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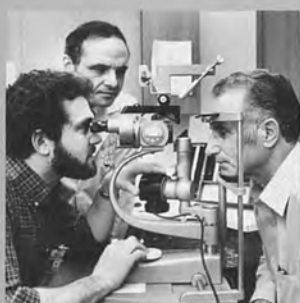
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Bulletin of Washington University

School of
Medicine
1985/1986



BULLETIN OF WASHINGTON UNIVERSITY (USPS: 078-340)

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Bulletin of
Washington
University

St. Louis

School of Medicine
1985/1986

Calendar 1985-86

1985

June

3	Monday	Academic year begins for the third- and fourth-year classes.
7	Friday	Deadline for registration and initial payment of tuition and fees for the third- and fourth-year classes.
11, 12	Tuesday, Wednesday	National Board Examination, Part I.

July

4	Thursday	Independence Day observance.
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August

19	Monday	Academic year begins for the second-year class.
21	Wednesday	Orientation, matriculation, and initial payment of tuition and fees for the first-year class.
23	Friday	Deadline for registration and initial payment of tuition and fees for the second-year class.
26	Monday	Academic year begins for the first-year class.

September

2	Monday	Labor Day observance.
4, 5	Wednesday, Thursday	National Board Examination, Part I.
18, 19	Wednesday, Thursday	National Board Examination, Part II.

November

8	Friday	First trimester ends for the second-year class.
11	Monday	Second trimester begins for the second-year class.
15	Friday	First trimester ends for the first-year class.
18	Monday	Second trimester begins for the first-year class.
22	Friday	Deadline for payment of the balance of tuition and fees for the third- and fourth-year classes.
28	Thursday	Thanksgiving Day observance.
29	Friday	Holiday for first- and second-year classes.

December

21	Saturday	Winter recess begins at 1:00 p.m.
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1986

January

6	Monday	Winter recess ends at 8:00 a.m.
17	Friday	Deadline for payment of the balance of tuition and fees for the second-year class.
24	Friday	Deadline for payment of the balance of tuition and fees for the first-year class.

February

14	Friday	Second trimester ends for the second-year class.
17	Monday	Third trimester begins for the second-year class.
21	Friday	Second trimester ends for the first-year class.
24	Monday	Third trimester begins for the first-year class.

March

5	Wednesday	National Board Examination, Part III.
22	Saturday	Clinical Clerkship Final Examination of 1986 graduates (MSTP/MSTPCC), Erlanger Auditorium. 8:00 a.m.—Psychiatry. 10:30 a.m.—Pediatrics.
23	Sunday	Spring recess begins for the first- and second-year classes.
28, 29, 30	Friday through Sunday	Spring recess for the third- and fourth-year classes.
29	Saturday	Clinical Clerkship Final Examination of 1986 graduates (MSTP/MSTPCC), Erlanger Auditorium. 8:00 a.m.—Medicine
31	Monday	Classes resume at 8:00 a.m. for all classes.

April

1, 2	Tuesday, Wednesday	National Board Examination, Part II.
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May

3	Saturday	Clinical Clerkship Final Examination of 1987 graduates, Moore Auditorium. 8:00 a.m.—Psychiatry. 10:30 a.m.—Pediatrics.
9	Friday	Third trimester ends for the second-year class.
10	Saturday	Clinical Clerkship Final Examination of 1987 graduates, Moore Auditorium. 8:00 a.m.—Medicine.
15	Thursday	Academic year ends at 5:00 p.m. for graduating students.
16	Friday	Commencement.
17	Saturday	Academic year ends for the third-year class.
23	Friday	Third trimester ends for the first-year class.

June

10, 11	Tuesday, Wednesday	National Board Examination, Part I.
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Clerkship- and Elective-Period Intervals: 1985/86

Period	Begins
I	Monday, June 3, 1985
II	Monday, July 15, 1985
III	Monday, August 26, 1985
IV	Monday, October 7, 1985

Period	Begins
V	Monday, November 18, 1985
VI	Monday, January 13, 1986
VII	Monday, February 24, 1986
VIII	Monday, April 7, 1986

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 both to 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.

The curriculum includes a core experience based upon a sequence of courses that will introduce the student to the broad panorama of medicine. The principles, the methods of investigation, the problems, and the opportunities in each of the major disciplines of medical science and medical practice are presented in such a way as to help the student select the career best suited to his abilities and goals.

The elective program helps the student to decide where his major interests lie. It also enables him to benefit from the wide range of specialized knowledge and skills found in the faculty. As there is not enough time for each student to be introduced to each of today's areas of specialization, the elective program permits him to select, according to his own desires, the areas he wishes to explore or to study in depth.



Table of Required Hours 1985-86

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	173
Biochemistry	60*
Cell Biology	70
(Basic Genetics)**	(6)
Biomedical Statistics	17
Medicine in Modern Society	18.5
Microscopic Anatomy	91
Immunology	47
Physiology	115
Molecular Biology	35
Topics in Clinical Medicine	28
Neural Science	119
Microbiology and Infectious Diseases ..	113
Medical Genetics	33
Electives	33
Total clock hours for the year	952.5

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 Neurosurgery	17
Developmental Biology (Peds)	16
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 Neuropathophysiology	19
PP Developmental Biology (Ob/Gyn) ...	24
Total clock hours for the year	852

*Course content adjusted based on student's background in Biochemistry.

**A background course for students desiring additional preparation.

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

Medicine Clerkship	462
Neurology/Neurosurgery Clerkship	154
Obstetrics/Gynecology Clerkship	231
Ophthalmology Clerkship	38.5
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 may participate in clinical electives of four and six weeks duration. If a student takes a research elective, that elective must be of at least twelve weeks duration.

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 second-year 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 third-year class, the student is a duly registered, full-time student for a minimum of 22 months and tuition is paid for two complete academic years.

Students are encouraged to take lecture-seminar elective courses, but such offerings are optional.

Total clock hours for the year	1,386
Total clock hours for four years	5,038.50

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

In addition to the regular four-year program leading to the M.D. degree and the M.A./M.D. degree program, students are permitted to spend one additional year in an academic program in a medical or medically-related field. The program must be arranged with an academic advisor and is subject to the approval of the Committee on Medical Education.

M.A./M.D. Program

Medical 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. Students accepted into this program qualify for a stipend during the research time. Additional information can be obtained by contacting Ms. Barbara Fox in the Medical Scientist Training Program office.

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

Washington University offers a combined M.D./Ph.D. program within the Division of Biology and Biomedical Sciences and the School of Medicine. The program is designed for selected students interested in a research career in medicine whose undergraduate education placed major emphasis on science. The program permits the student to complete both M.D. and Ph.D. degrees, usually within six years. The major purpose of the program is to provide basic research training to individuals who wish to join faculties of clinical or preclinical departments at medical schools throughout the country.

Financial support in the form of stipends (currently \$7,250/year) and tuition remission will be available to all students admitted to the program. Support is obtained from National Institutes of Health grants and is subject to their policies governing funding. There are 100 students currently enrolled in this program.

Applicants must meet the requirements for admission to both the School of Medicine and the Graduate School of Arts and Sciences. In addition to the minimum requirements established for acceptance into both schools, students planning to concentrate in disciplines related to the chemical or physical sciences should have completed mathematics through calculus, physics and physical chemistry (with calculus as a prerequisite), and advanced organic chemistry. A course in differential equations is also recommended. For students whose major interests are in the more biological aspects of medical science, the requirements for chemistry are less rigorous, but a strong background in mathematics and physics is essential. Although most individuals enter the program as first-year students, applications will be accepted from students in their first or second year of the medical curriculum. Only students who have spent the equivalent of one semester in a research laboratory should apply to the program.

The program consists of three segments: (1) two years of the usual medical curriculum; (2) three or more years of work in preparing a thesis to satisfy requirements for the Ph.D. degree; and (3) a final year which is

the usual clinical year of the medical curriculum, adjusted to each student's requirements and career goals. Since the fourth year of medical school is completely elective, the medical scientist will have taken the equivalent of that year during the graduate portion of the Medical Scientist Training Program. This sequence may be modified to fit individual needs. In particular, 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 M.D. and Ph.D. degrees.

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

Every effort is made to individualize each student's curriculum, based on previous background and interests. Regular courses during the first two years in medical school are supplemented by tutorials or special courses. Recent revisions in the medical school curriculum include a molecular biology sequence and an interdepartmental cell biology course in the first year. There has been a significant reduction of formal class hours in the second year as well as an effective integration of the pathophysiology sequence.

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 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. The laboratories selected for summer research need not be those chosen for the Ph.D. portion of the program.

Students in the combined degree program will take the usual medical school courses in the first two years supplemented by special tutorials and electives.

A student who passes a qualifying examination in any of the regularly offered preclinical courses will be allowed to substitute either advanced coursework or laboratory research in the time made available. In this way, students may have an opportunity to do supervised research immediately after entry. Research can be continued in free periods during the first two years.

The performance of each student will be reviewed annually. Students are expected to maintain a high scholastic standing as well as a commitment to research.

Years 3, 4, 5

Students will spend the third, fourth, and fifth years in satisfying the following requirements of the Graduate School of Arts and Sciences for the Ph.D. degree: 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 one semester.

Prior to beginning the third year, students will select a faculty advisor under whom the thesis work will be carried out and the training program or department in which the Ph.D. degree will be obtained. For purposes of graduate training, the Division of Biology and Biomedical Sciences is divided into the following programs: Cell and Integrative Biology, Molecular Biology and Biochemistry, Neural Sciences, Plant Biology, and Population Biology. These interdisciplinary programs draw together 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. They 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 126 as well as in the sections describing the various departments of the School of Medicine.

Monthly seminars are held for students during the research years. Conducted by medical scientists of the clinical 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 to 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. Both the Ph.D. and M.D. degrees will be granted simultaneously at the end of this clinical year.

Interested students must apply to the School of Medicine through the American Medical College Application Service. Upon receipt of the AMCAS application by the School, additional information regarding forms specific to the combined-degree program will be mailed to applicants.

For questions or information regarding the M.D./Ph.D. program, please contact:

Barbara J. Fox
Assistant Director
Medical Scientist Training Program
Campus Box 8033
660 South Euclid Avenue
Washington University
St. Louis, MO 63110
Telephone: 314/362-7190

Doctor of Philosophy Programs

The Division of Biology and Biomedical Sciences offers predoctoral programs in cell and integrative biology, molecular biology and biochemistry, neural sciences, plant biology, and population biology. These educational activities are organized on an interdepartmental basis by the faculty of the seven preclinical departments of the School of Medicine, as well as the Department of Biology of the Graduate School. Degrees are awarded through the Washington University Graduate School of Arts and Sciences. Additional information about the Divisional programs may be obtained by writing to:

The Office of Graduate 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 trimester 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
I = 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 depart-

ments. 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 *may recommend* to any first-trimester 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 trimester 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 trimester, and will be eligible for individual tutorial help in the remaining courses. At the end of the first trimester 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 trimesters 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

*The term "major courses" refers particularly to the first-year courses: Biochemistry, Gross Anatomy, Cell Biology, Physiology, Microscopic Anatomy, Neural Science, Immunology, Molecular Biology, and Microbiology and Infectious Diseases.



FIG. 26. X-ray of the wrist of the patient.

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.

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 has 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 Associate Dean for Postgraduate Training. Thus, students in the third-year class are provided with general background information about the kinds of residencies available. Since the number of available residencies has recently decreased to approximately the same as that of graduates applying, students must make their choices with considerable care.

The Associate Dean for Postgraduate Training maintains an open file of brochures and other descriptive data regarding residencies throughout the country. Included are evaluations of the residency experience of 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 lifelong 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 35 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 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, 1985. 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, 1985; 5) visit the Medical Center for interviews on a mutually convenient date prior to September 1, 1985; 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 filled by Early Decision applicants. The AMCAS Application 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, 1985. On receipt of the application from AMCAS, the Committee on Admissions promptly forwards to applicants the additional materials that must be submitted to complete the application process. At this stage, a nonrefundable Application Service Fee of \$50 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 committee. Washington University School of Medicine operates 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, 1986, every applicant should have a final decision; accepted, waiting list, or not accepted.

Personal Interview

The Committee on Admissions would like to interview 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 requested 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, 1986, the deposit is refunded.



THIRD-YEAR CLASS TRANSFER PROGRAM

Each year the Washington University School of Medicine accepts ten to fifteen transfer students into its third-year class. This class enlargement is permitted because of the abundant clinical training facilities available in the Medical Center and because of the existence of a national need for such transfer positions. Transfer applications are accepted from well-qualified students enrolled in U.S. medical schools, 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 1986 third-year class are available on August 1, 1985. Application deadline is November 1, 1985. Those applicants selected for interview will be invited to visit the Medical Center during November 1985. All applicants will be notified of the decision of the Committee on Admissions by December 31, 1985. 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, 1985-86 FIRST-YEAR CLASS

For a first-year matriculant, tuition and housing rates for the 1985-86 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 1986-87 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 \$19,140. Allowances for entertainment, travel, clothing, and other miscellaneous items must be added to this estimate.

Tuition (includes Student Health Service and Microscope Lending Plan)	\$13,700
Books, supplies, and instruments	\$ 1,165
Housing (single room, Olin Residence Hall)	\$ 1,890
Board (Medical Center cafeterias)	\$ 2,385

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.

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 percent 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 total repayment of the accounts from which financial aid was drawn, with any remaining refund balance given to the student. Financial aid received in excess of the costs of tuition and fees must be refunded by the student to the School on the same pro rata basis as calculated for the tuition refund outlined above.

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 Professional 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 1985-86 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 returns complete 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 in writing if their financial situation changes, for example, through employment or receipt of a scholarship not anticipated at the time the application was submitted.

First- and second-year students are urged not to accept employment during the academic year. A number of fourth-year students find employment in hospitals within the Medical Center. The Personnel Office provides assistance to students' spouses seeking employment.

