (or their equivalents), and mathematics through college algebra are very strongly recommended.

Tuition per semester .................................. $ 3,950
Books and supplies (per semester) ............... 366
Application fee (nonrefundable) .................. 25

“B” Electives
Health Administration
As a specialty, health administration (HA) looks at medical care from an institutional and organizational perspective. Rational health administration requires expert knowledge in many areas including: law, finance, planning, and organizational behavior.

The goals of this six-week elective are:
1. An overview of the specialty of health administration.
2. First-hand contact with selected local institutions and their administrators.
3. Investigation of particular subjects of interest.

The purpose of the elective is not to make administrators out of physicians. Rather it is anticipated at the end of the six weeks that the student will be able to communicate with those persons who see medicine from an organizational viewpoint. (Dr. James Hepner)
Health Administration and Planning

**Professor and Director**


**Associate Professor Emeritus and Deputy Director**

Donald J. Horsh, B.S.B.A., University of Nebraska, 1941; M.H.A., Washington University, 1951; J.D., St. Louis University, 1953.

**Associate Professor and Associate Director**


**Professor**


**Associate Professors (Adjunct)**

Ted Bowen, B.S., Austin College, 1941; M.H.A., Washington University, 1951.


David H. Hitt, B.S., University of South Dakota, 1950; M.Sc., 1950; M.H.A., University of Minnesota, 1952.


**Assistant Professors**


Robert J. Hickok, B.S., Washington University, 1953; M.H.A., 1971. (See Administration and Program in Physical Therapy.)

Marc D. Smith, B.S., University of Missouri, 1971; M.Div., Concordia (Seminary), 1975; Ph.D., St. Louis University, 1979.

Robert S. Woodward (Health Care Research), B.A., Haverford College, 1965; Ph.D., Washington University, 1972. (See Department of Preventive Medicine and Public Health.)

**Assistant Professors (Adjunct)**

Donald W. Cordes, A.B., Hope College, 1940; M.A., University of Michigan, 1941.


Frank S. Groner, A.B., Baylor University, 1934; LL.D., East Texas Baptist College, 1946.


Boone Powell, Sr., LL.D., Baylor University, 1958.

Sister Mary R. Rocklage, B.S., St. Xavier College, 1961; M.H.A., St. Louis University, 1963.

Robert F. Seates, B.A., Baylor University, 1939.


**Instructors (Adjunct)**

Barry T. Bedenkop, Sr., B.S., Purdue University, 1954; M.B.A., University of Chicago, 1961; J.D., University of Toledo, 1972.


Arthurline Clinegman, B.S., University of Houston, 1957; M.H.A., Washington University, 1959.


A.B. Davis, Jr., B.A., University of Kansas, 1930.

Paul F. Detrick, B.A., Kansas State Teachers College, 1949; M.B.A., Northwestern University, 1951.


Earl J. Frederick, B.B.E., Ohio State University, 1951; M.S., 1951.

Donald S. Good, B.S., Ohio State University, 1958; M.H.A., Medical College of Virginia, 1964.


Henry E. Manning, B.S., Long Island University, 1960; M.S., Columbia University, 1962.
Larry D. Matheny, A., Florissant Valley Community College, 1966; B.S., University of Missouri, 1969; M.H.A., St. Louis University, 1972.
Elwood P. Opstad, B.S., State University of Iowa, 1947; M.H.A., Washington University, 1949.


Paul F. Umbeck, B.A., Elmhurst College, 1941; D.D., Chicago Theological Seminary University of Chicago, 1945.


Paul R. Wozniak, B.A., St. Louis University, 1950; M.H.A., 1955.


Colonel Richard C. Yoemans, B.G.E., University of Nebraska, 1961; M.P.H., Yale University, 1967.

Lecturers

Merlin E. Lickhalter, B.A., Massachusetts Institute of Technology, 1957.


James C. Crews, B.S., Wisconsin State University, 1959; M.H.A., University of Iowa, 1964.


Colonel Harold W. Greinstaff, B.S., Kansas State University, 1961.


Colonel Lawrence R. Smith, A.B., Cornell University, 1951; M.D., New York Medical College, 1957.


PROGRAM IN PHYSICAL THERAPY

The program of instruction leading to the Bachelor of Science degree in physical therapy is an intensive two-year curriculum offered at the School of Medicine. Applicants for admission must have completed 60 hours at an accredited college or university. Requirements are specific courses in English, psychology, biology, physics, chemistry, mathematics, and social sciences.

Kinesiology and pathokinesiology form the core of the curriculum. Kinesiology/pathokinesiology is the integrative study and application of physical, biological, and applied science principles to normal and abnormal human movement. The basic and clinical sciences of kinesiology and pathokinesiology provide the foundation upon which the physical therapist can develop and apply scientific principles to patient care. The goal of the curriculum is to produce practitioners who can competently utilize the scientific approach to assess, remediate, and prevent pathokinesiological disorders.

The program provides an environment in which students, faculty, and physical therapy practitioners are guided in the acquisition of the requisite body of knowledge for the current and future practice of physical therapy. The program strives to bring scholarly knowledge to bear on the problems of the profession through research activities of the faculty. By providing an environment which permits expression of the individual's imagination and creativity, the program encourages the professional growth of its constituents.

Tuition per semester: $3,750
Tuition for internship (estimate): 100

Further information may be secured by direct correspondence with the Program in Physical Therapy, Campus Box 8083, 660 South Euclid Avenue, St. Louis, Missouri 63110.

Associate Professor Emeritus

Assistant Professor Emeritus

Associate Professor and Director
Steven J. Rose, B.S., Ithaca College, 1962; Ph.D., Albert Einstein College of Medicine, 1977.

Visiting Associate Professor

Assistant Professors
Robert J. Hickok, B.S., Washington University, 1953; M.H.A., 1971. (See Administration and Health Administration and Planning Program.)
Shirley A. Sahrmann, B.S., Washington University, 1958; M.A., 1971; Ph.D., 1973. (See Departments of Neurology and Neurological Surgery and Physiology and Biophysics.)

Adjunct Associate Professor
Kenneth Keefer, Ph.D., University of North Dakota, 1971.

Instructors
Gail W. Baudendistel, B.S., St. Louis University, 1974; M.S., 1977.
Robert H. Deusinger, B.S., Slippery Rock State College, 1967; M.S., University of Massachusetts, 1968; Ph.D., The University of Iowa, 1981.

Sandra K. Lewis, B.S., Ohio State, 1975; M.S., 1980; Ph.D., 1983.

Lecturers
Kathleen M. Haralson, B.S., State University of Kansas, 1965.
Susan D. Hatfield, B.S., University of Kentucky, 1974.
Linda Van Dillen, B.S., University of Missouri-Columbia, 1979.

Research Assistants
Peter Miller, B.S., New York University, 1980; M.S., Washington University, 1983.

Instructors (Clinical)
Ms. Elaine Angelo
Mr. Steve Allen
Ms. Michelle Audet
Ms. Susan B. Barr
Ms. Barbara A. Baum
Mr. John Bishop
Capt. Mary Bong
Ms. Molly S. Browning
Mr. Joseph Burger
Ms. Karen S. Burns
Mr. Lawrence F. Chojecki
Ms. Debby M. Davenport
Ms. Gwyn DeCremer
Mr. Steven A. Dietz
Mr. William Diers
Ms. Camilla J. Dude
Ms. Patricia M. Ellis
Ms. Frances Erlacker
Ms. Beth Ethofer
Ms. Sharon Foster
Ms. Mary Kay Fritz
Mr. Mark Gayer
Mr. Ira Gorman
Ms. Linda Grambow
Ms. Betty Helfrich
Ms. Judith A. Hembree
Ms. Helen Marie Holzum
Ms. Bonnie Johnson
Ms. JoAnn Jones
Ms. Ellen L. Jost
Ms. Carol A. Knudson
Dr. Gerald C. Kraft
Ms. Sandra A. Lake
Mr. Nick Laubenthal

Ms. Mary B. Liedloff
Ms. Janet Linsten
Ms. June Macchiaverna
Mr. Daniel Madden
Ms. Sandra Martin
Ms. Juanita S. Mayer
Ms. Sharon L. MeNeell
Dr. Charles E. Meacci
Mr. Kyle P. Meyer
Ms. Harriette A. Mueller
Ms. JoAnn Niccum
Ms. Mary M. Niemeyer
Ms. Colleen O'Berry
Ms. Kathleen M. Keller Passinissi
Ms. Christine Ploski
Ms. Janet Rabbit
Ms. Alicia Kay Robinson
Ms. Mary Beth Rollins
Mr. Richard J. Rother, Jr.
Ms. Erica Rouvalis
Ms. Phyllis Rowland
Ms. Mary L. Rudd
Ms. Suzanne B. Rutledge
Ms. Cynthia K. Rysgaard
Ms. Babette Sanders
Ms. Catherine Schmidt
Ms. Lisa Schrutz
Ms. Ann Short
Ms. Debby Short
Mr. Dean Soder
Ms. Barbara A. Tschoepe
Ms. Sally Wasserman
Ms. Barbara L. Woodall
Ms. Maureen P. Wulf
Ms. Katherine A. Yochum
PROGRAM IN OCCUPATIONAL THERAPY

The Program in Occupational Therapy prepares students to practice occupational therapy, which is a clinical profession—that is, an applied science. The occupational therapist's role is the assessment, training, and facilitation of an individual in skills that will allow the individual to carry out daily activities that are of value to him. These skills would be in the areas of self-care, vocation, and avocations, and they frequently involve skills with relationships with people. The occupational therapist is skilled in assessment and remediation techniques for impairments caused by physical or mental dysfunction. Occupational therapy utilizes activities to increase functional performance. Adaptive equipment is prescribed and sometimes fabricated by the occupational therapist.

Undergraduate Program

The curriculum consists of the junior and senior years of a four-year baccalaureate degree program. Applicants for transfer must present a minimum of 60 semester hours (including required prerequisites) from an accredited college or university. Students wishing to enroll at Washington University may enter the program as freshmen.

Upon completion of four academic semesters at the School of Medicine, the degree of bachelor of science in occupational therapy is conferred. Six months of supervised clinical internship is required following graduation. Tuition, per semester $3,750 Fee, Clinical Internship 700

For further information, contact the Office of Admissions, Washington University, Lindell and Skinker boulevards, St. Louis, Missouri 63130. Phone: (314) 889-6000.

Associate Professor Emeritus
Martha E. Matthew, A.B., Winthrop College, 1933; Cert. in O.T., College of William and Mary, 1947.

Assistant Professor Emeritus
Elizabeth H. Withers, B.S., Memphis State University, 1957; M.A., 1959; Cert. in O.T., Philadelphia School of O.T., 1941.

Assistant Professor and Elias Michael Director

Assistant Professor and Associate Director
Ellen T. Tyson, B.S., Syracuse University, 1949; M.A., 1950; Cert. in O.T., University of Pennsylvania, 1952.

Associate Professor

Assistant Professors

Ruthan B. Kaufmeier, A.B., University of California, 1950; Cert. in O.T., U.S. Army School of Occupational Therapy, 1954; M.A., San Francisco State University, 1958; Ph.D., Stanford University, 1968.

Elsie S. Roush, B.S., Madison College, 1943; M.S., University of Wisconsin, 1947; Ph.D., Washington University, 1950. (See Anatomy and Neurobiology.)

Garth D. Tubbs, B.S., Wisconsin State College, 1953; Cert. in O.T., Washington University 1955.

Instructors


Carol W. Niman, B.S.O.T., University of Iowa, 1968; M.S., Spl.Ed., University of Texas at Dallas, 1977.


Instructors (Clinical)
Norma Bates
Carolyn Baum
Robbie Black
Diana Brower
Ing-Ing Chou
Jeff Cowdry
Loray Dailley
Christine Dieckmann
PEDIATRIC NURSE PRACTITIONER PROGRAM

The School of Medicine, through the Department of Pediatrics, offers a program for preparing pediatric nurse practitioners in collaboration with the Department of Nursing of Maryville College. In addition to providing certification, the program provides the opportunity to obtain academic credit through Maryville College toward a baccalaureate degree in nursing.