Policy for International Students

The admission decision at Washington University School of Medicine is based on academic and personal merit and not on the ability of the student to pay the costs of education. However, individuals who are not citizens of the United States of America or who do not hold U.S. Permanent Resident Visa status are not eligible for financial aid due, in part, to Federal Government regulations covering most programs used by the School to fund financial assistance. Therefore, in order for the School to

complete the required documents which are necessary for issuance of a Visa, the student must document, by a date and in a manner designated by the School, that the necessary amount of funds, as established by the School, is available to pay the costs of education (tuition and living expenses) for the anticipated period of enrollment, normally four years.

Documentation of the required amount of financial resources may be by a letter of credit or by deposit of funds in an escrow account with a bank designated by the School. In either manner, the funds must be available only to the School. Should the amount prove inadequate to cover the necessary costs, an additional letter of credit or deposit to the escrow account will be required. Unused funds will be released upon the student's termination, withdrawal, or graduation from the School.

Standards for Satisfactory Academic Progress for Financial Aid Eligibility

Federal law and regulations require that all students receiving financial assistance from Federal Title IV funds maintain satisfactory academic progress. The following policy presents the standards adopted by the Washington University School of Medicine. The policy applies to all students receiving financial aid.

Academic requirements for the M.D. degree include the satisfactory completion of the curriculum designated by the faculty. The progress of each student working toward an M.D. degree is monitored carefully and at least once each academic year by the designated Committee on Academic Review and Promotions. The qualitative measure of performance is based on a Pass/Fail grading system for the first trimester of the first year, and thereafter on an Honors/High Pass/Pass/Fail/Incomplete and Deferred grading system. A student who does not satisfactorily complete all course requirements may be





permitted to remediate. In this case, a student assigned to an individualized program which deviates from the norm and who earns satisfactory qualitative assessment in all courses for which enrolled will be deemed to be making satisfactory academic progress. The individualized program permits a student to take one final makeup reexamination in a course which a student has failed.

The normal time frame for completion of required course work for the M.D. degree is four academic years. Due to academic difficulties or personal reasons a student may require additional time. In such situations, the Committee on Academic Review and Promotions may establish a schedule for that student which departs from the norm. To be considered to be making satisfactory academic progress, the student must complete the first two years of the curriculum by the end of the third year after initial enrollment. The Committees on Academic Review and Promotions will monitor the progress of each student at the conclusion of each academic year to determine that the student is making sufficient progress to meet the time limits as specified. A student not making sufficient progress will be deemed not to be making satisfactory academic progress.

A student may be granted a leave of absence for health reasons or personal reasons. The period of time for which the student has been granted a leave of absence shall be excluded from the maximum time frame expected for completion of the program.

Medical students who are accepted for transfer from other medical schools will be evaluated with respect to levels of academic progress attained and a determination

will be made as to remaining years of financial aid eligibility. This determination will be coordinated among the Assistant Dean in Academic Administration, Associate Dean for Student Affairs, and the Director of Student Financial Aid.

A student failing to meet one or more of the standards of progress shall be placed on financial aid probation. While on probation the student may receive financial assistance for one trimester, semester or equivalent time period. At the conclusion of this period, the student must have achieved compliance with each standard.

A student who does not achieve compliance with each standard by the conclusion of the probationary period is suspended from financial aid eligibility.

The Office of Student Financial Aid must notify a student of implementation of probationary status and/or suspension.

A student shall be reinstated for financial aid eligibility at such time as that student has completed satisfactorily sufficient course work to meet the standards of progress.

A student on financial aid probation or suspension may appeal that status by indicating in writing to the Director of Student Financial Aid the existence of mitigating circumstances which should result in reinstatement of financial aid eligibility. Each appeal will be considered on its merit by the Committee on Student Financial Aid.

The Director of Student Financial Aid shall have primary responsibility for enforcement of this policy. The Director shall provide in writing to each student at the time of initial enrollment a copy of this policy. The Director shall ascertain at the time of each disbursement of funds and prior to certification of a financial aid application that the student is in compliance with the policy.

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 1985 selected applicants to the School's 1986 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 1986 scholarship recipients will be made on March 4, 1986.

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 partici-

page 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

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

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.

Robert Elman Scholarship in Surgery. Created in 1980 through the bequest of Minna Elman in memory of her husband.

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 as a memorial to Dr. Charles Poplin 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.

Dr. Lorraine A. Johnsrud Scholarship Fund. Established in 1983 as a memorial to Lorraine from her classmates, friends, and family to assist deserving medical students in the funding of their medical expenses.

Henry J. Kaiser Family Foundation—Medical Century Club Scholarship Fund. Following the Foundation's generous gift in 1980 for medical student scholarships, the Medical Century Club accepted the challenge to raise new scholarship funds to match an additional gift from the Foundation.

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.

Anne L. Lehmann Scholarship Fund. Established in 1983 to grant continued scholarship support to medical students.

Maude L. Lindsey Memorial Scholarships. Created in 1976 to assist students in the School of Medicine.

John R. Lionberger, Jr., Medical Scholarship Endowment Fund. Created in 1982 by Dr. John R. Lionberger to be used to aid worthy students in acquiring their medical education.

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.

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

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

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

Robert Allen Roblee Scholarship Fund. Established in 1948 through the gift of Mrs. Joseph H. Roblee for students in the School of Medicine.

Thomas W. and Elizabeth J. Rucker Scholarship Fund. Created in 1956 under the will of Eugenia I. Rucker, in memory of her mother and father.

Joseph H. Scharf Scholarship Fund. Provided in 1949 through the bequest of Dr. Joseph H. Scharf.

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 Balridge Shaw Scholarship Fund. Created in 1958 through the bequest of Roy A. Shaw in memory of his father, Dr. Alexander Balridge Shaw.

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

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.

Mildred Trotter Scholarship Fund. For students with documented financial need, the fund was established in 1979 by Dr. and Mrs. Paul Guttman, and supplemented by former students of Dr. Trotter, as a tribute to her many years of teaching in the Department of Anatomy.

Hiromu Tsuchiya Scholarship Fund. Created to provide scholarships in the School of Medicine.

Tuholske-Jonas-Tuholske Medical Scholarship Fund. Established in 1974 by Rose T. Jonas in memory of her father, husband, and brother. The recipient shall be a senior student preparing to enter the field of surgery, obstetrics and gynecology, or internal medicine.

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.

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

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 col-

leagues 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.

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

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 E. 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.

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

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 bridge 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.

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.

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

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

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 Wohlgemuth 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. Cori Prize in Biochemistry. Awarded at the end of the first year to the member of the class who has demonstrated superior scholarship in biochemistry.

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.

Ishiyaku EuroAmerica—Piccin Nuova Libreria Book Prize. Awarded for the first time at graduation in 1985, selection is based on general academic excellence throughout the recipient's medical education.

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.

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 members 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 Disease 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 Hilltop 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 1985-86 are:

School Year: September-June (Nine Months)

Two-room suite	\$2,214
Single room	1,890
Double room	1,323
Large single	2,340

Summer 1985: for Three Months

Two-room suite	738
Single room	630
Double room	441
Large single	780

Summer 1985: Weekly Rates for Student Visitor

Two-room suite	87
Single room	78
Double room	69

Daily Rates for Visitors

Two-room suite	37
Single room	30
Single room (prospective student)	26

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 required to have a medical examination prior to matriculation. Subsequent medical care is provided 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.



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. This includes the Busch lot which is fenced and shared equally by the School of Medicine and Barnes Hospital. An annual permit must be purchased for the use of any of the surface parking lots. These permits are available to students on a limited basis. Students also qualify to purchase monthly parking cards in the Washington University WayCo Garage at the corner of Audubon and Euclid Avenues.

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 *Globe-Democrat* and the *Post-Dispatch*.

For spectators, there are four major-league sports teams—the baseball and football Cardinals, hockey Blues, and soccer Steamers. 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 Souard, 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, St. Louis Science Center's McDonnell Planetarium, Museum of the Missouri Historical Society, Jewel Box Floral Conservatory, City Art Museum, and Municipal Opera.

MEDICAL SCHOOL JAZZ ENSEMBLE

The "Hot Docs," now in its seventh year of existence, is a fully instrumented big band jazz ensemble. The 20-member group, composed of predominantly Washington University medical students, rehearses weekly and performs at concerts and dances throughout the year. The band's large repertoire spans several musical generations, with the music of Miller, Dorsey, Basie, and Gillespie as well as present day jazz and pop composers represented.

The "Hot Docs" provide one of several ways students can continue to pursue long-time special interests in addition to their medical education.

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, Occupational Therapy, and Physical 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.

To further alumni-student relationships, the Association coordinates a program designed to give first- and second-year 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, through the William Greenleaf Eliot Society of the University, 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. Recognizing the critical part which gifts play in the continued progress of Washington University, the William Greenleaf Eliot Society has established the following guidelines for donor recognition: Eliot Society Member, \$1,000—\$2,499; Eliot Society Fellow, \$2,500—\$4,999; Eliot Society Benefactor, \$5,000—\$9,999; Eliot Society Patron, \$10,000 or more.

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 post-graduate 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.

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 presents special alumni activities in selected cities across the United States. Each event will be tailored to the interests of medical alumni in each metropolitan area. Network cities for 1985 include Los Angeles, San Francisco, New York, and Houston. 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 has been 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.

LECTURESHIPS AND VISITING PROFESSORSHIPS

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

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 1981 by friends and colleagues of Dr. Brodman in honor of her distinguished contributions to the School of Medicine.

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

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

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.

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

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.

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

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.

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

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

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

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.

The Probstin Oncology Lectureship. Established in 1985 by Mr. and Mrs. Norman K. Probstin in appreciation of professional services provided by William Fair, M.D., former head of the urology division of the Department of Surgery, and Carlos Perez, M.D., professor of radiology and head of radiation oncology at the Medical Center's Mallinckrodt Institute of Radiology.

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

St. Louis Football Cardinals Visiting Professorship in Orthopedic Surgery. Made possible since 1971 by donations from the St. Louis Football Cardinals.

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

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

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

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

The Donald B. Strominger Visiting Professorship. Established in 1984 by family, friends, and colleagues, fellows, and patients of Dr. Strominger in honor and in memory of his dedication and contributions to their lives, their careers, and to the field of medicine in pediatrics.

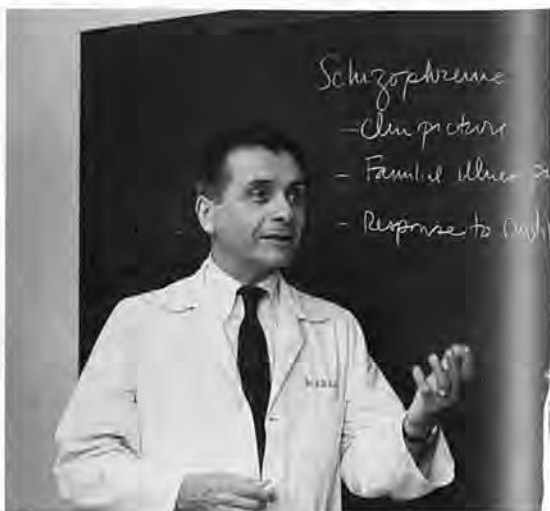
The Richard A. and Betty H. Sutter Visiting Professorship in Occupational and Industrial Medicine. Established in 1985 by Dr. and Mrs. Sutter to encourage opportunities for students, faculty, other physicians, and the St. Louis community to expand the understanding and practice of Occupational Medicine.

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

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

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

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



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. Seven faculty members have been elected to the National Academy of Sciences, eleven 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, Jewish Hospital at Washington University Medical Center, Children's Hospital at Washington University Medical Center, Barnard Hospital, the Washington University School of Dental Medicine, 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. Twenty-one Program Project and Center Grants are held in the fields of cancer, general clinical research, thrombosis, diabetes, arthritis, renal diseases, asthma, stroke, glaucoma, 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 more than forty 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 nearly 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 1985 the School employed 719 full-time, salaried faculty members in its eighteen preclinical and clinical departments. The clinical departments are further greatly strengthened by 927

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 540 medical students. Programs are also conducted for students in health administration, occupational therapy, nurse anesthesia, 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 cell and integrative biology, molecular biology and biochemistry, the neural sciences, plant biology, and population 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 Hilltop 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 first class research laboratories and classroom space, was made possible by James Smith McDonnell III, 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.

The East Building houses an MRI (magnetic resonance imaging) facility containing a 20 kilogauss magnet, as well as a film library, computer installation and other components of the Mallinckrodt Institute of Radiology. Other facilities in the East Building include the Program in Physical Therapy, the medical and dental bookstore, and several office suites.

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—An internationally recognized center of excellence in teaching, research, and clinical services in Radiology, the Institute is housed in a 10-story building with satellite units in the West Pavilion of Barnes Hospital and the new Children's Hospital. MIR's facilities include two functioning cyclotrons and a 5 kilogauss Nuclear Magnetic Resonance unit.

Renard Hospital—With consolidation of Psychiatric patient-care services in the West Pavilion, this 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, provides offices and laboratories for the Departments of Medicine and Surgery. Recently completed were facilities for a Cancer Center on floor three which is contiguous with companion facilities in 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 in Children's Hospital, 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 382,080 gross square feet of space, is the newest structural addition to the Medical Center. The 10-story structure, constructed at a cost of \$55 million and dedicated in October 1984, houses research laboratories for the School's clinical departments, the Howard Hughes Institute, and elaborate animal care facilities.

Further, the Clinical Sciences Research Building is the connecting link for a series of enclosed pedestrian bridges that tie the Medical Center together. These enclosed, environmentally-controlled bridges connect Jewish Hospital on the north, the new Children's Hospital on the west, and the Wohl Buildings and Barnes Hospital to the south.