The program was developed to help meet the challenge of needed health services in the pediatric community by preparing registered nurses to deliver primary pediatric health care.

The pediatric nurse practitioner (PNP) is a registered nurse whose special training enables her to play a larger role in pediatric health care. She obtains histories, performs physical examinations, and appraises physical, psychological, and intellectual growth and development. The pediatric nurse practitioner is competent to counsel families in matters concerning nutrition, accident prevention, and child-rearing. With the physician, she participates in the management of acute and chronic illnesses.

The program curriculum covers a nine-month period divided into a 16-week didactic portion followed by a 17-week practicum. The practicum may be obtained through the facilities of the program or by special arrangement at the site of future employment for those nurses who are sponsored by an employer or agency guaranteeing an appropriate position upon the completion of the program.

Supervised clinical practice is scheduled in a variety of settings, including public health clinics, neighborhood health centers, and private pediatricians' offices. Instruction is shared by medical and nursing faculties of Washington University and Maryville College.

Applicants must be registered nurses with at least one year of nursing experience, preferably in pediatric nursing or public health nursing. On completion of the program, the PNP is qualified to serve wherever pediatric services are needed. The program has been accredited by the American Nurses Association and complies with the guidelines for such programs as proposed by the American Academy of Pediatrics and the American Nurses Association.

Program tuition (estimate) $3,050
PROGRAMS IN RADIOLOGIC TECHNOLOGY

The Department of Radiology, which has its headquarters in the Edward Mallinckrodt Institute of Radiology, offers a basic course in X-ray technology and two one-year postgraduate courses. Each course leads to a certificate awarded by the Washington University School of Medicine, Department of Radiology.

X-ray Technology

This two-year program is approved by the American Society of Radiologic Technologists, the American College of Radiology, the Joint Review Committee on Education in Radiologic Technology, the Council on Medical Education of the American Medical Association, and the Veterans Administration. It includes the following courses: radiation protection, professional ethics, anatomy and physiology, nursing procedures, radiation physics, medical terminology, survey of medical and surgical diseases, radiographic positioning, darkroom processing procedures, radiation therapy, radiation biology, nuclear medicine, special procedure radiography, room design and selection of equipment, and introduction to business administration and personnel management. Course work totals approximately 806 hours.

During the first six months, a student is on probation. Upon satisfactory completion of this work, he will be paid a monthly stipend of $75 for the next six months. This stipend increases to $100 for the third six months and $125 for the last six months. During the 24 months, the student is assigned tours of duty in various diagnostic and therapeutic areas for practical experience, amounting to a total of 30 contact hours a week.

Candidates for admission must be graduates of an accredited secondary school and should rank in the upper third of their class. Special consideration is given to graduates of schools of nursing that are recognized by the State Board of Nurse Examiners and to students who have passed a college entrance examination. A one-year postgraduate course is offered in the fields of therapy and nuclear medicine.

Nuclear Medicine Technology

This course covers 12 consecutive months, divided between didactic course material (225 hours) and practical experience. Persons admitted into the nuclear medicine technology program shall have completed high school, or its equivalent, and have completed post-secondary courses in the following areas: anatomy and physiology, basic physics, basic mathematics, medical terminology, oral and written communications, general chemistry, psychology and sociology, medical ethics, and jurisprudence.

Qualified medical technologists [MT (ASCP) or eligible], radiographers [RT (R) (ARRT) or eligible], and registered nurses [RN] are presumed to have the necessary credentials to meet the entrance requirements.

Graduate Course in Radiation Therapy Technology

The Division of Radiation Oncology offers a 12-month postgraduate course in radiation therapy technology. This course consists of 260 hours of didactic material plus extensive practical experience and training in the clinical application and dosimetry procedures of radiation therapy. Approximately 1,400 new patients are treated each year. The equipment includes a 35 MV linear accelerator, a Clinac 20 linear accelerator, a 4 MV linear accelerator, a cobalt unit, a superficial ortho-voltage machine, and two simulators. Students obtain experience on each of the therapy machines as well as in the dosimetry and treatment planning area and in nursing procedures. Two on-site computers are used for dosimetry and treatment planning computations. The students rotate through the physics and treatment planning service in addition to attending practical demonstrations.

Radiologic Technology Lecturer and Educational Director

Armand Diaz, R.N., R.T., Havana
University School of Medicine, 1948.
(See Department of Radiology.)
## Administration

### The Board of Trustees

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<td>Spencer T. Olin</td>
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<td>Margaret Bush Wilson</td>
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<td>Raymond H. Witcoff</td>
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### Officers of the University Administration

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<td>William H. Danforth</td>
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<td>John H. Biggs</td>
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<td>James W. Davis</td>
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<td>Samuel B. Gaze</td>
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<td>Herbert F. Hitzeman, Jr.</td>
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<td>Ralph E. Morrow</td>
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<td>Harriet K. Switzer</td>
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<td>Virginia V. Weldon</td>
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<td>Jerry V. Woodham</td>
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- **Chancellor**
- **Vice Chancellor for Administration and Finance**
- **Vice Chancellor for Alumni and Development Programs**
- **Vice Chancellor for Medical Affairs**
- **Senior Vice Chancellor for University Relations**
- **Dean of the Faculty of Arts and Sciences**
- **General Counsel**
- **Secretary to the Board of Trustees**
- **Deputy Vice Chancellor for Medical Affairs**
- **Treasurer**
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William H. Danforth, A.B., M.D.
Chancellor
Merle Kling, Ph.D.
Provost
Samuel B. Guze, M.D.
Vice Chancellor for Medical Affairs
M. Kenton King, B.A., M.D.
Dean
Virginia V. Weldon, A.B., M.D.
Deputy Vice Chancellor for Medical Affairs
Lee F. Feiter, B.A., M. Ed.
Assistant Vice Chancellor for Medical Affairs for Finance and Planning, and Chief Financial Officer of the School of Medicine
Robert J. Hickok, B.S., M.H.A.
Assistant Vice Chancellor for Medical Affairs
Peter G. Tuteur, A.B., M.D.
Assistant Vice Chancellor for Medical Affairs
John C. Herweg, B.S., M.D.
Associate Dean

Elmer B. Brown, Jr., A.B., M.D.
Associate Dean for Continuing Medical Education and Post-Graduate Education
Mabel L. Purkerson, A.B., M.D.
Associate Dean for Curriculum
Robert Lee, M.Ed., Ph.D.
Assistant Dean for Minority Student Affairs
John L. Schultz, B.S., B.S.Ed., M.S., Ed.S., Ph.D.
Assistant Dean in Academic Administration, Registrar, and Secretary to the Executive Faculty
Morton E. Smith, B.S., M.D.
Assistant Dean
G. Michael Timpe, B.S., M.B.A.
Assistant Dean, and Assistant Vice Chancellor for Medical Affairs
John D. Vavra, B.A., M.D.
Assistant Dean
John F. Walters, B.A., M.A.
Assistant Dean for Student Affairs
John L. Midkiff, B.S.B.A.
Business Manager

Susan Y. Crawford, Ph.D.
Director of Library
School of Medicine
Mary L. Parker, B.S., M.S., M.D.
Director of University Health Services
Muriel L. Koch
Administrative Assistant to the Dean
Dorothy T. Rinderer
Senior Administrative Assistant to the Vice Chancellor
Jean Stumbaugh
Ruth T. Schmitz
Assistant Registrars

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The Washington University Medical Center comprises six institutions: Barnard Free Skin and Cancer Hospital, Barnes Hospital, Central Institute for the Deaf, Jewish Hospital of St. Louis, St. Louis Children's Hospital, and the Washington University School of Medicine.

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The Faculty Council consists of all fulltime members of the faculty with the rank of professor, associate professor, assistant professor, and those instructors who have been on the faculty for at least three years. The officers and executive committee are:
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Committee on Academic Review and Promotions II
Selected faculty members
Committee on Academic Review and Promotions III
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William M. Landau
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1Parttime faculty representative to the Executive Faculty during 1982-83.
2Representing the Faculty Council during 1983-84.

*The dean is ex officio a member of all standing committees.*
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Alternate
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Alternate

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Harold Gamble
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Richard Marshall
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Mildred Trotter
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John C. Herweg
ex officio
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John L. Schultz
ex officio

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Co-Program Director
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Richard Bunge
Jonathan Cohen
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J. Russell Little, Jr.
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Robert Waterston
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ex officio
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John L. Schultz
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Robert McDivitt
David Silbert
John C. Herweg
ex officio
Mabel L. Purkerson
ex officio
John L. Schultz
ex officio
Register of Students

DOCTOR OF MEDICINE

Graduate
August 27, 1982

Fortune, Michael Arthur, A.B., Cornell University, '76—Southport, Connecticut; Oregon Health Sciences University; Portland, Oregon

Satchell, Cynthia Vale, B.S., University of California-Davis, '78—Carmel, California; St. Mary's Health Center; St. Louis, Missouri

Graduate
September 27, 1982

Brownridge, Seth Jonathan, A.B., Washington University, '78—Centreville, Illinois; St. Louis Children's Hospital; St. Louis, Missouri

Graduate
November 21, 1982

Hines, Christa Louise, B.S., Purdue University, '78—West Lafayette, Indiana; St. Louis University Medical Center; St. Louis, Missouri

Graduating Class
May 20, 1983

April, Brian Scott, B.A., Whittier College, '79—Morton Grove, Illinois; Oakland Naval Regional Medical Center; Oakland, California

Austin, Mark Bickford, B.S., University of Michigan at Ann Arbor, '78—St. Louis, Missouri; Univ. of Virginia Medical Center; Charlottesville, Virginia

Ballin, Daniel Spencer, B.S., Brown University, '78—Stamford, Connecticut; Michael Reese Hospital; Chicago, Illinois

Benedett, Robert Edwin, B.A., Augustana College, '79—St. Charles, Minnesota; St. John's Mercy Medical Center; St. Louis, Missouri

Blatt, Mitchell Evan, B. Mus. A., University of Michigan at Ann Arbor, '79—Camp Springs, Maryland; Michael Reese Hospital; Chicago, Illinois

Blum, Julia Elizabeth, B.S., University of Pittsburgh, '79—Curwensville, Pennsylvania; St. Luke's Hospital; St. Louis, Missouri

Blumenthal, David Evan, B.A., Brown University, '79—Fayetteville, New York; Jewish Hospital; St. Louis, Missouri

Brown, Robert John, B.S., Saint Peter's College, '77—Jersey City, New Jersey; St. John's Mercy Medical Center; St. Louis, Missouri

Carpenter, David Adams, B.A., Amherst College, '79—Canandaigua, New York; Michael Reese Hospital; Chicago, Illinois

Chelimsky, Thomas Charles, A.B., Harvard University, '79—Fairfax, Virginia; Mayo Graduate School of Medicine; Rochester, Minnesota

Chung, Mina Kay, B.A., University of California at San Diego, '79—Monterey Park, California; Jewish Hospital; St. Louis, Missouri

Clanahan, James John, B.S., University of Illinois at Urbana, '79—Herrin, Illinois; Jewish Hospital; St. Louis, Missouri

Cohen, Mark Allen, A.B., Washington University, '79—Chicago, Illinois; Barnes Hospital; St. Louis, Missouri

Collins, Gregory, B.A., University of California at Santa Barbara, '75—Bonita, California; Tulane University Affiliated Hospitals; New Orleans, Louisiana