INSTITUTE FOR BIOMEDICAL COMPUTING

The Institute for Biomedical Computing is an inter-school facility which spans computing research activities at both the School of Medicine and the School of Engineering and Applied Science. The Institute consists of two research-laboratory components, the Biomedical Computer Laboratory and the Computer Systems Laboratory, both of which have close ties with both Schools. The purpose of the Institute is to foster the development and application of advanced computing and engineering technologies to problems in biomedical science. In addition to its activities in collaborative research, the Institute serves as a focal point for interdisciplinary teaching and student research in areas not ordinarily included in conventional curricula.

The Institute has its primary location on the Medical School campus but it also occupies the Edward L. Bowles Laboratory on the Engineering School campus. The Bowles Laboratory is adjacent to Computer Science, Electrical Engineering, and other departments of the School of Engineering. This provides an Engineering School location for research and teaching activities associated with the Biomedical Computer Laboratory and the Computer Systems Laboratory. The arrangement creates opportunities for collaborations between the two campuses and fosters involvement of students in activities spanning the medical and computer-engineering disciplines.

LIBRARY

Founded in 1911, the Washington University School of Medicine Library is one of the oldest and largest medical libraries in the Midcontinental Region. It serves as an information center for the faculty, students, and staff of the Medical Center and, in addition, extends its services and resources to health professionals in the local, state, and national communities.

The Library maintains a comprehensive collection of over 200,500 volumes and some 2,800 current subscriptions. An Audiovisual Center makes available to users



some 1,500 audiovisual titles. Its Rare Books Division includes such outstanding collections as the Bernard Becker Collection in Ophthalmology and the Goldstein Collection in Speech and Hearing. It houses the Archives of the Medical Center which includes records and private papers of the School, memorabilia, and oral histories of individuals who have made important contributions to American medicine. Among its manuscript collections are papers of William Beaumont, Joseph Erlanger, E. V. Cowdry, Evarts Graham, and Carl Cori.

The Library is a pioneer in technology application, and users will find most library functions computerized. Through its BACS database, students and staff may access from their offices a variety of information sources, among them, the Library's catalog of book and journal holdings, *Current Contents*, and MEDLINE. The world's

output of knowledge is reached through online access to over 250 computerized data bases covering the biological, health, social and physical sciences. As a member of the large regional and national networks, the Library reaches other library collections nationwide through telecommunications.

The Medical Library is housed in three locations. The main School of Medicine Library, located at 4580 Scott Avenue, is on the second floor of the North Building of the Medical School. The Taylor Annex, located one block east of the main Library at 615 South Taylor Avenue, houses the rare books, the Archives of the Medical Center and older, non-rare books and journals. The Spruce Street Annex, which is in downtown St. Louis, houses rarely-used journals and books.

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. Holiday hours are posted when applicable.

For information on the Library's special services, the "Library Guide," "Library Newsletter," or Director, Susan Crawford, Ph.D., may be consulted.

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 facilities for several departments of the School of Medicine. This building is owned by the School of

Medicine, with Barnes Hospital operating the Emergency Room and the David P. Wohl, Jr. Memorial—Washington University Outpatient Clinics.

THE MEDICAL CENTER, ITS HOSPITALS AND INSTITUTIONS

The School of Medicine is part of a medical center of nearly 2,000 beds and over 11,000 employees, providing nearly 610,000 days of care and more than 218,000 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 seven 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 16 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, nearly \$395 million worth of construction, renovation, and improvements have 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 1,200 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.

Children's Hospital, governed by its own Board since 1879, is an integral part of the Medical Center and is nationally recognized as a premier provider of advanced care for neonates, children, and adolescents. A completely new 235-bed, 500,000 square-foot facility was dedicated in April 1984. Children's offers the full range of primary, secondary, and tertiary pediatric care. The Hospital is recognized as a major referral and research center for a variety of diseases including neurological and communicative disorders, childhood diabetes, kidney and vascular diseases, craniofacial deformities and birth defects, and pediatric infectious diseases. The professional staff of Children's Hospital are members of the faculty of the School of Medicine.

Jewish Hospital, an acute and tertiary care facility licensed for 628 beds, is a charter member and integral component of the Washington University Medical Center. It serves as a primary teaching hospital for the School of Medicine, providing education for medical students throughout their clinical experience, as well as training for graduate physicians in many specialties and subspecialties. The hospital provides an array of health-oriented services, an alcohol and chemical dependency program, including stress management, *in vitro* fertilization, a broadly based consultative service for the elderly (Program on Aging), an osteoporosis diagnosis and prevention center, and an inpatient and ambulant rehabilitation program.

Its modern nine-story Sydney M. Shoenberg Pavilion provides 300 inpatient rooms, four intensive care units, sixteen operating suites, as well as diagnostic radiology and clinical laboratories. Jewish Hospital is also one of the largest research institutions in the State of Missouri, housing and sponsoring many major investigative programs in its Yalem Research Building and in the adjacent Washington University Clinical Sciences Research Building.

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.

The Washington University School of Dental Medicine is the newest member of the Medical Center family. The oldest continuously operating dental school west of the Mississippi and one of the oldest in the nation, the school began classes in 1866, and became Washington University's dental department in 1892.

Graduating approximately 60 new dentists each year, the school is known for both strong clinical and research programs, the latter primarily funded by the National Institutes of Health and the National Science Foundation. Many of the 130 faculty members have joint appointments with Washington University School of Medicine, and Barnes, Jewish, and Children's hospitals.

The School of Dental Medicine operates walk-in clinics, where third- and fourth-year students practice dental procedures. The school is aggressive in treating children's dental problems. Dental faculty operate several clinics, including one for maxillofacial prosthodontics, the rebuilding of jaws and other facial structures left abnormal by birth defects, or surgery to remove disease. Another clinic is in Children's Hospital, for both inpatients and outpatients.

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.

St. Louis City Hospital, with 600 beds.

Malcolm Bliss Mental Health Center, with 150 beds.

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

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

St. Louis County Hospital, with 200 beds.

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

Department of Anatomy and Neurobiology

The anatomical sciences are presented in four required courses: gross anatomy and cell biology, offered in the first trimester; microscopic anatomy, offered in the second trimester; and neural science, taught in the third trimester. The course in neural science is taught conjointly with the Department of Cell Biology and Physiology. 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 dissecting 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 Department of Cell Biology and Physiology 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 Cell Biology and Physiology, provides a broad introduction to modern neuroscience, including both cellular aspects of neurobiology and a comprehensive overview of the structure and function of major systems in the central nervous system. Class time of three half days a week throughout the third trimester. 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)
- Cell and developmental biology of excitable cells. (Dr. Bridgman)

Department of Anatomy and Neurobiology

Vision: phototransduction. (Dr. J. Brown)
Developmental biology of nervous tissue. (Dr. M. Bunge)

The development of the nervous system; response to injury and regeneration in neural tissues. (Dr. R. Bunge)

Anatomy and physiology of the somatosensory system. (Dr. Burton)

Insulin, renin and elastin gene organization and expression. (Dr. Chirgwin)

Organization and physiology of the retina. (Dr. A. Cohen)

Structure and function of neurotransmitter receptors. (Dr. J. Cohen)

Comparative primate anatomy and primate evolution. (Dr. Conroy)

Neurogenesis and synapse formation. (Dr. Fischbach)

Growth and differentiation of neuroblastoma and other malignant cell lines in culture. (Dr. Goldstein)

Studies on neurotransmitter receptors in the developing nervous system. (Dr. Gottlieb)

Growth and differentiation of sympathetic neurons in culture. (Dr. Johnson)

Cellular biochemistry of peptide secreting neurons. (Dr. Krause)

Developmental neurobiology. (Dr. Lichtman)

Central control of blood pressure and mechanisms of hypertension. (Dr. Loewy)

The structure and function of the skin. (Dr. Menton)

Molecular biology of neuronal plasticity. (Dr. O'Malley)

Cross-sectional anatomy. (Dr. Peterson)

Primate population biology. (Dr. Phillips-Conroy)

The organization of the olfactory and limbic systems. (Dr. Price)

The formation and maintenance of synaptic connections in the mammalian nervous system. (Dr. Purves)

Genetic, molecular and physiological analysis of nervous system mutations. (Dr. Salkoff)

Molecules and structures that account for the specificity of synapse formation, especially at the neuromuscular junction. (Dr. Sanes)

Development of peptidergic neurons. (Dr. Taghert)

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 and neurobiology. These course descriptions are presented in the section on Biology and Biomedical Sciences.

Bio 4281. Principles of Neural Development

Bio 5402. Molecular Biology of Transmitters and Receptors

Bio 551, 552. Topics in Neurobiology

Bio 5532. Topics in Developmental Neurobiology

Bio 5571. Cellular Neurobiology

Bio 5651. Neural Systems

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

Edison Professor of Neurobiology and Head of Department

Gerald D. Fischbach, A.B., Colgate University, 1960; M.D., Cornell University Medical School, 1965.

Professor Emeritus and Lecturer

Mildred Trotter, A.B., Mount Holyoke College, 1920; Sc.M., Washington University, 1921; Ph.D., 1924; Sc.D. (hon.), Western College, 1956; Sc.D. (hon.), Mount Holyoke College, 1960; Sc.D. (hon.), Washington University, 1980. (See Department of Radiology.)

Beaumont-May Institute of Neurology Scholar in Anatomy and Professor

Richard P. Bunge, B.A., University of Wisconsin, 1954; M.S., 1956; M.D., 1960.

Professors

Joel E. Brown, B.S., Massachusetts Institute of Technology, 1960; M.A., 1960; Ph.D., 1964. (See Department of Ophthalmology.)

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

Harold Burton, B.A., University of Michigan, 1964; Ph.D., University of Wisconsin, 1968. (See Department of Cell Biology and Physiology.)

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.)

Jonathan B. Cohen, B.A., Harvard College, 1966; M.A., Harvard University, 1967; Ph.D., 1972.

Glenn C. Conroy, B.A. (hon.), University of California, Berkeley, 1970; M.Phil., Yale University, 1972; Ph.D., 1974. (Also Faculty of Arts and Sciences.)

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

Arthur D. Loewy, B.A., Lawrence University, 1964; Ph.D., University of Wisconsin, 1969.

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

Joseph L. Price, B.A., University of the South, 1963; Ph.D., Oxford University, 1969.

Dale Purves, A.B., Yale University, 1960; M.D., Harvard University, 1964.

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.)

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

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

Associate Professors

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

E. Richard Bischoff, A.B., Knox College, 1960; Ph.D., Washington University, 1966.

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.)



Stephen M. Highstein, B.S., Rensselaer Polytechnic Institute, 1961; M.D., University of Maryland Medical School, 1965; Ph.D., University of Tokyo, 1976. (See Department of Otolaryngology.)

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

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

Jane Phillips-Conroy, B.A. (hon.), Brandeis University, 1969; M.A., New York University, 1973; Ph.D., 1978. (Also Faculty of Arts and Sciences.)

Joseph Henry Steinbach, B.A., Reed College, 1968; Ph.D., University of California, San Diego, 1973. (See Department of Anesthesiology.)

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

Research Associate Professor

Nancy L. Baenziger, B.A., St. Olaf College, 1967; Ph.D., Washington University, 1971.

Assistant Professors

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

Paul C. Bridgman, B.A., University of California, San Diego, 1974; M.S., 1976; Ph.D., Purdue University, 1980.

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

John M. Chirgwin, A.B., Harvard College, 1968; Ph.D., University of California, Riverside, 1974.

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

James E. Krause, B.S. (hon.), University of Wisconsin, Stevens Point, 1974; Ph.D., University of Wisconsin, Madison, 1980.

Jeff W. Lichtman, A.B., Bowdoin College, 1973; M.D., Ph.D., Washington University, 1980.

Karen L. O'Malley, B.A. (hon.), California State University of Sonoma, 1971; M.S., Portland State University, 1973; Ph.D., University of Texas, Austin, 1980.

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

Lawrence B. Salkoff, B.A., University of California, Los Angeles, 1967; Ph.D., University of California, Berkeley, 1979.

Joshua R. Sanes, B.A., Yale College, 1970; Ph.D., Harvard University, 1976.

Antoinette Steinacker, B.S., Western Maryland College, 1960; Ph.D., University of the Pacific, San Francisco, 1972. (See Department of Otolaryngology.)

Paul H. Taghert, B.A., Reed College, 1975; Ph.D., University of Washington, 1981.

Research Assistant Professors

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.)

Andreas H. Burkhalter, B.S., University of Zurich, 1973; Ph.D., Brain Research Institute, University of Zurich, 1977. (See Department of Neurology and Neurological Surgery.)

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."

An elective in clinical anesthesiology is offered every six weeks for up to four students. The pharmacology of inhalation, intravenous, and local anesthetic drugs is demonstrated by practical application by the student in

the operating room. The importance of blood gas determinations in evaluating the efficacy of ventilation is shown. Opportunities to develop proficiency in techniques such as endotracheal intubation are available. Students are expected to attend the regular anesthesia conferences and seminars.

An additional four-week elective is offered in critical care medicine that is designed to familiarize the student with the diagnosis and treatment of the critically ill surgical patient. This is accomplished by the student becoming an integral part of the intensive care team.



Faculty of the Department of Anesthesiology

Mallinckrodt Professor and Head of Department

William D. Owens, B.A., Westminster College, 1961; M.D., University of Michigan, 1965.

Professor Emeritus

Albert Roos, M.D., University of Groningen, 1940. (See Department of Cell Biology and Physiology.)

Professors

Leonard W. Fabian, B.S., University of Arkansas, 1950; M.D., 1951.

A. Ercument Kopman, M.D., Istanbul University, 1947.

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

James A. Felts, B.S., DePauw University, 1943; M.D., Northwestern University, 1946.

John E. Forestner, B.A., Northwestern University, 1966; M.D., 1970. (See Department of Pediatrics.)

Susan W. Krechel, A.B., Washington University, 1967; M.D., University of Louisville, 1972.

Elsie F. Meyers, B.A., Indiana University, 1947; M.D., 1950. (See Department of Ophthalmology.)

Necita L. Roa, B.S., University of the Philippines, 1964; M.D., 1969.