Cortez, Jane Elizabeth, B.S., Michigan State University, '79—Grosse Pointe Woods, Michigan; Barnes Hospital; St. Louis, Missouri
Cox, Janie Mae, B.A., Olivet Nazarene College, ’79—Crawfordsville, Indiana. Children’s Hospital National Medical Center; Washington, D.C.
Crowe, Paul James, Carleton College—Minneapolis, Minnesota. SUNY-Upstate Medical Center; Syracuse, New York
Dungan, William Clairborne, B.S., University of Texas at Austin, ’79—Monahans, Texas. Barnes Hospital; St. Louis, Missouri.
Dykman, Douglas David, B.S., Johns Hopkins University, ’79, M.S., Johns Hopkins University, ’80—Livingston, New Jersey. Jewish Hospital; St. Louis, Missouri.
Egbert, Bryan George, George Washington University—West Deal, New Jersey. Baylor College of Medicine, Houston, Texas.
Emanuel, James Patrick, B.S., University of Iowa, ’79—Vermilion, South Dakota. Jewish Hospital; St. Louis, Missouri.
Epstein, David Marc, A.B., Columbia University, ’79—Wilmington, Delaware. Mount Sinai Hospital; New York, New York.
Etinger, Neil Allan, B.S., Vanderbilt University, ’79—Miami, Florida. Barnes Hospital; St. Louis, Missouri.
Ewing, Thomas Neil, B.A., Wesleyan University, ’78—Decatur, Illinois. Medical University of South Carolina; Charleston, South Carolina.
Farber, Sharon Nancy, A.B., University of California at Santa Cruz, ’74; B.A., California State College at Sonoma, ’78—San Francisco, California. St. Luke’s Hospital; St. Louis, Missouri.
Fay, Mark Terence, B.S., North Dakota State University, ’78—Grand Forks, North Dakota. Hemmepin County Medical Center, Minneapolis, Minnesota.
Fiedler, Brian S., B.S., University of Wisconsin at Madison, ’79—Mt. Hopeh, Wisconsin. University Hospitals; Madison, Wisconsin.
Fry, Edward T. A., A.B., Grinnell College, ’79—Oak Ridge, Tennessee. Barnes Hospital; St. Louis, Missouri.
Fulwiler, Carl Edward, B.A., Hofstra University, ’78—Mt. Laurel, New Jersey. Barnes Hospital; St. Louis, Missouri.
Groten, Dawn Marie, B.S., University of California at Davis, ’78—Campbell, California. Jewish Hospital; St. Louis, Missouri.
Ham, John Richard, B.A., Stevens Institute of Technology, ’71; Ph.D., State University of New York at Stony Brook, ’78—Bronx, New York. Barnes Hospital; St. Louis, Missouri.
Hansbrough, James Randall, B.S., Southeast Missouri State University, ’76, Ph.D., Vanderbilt University, ’80—Poplar Bluff, Missouri. Barnes Hospital; St. Louis, Missouri.
Hansen, Keith Allen, B.S., Carroll College, ’79—Wail, South Dakota. U.S. Naval Regional Medical Center; Portsmouth, Virginia.
Harsch, John Arthur, B.S., University of North Carolina at Chapel Hill, ’78—Atlanta, Georgia. Barnes Hospital; St. Louis, Missouri.
Haskell, Ethan Jay, B.S., Brown University, ’79—Huntington, New York. Jewish Hospital; St. Louis, Missouri.
Hills, John Foster, Jr., B.A., Macalester College, ’75; M.S., University of Colorado at Boulder, ’78—Littleton, Colorado. Good Samaritan Hospital; Portland Oregon.
Horsman, William Glynn, B.S., University of South Dakota at Vermillion, ’79—Parkston, South Dakota. U.S. Naval Regional Medical Center; San Diego, California.

Graduating Class
May 20, 1983
Horwitz, Kenneth Bruce, A.B., Dartmouth College, ’79—Bethesda, Maryland. Baystate Medical Center; Springfield, Massachusetts.
Hubbard, Thomas Joseph, B.S., University of Notre Dame, ’79—Decatur, Illinois. Jewish Hospital; St. Louis, Missouri.
Jacobs, Daryl Larkin, B.S., Washington University, ’77; M.S., Carnegie-Mellon University, ’79—Broadview Heights, Ohio. Jewish Hospital; St. Louis, Missouri.
Jenkins, Gregory Dean, A.A., College of the Cyns, ’72. B.S. University State of New York, ’79—Newhall, California. Veteran’s Administration Hospital; Sepulveda, California.
Johnson, Jerry Avila, A.B., University of Michigan at Ann Arbor, ’78—Encore, Michigan. Indiana University Medical Center; Indianapolis, Indiana.
Kellis, Dana Sterling, B.S., Brigham Young University, ’79—Glendale, Arizona. Good Samaritan Hospital; Phoenix, Arizona.
Kilzer, Helen Margaret, B.S. & B.A., Metropolitan State College, ’79—Richardson, North Dakota. Presbyterian Denver Hospital; Denver, Colorado.
King, Thomas Ray, B.A., Washington University, ’79—Winter, South Dakota. Jewish Hospital; St. Louis, Missouri.
Kramer, Robert Scott, A.B., Harvard University, ’79—Cres Coeur, Missouri. University of Minnesota Hospitals; Minneapolis, Minnesota.
Laftman, Robert Steven, B.A., Northwestern University, ’79—Wanamassa, New Jersey. Bronx Municipal Hospital Center; Bronx, New York.
Lambie, Paul Benson, B.S., University of Minnesota Hospitals; Minneapolis, Minnesota

Link, Robert Nathan, B.S., Butler University, '79—Dayton, Ohio. New York University Medical Center; New York, New York

Lipinski, Irene Elizabeth, B.S., University of Southern California at Los Angeles, '79—Monterey Park, California. McGaw Medical Center; Evanston, Illinois

Lips, Daniel Lee, B.A., University of Oxford, St. John's College, '80—Faribault, Minnesota. Barnes Hospital, St. Louis, Missouri

Luecke, Gail Anne, B.A., Kalamazoo College, '79—St. Louis, Missouri. Reading Hospital & Medical Center; Reading, Pennsylvania

Malter, James Samuel, A.B., Dartmouth College, '79—Boston, Massachusetts. Hospital of the University of Pennsylvania; Philadelphia, Pennsylvania

McCormick, Wayne C., A.B., University of Missouri at Columbia, '74—Webster Groves, Missouri. Michael Reese Hospital; Chicago, Illinois

Melamed, David Michael, B.A., Columbia University, '78—Chicago, Illinois. Case Western Reserve University Hospital; Cleveland, Ohio

Moitoza, David John, B.S., University of California at Davis, '79—Sacramento, California. San Joaquin General Hospital; Stockton, California

Monroe, Harry Keith, B.S., Creighton University, '79—University City, Missouri. State University of New York, Stony Brook, New York

Moore, Kenneth Earl, B.S., Georgetown University, '79—Washington, D.C. Albert Einstein Medical Center; Philadelphia, Pennsylvania

Morrow, Jason Drew, B.A., Vanderbilt University, '79—St. Louis, Missouri. Vanderbilt University Affiliated Hospitals; Nashville, Tennessee

Morton, Kenneth Laurence, B.S., Stanford University, '78—Kansas City, Missouri. University of Chicago Clinics; Chicago, Illinois

Munro, Douglas Alan, A.B., Washington University, '79—Grand Junction, Colorado. Tucson Hospitals; Tucson, Arizona

Nelson, Patricia Landon, A.B., Washington University, '79—Yreka, California. Jewish Hospital; St. Louis, Missouri

North, Carol Sue, B.S., University of Iowa at Iowa City, '76—Clinton, Iowa. Barnes Hospital; St. Louis, Missouri

Ohtani, Robb Kenji, A.B., Occidental College, '79—Honolulu, Hawaii. Ohio State University Hospitals; Columbus, Ohio

Parker, Christine Mershon, B.A., Carleton College, '79—Webster Groves, Missouri. Children's Hospital; Boston, Massachusetts

Parker, Katherine Anne, B.S., Stanford University, '79—Webster Groves, Missouri. University of Texas S.W. Affiliated Hospitals; Dallas, Texas

Pearson, Michele Leontyne, B.A., Emory University, '79—Jacksonville, Florida. Michael Reese Hospital; Chicago, Illinois

Pfeffer, David Michael, B.E.S., Johns Hopkins University, '79—Hewlett, New York. North Shore University Hospital; Manhasset, New York

Plotke, Gary Steven, B.S., Tulane University, '78—St. Paul, Minnesota. McGaw Medical Center; Evanston, Illinois

Prater, Thomas G., B.A., Southern Methodist University, '79—Springfield, Missouri. Jewish Hospital; St. Louis, Missouri

Puchalsky, David Ralph, B.S., University of Connecticut, '78—Boston, Massachusetts. Michael Reese Hospital; Chicago, Illinois

Ragins, Mark, B.S., California Institute of Technology, '79—Woodland Hills, California. Los Angeles Co-USC Medical Center; Los Angeles, California

Ravenscraft, Mark Douglas, A.B., Harvard University, '79—Fort Thomas, Kentucky. Jewish Hospital; St. Louis, Missouri

Roberts, Craig Stanley, B.S., George Fox College, '79—Central Point, Oregon. Inland Empire Hospital; Spokane, Washington

Scanlan, Brian Edward, B.S., University of Illinois at Urbana, '79—Hometown, Illinois. University of Chicago Clinics; Chicago, Illinois

Schuster, Erika Dale, A.B., Washington University, '75—Atlanta, Georgia. Jewish Hospital; St. Louis, Missouri

Schwartz, Benjamin, A.B., Dartmouth College, '79—Evanston, Illinois. Case Western Reserve University Hospital; Cleveland, Ohio
Seacord, Lynne M., A.B., Princeton University, 75—Scituate, Massachusetts. Barnes Hospital, St. Louis, Missouri
Selland, Mark Alan, B.S., University of North Dakota, 79—Minot, North Dakota. Virginia Mason Hospital; Seattle, Washington
Shannon, Vicki Rene, A.B., Smith College, ’79—St. Louis, Missouri. University of Texas Affiliated Hospitals; Houston, Texas
Shulman, Keith Lawrence, B.A., Carleton College, ’79—Highland Park, Illinois. McGaw Medical Center, NW University; Chicago, Illinois
Sibbens, David Phillips, B.A., College of Wooster, ’78—Baltimore, Maryland. North Carolina Memorial Hospital; Chapel Hill, North Carolina
Slader, Dirk Paul, B.A., University of California—San Diego, ’77—El Cajon, California. St. John’s Mercy Medical Center; St. Louis, Missouri
Smith III, John Clair, B.A., University of North Dakota, ’78—Minot, North Dakota. Presbyterian-St. Luke’s Hospital; St. Louis, Missouri
Smith, John, A.B., University of Wisconsin at Madison, ’79—Austin, Minnesota. St. Luke’s Hospital; St. Louis, Missouri
Spaite, Daniel Wayne, B.A., Point Loma College, ’79—Fresno, California. University of California/Los Angeles; Los Angeles, California
Stark, Mark Edward, B.A., Northwestern University, ’79—Fairview Heights, Illinois. Keeler, AFB; Biloxi, Mississippi
Steinhoff, Margaret Mary, B.A., Washington University, ’79—Miami, Florida. Barnes Hospital, St. Louis, Missouri
Stene, Erik Nelson, B.A., Augustana College, ’79—Crystal, Minnesota. St. Luke’s Hospital; St. Louis, Missouri
Strzemboz, Andre Steve, B.S., Purdue University, ’79—Hoopeston, Illinois. Indiana University Medical Center; Indianapolis, Indiana
Sullivan, Roger, B.S., North Dakota State University, ’78—Grand Forks, North Dakota. Waterbury Hospital; Waterbury, Connecticut
Swarn, Robert Alexander, B.A., Oberlin College, ’77—Ridgewood, New Jersey. Barnes Hospital, St. Louis, Missouri
Taylor, Megan Beth, B.S., University of North Carolina at Chapel Hill, ’78—Pittsburgh, Pennsylvania. St. Luke’s Hospital; St. Louis, Missouri
Vernon, Hazel Jane, B.A., Baylor University, ’79—Baton Rouge, Louisiana
Wilkerson, Donald Keith, A.B., Washington University, ’79—Memphis, Tennessee. Michael Reese Hospital; Chicago, Illinois
Wnek, David Kent, B.S., University of Wauwatosa, Wisconsin. Barnes Hospital, St. Louis, Missouri
Wolney, Dan E., B.S., Washington University, ’79—State Island, New York. University of Maryland Hospitals; Baltimore, Maryland
Wu, Andrew Christopher, B.A., Johns Hopkins University, ’79—Memphis, Tennessee. St. Luke’s Hospital; St. Louis, Missouri
Yi, Hokyun, B.A., Vanderbilt University, ’78—Nashville, Tennessee. University of Michigan Affiliated Hospitals; Ann Arbor, Michigan
Younkin, Casey Carrick, B.A., Johns Hopkins University, ’79—Springfield, Illinois. Barnes Hospital, St. Louis, Missouri