Joseph H. Steinbach, B.A., Reed College, 1968; Ph.D., University of California, San Diego, 1973. (See Department of Anatomy and Neurobiology.)

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

Associate Professor (Clinical)

Milton L. Cobb, B.A., Baylor University, 1964; M.D., University of Texas (Southwestern), 1968.

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.)

Donald J. Dickler, B.A., New York University, 1942; M.D., 1945. (Jewish Hospital.)

Alex S. Evers, B.S., Yale University, 1974; M.D., New York University, 1978. (See Department of Medicine.)

W. Patrick Gibson, B.A., Hendrix College, 1970; M.D., University of Arkansas, 1974.

Melvin Haber, B.S., Rutgers University, 1956; M.D., New York University, 1963. (See Department of Ophthalmology.)

Robert E. Herold, B.A., Wabash College, 1970; M.D., Washington University, 1974.

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.)

Jane E. Kosa, B.A., West Virginia University, 1975; M.D., 1979. (See Department of Pediatrics.)

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

Cyril M. Sliom, M.B.B.Ch., University of Witwatersrand, 1947; F.F.A., South African College of Medicine, 1962. (Jewish Hospital.)

Lawrence S. Waldbaum, A.B., Cornell University, 1969; M.D., Washington University, 1973. (Jewish Hospital.)

Mehernoor F. Watcha, M.B.B.S., Seth G.S. Medical College, 1972. (See Department of Pediatrics.)

Assistant Professor (Clinical)

M. Emin Kiyancilar, M.D., Ain-Shams University, 1970.

Instructors

Lester L. Bluth, B.S., Tulane University, 1971; M.D., New York University, 1976.

Marshall Fay, B.S., Duke University, 1974; M.D., Medical College of Georgia, 1978. (Jewish Hospital.)

Joseph M. Forand, A.B., Hamilton College, 1977; M.D., St. Louis University, 1981. (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.)

Scott A. Hernberg, B.A., Rutgers University, 1976; D.O., College of Osteopathic Medicine and Surgery, Iowa, 1980.

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

Surekha Joshi, B.A., Kirti College, 1972; M.B.B.S., Grant Medical College, Bombay, 1976.

Vinod K. Kothapa, M.B.B.S., University of Mysore, 1976.

Ravi S. Kumar, M.B.B.S., Andhra University, 1973.

Hieu H. Le, M.D., Saigon University Faculty of Medicine.

Raju N. Mantena, M.D., Andhra University, 1971.

Amrik S. Narula, M.B.B.S., H. P. Medical College, 1972.

Carl H. Nielsen, M.D., Copenhagen Medical School, 1979.

S. Mark Poler, B.S., University of California, San Diego, 1974; M.D., 1978.

Frank E. Robbins, B.A., Earlham College, 1973; M.D., Washington University, 1977. (Jewish Hospital.)

Paparao Tatini, M.B.B.S., Andhra Medical College, 1969.

René Tempelhoff, M.D., University of Lyon, France, 1974.

Silvestre A. Tomeldan, B.S., Far Eastern University, 1964; M.D., 1970. (Jewish Hospital.)

Sudhakar Vaddi, M.B.B.S., Rangaraya Medical College, 1977.

Madhav Vinjamuri, M.B.B.S., Medical College of Gulbarga, 1971.

Instructors (Clinical)

Sedat M. Ayata, B.S., Istanbul Lyceum, 1949; M.D., University of Istanbul, 1955.

Edwin T. de Castro, M.D., University of East College of Medicine, 1968.

Robert C. Engelhardt, B.S., University of South Carolina, 1946; M.D., University of Missouri, 1950.

Robert Hellman, B.A., Yeshiva University, 1969; M.D., New Jersey College of Medicine and Dentistry, 1973.

Akira Iwane, M.D., Nihon University, 1966.

Hugh F. Keister, A.B., Washington University, 1955; M.D., 1959.

Edgardo Mayuga, M.D., University of Santo Tomas, 1960.

Dorothy S. Perry, B.A., Swarthmore College, 1973; M.D., St. Louis University, 1977.

William A. Sims, Jr., B.S., University of Missouri, 1955; M.D., Washington University, 1957.

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 531. Biochemistry

A study of the intermediary metabolism of principal cellular components and of general aspects of metabolic regulation followed by discussion of the biochemistry of organized systems with special emphasis on problems relevant to medicine. Discussion sections will be organized as small groups of students, as appropriate, with extra sessions for the students without previous exposure to the background material. Extensive reading of original literature will be required of students with adequate previous preparation in biochemistry as well as of graduate students. 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)

NMR studies of mechanisms of enzyme reactions. (Dr. Drysdale)

Interactions between cell surface and cytoskeleton. Mobility of molecules in animal cell surfaces. Forces and mechanisms which determine cell shape and cellular viscoelasticity. (Dr. Elson)

Structure and function of macromolecules involved in platelet aggregation and in Dictyostelium chemotaxis.

(Dr. Frazier)

Actin polymerization 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. J. Gordon)

Protein chemistry; protein sequence analyses; structure and function of enzymes—collagenases, dehydrogenases, serine proteases; site specific mutagenesis. (Dr. Grant)

Computer methods in biochemistry and mass spectrometry. Modelling the development of multicellular structures. (Dr. Holmes)

Structure of the oligosaccharides of soluble and membrane glycoproteins and their interactions with lectins.

(Dr. R. Kornfeld)

Transcriptional regulation of retroviral gene expression. (Dr. Majors)

Mechanism of action of insulin and growth hormones; phosphorylation of proteins on tyrosine. (Dr. Pike)

Membrane biochemistry of prokaryotes and eukaryotes. (Dr. Silbert)

Gene structure and protein biosynthesis in eukaryotes. Cloning, translation and compartmentalization of secretory, mitochondrial, and membrane protein.

(Dr. Strauss)

Plant molecular biology; regulation of gene expression by the plant hormones auxin and ethylene. (Dr. Theologis)

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 532. Biochemistry of the Extracellular Matrix

Bio 5341. Principles of Gene Manipulation

Bio 5351. Molecular Biology

Bio 537. Protein Chemistry and Enzyme Mechanisms

Bio 538. Structure and Function of Cell Membranes and Surfaces

Bio 5451. Introductory Biophysical Chemistry

Bio 548. Nucleic Acids and Protein Biosynthesis

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 Biological Chemistry



Professor and Head of Department

Luis Glaser, B.A., University of Toronto, 1953; Ph.D., Washington University, 1956.

Professors

Leonard J. Banaszak, B.S., University of Wisconsin, 1955; M.S., Loyola University, 1960; Ph.D., 1961. (See Department of Cell Biology and Physiology.)

Barbara I. Brown, B.A., Smith College, 1946; Ph.D., Yale University, 1950.

David H. Brown, B.S., California Institute of Technology, 1942; Ph.D., 1948. (See Administration.)

Jonathan B. Cohen, B.A., Harvard College, 1966; M.A., 1967; Ph.D., 1972. (See Department of Anatomy and Neurobiology.)

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.

Elliot L. Elson, B.A., Harvard College, 1959; Ph.D., Stanford University, 1966.

Carl Frieden, B.A., Carleton College, 1951; Ph.D., University of Wisconsin, 1955.

Craig M. Jackson, B.S., Washington State University, 1963; 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.)

Michael W. Lieberman, B.A., Yale University, 1963; M.D., University of Pittsburgh, 1967; Ph.D., 1972.

Philip W. Majerus, 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 Cell Biology and Physiology.)

F. Scott Mathews, B.S., University of California, 1955; Ph.D., University of Minnesota, 1959. (See Department of Cell Biology and Physiology.)

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.

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

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 Wichita, 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

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

Oscar P. Chilson, 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 Anatomy and Neurobiology.)

Jeffrey I. Gordon, A.B., Oberlin College, 1969; M.D., University of Chicago, 1973. (See Department of Medicine.)

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 F. 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.)

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

Research Associate Professor

Carl D. Rhodes, A.B., University of North Carolina at Chapel Hill, 1963; Ph.D., The Johns Hopkins University, 1971.

Assistant Professors

Jens J. Birktoft, Cand. Scient., University of Copenhagen, Denmark, 1967.

Peter M.J. Burgers, B.Sc., State University of Leiden, The Netherlands, 1969; M.S., 1972; Ph.D., 1977.

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

Linda C. Kurz, A.B., Washington University, 1967; Ph.D., 1973.

Robert L. Low, A.B., University of California, 1970; Ph.D., University of Chicago, 1975; M.D., 1977.

John E. Majors, B.S., University of Washington, 1970; Ph.D., Harvard University, 1977.

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 Medicine.) (Jewish Hospital.)

Linda J. Pike, B.S., University of Delaware, 1975; Ph.D., Duke University, 1980.

J. Evan Sadler, A.B., Princeton University, 1973; Ph.D., Duke University Medical Center, 1978; M.D., 1979. (See Department of Medicine.)

Anthanasios Theologis, B.A., Agricultural College of Athens, 1967; M.A., University of California, 1973; Ph.D., 1979.

Douglas M. Tollefsen, B.A., Grinnell College, 1970; Ph.D., M.D., Washington University, 1977.

Richard Wrenn, B.S., Virginia Polytech and State University, 1972; M.S.E.E., Washington University, 1975; D.S.C., 1979. (Also Department of Electrical Engineering.)

Research Assistant Professor

Andrew N. Tyler, B.Sc., University of Manchester, 1979; Ph.D., University of Manchester Institute of Science and Technology, 1979.

Instructors

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

Walter L. Nulty, Jr., B.A., Southern Illinois University, 1956.

Lecturer

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



Department of Cell Biology and Physiology

The department offers instruction to medical and graduate students. A Cell Biology course (taught jointly with the Department of Anatomy and Neurobiology) in the first trimester of the first year of the medical curriculum deals with introductory cell physiology, and cellular biophysics. A Physiology course in the second and third trimesters of the first year is designed to provide students with a foundation for their further study of clinical and applied physiology. The department also offers a Neural Sciences course (jointly with Anatomy and Neurobiology) in the third trimester dealing with the anatomy and physiology of the nervous system. In addition, advanced courses open to medical and graduate students provide for more detailed study of specific areas of cell biology, physiology, and cellular biophysics.

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. Electron microscopy of nerve and muscle is used to relate structure and function in these tissues.



FIRST YEAR

Bio 502. 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 5061. Cell Biology

A course offered jointly with the Department of Anatomy and Neurobiology, covering fundamental aspects of cell morphology and cell physiology.

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^+ , Mg^{2+}) 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)

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)

Developmental neurobiology. (Dr. Jeff W. Lichtman)

Determination of protein structures by x-ray diffraction methods. Flavoenzymes, iron-sulfur proteins, glycoproteins, and proteins involved in transcription 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)

Research in peripheral auditory mechanisms. Development of theory of asynchronous circuits and systems. Design of specialized computer equipment for biomedical applications, such as collection, analysis, and modeling. (Dr. Charles E. Molnar)

Tissue culture and immunohistofluorescent studies of neuronal migration in the developing mammalian cerebral cortex. (Dr. Alan L. Pearlman)

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. 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 residue 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)

Development of the cerebral cortex. (A.L. Pearlman)

Biophysics and neurobiology of the auditory system. (D.O. Kim)

Biophysics and physiology of mechanoreceptors in muscle. (Y. Fukami)

Synapse formation. (J.R. Sanes)

Developmental neurobiology. (J.W. Lichtman)

Neurophysiology of the lamprey central nervous system. (C.M. Rovainen)



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 electron microscopy. (J.E. Heuser)

Mathematical and computational techniques in auditory research. (C.E. Molnar)

Computer-based acquisition and analysis of biological signals. (L.J. Thomas, Jr.)

X-ray crystallography and molecular modeling proteins. (F.S. Mathews)

ELECTIVES

Descriptions of the following courses may be found under the Division of Biology and Biomedical Sciences.

Bio 458. Neurobiology and Biophysics of the Ear

Bio 459. Vision

Bio 511. Intracellular Transport of Macromolecules

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

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 Cell Biology and Physiology



Edward Mallinckrodt, Jr. Professor and Head of Department

Philip D. Stahl, B.S., West Liberty State College, 1964; Ph.D., West Virginia University, 1967.

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

Joel E. Brown, B.S., Massachusetts Institute of Technology, 1960; M.S., 1960; Ph.D., 1964. (See Departments of Ophthalmology and Anatomy and Neurobiology.)

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 Science.)

Nigel W. Daw, 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.

John E. Heuser, B.A., Harvard College, 1964; M.D., Harvard University, 1969.

Carlton C. Hunt, B.A., Columbia University, 1939; M.D., Cornell University, 1942.

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.)

Luis Reuss, B.A., University of Chile, 1957; M.D., 1964.

Albert Roos, M.D., University of Groningen, 1940. (See Department of Anesthesiology.)

Carl M. Rovainen, B.S., California Institute of Technology, 1962; Ph.D., Harvard University, 1967.

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

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, 1968. (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; D.Sc., Washington University, 1972.

Robert F. Miller, M.D., University of Utah, 1967. (See Department of Ophthalmology.)

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

Assistant Professors

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

Stanley Misler, B.S., City College of the City University of New York, 1970; M.D., New York University School of Medicine, 1977; Ph.D., New York University, 1977. (See Department of Medicine.)

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.

David Parkinson, B.Sc., University of Bath, 1976; Ph.D., Cambridge University, 1979.

Peter Reinach, B.A., New York University, 1964; Ph.D., New York University, 1972.

Robert S. Wilkinson, B.S., Rice University, 1968; M.A., University of Texas, Austin, 1970; Ph.D., 1974.

Instructor

Shirley A. Sahrman, 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.)

James S. McDonnell Department of Genetics

The McDonnell Department of Genetics provides a broad program of preclinical and graduate instruction in genetics, with research opportunities ranging from cell and molecular genetics to population genetics and genetic epidemiology. A medical genetics course offered in the third trimester of the first year provides a thorough introduction to human and clinical genetics. Advanced training in clinical genetics is available in the fourth year of study through the Division of Medical Genetics of the Departments of Medicine and Pediatrics.

Virtually all major areas of investigation in modern genetics are represented in the McDonnell Department of Genetics, and a broad range of research and graduate training opportunities is available. Advanced courses and seminars are offered in the areas of human genetics, molecular genetics, developmental genetics, gene expression, microbial genetics, immunogenetics, and population genetics. Extraordinary 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, including such subjects as clinical cytogenetics, molecular genetics, inborn errors of metabolism, genetic counseling, immunogenetics, population genetics, and genetic epidemiology. Lectures and clinical conferences only. Credit 2 units. Prerequisite, an introductory genetics course or permission of the instructor. Students may also qualify by attending several review lectures in genetics, which are given at the beginning of the first year. (Dr. Levine)

RESEARCH

Bio 590. Research Opportunities

Mechanisms of gene transposition and plasmid-host cell interactions. (Dr. Berg)
Neuroblastoma and oncogene activation. (Dr. Brodeur)
Genetics of psychiatric disorders. (Dr. Cloninger)
Molecular-genetic relationships of products of the major histocompatibility gene complexes. (Dr. Cullen)
Developmental genetics of *Drosophila*. (Dr. Duncan)
Molecular population genetics and evolution in bacteria. (Dr. Dykhuizen)

Genetics of psychiatric disease and behavioral genetics. (Dr. Gottesman)

Cellular immunology and the role of major histocompatibility gene products. (Dr. Hansen)

Experimental population genetics and molecular evolution. (Dr. Hartl)

Genetic disorders in amino acid metabolism. (Dr. Hillman)

Molecular population genetics. (Dr. Johnson)

Gene expression in yeast. (Dr. Johnston)

Human restriction fragment length polymorphisms as chromosome markers. (Dr. Lalouel)

Chemical properties and molecular structure of complement proteins. (Dr. Levine)

Molecular organization of eukaryotic chromosomes. (Dr. Olson)

Human population genetics and genetic epidemiology. (Dr. Rao)

Genetics of psychiatric disease. (Dr. Reich)

Theoretical population genetics. (Dr. Sawyer)

Molecular population genetics and life history in plant populations. (Dr. Schaal)

Immunogenetics and molecular genetics of the major histocompatibility gene complexes. (Dr. Shreffler)

Human population and anthropological genetics. (Dr. Suarez)

Population and developmental genetics in *Drosophila*. (Dr. Templeton)

Genetics of muscle development and nonsense suppressors in the nematode, *C. elegans*. (Dr. Waterston)

Molecular and population genetics of alcohol metabolism. (Dr. Yokoyama)

ELECTIVES

Bio 5271. Topics in Immunology: Immunogenetics.

Genetic and immunologic aspects of the major histocompatibility complex. (Drs. Shreffler, Hansen)

Bio 5281. Developmental Genetics.

Model systems in the study of genetic mechanisms underlying development, including examples from yeast, nematodes, *Drosophila*, mouse, and humans. (Dr. Waterston)

Bio 5244. Topics in Gene Expression.

Review and critical discussion of current research articles related to gene regulation, particularly in eukaryotes. (Dr. Waterston, Staff)

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

Daniel L. Hartl, B.S., University of Wisconsin, 1965; Ph.D., 1968. (Also Faculty of Arts and Sciences.)

Professors

Douglas E. Berg, B.S., Cornell University, 1964; Ph.D., University of Washington, 1969. (See Department of Microbiology and Immunology.)

C. Robert Cloninger, B.A., University of Texas, 1966; M.D., Washington University, 1970; M.D. (hon.), Umea University Sweden, 1983. (See Department of Psychiatry.)

Irving I. Gottesman, B.S., Illinois Institute of Technology, 1953; Ph.D., University of Minnesota, 1960. (See Department of Psychiatry.)

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.

Dabeeru C. Rao, B.S., Indian Statistical Institute, 1967; M.S., 1968; Ph.D., 1971. (See Departments of Preventive Medicine and Public Health and Psychiatry.)

Theodore Reich, B.S., McGill University, 1959; M.D., 1963. (See Department of Psychiatry.)

Stanley Sawyer, B.S., California Institute of Technology, 1960; Ph.D., 1964. (Also Faculty of Arts and Sciences.)

Donald C. Shreffler, B.S., University of Illinois, 1954; M.S., 1958; Ph.D., California Institute of Technology, 1962.

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

James P. Crane, A.B., Indiana University, 1966; M.D., 1970. (See Department of Obstetrics and Gynecology.)



Susan E. Cullen, B.S., College of Mount St. Vincent, 1965; Ph.D., Albert Einstein College, 1971. (See Department of Microbiology and Immunology.)

Ted H. Hansen, B.S., Michigan State University, 1970; M.S., University of Michigan, 1972; Ph.D., 1975.

Maynard V. Olson, B.S., California Institute of Technology, 1965; Ph.D., Stanford University, 1970.

Barbara A. Schaal, B.S., University of Illinois, 1969; M.Phil., Yale University, 1971; Ph.D., 1974. (Also Faculty of Arts and Sciences.)

Brian K. Suarez, B.A., San Fernando Valley State College, 1967; M.A., University of California, Los Angeles, 1972; Ph.D., 1974. (See Department of Psychiatry.)

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

Research Associate Professor

Daniel E. Dykhuizen, B.S., Stanford University, 1965; Ph.D., University of Chicago, 1971.

Assistant Professors

Garrett M. Brodeur, B.A., St. Louis University, 1971; M.D., Washington University, 1975. (See Department of Pediatrics.)

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.

Shozo Yokoyama, B.S., Miyazaki University, 1968; M.S., Kyushu University, 1971; Ph.D., University of Washington, 1977. (See Department of Psychiatry.)

Research Assistant Professors

Miroslav Hauptfeld, M.D., University of Zagreb, 1963.

Vera Hauptfeld, Ph.D., Charles University, 1968.

Donald G. Moerman, B.Sc., Simon Fraser University, 1973; Ph.D., 1980.

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. Cryer*

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*

Pulmonary Diseases, *Drs. McDonald, 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 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 is 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. Tuteur 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)

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 and St. Louis Veterans Administration 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, 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. Studies related to complement deficiency states and immunogenetics of complement proteins in humans and animals and biosynthesis genetics and structure-function relationships of complement receptors and complement regulatory proteins. (Dr. Atkinson)

2. Structure of the human major histocompatibility complex (HLA) antigens. Mechanisms of HLA and disease association. (Dr. Schwartz)

3. 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 service, on the Cardiology Consultation team and in the Cardiac Diagnostic Laboratory. Particular emphasis will be placed on clinical diagnosis, electrocardiography and the non-invasive techniques. (Dr. Geltman and Staff)

(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. (Drs. R. Paine, G. Clark, S. Brodarick, D. Bauwens, and S. Gowda)

(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. In addition, students may observe procedures in the cardiac catheterization laboratory. (Drs. Kleiger, Krone, and Staff)

(d) Cardiac Catheterization and Hemodynamics. Highly specialized elective. Four 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. (Dr. Ludbrook and Staff)

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

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

(g) Research. Minimum of 12 weeks, all day.
1. External assessment of myocardial metabolism and ischemic injury with positron-emitting isotopes. (Dr. S. Bergmann)

2. Experimental analysis of mechanisms of arrhythmia. (Dr. Corr)

3. Exercise physiology. (Dr. Ehsani)

4. Hemodynamics, myocardial mechanics, and ventricular function (cardiac catheterization). (Dr. Ludbrook)

5. Ultrasonic assessment of cardiac metabolism. (Dr. Perez)

6. 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. (Dr. Eisen and Staff)

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

1. Biochemistry and regulation of mammalian connective tissue degradation. (Drs. Bauer, Eisen, Grant, Jeffrey, Seltzer, and Welgus)

2. Origins of DNA replication in mammalian cells. (Dr. G. Goldberg)

3. Biochemical studies on the control of cellular differentiation of the medically important systemic mycotic agents in particular *Histoplasma capsulatum*. (Dr. Kobayashi)

Gastroenterology

(a) Clinical Gastroenterology. Four 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, observe biopsy, endoscopic and intubation techniques, and participate in the conferences and clinics run by the Division. (Dr. Zuckerman)

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

1. Synthesis and processing of intestinal proteins; regulation of protein and mRNA concentrations after fat feeding. Emphasis will be on cell surface proteins, including the receptor for intrinsic factor-cbl. (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

Clerkship in Primary Care in General Internal Medicine is designed to provide the student with firsthand 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 clerkship is direct patient care under the supervision of senior internists who are members of the group.

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

Geriatric Medicine

Clinical Geriatrics. Six weeks, all day. Students participate in management of inpatients seen in consultation and outpatients in Geriatric Clinic. Attendance at research and clinical conferences and teaching rounds in geriatric medicine required. (Drs. Peck, Birge, Davis, and Staff)

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)

(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 selected solid tumors. Emphasis is placed on attempts to develop curative therapy utilizing bone marrow transplantation. (Drs. G. Herzig and R. Brown)



(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.

1. Biochemistry and mechanisms of action of the platelet-derived growth factor (PDGF). (Dr. T. Deuel)

2. Biochemistry of mammalian cell membranes.

(Drs. R. Kornfeld, S. Kornfeld)

3. Biochemistry of platelets, regulation of lipid metabolism in tissue culture; mechanism of platelet thrombus formation. (Dr. Majerus)

4. Molecular biology of hormonally regulated genes; characterization of the thial protease gene family.

(Dr. Rogers)

5. 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.

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. The molecular biology of varicella-zoster virus. Varicella-zoster virus infection, latency, and oncogenicity. (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. Elective is designed to teach the student how the vast array of clinical assays are used in the diagnosis of disease and how the tests are actually performed in the clinical laboratory.

(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. Studies on the control of cellular differentiation of the medically important systemic mycotic agents in particular *Histoplasma capsulatum*. (Dr. Kobayashi)

3. Mechanisms and genetic basis of antimicrobial resistance in enterococci, drug action and resistance in *Plasmodium falciparum*, red cell deformability and parasite growth, epidemiology of nosocomial infection.

(Dr. Krogstad)

4. Electrolyte partition in biological fluids.

(Dr. Ladenson)

5. Study of development of mammalian nervous system; with specific focus on differentiation of the neural crest, the precursor of peripheral nervous system.

(Dr. Milbrandt)

6. Research focuses upon the cellular mechanism of insulin action and the intracellular mechanism of Ca^{2+} homeostasis and the role of intracellular Ca^{2+} in metabolic regulation.

(Dr. McDonald)

7. Relationship between IgG subclass restriction to many pyogenic infections using hybridomas to B-lymphocytes.

(Dr. Nahm)

8. Analytical techniques and theoretical concepts underlying the field of medical decision analysis are investigated.

(Dr. Parvin)

9. Research elective designed to familiarize student with fundamental concepts and techniques of histocompatibility and transplantation immunology.

(Dr. Rodey)

10. Research is aimed at defining the mechanisms of cell-cell and cell-substrate adhesion as manifest by the blood platelet.

(Dr. Santoro)

11. Ongoing projects involve the study of arachidonic acid metabolism with liquid chromatographic, gas chromatographic, and mass spectrometric methods.

(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. Cryer, Daughaday and Staff)

(b) Bone and Mineral Metabolism. Jewish Hospital. Designed to acquaint students with clinical, radiological, and pathological manifestations of generalized disorders of endocrinology and of the skeleton and to expose him to current concepts of therapy.

(Drs. Avioli, S. Birge, Chase, and Whyte)

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

1. Research activities involve analysis of age-related changes on membrane-transport activities, alterations in cellular metabolism, calcium control and energy utilization.

(Dr. Avioli)

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. C. Daughaday, McDonald, 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) Students will be introduced to large animal models of acute lung injury and techniques involving positron emission tomography, nuclear medicine, and pulmonary physiology.

(Dr. Schuster)

(d) Research elective. Students will be introduced to contemporary methods to study the interaction of cells with extracellular matrix molecules important in wound healing and repair and embryogenesis.

(Dr. McDonald)



Renal Disease

(a) Clinical Nephrology. Barnes Hospital, six weeks, all day. Study of patients with renal disease and electrolyte disorders. (Drs. Klahr, Slatopolsky, 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. Pathophysiology of chronic renal disease, glomerulonephritis, and obstructive uropathy. (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)

3. Studies of solute transport in isolated membrane vesicles from renal tubular cells. Studies of protein phosphorylation through the activity of membrane bound protein kinase. (Dr. Hammerman)

4. Cellular mechanisms of parathyroid hormone action. Renal phospholipid metabolism and effects of parathyroid hormone. (Dr. Hruska)

5. Methodology of ion transport and principles of energy transfer and ion transfer. Studies on the mechanisms of renal injury in urinary tract obstruction. (Dr. Klahr)

6. Studies on the metabolism of parathyroid hormone by isolated adult perfused bone. Studies on parathyroid hormone receptors in kidney membranes with emphasis on their function in diseased states. (Dr. K. Martin)

7. Clinical and metabolic studies in patients with end stage renal disease and hemodialysis patients. (Dr. Delmez)

8. Mechanisms of modulation of neuromuscular transmission by cations, repetitive stimulation, neurotoxins, osmotic pressure and regulatory neuropeptides. (Dr. Misler)

9. Studies on the biochemical control of parathyroid hormone biosynthesis, intracellular processing and secretion. (Dr. Morrissey)

10. Structural-functional correlations in renal disease. Studies on the pathophysiology of acute and chronic renal failure. (Dr. Purkerson)

11. 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)

12. Immunopathology of renal diseases: Role of macrophage in renal disease. (Dr. Schreiner)

13. Studies of renal transport using isolated membrane vesicles. (Dr. Schwab)

14. Transport studies using isolated renal and basolateral membranes with particular emphasis on the role of starvation and acid base disorders in transport functions. (Dr. Windus)

Section of Applied Physiology

(a) Clinical Elective. Exercise in Medicine and Preventive Medicine. Six weeks, all day. Students will participate as members of Applied Physiology Section's clinical team, doing exercise-testing, with measurement of oxygen uptake and cardiac output, and metabolic studies; and working with patients with coronary artery disease, diabetes, and/or hypertension who are undergoing exercise-training as part of their treatment. (Drs. Ehsani, Hagberg, Dalsky, and Holloszy)

(b) Research Elective. Physiology and Biochemistry of Exercise. Research deals with the acute and chronic responses to exercise. Areas include acute and long term metabolic and cardiovascular adaptations to exercise that have relevance to the prevention and treatment of coronary artery disease, diabetes, osteoporosis, and hypertension, and to slowing the decline in functional capacity with aging. (Drs. Holloszy, Ehsani, Hagberg, and Dalsky)

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

William A. Peck, A.B., Harvard University, 1935; M.D., University of Rochester, 1960.