Third-Year Class
1982-83
Albert, Clark Jae, B.S., Morningside College, ’77, M.A., University of South Dakota. ’80—Hartley, Iowa
Allen, Steven Robert, B.S., Milligan College, ’80—Tampa, Florida
Appelbaum, John Kenneth, B.A., St. Louis University, ’80—St. Ann, Missouri
Bailey, Thomas Charles, A.B., William Jewell College, ’80—Liberty, Missouri
Barga, Bruce Edward, B.S., Washington State University, ’77; M.S., University of Wisconsin at Madison, ’80—St. Louis, Missouri
Bigler, Carl Frederick, B.A., Williams College, ’80—Garden City, Kansas
Boos, Richard John, A.B., Washington University, ’79—Clearwater, Florida
Bregg, Kenneth Joel, A.B., Washington University, ’79—Clifton, New Jersey
Brent, Dale J., B.S., Yale University, ’80—Los Angeles, California
Burgerman, Robert Stephen, B.S., Washington University, ’79—Bethesda, Maryland
Cadwalader, Ann Marie, B.S., North Dakota State University, ’78—Minot, North Dakota
Chien, Walter Waitak, A.B., Washington University, ’79—Kowloon, Hong Kong
Chun, Gary Paul, B.S., Stanford University, ’77; M.S., Harvard University, ’80—Sacramento, California
Cole, Jennifer Wray, A.B., Washington University, ’80—St. Louis, Missouri
Cole, Rhonda Audrey, B.A., Yale University, ’80—St. Louis, Missouri
Cooper, Mark Dale, University of Oklahoma at Norman—Pryor, Oklahoma
Cruvant, Ethan Milton, A.B., Harvard University, ’80—St. Louis, Missouri
DiFabrizio, Larry, A.B., Columbia University, '78—D.M.D., Harvard School of Dental Medicine, '81—Bronx, New York

Droge, Gerard Francis, B.S., St. John's University, '80—Washington, Missouri

Edelson, Michael Charles, A.B., Cornell University, '80—Silver Springs, Maryland

Edmunds, Laure B.A., Johns Hopkins University, '80—Orem, Utah


Ennen, Randy Mark, B.S., University of Iowa, '80—St. Louis, Missouri

Eveloff, Scott Eugene, A.B., Washington University, '80—Kansas City, Missouri

Francis, Joseph Jr., B.A., Johns Hopkins University, '80—New Castle, Delaware

Frank, Mark Steven, A.B., Transylvania University, '79—Somerset, Kentucky

Frank, Thomas Seymour, B.A., Northwestern University, '79—Clayton, Missouri

Friedman, Jon Robert, University of Pennsylvania—Wynnewood, Pennsylvania

Gallagher, Christopher J., B.S., University of Wisconsin at Madison, '80—LaCrosse, Wisconsin

Gray, Patricia Anne, B.S., University of California at Irvine, '79—Irvine, California

Greene, Laura Bari, A.B., Washington University, '80—A.B., '80—Ocoee, Arkansas

Hadesman, Robert Allen, B.S., Brown University, '79—Bloomfield Hills, Michigan

Herr, Robert Douglas, B.S., Yale University, '80—Kensington, Connecticut

Howey, Tommy Dean, B.S., South Dakota State University, '80—Elementary School, New York

Huang, Shirley Jane, B.S., Stanford University, '80—M.S., '80—Delmar, New York

Hvoslik, George Robert, A.B., University of Illinois at Urbana, '80—Beryn, Illinois

Jerabek-Willett, Michael William, B.S., Georgetown University, '70—St. Louis, Missouri

Jones, Robert W., B.S., Brigham Young University, '80—Orem, Utah

Joyce, Stephen Thomas, Massachusetts Institute of Technology—Rochester, Michigan

Kennedy, Thomas Campbell, A.B., Stanford University, '80—Yakima, Washington

Kent, Joseph H., B.S., University of Notre Dame, '80—Oak Lawn, Illinois

Kidney, Selwyn Anthony, B.S., State University of New York at Plattsburgh, '79—St. Augustine, Trinidad

Kirsch, William Arthur, B.A., Northwestern University, '80—Beech Grove, Indiana

Kluschman, David Jordan, B.S., Massachusetts Institute of Technology, '80—Newton, Massachusetts

Kogan, Melanie G., B.A., Johns Hopkins University, '77—St. Louis, Missouri

Kolodziej, Michael Alex, A.B., Washington University, '80—East Chicago, Indiana

Kuhar, Lisa Ann, B.A., Johns Hopkins University, '76, M.P.H., University of Pittsburgh, '78—Silver Spring, Maryland

Langston, Amelia Ann, B.A., Williams College, '79—Lake Placid, Florida

Larkin, Joan Marie, B.S., Stanford University, '78—Kenfield, California


Lawrence, Michael Kevin, B.S., Northwestern University, '80—Elgin, Illinois

Lazar, David Walter, A.B., Washington University, '76—Hewlett, New York

Lee, Robert Alan, B.S., University of Illinois at Urbana, '80—Prophetstown, Illinois

Lerman, Steven Elliot, B.A., Rutgers University, '80—Paramus, New Jersey

Leung, Cheung Kwok, B.S., University of Illinois at Urbana, '74—M.S.E., University of Michigan at Ann Arbor, '75—St. Louis, Missouri

Lindemann, Steven Roger, B.S., Washington University, '80—Cincinnati, Ohio

Linder, Barry John, B.S., Massachusetts Institute of Technology, '78—M.S., University of Connecticut, '80—Lenox, Massachusetts

Loeffer, Roberta Lynn, B.S., Emporia State University, '78—M.S., Purdue University, '80—Newton, Kansas

Loper, Keith Allen, B.A., University of California at Berkeley, '80—Rolling Hills, California

Lubarsky, David Allan, B.A., Washington University, '80—Scarsdale, New York

Maguire, Kathryn Larel, B.S., Washington University, '80—Manchester, Missouri

Mahony, Margaret Anne, B.S., University of Illinois at Urbana, '80—Toulon, Illinois

Martin, Julie Ann, B.S., University of Washington, '80—Tacoma, Washington

McAllister, John William II, B.S., University of Missouri at Columbia, '80—Joplin, Missouri

McCool, Robert Edward, B.A., Greenville College, '77—St. Louis, Missouri

Merine, Dimitri Serge, A.B., Columbia University, '80—Brooklyn, New York

Mitchell, Gary Frank, B.A., Vanderbilt University, '80—Kingsport, Tennessee

Moore, Charles Kevin, B.S., Indiana University at Bloomington, '80—Kokomo, Indiana

Morehouse, Jeffrey Dean, B.S., Stanford University, '80—Mesa, Arizona

Morrell, Louise Ellen, B.A., University of Michigan, '80—Park Ridge, Illinois

Natter, Lonny Ray, Brigham Young University—Sunnyside, Washington

Nil, Lenore Tomoye, B.S., University of California at Los Angeles, '80—Dinuba, California

Obel, Robert James, B.M.Sc., Emory University, '77—St. Louis, Missouri

Okun, Neil Jeffrey, A.B., Dartmouth College, '80—St. Louis, Missouri

Owens, John Robert, B.S., University of Notre Dame, '80—Glenside, Illinois

Pack, Michael Alan, B.A., Stanford University, '80—New York

Penn, William Francis, Jr., B.A., University of California at Los Angeles, '78—La Jolla, California

Perednia, Douglas Alan, B.A., Swarthmore College, '79—Roseville, California

Polf, Mary Olivia, B.S.E., Duke University, '80—St. Louis, Missouri

Powers, Timothy Bernard, A.B., Washington University, '78—St. Louis, Missouri

Reep, Karen Louise, B.A., Luther College, '79—Williston, North Dakota

Reichman, Alexandra Ilma, B.A., University of California at Berkeley, '80—San Francisco, California
<table>
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<tr>
<th>Name</th>
<th>Degree</th>
<th>Institution</th>
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<tr>
<td>Richter, James Robert</td>
<td>B.S.</td>
<td>University of Nebraska at Omaha</td>
<td>Omaha, Nebraska</td>
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<tr>
<td>Ritter, Edmond Frederick</td>
<td></td>
<td>University of Cincinnati</td>
<td>Cincinnati, Ohio</td>
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<td>Rockwell, William Bradford</td>
<td>A.B.</td>
<td>Harvard University</td>
<td>North Andover, Massachusetts</td>
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<tr>
<td>Rollins, Edward Sterling</td>
<td>B.A.</td>
<td>University of California at Davis</td>
<td>Woodland, California</td>
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<td>Rollins, Susan Davidson</td>
<td>B.S.</td>
<td>Davidson College</td>
<td>St. Louis, Missouri</td>
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<td>Rosenthal, John Gregory</td>
<td>B.S.</td>
<td>University of Notre Dame</td>
<td>St. Louis, Missouri</td>
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<td>Ross, Theodore</td>
<td>A.B.</td>
<td>Mississippi Valley State University</td>
<td>Tchula, Mississippi</td>
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<td>Ross, Willie Ray</td>
<td>B.A.</td>
<td>Yale University</td>
<td>St. Louis, Missouri</td>
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<td>Rowley, Howard Andrew</td>
<td>B.S.</td>
<td>University of Illinois at Urbana</td>
<td>Lockport, Illinois</td>
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<td>Ruben, James Bradford</td>
<td>B.A.</td>
<td>University of Colorado at Boulder</td>
<td>Rye, New York</td>
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<td>Saltzman, Andrew Kenneth</td>
<td>A.B.</td>
<td>Washington University</td>
<td>Flushing, New York</td>
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<td>Seannell, Lynne Marie</td>
<td>B.A.</td>
<td>University of California at Davis</td>
<td>San Rafael, California</td>
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<td>Schick, Karen Sue</td>
<td>B.S.</td>
<td>University of Kansas</td>
<td>Wichita, Kansas</td>
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<td>Schuster, Debra Kay</td>
<td>B.S.</td>
<td>University of South Dakota</td>
<td>Mitchell, South Dakota</td>
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<td>Schwartz, Daniel Richard</td>
<td>B.A.</td>
<td>Hamilton College</td>
<td>Scarsdale, New York</td>
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<td>Silla, Mehmet Kaya</td>
<td>B.A.</td>
<td>Swarthmore College</td>
<td>Towson, Maryland</td>
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<td>Slack, Stephen Francis</td>
<td>A.B.</td>
<td>Dartmouth College</td>
<td>Louisville, Kentucky</td>
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<td>Snover, Daniel Perry</td>
<td>A.B.</td>
<td>Washington University</td>
<td>Shawnee Mission, Kansas</td>
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<td>Suba, Eric John</td>
<td>A.B.</td>
<td>Princeton University</td>
<td>St. Louis, Missouri</td>
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<td>Surratt, Robert Stephen</td>
<td>B.A.</td>
<td>Vanderbilt University</td>
<td>Jackson, Mississippi</td>
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<td>Tartell, Paul Brendan</td>
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<td>Elmhurst, New York</td>
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<td>Thompson, James Anderson</td>
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<td>Timmerman, Gary Lee</td>
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<td>Watertown, South Dakota</td>
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<td>Tobler, Randall Wayne</td>
<td>B.A.</td>
<td>University of Missouri at St. Louis</td>
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<td>Travis, Mark Stephen</td>
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<td>Tung, Rebecca Lillian</td>
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<td>Radcliffe College</td>
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<td>Uraneck, Katherine Irene</td>
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<td>Cornell University</td>
<td>Bartsille, Oklahoma</td>
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<td>Vannier, Ann May</td>
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<td>Covington, Kentucky</td>
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<td>Van Rybroek, John Joseph</td>
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<td>Madison, Wisconsin</td>
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<td>Mt. Prospect, Illinois</td>
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<td>Vieroy, Theresa Gay</td>
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<td>Fort Worth, Texas</td>
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<td>St. Louis University</td>
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</tbody>
</table>
Domenchaux, Elisabeth Lucille, B.A., Northwestern University, '81—Topeka, Kansas

Durant, Lynette Lee, B.A., Tuskegee Institute, '81—Christiansted, Virgin Islands


Evans, Gregory, Herbert H. Lehman College of the City University of New York—New York, New York

Faber, Kathy Lynn, B.A., Calvin College, '81—Grand Rapids, Michigan

Ford, Neville Finch, B.S., University of Bristol, '55, Ph.D., University of Bristol, '58—Millington, New Jersey

Frost, Timothy William, B.A., Duke University, '81—Dunwoody, Georgia

Gaines, Sharon Elaine, B.A., Atlantic Union College, '81—Nashville, Tennessee

Gitelman, Darren Ross, B.A., Washington University, '81—Brooklyn, New York

Goldblum, Kenneth David, B.A., Washington University, '80—Broomall, Pennsylvania

Griffith, Patrick Keith, B.A., Northwestern University, '81—Chicago, Illinois

Grow, Pamela Keller, B.A., University of Nebraska, '81—St. Louis, Missouri

Hale, Kenneth Douglas, A.A., Glendale College, '74, B.A., California State University, Northridge, '80—La Crescenta, California

Helfer, Donald Lee, B.A., University of Illinois, '81—Morton, Illinois

Hershey, Jonathan Marc, B.A., Johns Hopkins University, '81—Glencoe, Illinois

Himelstein, Andrew Louis, B.A., Harvard University, '81—Garden City, New York

Hingsbergen, Elizabeth Ann, B.A., Northwestern University, '81—Delaware, Ohio

Hopson, David Kent, B.S., Southeast Missouri State University, '80—Chesterfield, Missouri

Huppenbauer, Bob, B.A., University of California-Berkeley, '80—Plymouth, Michigan

Huppert, Jill Suzanne, B.A., Johns Hopkins University, '81—Perry Hall, Maryland

Hutchison, Anne Victoria, B.A., Capital University, '81—Livonia, Michigan

Jankowski, Dorian Elaine, B.S., Massachusetts Institute of Technology, '80—Highland Springs, Virginia

Jarka, Robert Michael, B.S., University of Notre Dame, '81—Grand Rapids, Michigan

Johnson, Corbin Ross, B.A., Harvard University, '81—N. Miami Beach, Florida

Jones, Dennie Vance, B.S., Washington University, '81—Chicago, Illinois

Jones, Sheila Bertha, B.S., Yale University, '80—Philadelphia, Pennsylvania

King, Karl Wei-Han, B.A., Washington University, '80—Omaha, Nebraska

Klein, Marisa Sue, B.A., Stanford University, '80—Aptos, California

Klein, Mitchell Alan, B.A., Washington University, '81—Pembroke Pines, Florida

Koch, Gregory Edward, B.A., University of California-Irvine, '77, B.S., University of California-Irvine, '81—Irvine, California


Larson, Leann Janet, B.A., St. Olaf College, '80—Madison, Wisconsin

Lenzi, Victor Daniel, B.S., University of Illinois, '81—Farmington, Illinois

Levisohn, Dianne Rae, B.A., Washington University, '76, P.A. Certificate, Yale University, '78—Lakewood, Colorado

Litwin, Sheldon Ellis, B.S., Colorado College, '81—Topeka, Kansas

Locke, Susan Marie, B.A., Washington University, '81—University City, Missouri

Lund, Jr. Herluf Gyde, B.A., Tufts University, '78—Frontenac, Missouri

Macbin, Steven Robert, B.A., Washington University, '81—Livingston, New Jersey

Manber, Yvonne Marie, B.S., B.A., University of Illinois, '81—Canton, Illinois

Mathews, Karen Michelle, B.S., Bowling Green State University, '81—Dayton, Ohio

Melnik, Christine Marie, B.S., University of Illinois, '81—Dixon, Illinois

Mensah, George Akowua, B.A., Harvard University, '80—Kokofu, Ashanti, Ghana

Mittel, Robert Louis, B.S., M.S., Yale University, '81—Convent Station, New Jersey

Muchmore, Heather Edwina, B.S., University of Illinois, '81—Carbondale, Illinois

Nativ, Aurelia, B.S., University of California—Los Angeles, '81—W. Los Angeles, California

Noordy, Douglas Louis, B.S., St. Lawrence University, '81—Dewitt, New York

Nordlund, John Richard, B.S., Rensselaer Poly Institute, '75—St. Louis, Missouri

Nowotny, Thomas John, B.S., Washington University, '80—St. Louis, Missouri

O’Neill, Conor William, B.A., College of St. Thomas, '81—St. Paul, Minnesota

Organ, Gregory Michael, B.S., Stanford University, '80—Omaha, Nebraska

Pearlstone, Anthony Craig, B.S., Washington University, '81—Creve Coeur, Missouri

Pennington, Mary Jane, B.S., Duke University, '81—Birmingham, Alabama

Pohl, David Lee, B.A., Miami University, '76—Osgood, Ohio

Randle, Gregory Clayton, B.A., Washington University, '81—St. Louis, Missouri

Resta, Regina Marie, B.A., Washington University, '80—St. Louis, Missouri

Robinson, Gordon Howard, B.A., St. Louis University, '80—St. Louis, Missouri

Rook, Joshua Alan, B.A., Washington University, '81—Downey, California

Roth, Judith Ann, B.S., Indiana University, '76—St. Louis, Missouri

Runik, Gregory, B.S., Stanford University, '81—Fresno, California

Sand, Craig Martin, B.S., Stanford University, '81—Reno, Nevada

Scales, Steven Michael, A.A., Modesto Junior College, '75, B.S., University of California, '78—Modesto, California

Schechter, Larry David, B.A., Northwestern University, '81—Lombard, Illinois

Scholz, Thomas Dean, B.S., Swarthmore College, '81—Clarendon Hills, Illinois

Seedack, Jeffrey David, B.A., Northwestern University, '81—Rochester, Minnesota
Shapiro, Michael Alan, B.A., Dartmouth College, '81—Watchung, New Jersey
Shields, Steven Miller, B.S., Washington University, '81—El Dorado, Kansas
Sivier, Robert Alan, B.A., Illinois Wesleyan University, '81—Mahomet, Illinois
Smart, Steven Craig, B.A., Harvard University, '81—Milwaukee, Wisconsin
Smith, Page Armand, B.A., University of California, '77—San Francisco, California
Steele, Dean Wesley, B.A., Washington University, '81—Anchorage, Alaska
Stern, Richard Curtis, B.A., Brandeis University, '81—Valley Stream, New York
Stevens, Jr. John Kirwin, B.S., Washington University, '81—St. Louis, Missouri
Strickland, Adrienne Patrice, B.A., Duke University, '81—Tampa, Florida
Sun, Francis Roma, B.S., Massachusetts Institute of Technology, '81—Hebron, Indiana
Swanson, Todd Victor, B.A., Augustana College, '81—Brooks, South Dakota
Szale, Leslie Steven, B.A., Dartmouth College, '81—Granite City, Illinois
Tannin, Grace Michele, B.A., Washington University, '81—Chappaqua, New York
Tenaglia, Alan Nicholas, B.S., University of Pennsylvania, '78—Philadelphia, Pennsylvania
Thullborn, Keith Raymond, B.S., University of Melbourne, '76—Victoria, Australia
Tobin Garry Stuart, B.S., University of Missouri-Rolla, '81—St. Louis, Missouri
Toliver, James Edward, Jr., B.A., Johns Hopkins University, '80—St. Louis, Missouri
Villanueva, Merceditas Santos, B.A., Harvard University, '81—New York, New York
Volck, Brian Edward, B.A., Washington University, '81—Cincinnati, Ohio
Watson, Blanche Evangeline, B.A., Washington University, '77—Los Angeles, California
Weiss, Peter John, B.A., Washington University, '81—St. Petersburg, Florida
Whiting, David Wade, B.S., Stanford University, '81—Stanford, California
Wilkerson, Dennis Michael, B.A., University of California, '81—Kensington, California
Winokur, Patricia Lee, B.A., Brown University, '81—Iowa City, Iowa
Wolford, Thomas Lee, B.A., St. Louis University, '76—Louisville, Kentucky
Wong, Ella Hoy, B.S., Caltech University, '78—Skokie, Illinois
Wren, Megan Elizabeth, B.A., Washington University, '81—Pennington, New Jersey
Yerman, Howard Mark, B.S., University of Michigan, '81—Oak Park, Michigan
Zuckerman, Jordan Spence, B.A., Washington University, '81—Bayside, New York