Professors Emeriti

Carl G. Harford, A.B., Amherst College, 1928; M.D., Washington University, 1933.

Virginia Minnich, B.S., Ohio State University, 1937; M.S., Iowa State College, 1938.

Edward H. Reinhard, A.B., Washington University, 1935; 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

David H. Alpers, A.B., Harvard University, 1956; M.D., 1960.

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.)

Sydney M. and Stella H. Schoenberg Professor

Louis V. Avioli, B.A., Princeton University, 1953; M.D., Yale University, 1957.

Eugene A. Bauer (Dermatology), B.S., Northwestern University, 1963; M.D., 1967.

John Pope Boineau, B.S., University of South Carolina, 1955; M.D., Duke University, 1959. (See Department of Surgery.)

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.)

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

Philip E. Cryer, 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.)

Irene E. and Michael M. Karl Professor of Endocrinology and Metabolism

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.)

The Winfred A. and Emma R. Showman Professor of Dermatology

Arthur Z. Eisen (Dermatology), A.B., University of Buffalo, 1951; Sc.M., Brown University, 1953; M.D., University of Pennsylvania, 1957.

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

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

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.)

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

Stephen S. Lefrak, A.B., Colgate University, 1960; M.D., State University of New York, Downstate, 1965.





J. Russell Little, Jr., A.B., Cornell University, 1952; M.D., University of Rochester, 1956. (See Department of Microbiology 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.)

M. Alan Permutt, A.B., Johns Hopkins University, 1961; M.D., Washington University, 1965.

H. Mitchell Perry, Jr., M.D., Washington University, 1946.

Selma and Herman Seldin
Professor of Medicine

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.)

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.)

Robert M. Senior, A.B., Oberlin College, 1957; M.D., George Washington University, 1961.

Barry A. Siegel, A.B., Washington University, 1965; M.D., 1969. (See Department of Radiology.)

Eduardo Slatopolsky, M.D., University of Buenos Aires, 1959.

The Tobias and Hortense Lewin
Professor of Cardiovascular Diseases

Burton E. Sobel, A.B., Cornell University, 1958; M.D., Harvard University, 1962.

John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration and Department of Preventive Medicine and Public Health.)

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)

I. J. Fance, A.B., Washington University, 1931; M.D., 1935.

Bernard T. Garfinkel, M.D., Washington University, 1948.

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

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

Harold J. Joseph, B.A., University of Texas, 1947; M.D., 1950.

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 C. Packman, A.B., Washington University, 1953; B.S. Med., University of Missouri, 1954; M.D., Washington University, 1956.

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

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.)

Stanley J. Birge, Jr., B.A., Amherst College, 1959; M.D., Washington University, 1963.

Eric D. Brown, A.B., Harvard University, 1971; M.D., 1975. (See Department of Microbiology and Immunology.)

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

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.)

James A. Delmez, A.B., Washington University, 1969; M.D., University of Rochester, 1973.

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 Walter Johnson Institute of Rehabilitation.)

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

James R. Gavin, III, B.S., Livingstone College, 1966; Ph.D., Emory University, 1970; M.D., Duke University, 1975.

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

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

Jeffrey I. Gordon, A.B., Oberlin College, 1969; M.D., University of Chicago, 1973. (See Department of Biochemistry.)

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

Marc R. Hammerman, Established Investigator of the American Heart Association; A.B., Washington University, 1969; M.D., 1972.

Geoffrey P. Herzig, 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.

Allan S. Jaffe, B.S., University of Maryland, 1968; M.D., 1973.

Donald J. Krogstad, 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., (Howard Hughes Medical Institute Associate Investigator in Medicine.), A.B., Princeton University, 1966; M.D., Harvard University, 1970. (See Department of Microbiology and Immunology.)

Louis G. Lange, III, Established Investigator of the American Heart Association; A.B., University of Rochester, 1970; M.D., Harvard University, 1976; Ph.D., 1976.

Richard P. MacDermott, B.A., Oberlin College, 1965; M.D., Ohio State University, 1969.

John A. McDonald, B.A., University of South Florida, 1965; M.S., 1967; Ph.D., Rice University, 1970; M.D., Duke University, 1973. (See Department of Biochemistry.)

Kevin J. Martin, M.B., B.Ch., B.A.O., University College of Dublin, 1971.

Aubrey R. Morrison, 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.)

Samuel A. Santoro, B.S., Emory University, 1972; M.D., Vanderbilt University, 1979; Ph.D., 1979. (See Department of Pathology.)

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

William F. Stenson, B.A., Providence College, 1967; M.D., Washington University, 1971.

Douglas M. Tollefsen, B.A., Grinnell College, 1970; M.D., Washington University, 1977; Ph.D., 1977.

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

H. James Wedner, A.B., Cornell University, 1963; M.D., 1967.

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 Associate Professors

Norma A. Fletcher, M.S., Technical University, 1949; Ph.D., University of Copenhagen, 1965.

James M. Hagberg, B.S., Carthage College, 1972; M.S., University of Wisconsin, 1974; Ph.D., University of Wisconsin, 1976.

Robert P. Mecham, B.S., University of Utah, 1973; Ph.D., Boston University, 1976.

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.)

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

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

Associate Professors Emeriti (Clinical)

James W. Bagby (Dermatology), A.B., University of Missouri, 1930; B.S.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, 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.)

Melvin L. Goldman, A.B., Washington University, 1939; M.D., 1943.

Siddhesh Gowda, M.B., B.S., Medical College Bellary Mysore, 1969.

James N. Heins, A.B., University of Louisville, 1957; M.D., 1961.

- Owen S. Kantor, M.D., University of Missouri, 1968.
- Robert S. Karsh, A.B., Washington University, 1951; M.D., 1952.
- John J. Kelly, B.S., Rockhurst College, 1959; M.D., St. Louis University, 1963.
- Charles Kilo, M.D., Washington University, 1959.
- Philip E. Korenblat, M.D., University of Arkansas, 1960.
- Joseph Levitt, M.D., Washington University, 1949.
- 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.
- William E. Magee, M.D., Duke University, 1950.
- 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.
- Charles C. Norland, B.S., Washington State University, 1955; M.D., Washington University, 1959.
- 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.)
- William D. Perry, A.B., Northwest Missouri State College, 1943; B.S. Med., University of Missouri, 1945; M.D., Washington University, 1947.
- Lester T. Reese (Dermatology), M.D., Tulane University, 1966.
- Ernest T. Rouse, B.S., Alabama Polytechnic Institute, 1939; M.D., Washington University, 1943.
- Shabbir H. Safdar, F.Sc., Government College Jhang, 1954; M.D., Nishtar Medical College, 1961.
- 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.
- Alan N. Weiss, B.A., Ohio State University, 1963; M.D., 1966.
- Alvin S. Weneker, A.B., Washington University, 1949; M.D., 1953.
- Assistant Professors**
- Benico Barzilay, B.S., Case Western Reserve, 1974; M.D., University of Illinois, 1978.
- Elsa Bello-Reuss, B.A., University of Chile, 1957; M.D., 1964. (See Department of Cell Biology and Physiology.)
- Steven R. Bergmann (Medical Physiology), B.A., George Washington University, 1972; Ph.D., Hahnemann Medical College, 1977.
- George J. Broze, Jr., B.S., University of Washington, 1968; M.D., Washington University, 1972.
- Michael E. Cain, B.A., Gettysburg College, 1971; M.D., George Washington University, 1975.
- Edward J. Campbell, B.S., Purdue University, 1969; M.D., Washington University, 1972.
- Kwok-Ming Chan, Ph.D., University of South Dakota, 1977. (See Department of Pathology.)
- David D. Chaplin (Howard Hughes Medical Institute Associate Investigator), A.B., Harvard College, 1973; M.D., Ph.D., Washington University, 1980. (See Department of Microbiology and Immunology.)
- Ray E. Clouse, B.S., Purdue University, 1973; M.D., Indiana University, 1976.
- William E. Clutter, B.S., Ohio State University, 1972; M.D., 1975. (Also Clinical Research Center.)
- Jonathan A. Cohn, B.A., Harvard University, 1972; M.D., Cornell, 1978.
- Carlos C. Daughaday, A.B., Harvard University, 1967; M.D., Washington University, 1971.
- Keith A. Fox, B.Sc., University of Edinburgh, 1972; M.B.Ch.B., 1974; M.R.C.P., Royal College of Physicians, 1977.
- Mark E. Frisse, B.S., University of Notre Dame, 1974; M.D., Washington University, 1978.
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- Richard W. Gross, A.B., Columbia College, 1972; M.D., New York University, 1976; Ph.D., Washington University, 1982.
- Guner B. Gulmen, M.D., Hacettepe University, 1969. (See Medical Care Group.)
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- Scot G. Hickman, A.B., Duke University, 1966; M.D., Washington University, 1970.
- Sung Soon Kim, M.D., 1970; M.S., 1974; D.M.S., Yonsei University Graduate School, 1979.
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Research Assistant Professor Emeritus

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Research Assistant Professors

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

Thomas W. Allen (Education), B.A., Cornell College, 1960; Ed.D., Harvard University, 1966. (Also Graduate Institute of Education.)

Hans D. Ambos

Janina M. Brajtburg, M.S., University of Lodz, 1950; Ph.D., 1968.

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Assistant Professors Emeriti (Clinical)

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Assistant Professors (Clinical)

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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.

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Benjamin M. Goldstein, A.B., Washington University, 1960; M.D., 1964.

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Morris Joftus, M.D., University of Illinois, 1967.

William G. Juergens, Jr., M.D., Washington University, 1961.

Robert L. Kaufman, A.B., Washington University, 1959; M.D., 1963.

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Robert E. Kraetsch, B.S., University of Illinois, 1965; M.D., Washington University, 1969.

Ralph F. Kuhlman, M.D., University of Illinois, 1964. (Also Student Health Service.)

Jerrold J. Lander, A.B., Washington University, 1964; M.D., 1968.

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

Morton A. Levy, B.A., University of California at Los Angeles, 1957; M.D., Washington University, 1961.

- Douglas R. Lilly, A.B.**, Princeton University, 1952; M.D., Washington University, 1956.
- Warren M. Lonergan, A.B.**, Westminster College, 1936; M.D., Vanderbilt University, 1940.
- Jay Michael Marion, B.S.**, University of Missouri, 1973; M.D., Vanderbilt University, 1977.
- Jay P. Marshall II, B.S.**, DePauw University, 1968; M.D., University of Missouri, 1972.
- Thomas F. Martin, B.S.**, St. Louis University, 1961; M.D., 1965.
- Robert S. Mendelsohn, B.A.**, Washington and Lee University, 1950; M.D., Washington University, 1954.
- Paul A. Mennes, B.S.**, University of Wisconsin, 1966; M.D., Washington University, 1970.
- J. Roger Nelson, A.B.**, Washington University, 1949; M.D., 1953.
- Leonard N. Newmark, A.B.**, Washington University, 1956; A.M., 1959; M.D., 1963.
- Gordon Newton, M.D.**, University of Arkansas, 1958.
- Scott M. Nordlicht, B.A.**, Columbia University, 1969; M.D., State University of New York, Downstate, 1973.
- David W. Orbals, B.S.**, St. Louis University, 1966; M.D., Washington University, 1970.
- James W. Owen, Jr., M.D.**, Washington University, 1946.
- James C. Peden, Jr., A.B.**, Haverford College, 1951; M.D., Washington University, 1955.
- William J. Phillips, B.A.**, Oklahoma State University, 1959; M.D., Washington University, 1963.
- 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, B.S.**, University of Detroit, 1954; M.D., Marquette University, 1964.
- Gary A. Ratkin, B.A.**, Rice University, 1963; M.D., Washington University, 1967. (See Department of Radiology.)
- Ronald N. Riner, A.B.**, Princeton University, 1970; M.D., Cornell Medical College, 1974.
- 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.
- Joseph F. Ruwittch, Jr., M.D.**, Washington University, 1966.
- Ali Salimi, M.D.**, University of Tehran, 1965.
- Samuel E. Schechter, M.D.**, Washington University, 1941.
- William F. Southworth, B.A.**, Washington University, 1969; M.D., 1975.
- Alan R. Spivack, A.B.**, Washington University, 1960; M.D., St. Louis University, 1964.
- Linda G. Stanton, B.A.**, Swarthmore College, 1972; M.D., Boston University, 1979.
- Paul M. Stein, A.B.**, University of Rochester, 1967; M.D., St. Louis University, 1971.
- Kongsak Tanphaichitr, M.D.**, Siraraj Hospital Medical School, 1970.
- Robert M. Taxman, A.B.**, Washington University, 1960; M.D., 1964.
- Elliot A. Wallach (Dermatology)**, B.S., College of William and Mary, 1942; M.D., St. Louis University, 1945.
- James W. Walsh, A.B.**, Washington University, 1950; M.D., 1954.
- Gerald A. Wolff, A.B.**, Harvard University, 1955; M.D., Washington University, 1961.
- John A. Wood, M.D.**, Oklahoma University, 1968.
- Herbert B. Zimmerman, M.D.**, Washington University, 1951.
- Instructors**
- David Ban, B.A.**, Kalamazoo College, 1976; M.D., University of Oregon, 1980.
- Joseph J. Billadello, B.S.**, SUNY at Stony Brook, 1973; M.D., Georgetown University, 1978.
- Randy A. Brown, B.S.**, Stanford University, 1975; M.D., Case Western Reserve, 1979.
- Greta Camel, A.B.**, University of Wisconsin, 1946; M.D., 1949.
- Paula B. Davis, B.S.**, Rensselaer Polytechnic Institute, 1975; M.D., Case Western Reserve, 1979.
- Paul R. Eisenberg, B.S.**, Tulane University, 1975; M.P.H. and T.M., Tulane School of Public Health, 1980; M.D., New York Medical College, 1980.
- Alex Stevens Evers, B.S.**, Yale University, 1974; M.D., New York University, 1978. (See Department of Anesthesiology.)
- Debra L. Haire-Joshu, B.S.**, Southern Illinois University, 1975; M.D., 1978.
- V. Michael Holers (Howard Hughes Medical Institute Research Associate)**, B.S., Purdue University, 1973; M.D., Washington University, 1978.
- Jeffrey Kaine, B.S.**, University of Michigan, 1974; M.D., Yale University, 1979.
- Joseph L. Kenzora, M.D.**, University of New Mexico Medical School, 1975.
- Kwangsup S. Kim, M.D.**, Seoul National University, 1963. (See Medical Care Group.)
- Sandor J. Kovacs, B.S.**, Cornell University, 1969; M.S., California Institute of Technology, 1972; Ph.D., 1977; M.D., University of Miami, 1979.
- Laurel Krewson, B.S.**, Carroll College, 1974. (See Department of Pathology.)
- Roop Lal, M.B.**, B.S., Osmania Medical College, 1970; M.D., 1975.
- Bruce D. Lindsay, B.S.**, Eckerd College; M.D., Jefferson Medical College, 1977.
- Michael B. Lippmann, B.A.**, SUNY, 1975; M.D., 1977.
- Gary F. Marklin, B.A.**, University of Missouri, 1975; M.A., 1979; M.D., 1980.
- Matthew J. Orland, B.S.**, Yale University, 1975; M.D., University of Miami, 1979.
- MaryBeth Pereira, B.S.**, Swarthmore College, 1973; M.D., University of California, San Diego, 1978.
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- Marcos Rothstein, B.S.**, Maristas College, 1968; M.D., University of Zulia, 1974.
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Research Instructors

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Instructors Emeriti (Clinical)

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Instructors (Clinical)

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William W. Benedict, B.S., University of Illinois, 1971; M.D., Washington University, 1975.

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- Jeffrey S. Brooks** (Podiatry), B.S., University of Missouri, 1969; D.P.M., New York College of Podiatric Medicine, 1974.
- J. William Campbell**, B.A., 1973; M.D., Washington University School of Medicine, 1977.
- Kim A. Carmichael**, B.S., Duke University, 1974; M.D., Medical College of Virginia, 1978.
- John M. Cary**, A.B., Central College, 1954; M.D., St. Louis University, 1958.
- John A. Chanasue** (Dermatology), B.S., McGill University, 1972; M.D., New York University, 1976.
- Margaret Chieffi**, M.D., University of New Zealand, 1937.
- Duck Sung Chun**, M.D., Seoul National University College of Medicine, 1969.
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- Frank Cohen**, M.D., University of Toronto, 1939.
- Robert B. Cusworth**, B.S., William and Mary College, 1970; M.D., University of Rochester, 1974.
- Rand E. Dankner**, B.A., University of Pennsylvania, 1974; M.D., Baylor College of Medicine, 1978.
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- Gary L. Jones**, M.D., Baylor College of Medicine, 1977.
- Daniel K. Lane** (Dermatology), B.A., Princeton University, 1955; M.D., Washington University, 1959.
- Ellis S. Lipsitz**, A.B., Yale University, 1940; M.D., St. Louis University, 1943.
- Carl A. Lyss**, A.B., Washington University, 1952; B.S., 1952; M.D., 1956.
- David M. Margolis**, B.Sc., University of Manitoba, 1971; M.D., 1971.
- 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.)
- Henry E. Mattis**, B.S., University of Illinois, 1971; M.D., Washington University, 1975.
- Charles W. Miller** (Dermatology), B.S., Trinity College, 1968; M.D., Washington University, 1972.
- Austin F. Montgomery**, M.D., University of Pittsburgh, 1954.
- Arlen E. Morrison**, A.B., Washington University, 1954; M.D., 1958.
- Frede Mortensen**, B.A., Wagner College, 1949; M.D., New York Medical College, 1953.
- 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.)
- S. Michael Orgel**, A.B., Washington University, 1960; M.D., St. Louis University, 1965.
- Robert F. Owen**, B.A., Princeton University, 1948; M.D., Yale University, 1952.
- J. Kevin Poitras** (Dermatology), B.S., University of Maryland, 1975; M.D., Georgetown University, 1979.
- John A. Powell** (Dermatology), B.S., University of Notre Dame, 1967; M.D., University of Michigan, 1971.
- Ernest T. Rouse III**, B.A., Princeton University, 1967; M.D., Washington University, 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.
- Robert J. Scheff**, A.B., Dartmouth College, 1970; M.D., Washington University, 1974.
- Robert J. Schneider**, A.B., Johns Hopkins University, 1973; M.D., 1976.
- Susan B. Schneider**, A.B., Swarthmore College, 1973; M.D., Yale University, 1977.
- John S. Schoentag** (Dermatology), A.B., University of Missouri, 1956; M.D., Washington University, 1960.
- Kenneth E. Shafer**, B.A., College of Wooster (OH), 1975; M.D., St. Louis University, 1979.
- Anil S. Shah**, B.S., St. Xavier's College, University of Gujarat, 1972; M.D., Smt. N.H.L. Medical College, Agnedabad, India, 1978.
- Bharat J. Shah**, M.B., B.S., Guharat University, 1973.

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

Gerald S. Shatz, B.A., Northwestern University, 1970; M.D., Washington University, 1974.

Bernard L. Shore, B.S., Washington University, 1972; M.D., 1977.

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

Donald A. Skor, B.A., Washington University, 1973; M.D., Rush Medical College, 1978.

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

Rand Sommer, B.S., Davidson College, 1976; M.D., Washington University, 1980.

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.)

William M. Thomson, B.S., Davidson College, 1969; M.D., Johns Hopkins University, 1973.

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

Alice W. Trotter, B.A., Mount Holyoke College, 1962; M.D., Washington University, 1969.

Dolores R. Tucker (Dermatology), B.S., St. Mary's of Notre Dame, 1958; M.D., Washington University, 1974.

John H. Uhlemann (Dermatology), B.A., Grinnell College, 1967; M.D., Washington University, 1971.

Albert L. Van Amburg III, A.B., Washington University, 1968; M.D., 1972.

Richard C. Walters (Dermatology), B.S., University of Illinois, 1969; M.D., Washington University, 1973.

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

James R. Wiant, A.B., Princeton University, 1955; M.D., Jefferson Medical College, 1959.

Herbert C. Wiegand, A.B., Washington University, 1940; M.D., 1943.

R. Jerome Williams, Jr., A.B., Harvard University, 1973; M.D., Duke University, 1977.

Edward M. Wolfe (Dermatology), B.A., Hobart College, 1956; M.D., Washington University, 1960.

James A. Wood, A.B., Westminster College, 1947; M.D., Washington University, 1949.

Research Associates

Thorbjorn Amundsen, M.D., Autonomous University of Guadalajara School of Medicine, 1977.

Su Li Cheng, B.S., National Taiwan University, 1971; M.S., 1973; Ph.D., University of Louisville, 1978.

Michael Crowley, B.S., University of Missouri, 1974; Ph.D., University of Florida, 1982.

Teresa A. Davis, B.S., University of Tennessee, 1975; M.S., 1976; Ph.D., 1980.

Svetlana G. Elberg, B.S., University of Kharkov, 1954; M.S., 1959.

Walter T. Gregory, B.S., St. Louis University, 1960.

Hidemi Ishii, B.S., Tokyo College of Pharmacy, 1979; Ph.D., 1977.

Annemarie Kronberger, B.S., University of Vienna, 1965; Ph.D., University of Salzburg, 1978.

Katherine D. Little, B.S., Illinois Wesleyan University, 1952; Ph.D., University of Rochester, 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.

Audrey A. Painter, B.S., Southern Florida College, 1955; M.D., Northwestern University, 1957.

Neville Rapp, B.A., Radcliffe College, 1960; Ph.D., University of Missouri at Columbia, 1977.

Tsukasa Seya, M.D., Hokkaido University School of Medicine (Japan), 1976; Ph.D., 1984.

Suresh D. Shah, B.S., Gujarat University, 1956; M.S., 1959; M.S., St. Louis University, 1972. (Also Clinical Research Center.)

Chinnaswam Tirupathi, B.S., 1974; M.S., 1977; Ph.D.; Madras University (India), 1983.

Bakula L. Trivedi, M.S., Sarvajani 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.





David S. Wrenn, B.S., Furman University, 1976; Ph.D., Medical College of Virginia, 1983.

Research Assistants

Sharon E. Carmody, B.A., Webster College, 1960.

May W-S Chen

Howard L. Christopherson, B.S., University of Minnesota, 1949; M.S., 1953.

Margaret W. Erlanger, B.A., University of Iowa, 1932; M.S., 1938.

Jane Lewis Finch, B.S., Central Missouri State University, 1971.

Ann M. Grace, A.B., Bryn Mawr College, 1954; A.M., Washington University, 1956; Ph.D., St. Louis University, 1970.

Ellen B. Heath-Monnig, A.B., Washington University, 1971; Ph.D., Case Western Reserve, 1981.

Thomas Howard, Sr.

Milan D. Kapadia, B.S., Gujarat University, 1972; M.D., Indore University, 1974.

Charles L. McConkey, Jr., B.A., Illinois Wesleyan University, 1969; M.S., Southern Illinois University, 1975.

Bonnie K. Mills-Dunlap, B.A., 1973; M.S., University of Missouri—St. Louis, 1977.

Anna D. Naumowicz, M.D., University of Wroclaw Medical School, 1975.

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.

William T. Roswit (Dermatology), B.A., Washington University, 1973.

Joan Schultz, B.S., Springfield, 1973; M.S., University of Arizona, 1980.

Donna Kay Yang, B.A., University of Missouri, 1980; M.S., University of Connecticut, 1984.

Jesse T. Yates, B.S., Fisk University, 1956.

Assistants (Clinical)

Ellen F. Binder, B.A., University of Michigan, 1977; M.D., Washington University, 1981.

Carl F. Blatt, Jr., B.A., Vanderbilt University, 1976; M.D., Georgetown University, 1980. (See Medical Care Group.)

Joyce Boehmer, B.S., New College, Darasota, 1975; M.D., University of Missouri, 1979. (See Medical Care Group.)

Irl J. Don, A.B., Washington University, 1968; M.D., 1972. (See Medical Care Group.)

Kathleen M. Garcia, B.S., University of California, 1976; M.D., Harvard University, 1980. (See Medical Care Group.)

Daniel P. Gluckstein, B.S., University of Michigan, 1977; M.D., Washington University, 1981. (See Medical Care Group.)

Faith H. Holcombe, B.A., Harvard University, 1976; M.D., Washington University, 1980. (See Medical Care Group.)

Ronald W. Leong, A.B., Washington University, 1976; M.D., 1981. (See Medical Care Group.)

John E. Mullins, A.B., Washington University, 1954; M.D., 1958.

John H. Rice, B.S., St. Louis University, 1975; M.D., University of Missouri, 1980.

David J. Tucker, B.S., University of Notre Dame, 1977; M.D., St. Louis University, 1981. (See Medical Care Group.)

Department of Microbiology and Immunology

This department, in collaboration with the Division of Infectious Diseases, Department of Medicine, teaches introductory courses in microbiology and infectious diseases for first-year medical students and for graduate students. The courses are 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

Medical Microbiology consists of immunology, microbial genetics and physiology, basic information on pathogenic microorganisms including viruses, bacteria, fungi, and parasites, and studies on the pathophysiology of infectious diseases. These subjects are presented in three courses offered during the second and third trimesters of the first year. Immunology (2nd trimester) focuses on the structure and biosynthesis of antibodies, elements of cell-mediated immunity and the host response to pathogens and other antigenic stimuli. Included in the latter are normal, deficient, and inappropriate responses and discussions of the beneficial and detrimental aspects of specific and non-specific activities. Molecular biology (second trimester) introduces distinctive features of the prokaryotic cell with emphasis on the structure and dynamics of the prokaryotic genome. Mechanisms of regulating gene expression, structure and replication of bacterial viruses (phage), and the principles of recombinant DNA technology are presented. Microbiology (3rd trimester) integrates basic information about structure and growth of a wide range of microorganisms with consideration of the effects of the organisms on the human host. The basic ecology of microbial populations and mechanisms of action of antibiotics are presented. Lectures on pathophysiology of infectious diseases emphasize mechanisms of infection, identification of the organism and means of treatment.

In both the immunology and microbiology courses, laboratory demonstration, and discussion sessions supplement lecture material. In the final weeks of Microbiology, small teams of students, led by a clinical fellow, will work up current infectious disease cases and identify the causative agents through use of current diagnostic microbiology techniques.



A wide selection of mini-electives are offered to allow students to pursue in some depth a specific area of Medical Microbiology by means of seminar-type discussion groups, led by faculty members.