First-Year Class 1982-83
Allen, Carl Edward, B.A., Vanderbilt University, '82—Cleveland, Mississippi
Anderson, Cynthia Lu, B.S., St. Louis University, '81—St. Louis, Missouri
Anolik, Steven Lee, B.S., Pennsylvania State University, '82—Pittsburgh, Pennsylvania
Arquette, Matthew Arthur, B.A., Northwestern University, '82—Oregon, Ohio
Bartlett, Jeffrey Andrew, B.A., Wabash College, B.S., Washington University, '82—Creve Coeur, Missouri
Bartlett, Nancy Lee, B.S., Stanford University, '78, M.S., Massachusetts Institute of Technology, '79—Kansas City, Missouri
Becker, William Lessing, A.B., Earlham College, '82—St. Louis, Missouri
Belew, Mark Edward, B.A., University of Denver, '82—Kirkwood, Missouri
Bello, Steven Louis, B.A., Emory University, '82—Naples, Florida
Bennett, Robert Louis, Jr., A.A., Fresno City College, '77, B.S., University of California-Davis, '81—Fresno, California
Berg, Carl Lansing, B.A., Williams College, '82—Singapore
Bodine, Christopher Kenneth, B.A., Lafayette College, '82—Lexington Park, Maryland
Boggs, David Peter, B.A., University of Colorado-Boulder, '79—Boulder, Colorado
Braun, Waldo Parden, B.A., Brown University, '81—St. Louis, Missouri
Buck, Gregory William, B.S., Morehouse College, '81—Atlanta, Georgia
Buschmiller, Edward Otto, B.A., University of the South, '71; M.S.W., St. Louis University, '77—St. Louis, Missouri
Buse, Paul Edward, B.A., Washington University, '82—Charleston, South Carolina
Bushunow, Peter Walter, B.A., M.A., Washington University, '82—Whitewater, New York
Butzer, Michelle Rae, B.A., University of Oregon-Eugene, '82—Portland, Oregon
Callahan, David Joseph, B.S., University of Notre Dame, '82—Hixson, Tennessee
Carter, Donald Phillip, B.S., Stanford University, '82—Redley, California
Cave, Anita Margaret, B.S., Trinity University, '73; B.A., Washington University, '81—Princeton, Texas
Cher, Michael Louis, B.S., Stanford University, '82—Thousand Oaks, California
Chokshi, Hitesh Ramesh, B.A., Johns Hopkins University, '82—Reading, Pennsylvania
Christoph, Ian Howard, B.A., Dartmouth College, '81—Bloomington, Indiana
Chrysikopoulos, Charalabos Spyridon, B.A., Washington University—Confu, Greece
Chu, Tommy Wah, B.S., University of Illinois-Urbana, '82—Danville, Illinois
Clark, Michael Robert, B.A., University of Iowa, '82—Des Moines, Iowa
Cohn, Steven Mark, B.S., Duke University, '76; Ph.D., Washington University, '82—Annapolis, Maryland
Dadery, Aidi Basik, B.S., University of Illinois-Urbana, '82—Decatur, Illinois
Davis, Rebecca Fay, A.B., Washington University, '82—Prarie Village, Kansas
Dibble, Judith Ann, B.S., Southeast Missouri State University, '82—Pacific, Missouri
Diehl, Gregory John, B.S., Washington University, '82—Jericho, New York
Donnelly, James Warren, B.A., Northwestern University, '82—St. Louis, Missouri
Dye, Daniel Mark, B.S., Seattle Pacific University, '78; Ph.D., Northwestern University, '82—Bellevue, Washington
Evanoff, Bradley Alan, B.A., Cornell University, '82—Richland, Washington
Evans, Allen Maurice, B.S., Fisk University, '82—Crosby, Mississippi
Fleischmann, Kirsten Elisabeth, B.A., B.S., Case Western Reserve University, '82—Stow, Ohio
Forsyth, Christopher Burton, B.A., University of Missouri-St. Louis, '82—Clayton, Missouri
Frattini, John Ernest, B.S., St. Louis University, '82—St. Louis, Missouri
Gooden, Earl Anthony, B.A., Boston University, '81—Bronx, New York
Gornet, Michael Kenneth, B.A., Washington University, '82—Webster Groves, Missouri
Graveline, Robert Bryan, B.A., University of California-Berkeley, '82—Saratoga, California
Griffin, Anthony Charles, A.B., Brown University, '82—Kenosha, Wisconsin
Gross, Fredric Jay, B.A., Washington University, '82—Plantation, Florida
Hanlon, Kathleen Marie, B.A., Northwestern University, '78—Euclid, Ohio
Harkness, Laurel Jean, B.A., University of the South, '81—Madison, Wisconsin
Harper, Baron Dwayne, B.S., Tufts University, '82—Vauxhall, New Jersey
Hayashi, Robert James, B.S., Stanford University, '82—Maplewood, Missouri
Hechtman, Daniel Herz, A.B., Brown University, '82—Brookline, Massachusetts
Herman, Bruce Aaron, A.B., Stanford University, '82—Jefferson City, Missouri
Ho, Michael Dinghwa, B.A., Cornell University, '82—McLean, Virginia
Jarvis, Michael Richard, B.S., University of Minnesota-Minneapolis, St. Paul, '77; M.S., University of Illinois-Urbana, '80—Woodbury, Minnesota
Johnson, David Alan, B.S., College of William and Mary, '74; Ph.D., University of Connecticut, '79—West Cape May, New Jersey
Judd, Jeffrey Brian, B.A., Washington University, '82—St. Louis, Missouri
Julien, William Hyatt, B.S., Manchester College, '82—Holbrook, Arizona
Kanan, Renee Janelle, B.A., Washington University, '81—Joplin, Missouri
Karp, Sharon Lynn, B.S., Brown University, '82—Southborough, Massachusetts
Kirkpatrick, Donald Mark, B.S., University of Puget, '82—Longview, Washington
Knight, Daniel Willis, B.A., Wesleyan College, '82—St. Louis, Missouri
Koo, Michele Deelwa, B.S., Stanford University, '78; M.S., University of California-Los Angeles, '81—Palo Alto, California
Korenfeld, Michael Stanton, B.S., University of Arizona, '81—Sarasota, Florida
Kory, Mark Charles, B.S., Washington University, '82—Arnold, Missouri
Kovarik, Wenzel Daniel, B.S., Carroll College, '82—Rapid City, South Dakota
Kumar, Ajith Gangadharr, B.S., Ohio State University, '82—Chillicothe, Ohio
Lim, Yin Yia, B.A., Washington University, '80—San Francisco, California
Lown, Kenneth Samuel, B.S., University of Michigan-Arr Arbor, '82—Paducah, Kentucky
McBrien, John Raymond, B.A., Calvin College, '82—Buchanan, Michigan
MacDonald, Margaret Russell, B.A., Oregon State University, '79—Corvallis, Oregon
McClyde, Anthony Ray, B.S., University of Illinois-Urbana, '81—Hazel Crest, Illinois
McCracken, Margaret Ellen, B.A., University of California-San Diego, '82—Del Mar, California
McDivitt, Lyn Stuart, B.A., Washington University, '81—St. Louis, Missouri
McFeely, James Edward IV, B.A., University of California-Berkeley, '82—Fremont, California
Menikoff, Jerry Alan, A.B., Harvard University, '73; J.D.—MPP, '77—New York, New York
Miller, Nina Gwen, B.A., Stanford University, '81—Prairie Village, Kansas
Molleston, Jean Pappas, B.A., Washington University, '82—Merrillville, Indiana
Monafo, William Joseph, B.A., Dartmouth College, '82—St. Louis, Missouri
Morison, Curtis, B.S., Dayton University, '81—Batavia, Ohio
Pitts, Eric Wayne, B.A., Yale University, '81—Kansas City, Kansas
Porter, Forbes Dennison, B.A., Washington University, '82—Nashville, Ohio
Powell, John Clark, B.S., University of Kentucky, '82—Harrordsburg, Kentucky
Prenti, Michael Edward, B.A., St. Louis University, '78—St. Louis, Missouri
Rauk, Phillip Neil, B.A., St. Olaf College, '81—Rochester, Minnesota
Reinsel, Tom Edwin, B.S., University of Missouri-St. Louis, '81—St. Louis, Missouri
Rosenthal, Richard, B.S., Cornell University, '77; Ph.D., Washington University, '82—Plantation, Florida
Roter, Bradley Scott, Northwestern University—St. Louis, Missouri
Rourie, Andrew McCom, B.A., Duke University, '82—St. Louis, Missouri
Schiro, James Anthony, B.A., Johns Hopkins University, '82—South Farmingdale, New York
Scroggins, Troy Gene, Jr., B.S., University of Kansas, '82—Topeka, Kansas
Sims, Charles Derek, B.S., Wake Forest University, '82—Greensboro, North Carolina
Slawski, Daniel Paul, B.A., Washington University, '82—Florissant, Missouri
Smith, Brian David, B.A., Carleton College, '82—Hinsdale, Illinois
Stevens, Eric Eugene, B.A., Yale University, '80—Cumberland, Rhode Island
Strominger, Mitchell Brent, A.B., Washington University, '82—Albany, New York
Sullivan, Susan Leslie, A.B., Harvard University, '79—Northampton, Massachusetts
Tu, Shi-Ming, B.A., Johns Hopkins University, '82—Tripoli, Libya
Weisman, Paul Stuart, B.A., Cornell University, '82—Skokie, Illinois
West, Orval Clark, B.A., Drake University, '82—Des Moines, Iowa
Whelan, Alison Jean, B.A., Carleton College, '81—Wilmette, Illinois
Wiggins, Trina Rene, B.A., Stanford University, '82—Oakland, California
Wolverton, Robert Keith, B.S., Washington University, '82—Jackson, Mississippi
Wu, James Shihkong, A.B., Dartmouth College, '73; Ph.D., Yale University, '78—New Haven, Connecticut
Zier, Judith Lynn, B.S., University of Illinois-Urbana, '82—Kewanee, Illinois

Summary of Students in the School of Medicine, 1981-1982
Graduate—August 27, 1982 ........................................ 2
Graduate—September 27, 1982 ................................. 1
Graduate—November 21, 1982 ................................. 1
Graduating Class—May 20, 1983
Doctor of Medicine Degree .................................. 113
Doctor of Medicine and Doctor of Philosophy Degrees ........ 9
Doctor of Medicine Degree
Third-Year Class .................................................. 120
Second-Year Class ............................................... 101
First-Year Class ................................................. 108
M.A.—M.D. Program
Fourth-Year Trainees ......................................... 1
Third-Year Trainees .............................................. 2
Second-Year Trainee ............................................ 1
Medical Scientist Training Program
Doctor of Medicine and Doctor of Philosophy Degrees
Seventh-Year Trainees ........................................ 1
Sixth-Year Trainees ............................................. 7
Fifth-Year Trainees ............................................. 7
Fourth-Year Trainees ......................................... 11
Third-Year Trainees ........................................... 10
Second-Year Trainees ........................................ 16
First-Year Trainees ............................................ 15
Total ................................................................. 526
DOCTOR OF MEDICINE AND DOCTOR OF PHILOSOPHY DEGREES
Medical Scientist
Training Program
Graduates—May 20, 1983
Bloom, Michele Helen, B.S., Cornell
University. ‘76—Flushing, New York
Boothby, Mark Robin, B.S., University of
Wisconsin. ’76—St. Louis, Missouri
Hofmann, Sandra Lee, B.A., University of
Virginia. ’77—Monroeville, Pennsylvania
Horton, Glen Lee, B.S., Illinois State
University. ’76—Zion, Illinois
Natowicz, Marvin Roy, A.B.,
Washington University. ’76—Oak Park
Michigan
Reitman, Marc Lionel, B.S.,
Massachusetts Institute of Technology.
’77—Stanford, Connecticut
Rubin, Jeffrey Steven, A.B., Harvard
University. ’72; A.M., ’74—New York
City, New York
Schoob, James Edward, B.S.,
University of Iowa. ’75—Iowa
City, Iowa
Tait, Jonathan Francis, A.B., Harvard
University. ’77—Salisbury, Connecticut
Seventh-Year Trainees 1982-83
Barshop, Bruce Allen, A.B., Brandeis
University. ’76—Freehold, New Jersey
Sixth-Year Trainees 1982-83
Ginsberg, Ann Meredith, B.A.,
Radcliffe College. ’77—New York City,
New York
Kastan, Michael Barry, B.S., University of
North Carolina. ’77—Chapel Hill,
North Carolina
Kreisle, Regina Ann, B.A., Kalamazoo
College. ’77—South Bend, Indiana
Mellis, Scott Jeffrey, B.A., Johns
Hopkins University. ’77—Hempstead,
New York
Neil, Jeffrey Joseph, A.B., Washington
University. ’77—North Olmstead, Ohio
Rothenberg, Paul Louis, B.S., Cornell
University. ’77—Douglas, New York
Weinman, Steven Alan, B.A., Harvard
University. ’77—Elmont, New York
Fifth-Year Trainees 1982-83
Daily, Bill Bates, Jr., B.A.,
Northwestern University. ’78—Midland,
Michigan
Faustman, Denise Louise, B.S.,
University of Michigan. ’78—Dearborn
Heights, Michigan
Karp, David Ross, B.S., Massachusetts
Institute of Technology. ’78—
Northfield, Ohio
King, Thomas Charles, B.A.,
Washington University. ’78—Rancho
Palos Verdes, California
Klunk, William Edward, B.A.,
Shippensburg State College. ’78—
Hanover, Pennsylvania
McCluskey, Edward Robert, B.S.,
Stanford University. ’75—Palo Alto,
California
Milestone, Dave Stanley, B.A.,
University of California at Santa
Barbara. ’76—Mountain View,
California
Fourth-Year Trainees 1982-83
Darnell, Robert Bernard, A.B.,
Columbia University. ’79—Larchmont,
New York
Floeter, Mary Kay, B.S., University of
Illinois at Urbana. ’78—Crystal Lake,
Illinois
Goldberg, Daniel Elliot, A.B., Harvard
University. ’78—Brookline,
Massachusetts
Harding, Clifford Vincent, A.B.,
Harvard University. ’79—Detroit,
Michigan
Hollifield, William Claude, Jr., B.S.,
University of California at Berkeley. ’74;
M.A., ’78—Sacramento, California
Lentz, Steven Russell, B.S., Iowa State
University of Science and Technology.
’79—St. Paul, Minnesota
Ling, Richard Takkam, B.A., M.A.,
Johns Hopkins University. ’79—
Hong Kong
Martin, Paul Langlie, B.A., Harvard
University. ’79—New Britain,
Connecticut
Nelson, Raoul Devin, B.A., St. Olaf
College. ’79—Bloomington, Minnesota
Neufeld, Ellis Jacob, B.A., Wesleyan
University. ’79—Bethesda, Maryland
Sudin, Ted Bjorn, B.A., Johns Hopkins
University. ’78—Arlington, Virginia
Third-Year Trainees 1982-83
Arkin, Martin Samuel, B.S., University of
Michigan at Ann Arbor. ’80—Novi,
Michigan
Barr, Frederic Glenn, B.A., Williams
College. ’80—Baltimore, Maryland
 Borguski, Mark Stanley, B.A., Johns
Hopkins University. ’78—Clayton,
Missouri
Chau, Andrew Chee-Yuen, B.A., M.S.,
Northwestern University. ’80—Irvine,
California
Lang, Leslie Mark, A.B., Brandeis
University. ’79—North Bergen,
New Jersey
Lukacher, Aron Eliot, B.A., Brandeis
University. ’80—Rochester, New York
Mirski, Marek Alexander, B.S.,
Massachusetts Institute of Technology.
’80—Washington, D.C.
Simmons, Barbara Marie, B.A., Johns
Hopkins University. ’80—St. Louis,
Missouri
Sturren, Justin Bruce, A.B., Washington
University. ’80—San Diego, California
Wilson, David Brian, B.A., Kalamazoo
College. ’80—Winfield, Illinois
Second-Year Trainees 1982-83
Baum, Charles Michael, B.A., Colorado
University. ’80—Denver, Colorado
Behlke, Mark, B.S., Massachusetts
Institute of Technology. ’81—El Paso,
Texas
Chou, Hubert Shin-Han, B.S.,
University of California-Irvine. ’81—
Santa Ana, California
Corless, Christopher Lee, B.A.,
University of California-Berkeley. ’81—
Orinda, California
Faust, Phyllis Lynn, B.A., State
University. ’80—Barnard Center,
New York
Grant, Paula, B.S., Catholic University.
’81—Stratford, Connecticut
Green, Eric Douglas, B.S., University of
Wisconsin. ’81—Frontenac, Missouri
Henkel, Timothy John, B.S.,
Southwestern College. ’81—
Lawrenceburg, Tennessee
Hing, Andrew William, B.A., Duke
University. ’81—San Jose, California
Hane, Steven, B.S., Miami University.
’81—University Heights, Ohio
MacArthur, Craig Alan, B.A., University of
California-Berkeley. ’81—Berkeley,
California
Mink, Jonathan Walter, B.A., Wesleyan
University. ’80—St. Paul, Minnesota
Selleck, Scott Brian, B.A., University of
Washington. ’79—Seattle, Washington
Smith, Roderic Lee, B.A., Harvard
University. ’80—Port Isabel, Texas
Tanouche, Megumi, B.S., M.S., Yale
University. ’81—Bethesda, Maryland
Tripp, Catherine Susan, B.A., University of
New Hampshire. ’78—St. Louis,
Missouri
<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>University</th>
<th>City</th>
<th>State</th>
</tr>
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<tbody>
<tr>
<td>Apkon, Michael</td>
<td>B.S.</td>
<td>Northwestern University, 82—Framingham, Massachusetts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auchus, Richard Joseph</td>
<td>S.B.</td>
<td>Massachusetts Institute of Technology, 82—Totowa, New Jersey</td>
<td></td>
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</tr>
<tr>
<td>Axelrod, Jeffrey David</td>
<td>Sc.B.</td>
<td>Brown University, 81—Rochester, New York</td>
<td></td>
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<tr>
<td>Crowder, Charles Michael</td>
<td>B.A.</td>
<td>Hendrix College, 82—Cameron, Arkansas</td>
<td></td>
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<tr>
<td>Duncan, James Richard</td>
<td>B.S.</td>
<td>University of Michigan, 82—Ann Arbor, Michigan</td>
<td></td>
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<tr>
<td>Dieckgraefe, Brian Keith</td>
<td>B.A.</td>
<td>Kansas University, 82—St. Louis, Missouri</td>
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<tr>
<td>Kueck, Dennis Frank</td>
<td>B.S.</td>
<td>University of Wisconsin, 82—Madison, Wisconsin</td>
<td></td>
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<tr>
<td>Loflin, David John</td>
<td>B.A.</td>
<td>Pomona College, 81—Palo Alto, California</td>
<td></td>
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<tr>
<td>Masakowski, Victoria Rose</td>
<td>B.S.</td>
<td>Washington University, 82—Garrett Park, Maryland</td>
<td></td>
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<tr>
<td>Quade, Bradley Joseph</td>
<td>B.A.</td>
<td>MacAlster College, 82—New Hope, Minnesota</td>
<td></td>
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<tr>
<td>Scott, Leland James</td>
<td>B.S.</td>
<td>Stanford University, 82—Red Bluff, California</td>
<td></td>
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<tr>
<td>Silverman, Neil Jerome</td>
<td>B.S.</td>
<td>University of California-Los Angeles, 82—Los Angeles, California</td>
<td></td>
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<tr>
<td>Standaert, David George</td>
<td>B.A.</td>
<td>Harvard University, 82—Bethesda, Maryland</td>
<td></td>
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<tr>
<td>Sweetser, David Alan</td>
<td>B.S.</td>
<td>Stanford University, 82—Fairfield, California</td>
<td></td>
<td></td>
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<tr>
<td>Tong, Patrick Yat-Fu</td>
<td>B.S.</td>
<td>Massachusetts Institute of Technology, 82—Freemont, California</td>
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**First-Year Trainees 1982-83**

**HEALTH ADMINISTRATION & PLANNING**

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<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>University</th>
<th>State</th>
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<tbody>
<tr>
<td>Brotherton, Thomas</td>
<td>M.S.</td>
<td>University of Missouri, 69—B.A., Central Methodist College, 67—Fredericktown, Missouri</td>
<td></td>
</tr>
<tr>
<td>Faucett, Daniel G.</td>
<td>B.S.</td>
<td>Northeast Missouri State, 79—Arnold, Missouri</td>
<td></td>
</tr>
<tr>
<td>Green, Garry K.</td>
<td>B.S.</td>
<td>Louisiana Tech University, 80—Belleville, Illinois</td>
<td></td>
</tr>
<tr>
<td>Hooper, Ann, B.S.</td>
<td>University of Missouri-St. Louis, 81—St. Louis, Missouri</td>
<td></td>
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<tr>
<td>Jansson, Susanne E.</td>
<td>B.A.</td>
<td>SUNY University, 76—M.A., Holstra University, 79—Brentwood, New York</td>
<td></td>
</tr>
<tr>
<td>Jewell, Robert E, B.A.</td>
<td>Cardinal Glennon College, 71—East St. Louis, Illinois</td>
<td></td>
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<tr>
<td>Jones, M. Michael</td>
<td>A.B.</td>
<td>University of Missouri-St. Louis, 69—St. Louis, Missouri</td>
<td></td>
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<tr>
<td>Knowles, Rose V.</td>
<td>B.S.B.A., University of Missouri-St. Louis, 78—St. Louis, Missouri</td>
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<tr>
<td>Krauss, John Penn</td>
<td>B.S.</td>
<td>Occidental College, 81—St. Louis, Missouri</td>
<td></td>
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<tr>
<td>Luebbert, Christine B.S.</td>
<td>Indiana University, 80—St. Louis, Missouri</td>
<td></td>
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<tr>
<td>McGuire, John, B.S.</td>
<td>Christian Brothers College, 70—M.S., Memphis State University, 75—Memphis, Tennessee</td>
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<tr>
<td>Nations, David W.</td>
<td>B.A.</td>
<td>Webster College, 80—St. Louis, Missouri</td>
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<tr>
<td>Purnell, Patricia R.N.</td>
<td>St. Joseph's Hospital School of Nursing, 63—B.A., Webster College, 80—St. Louis, Missouri</td>
<td></td>
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<td>Sams, P. Steven</td>
<td>B.S.</td>
<td>Washington University, 79—Belleville, Illinois</td>
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<tr>
<td>Sching, Connie K.</td>
<td>B.S.</td>
<td>College of St. Mary, 74—Rising City, Nebraska</td>
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<tr>
<td>Sorensen, Martin M.B.A.</td>
<td>St. Louis University, 72—B.S., Auburn University, 57—Festus, Missouri</td>
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<tr>
<td>Stoll, Martha A.</td>
<td>M.S.S.W.</td>
<td>University of Louisville, 73—B.A., University of Kentucky, 70—St. Louis, Missouri</td>
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<tr>
<td>velat, Mark B.S.N.</td>
<td>Wayne State University, 71—St. Louis, Missouri</td>
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<tr>
<td>Zoller, Gregg G. B.S.</td>
<td>Marquette University, 77—M.S.P.A., University of Missouri-Columbia, 80—Milwaukee, Wisconsin</td>
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**First Year Class of 1982-83**

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>University</th>
<th>State</th>
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<tbody>
<tr>
<td>Alles, Martha J.</td>
<td>B.S.</td>
<td>Western Kentucky University, 82—Jasper, Indiana</td>
<td></td>
</tr>
<tr>
<td>Bazar, Thomas R.</td>
<td>B.A.</td>
<td>Hope College, 82—Waukesha, Wisconsin</td>
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<tr>
<td>Brown, Charles E.</td>
<td>B.S.</td>
<td>University of Evansville, 80—Evansville, Indiana</td>
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<tr>
<td>Call, Ronald K.</td>
<td>B.S.</td>
<td>Memphis State University, 79—Nashville, Tennessee</td>
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<tr>
<td>Crawford, Barbara A.</td>
<td>B.S.</td>
<td>University of Missouri-Columbia, 82—St. Louis, Missouri</td>
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<tr>
<td>Daws, John M.</td>
<td>B.S.</td>
<td>Wichita State University, 80—Adel, Iowa</td>
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<tr>
<td>DeFratus, Laura A.</td>
<td>B.A.</td>
<td>University of Chicago, 82—Skokie, Illinois</td>
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<tr>
<td>Denkers, David N.</td>
<td>B.A.</td>
<td>University of Utah, 82—Buena Park, California</td>
<td></td>
</tr>
<tr>
<td>Earls, Lynne M.</td>
<td>B.S.</td>
<td>Dillard University, 82—Memphis, Tennessee</td>
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<td>Earnshaw, Michael R.</td>
<td>M.A.</td>
<td>Webster College, 70—B.S., University of Albuquerque, 75—Scott AFB, Illinois</td>
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<td>Foster, Scott E.</td>
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<td>Reed College, 77—Portland, Oregon</td>
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<td>Francis, James R.</td>
<td>M.S.</td>
<td>Southern Illinois University, 82—B.A., Southern Illinois University, 80—Herrin, Illinois</td>
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<td>Hamamoto, Susan S.</td>
<td>B.A.</td>
<td>University of Washington, 81—Honolulu, Hawaii</td>
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<td>Hampton, Daniel W.</td>
<td>B.A.</td>
<td>University of San Francisco, 79—Casper, Wyoming</td>
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<td>Hargrave, Alfred E.</td>
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<td>Oregon State University, 79—Portland, Oregon</td>
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<td>Hensley, Dana S.</td>
<td>Ph.D.</td>
<td>Vanderbilt University, 82—B.A., Bellhaven College, 75—Jackson, Mississippi</td>
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<td>Hogan, Timothy J.</td>
<td>B.S.</td>
<td>St. Bonaventure University, 82—Rochester, New York</td>
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<td>Holm, Kari W.</td>
<td>A.B.</td>
<td>Vassar, 79—Hibbing, Minnesota</td>
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<td>Husband, Randall T.</td>
<td>B.A.</td>
<td>Wake Forest University, 82—Wilmington, Delaware</td>
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</table>
Second Year Class 1982-83

Anderson, Gary W., B.S., Brigham Young University, '81—Provo, Utah
Boles, Mark D., B.S., Ohio State University, '76—Cuyahoga Falls, Ohio
Brooks, Sue W., B.A., Michigan State University, '79—East Lansing, Michigan
Bruhn, Susan M., B.S.N., University of Wisconsin, '79—Madison, Wisconsin
Chidester, Garrick, B.S., New York University, '81—St. Louis, Missouri
Coffman, Cheryl S., B.S., University of Missouri, '79—St. Louis, Missouri
Collins, John W., B.S., St. Louis University, '78—St. Louis, Missouri
Crahane, Dorothy K., B.A., State University of New York, '79—Brooklyn, New York
DeYoung, Joy M., A.B., Stanford University, '81—San Francisco, California
Dude, Kenneth M., B.S., Eastern Illinois University, '81—Park Ridge, Illinois
Fritzshall, Alan J., B.S., Northern Illinois University, '79—Bloomington, Illinois
Gaass, David L., B.S., SUNY at Buffalo, '81—Buffalo, New York
Glow, Robert J., B.A., Creighton University, '79—Omaha, Nebraska
Goss, Bruce M., B.S., Northeast Missouri State University, '80—Maryville, Missouri
Harris, Margaret J., B.A., University of Iowa, '77—Cedar Rapids, Iowa
Hettinger, Charles K., B.A., DePauw University, '81—St. Louis, Missouri
Joseph, Nesakumar, Diploma in Personnel Management, Xavier Labour Relations Institute, India, '77—Vellore, India
Lee, Edward, B.A., College of Medicine, National Taiwan University, '80—Taipei, Taiwan
Leibhert, Margaret, B.S., University of Pittsburgh, '81—Cheswick, Pennsylvania
Lombardo, Pamela K., B.S.B.A., Washington University, '81—Basking Ridge, New Jersey
Mann, Ethan L., B.A., University of Missouri-Columbia, '79—M.A., Washington University, '78—St. Louis, Missouri
Meyer, Steven M., B.A., St. Louis University, '77—St. Louis, Missouri
Ostric, Elizabeth, A.B., Smith College, '79—New Bedford, Massachusetts
Paul, Rashed D., B.S., St. Xavier College, '79—Chicago, Illinois
Phegley, Timothy L., B.S., Massachusetts Institute of Technology, '72—M.S., Harvard School of Public Health, '76—St. Louis, Missouri
Phillips, David W., B.S., Murray State University, '79—Quincy, Illinois
Pool, Christopher, B.S., Florida State University, '72—M.B.A., Golden Gate University, '79—Fort Walton Beach, Florida
Reifsteck, Mark W., B.A., Cardinal Glennon College, '77—St. Louis, Missouri
Roth, Patricia L., B.A., Trinity University, '81—St. Louis, Missouri
Russell, Kimberly, B.S., Purdue University, '81—Rocky River, Ohio
Shattes, Wayne S., B.S., State University College of New York, '78—Huntington, New York
Teig, Carol D., A.B., Washington University, '70—Washington University, '71—St. Louis, Missouri
Yang, Juinhong, B.A., National Taiwan Institute of Technology, '79—M.A., Virginia Polytechnic Institute, '81—Changhua, Taiwan

Johnson, Russell W., B.S., University of Tulsa, '81—Merriam, Kansas
Kaufman, Melissa W., B.S., Delaware State College, '78—M.S., University of Maryland, '80—Dover, Delaware
Kaylor, Rick D., B.S., Middle Tennessee State University, '76—M.P.S., Western Kentucky University, '79—Nashville, Tennessee
Kulis, Debra R., B.A., Washington University, '82—Potomac, Maryland
Maguire, Kevin P., B.A., University of Colorado, '81—Canton, Illinois
Mahle-Jiminez, Marlene, B.A., Fordham University, '77—M.S., St. John's University, '80—St. Louis, Missouri
Mamer, William I., B.S., St. Louis College of Pharmacy, '75—M.P.S., Western College of Pharmacy, '77—St. Louis, Missouri
Marks, Janice E., B.A., University of Missouri-Columbia, '75; R.N., Barnes Hospital School of Nursing, '78—St. Louis, Missouri
Mertens, Mark A., B.S., Lincoln University, '74—Jefferson City, Missouri
Nolan, Nancy J., B.A., Washington University, '82—Cranston, Rhode Island
Owens, I.Tanya R., B.S., Maryville College, '74—Belleville, Illinois
Pinkstaff, Gary J., B.A., McKendree College, '74—Carbondale, Illinois
Rooney, Terence L., B.S., Jacksonville University, '81—Kensington, Maryland
Ross, Cameron B., B.A., Yale University, '79—Milan, Massachusetts
Shore, John E., B.S., George Washington University, '77—Libertyville, Illinois
Stam, Scott, B.S., Indiana University-Purdue, '82—Cambridge City, Indiana
Stream, Roger S., B.S.B.A., University of Missouri-St. Louis, '76—St. Louis, Missouri
Tapp, Timothy A., B.S.I.M., Purdue University, '82—Lynchburg, Virginia
Touchelette, Kathleen, B.S.E., Illinois State University, '78—Cahokia, Illinois
Wiles, Patrick J., B.S., Canisius College, '82—Grand Island, New York
Wozniak, Gregory T., B.S.B.A., John Carroll University, '82—Evergreen Park, Illinois

Leibhert, Margaret, B.S., University of Pittsburgh, '81—Cheswick, Pennsylvania
Lombardo, Pamela K., B.S.B.A., Washington University, '81—Basking Ridge, New Jersey
Mann, Ethan L., B.A., University of Missouri-Columbia, '79—M.A., Washington University, '78—St. Louis, Missouri
Meyer, Steven M., B.A., St. Louis University, '77—St. Louis, Missouri
Ostric, Elizabeth, A.B., Smith College, '79—New Bedford, Massachusetts
Paul, Rashed D., B.S., St. Xavier College, '79—Chicago, Illinois
Phegley, Timothy L., B.S., Massachusetts Institute of Technology, '72—M.S., Harvard School of Public Health, '76—St. Louis, Missouri
Phillips, David W., B.S., Murray State University, '79—Quincy, Illinois
Pool, Christopher, B.S., Florida State University, '72—M.B.A., Golden Gate University, '79—Fort Walton Beach, Florida
Reifsteck, Mark W., B.A., Cardinal Glennon College, '77—St. Louis, Missouri
Roth, Patricia L., B.A., Trinity University, '81—St. Louis, Missouri
Russell, Kimberly, B.S., Purdue University, '81—Rocky River, Ohio
Shattes, Wayne S., B.S., State University College of New York, '78—Huntington, New York
Teig, Carol D., A.B., Washington University, '70—Washington University, '71—St. Louis, Missouri
Yang, Juinhong, B.A., National Taiwan Institute of Technology, '79—M.A., Virginia Polytechnic Institute, '81—Changhua, Taiwan

Bruhn, Bob, B.S., University of Arkansas, '79—St. Louis, Missouri
Cueto, Ramon, B.A., Trinity University, '79—St. Louis, Missouri
Daly, Cheryl J., B.A., Queens College, City University of New York, '79—Brooklyn, New York
DeYoung, Joy M., A.B., Stanford University, '81—San Francisco, California
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Glow, Robert J., B.A., Creighton University, '79—Omaha, Nebraska
Goss, Bruce M., B.S., Northeast Missouri State University, '80—Maryville, Missouri
Harris, Margaret J., B.A., University of Iowa, '77—Cedar Rapids, Iowa
Hettinger, Charles K., B.A., DePauw University, '81—St. Louis, Missouri
Joseph, Nesakumar, Diploma in Personnel Management, Xavier Labour Relations Institute, India, '77—Vellore, India
Lee, Edward, B.A., College of Medicine, National Taiwan University, '80—Taichung, Taiwan
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<td>Drake University—Peoria, IL</td>
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<td>Benjamin, Joann</td>
<td>Washington University—Rockville, MD</td>
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<td>Berry, Mary</td>
<td>Washington University—Chesterfield, MO</td>
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<td>Bullerick, Raymond</td>
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<td>University of Nebraska—Ashland, NE</td>
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<td>University of Maryland—Silver Spring, MD</td>
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<td>Junior Class 1982-84</td>
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<td>Anderson, Christy</td>
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<td>Wrich, Jacque</td>
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PROGRAM IN OCCUPATIONAL THERAPY
Graduate Class 1981-82

Bowman, O. Jayne, B.A., Baylor College, '58—Belton, Texas; B.S., University of Wisconsin, '73—Madison, Wisconsin

Buckley, Margaret Mary, B.A., St. Louis University—St. Louis, Missouri

Burson, Katherine Ann, B.S., Washington University, '81—St. Louis, Missouri

DuBuske, Susan Grebowski, B.S., University of Illinois, '78—Chicago, Illinois

Erwin, S. Ellen, B.S., Texas Woman's University, '75—St. Louis, Missouri

Fletcher, Catherine Spadem, B.A., Newcomb College, '70—Boulder, Colorado

Franz, Jane Renee, B.S., University of Missouri, '70—Columbia, Missouri

Heberg, Anne Marie Phillips, B.A., Valparaiso University, '79—Wheaton, Illinois

Kalscheur, Jean Ann, B.S., University of Wisconsin, Madison, '74—Middleton, Wisconsin

Kneeler, Joan Goodwin, B.A., Ithac College, '74—Aurora, Illinois

Koziol, Catherine Mary, B.A., Rockhurst College, '76—Chicago, Illinois

Luebben, Aimee J., B.A., Illinois State University, '75—Belleville, Illinois

Mallonee, Nancy Lee, B.S., St. Louis University, '63—St. Louis, Missouri

McInroy, Trudie K., B.S., University of Florida, '72—Atlanta, Georgia

Mendelson, Mary Lewis, B.S., Washington University, '53—St. Louis, Missouri

Montoya, Tamar Anette, B.A., North Dakota State University, '75—B.S., University of North Dakota, '77—Fargo, North Dakota

Mueller, Cynthia Haffner, B.S., Fontbonne College, '76—St. Louis, Missouri

Overhuls, Pamela, B.S., University of Oklahoma, '77—Norman, Oklahoma

Pennington, Dorothy Johnson, B.A., University of Mississippi, '65—St. Louis, Missouri

Poeschel, Peggy J., B.S., University of Missouri, '81—St. Louis, Missouri

Prins, Steven Scott, B.S., Grand Valley State College, '76—Zeeland, Michigan

Rankin, Cathy Ann, B.S., Tufts University, '78—Manchester, Maine

Robertson, Katherine Ann, B.A., De Pauw University, '82—Fl. Wayne, Indiana

Schwaab, Lynn Madras, B.S., University of Kansas, '76—St. Louis, Missouri

Steinmiller, Loren JoAnn, B.S., Fontbonne College, '79—St. Louis, Missouri

Velozo, Craig Antonio, B.A., College of the Holy Cross, '77—Worcester, Massachusetts

Yang, Min-ian, B.S., National Taiwan University, '77—Taipei, Taiwan

Senior Class 1982-83

Berres, Susan Jean, Washington University—Kenosha, Wisconsin

Boyajian, Joyce, Moraine Valley Community College—Palos Heights, Illinois

Class, Nancy Anita, Maryville College—Manchester, Missouri

Clemenson, Mary Ellen, University of North Dakota—St. Louis, Missouri

Flann, Karen Stacy, Washington University—Spring Valley, New York

Hofstein, Donna Gayle, Meramec Community College—St. Louis, Missouri

Kunz, Susan Marie, Meramec Community College—St. Louis, Missouri

Mullins, Susan Kay, University of Missouri—St. Louis—St. Louis, Missouri

Periman, Sheri Gail, Hebrew University—New Rochelle, New York

Rosefeld, Julie Beth, Washington University—St. Louis, Missouri

Schweiss, Nancy Cecelia, University of Missouri-Columbia—Creve Court, Missouri

Slochek, Cynthia Inez, Washington University—Milwaukee, Wisconsin

Tash, Elizabeth Susan, University of Missouri—St. Louis—St. Louis, Missouri

Junior Class 1982-83

Anderson, Lori

Barrett, Susan Lynn

Barshack, Pamela Ann

Bendian, Susan Rose

Berry, Dana Christine

Essmueller, Aranya Sandra

Fear, Linda Juanita

Gaudio, Gloria Jean

Grauman, Lisa Barbara

Helm, Linda Lee

Krieger, Deborah Leah

Lagomarcino, Carol Francis

Naddell, Monique Chantal

Roberts, Pamela Sue

Serman, Katherine Ann

Stout, Robert Burke

Trick, Tina Marie

Wallace, Patricia Gall

Wolper, Nancy Hondra
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<td>Agrawal, Harish C., 62, 78, 84</td>
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<td>Agress, Harry, 54</td>
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<td>Ahmed, Parveen, 52</td>
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<td>Ahmad, Gail A., 50</td>
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<td>Aiken, Louis F., 54</td>
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Schools of Washington University

All schools are located on the main campus at Lindell and Skinker Boulevards, St. Louis, Missouri 63130, except Medicine (660 South Euclid Avenue, 63110) and Dental Medicine (4559 Scott Avenue, 63110). A University-sponsored shuttle bus travels between the main campus and the medical/dental campus every 20 minutes.

The information which appears in this Bulletin was compiled in the spring of 1983. It is current as of April 1, 1983.