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 (4 units) and Bio 5351, Molecular Biology (2 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)

Biomedical polymorphism of Ir 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)

Molecular basis of pathogenicity of *Histoplasma capsulatum* and *Bordetella pertussis*. In vitro models of respiratory tract infections and toxin effects. Biochemical analysis and genetic manipulation of virulence-related phenotypes. (Dr. Goldman)

Molecular biology of multigene families. (Dr. Huang)
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 hypersensitivity. (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)

Cellular immunology; immediate hypersensitivity. (Dr. Parker)

Mechanisms regulating immune responses in tissue culture 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 underlying 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 including genetic analysis with transposon mutagenesis and gene cloning, physiological studies of the basis of resistances, and biochemical analysis of the enzymes or other cellular proteins responsible. (Dr. Silver)

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 lectures with student-directed seminars. In the latter, each student has an opportunity to integrate various

disciplines of modern molecular biology into the area of biology 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 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 hemopoiesis. 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 5271, 5272. Topics in Immunology

An in-depth consideration of the primary literature of immunology. The topic will change from semester to semester and will involve different faculty. Prerequisite: Bio 5051. Credit 2 units. 2 hours per week.

(Dr. Pierce and Staff)

Bio 5221. Molecular Basis of Microbiol Pathogenesis

Primarily for graduate and MSTP students, this seminar course will involve discussion of current research on pathogenic microorganisms and their virulence determinants. Emphasis will be on new research strategies for studying the molecular mechanisms of pathogenesis and the factors controlling host-pathogen interactions. Prerequisite: Preparation in undergraduate biochemistry or genetics and in introductory bacteriology is recommended. Credit 1 unit. (Dr. Goldman)

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 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.

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.)

Judith A. Kapp-Pierce, B.A., Miami University, 1965; M.S., Indiana University, 1969; Ph.D., Harvard University, 1976. (See Department of Pathology.) (Jewish Hospital.)

David E. Kennell, A.B., University of California, 1955; Ph.D., 1959.

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.) (Jewish Hospital.)

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., 1966. (See Department of Pathology.) (Jewish Hospital.)

Stephen H. Polmar, B.S., Union College, 1961; Ph.D., 1966; M.D., Case Western Reserve 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 Schlessinger, B.A., University of Chicago, 1955; B.S., 1957; Ph.D., Harvard University, 1961. (See Department of Medicine.)

Benjamin D. Schwartz, B.A., Columbia College, 1965; Ph.D., Albert Einstein College, 1971; M.D., 1972. (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.)

Associate Professors

Eric J. Brown, A.B., Harvard University, 1971; M.D., 1975. (See Department of Medicine.)

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.)

Dan M. Granoff, B.A., Johns Hopkins University, 1965; M.D., 1968. (See Department of Pediatrics.)

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

Hsiu-san Lin, M.D., Taiwan University, 1960; Ph.D., University of Chicago, 1968. (See Department of Radiology.)

Penelope G. Shackelford, B.S., University of Wisconsin, 1964; M.D., Washington University, 1968. (See Department of Pediatrics.)

Assistant Professors

David D. Chaplin, A.B., Harvard University, 1973; Ph.D., Washington University, 1980; M.D., 1980. (See Department of Medicine.)

William E. Goldman, B.S., Indiana University, 1976; Ph.D., University of North Carolina, 1980.

Henry V. Huang, A.B., Occidental College, 1972; Ph.D., California Institute of Technology, 1977.

Dennis Loh, B.S., California Institute of Technology, 1973; M.D., Harvard University, 1977. (See Department of Medicine.)

Richard B. Markham, A.B., Harvard University, 1969; M.D., Albert Einstein College of Medicine, 1972. (See Department of Medicine.)

Marion Peters, M.B.B.S., Melbourne University, 1972. (See Department of Medicine.)

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.)

Research Assistant

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 Cell Biology and Physiology. 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. The department also participates in the Preparation for Clinical Medicine course. 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 groups of faculty members are established for specialized research and teaching purposes. They include:

James L. O'Leary Division of Experimental Neurology and Neurological Surgery, *Dr. Woolsey* (Director).

Division of Pediatric Neurology, *Dr. Volpe* (Director), *Drs. Deuel, Dodge, Dodson, Holowach, Thurston, Johnson, Noetzel, Pinsky, Rothman.*

Division of Clinical Neuropharmacology, *Dr. Ferrendelli* (Director), *Drs. Clifford, Dodson, Morris.*

Division of Neuromuscular Diseases, *Dr. Brooke* (Director), *Mr. Kaiser* (Administrator and Director of Research Services), *Drs. Eliasson, Heller, Nemeth, Ms. Florence.*

Division of Functional Brain Metabolism, *Dr. Collins* (Director), *Dr. Toga* (Administrator and Director, Laboratory of Neuro-Imaging, LONI), *Dr. Santori.*

Groups concerned with particular neurological illness research areas include:

Cerebral Circulation and Metabolism, *Drs. Collins, Fox, Grubb, Herscovitch, Powers, Raichle, Rich.*

Convulsive Disorders, *Drs. Clifford, Dodson, Ferrendelli, Goldring, Picker.*

Demyelinating Diseases, *Drs. Agrawal, Trotter.*

Disorders of Movement, *Professor Clare, Drs. Landau, Montgomery, Perlmutter, Sahrmann, Thach.*

Memory, Aging, and Dementia, *Drs. Berg, Botwinick, Coben, Morris, Oster, Raichle, Storandt.*

Metabolic Diseases of Children, *Drs. Dodson, Noetzel, Pinsky.*

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 seminars.

(*Drs. Collins, Eliasson and Staff*)

Preparation for Clinical Medicine (Neurology and Neurosurgery) (part of interdepartmental course) Lectures, demonstrations, and symposia.

(*Dr. Eliasson and 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, City, and Jewish Hospitals and on 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

Consult Neurology

A four-week 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)

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 at 1:30 p.m. in the West Pavilion Auditorium. 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 braincutting conferences are held weekly in the Pathology Department on Monday at 1:00 p.m. 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
William M. Landau, M.D.,
Washington University, 1947.

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. Pinsky, 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.)

August A. Busch, Jr., Professor
Emeritus of Neurological Surgery
and Lecturer

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

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. (Also
Department of Psychology.)

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.)

Margaret H. Clare
(Neurophysiology), B.S.Ed., Southeast
Missouri State Teachers College, 1940;
M.A., Washington University, 1951.

Robert C. Collins, B.A., University of
California, Berkeley, 1964; M.D.,
Cornell University, 1969.

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

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

Marcus E. Raichle, B.S., University
of Washington, 1960; M.D., 1964. (See
Department of Radiology.) (Also
School of Engineering and Applied
Science.)

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

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.)

Thomas A. Woolsey (Neuroscience),
B.S., University of Wisconsin, 1965;
M.D., Johns Hopkins University, 1969.
(George H. and Ethel R. Bishop
Scholar in Neuroscience in Neurology
and Neurological Surgery.) (See
Neurological Surgery and Departments
of Anatomy and Neurobiology, and
Cell Biology and Physiology.)

Professors (Clinical)

Leonard Berg, A.B., Washington
University, 1945; M.D., 1949.

Herbert E. Rosenbaum, B.S.,
University of Oregon, 1947; M.D.,
1949.

Stuart Weiss, A.B., Washington
University, 1950; M.D., 1954.



Associate Professors

Lawrence A. Coben, B.S., Western Reserve University, 1948; M.D., 1954; M.A., Northwestern University, 1951. (Also Computer Systems Laboratory.)

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.)

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

John L. Trotter, A.B., DePauw University, 1965; M.D., Washington University, 1969. (Gordon R. and Thelma B. Coates Scholar in Neurology.)

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.)

Richard S. Sohn, B.S., Brooklyn College, 1964; M.D., University of Chicago, 1968.

Assistant Professors

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

Peter T. Fox, B.A., St. John's College, 1975; M.D., Georgetown University, 1979.

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

Erwin B. Montgomery, Jr., B.S., State University of New York, Buffalo, 1972; M.D., 1976.

John C. Morris, B.A., Ohio Wesleyan University, 1970; M.D., University of Rochester, 1974.

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

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

Joel S. Perlmutter, B.A., Princeton University, 1975; M.D., University of Missouri—Columbia, 1979.

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

William D. Snider, B.S., University of North Carolina, 1971; M.D., University of North Carolina Medical School, 1977.

Research Assistant Professor Emeritus

Joe Inukai (See Neurological Surgery.)

Research Assistant Professors

M. Carolyn Baum, B.S., University of Kansas, 1966; M.A., Webster College, 1979. (See Department of Preventive Medicine and Irene Walter Johnson Institute of Rehabilitation.)

Julaine Florence, B.S., Washington University, 1975; MHS, 1983.

Kenneth K. Kaiser, B.S., Colorado State University, 1968.

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)

Joseph T. Black, B.A., University of Rochester, 1961; M.D., State University of New York, Upstate, 1965.

Octavio de Marchena, A.B., Johns Hopkins University, 1972; M.D., 1976.

Richard J. Ferry, B.S., St. Louis University, 1958; M.D., 1962.



Joseph Hanaway, B.A., McGill University, 1956; M.D., 1960; C.M., 1960.

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.

David F. Mendelson, B.A., University of California, 1946; M.D., Indiana University, 1948.

David M. Reisler, A.B., Harvard University, 1957; M.D., Washington University, 1961; M.P.H., Johns Hopkins University, 1971.

James R. Rohrbaugh, B.A., Yale University, 1971; M.D., Ohio State University, 1974. (See Department of Pediatrics.)

Eli R. Shuter, A.B., Cornell University, 1956; M.D., Washington University, 1960.

Instructors

Scott Heller, B.S., University of Illinois, 1976; M.D., 1980.

Phyllis J. Oster (Psychology), B.A., Valparaiso University, 1966; Ph.D., Washington University, 1979.

Research Instructors

Danielle Darriet, B.A., University of Bordeaux, 1967; M.A., 1976; Ph.D., 1982; M.D., 1974.

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

Instructors (Clinical)

J. Michael Hatlelid, B.A., St. John's University, 1970; M.D., Washington University, 1977.

John F. Mantovani, B.A., University of Evansville, 1971; M.D., University of Missouri, Columbia, 1974.

Robert J. Mueller, M.D., Washington University, 1936; M.S., University of Michigan, 1942.

Karen J. Pentella, B.S., Ohio State University, 1976; M.D., 1979.

Daniel Phillips, B.A., Northwestern, 1976; M.D., Washington University, 1980.

Research Associate

Steven R. Buchholz (See Neurological Surgery.)



Research Assistants

David Yuen-Kai Chi, B.A., Greenville College, 1970; M.S., St. Louis University, 1976.

Elizabeth Galie, B.A., University of Missouri, 1982.

John Kunkel, B.A., Stanford University, 1970; M.A., Washington University, 1984.

Ann C. McKeon, B.S., Boston College, 1975.

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 Emeritus and Lecturer

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 Neurology and Department of Ophthalmology.)

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

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

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

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

Thomas A. Woolsey, B.S., University of Wisconsin, 1965; M.D., Johns Hopkins University, 1969. (Ethel R. and George H. Bishop Scholar in Neuroscience.) (See Neurology and Departments of Anatomy and Neurobiology and Cell Biology and Physiology.)

Assistant Professors

Arthur B. Jenny II, A.B., Johns Hopkins University, 1965; M.D., 1969; Ph.D., Washington University, 1980.

Selwyn Picker, M.B.B.Ch., Witwatersrand University, 1972; F.R.C.S., Edinburgh, 1977.

Keith M. Rich, B.A., Taylor University, 1974; M.D., Indiana University, 1977.

Research Assistant Professor Emeritus

Joseph Inukai (See Neurology.)

Research Assistant Professors

Andreas H. Burkhalter, B.S., University of Zurich, 1973; Ph.D., 1977.

Gary W. Harding, B.S., University of Washington, 1967; M.S.E., 1984.

Lloyd N. Simpson (See Neurology.)

Research Assistants

Isaac 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 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.).

(Perinatal Staff)

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 preconceptual 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. (Anesthesia Staff)

General Ob-Gyn Subinternships

St. Louis County Hospital

The externship in this affiliated hospital allows the student a greater degree of participation and responsibility in the care of patients. There is a wealth of clinical material in this facility. (Dr. Sauvage)

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. Physicochemical 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, 1950; M.D., University of Kansas, 1954; Ph.D., University of Nebraska, 1961. (See Department of Biological Chemistry.)

Professor Emeritus

Willard M. Allen, B.S., Hobart College, 1926; M.S., University of Rochester, 1929; M.D., 1932; Sc.D. (hon.), Hobart College, 1940; Sc.D. (hon.), University of Rochester, 1957.

Professors

Irryng 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.

Roy H. Petrie, B.S., Western Kentucky University, 1958; M.D., Vanderbilt University, 1965.

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)

Robert Burstein, M.D., Washington University, 1948.

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.

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.

Ronald C. Strickler, B.S., University of Toronto, 1963; M.D., 1967.

Associate Professors (Clinical)

S. Michael Freiman, A.B., Montana State University, 1951; M.D., Washington University, 1955.

Andrew E. Galakatos, B.S., St. Louis College of Pharmacy, 1960; M.D., University of Missouri, 1965.

Robert S. Goell, A.B., Middlebury College, 1949; A.M., University of Pennsylvania, 1950; M.D., Washington University, 1960.

Frank B. Long, Jr., M.D., Washington University, 1947.

J. Barlow Martin, B.A., Amherst College, 1951; M.D., Washington University, 1955.

Norman K. Muschany, A.B., Westminster College, 1947; M.D., Temple University, 1951.

Marvin Rennard, A.B., Washington University, 1947; B.S., University of Missouri, 1950; M.S., 1950; M.D., Washington University, 1952.

Melvin M. Schwartz, A.B., University of Nebraska, 1945; M.D., 1947.

Assistant Professors

Michael J. Gast, B.S., University of Illinois, 1970; M.D., Ohio State University, 1973; Ph.D., Washington University, 1981.

Allan J. Jacobs, B.A., Cornell University, 1966; M.S., University of Southern California, 1972; M.D., 1972.

Asko I. Kivikoski, B.M., University of Helsinki, 1954; M.D., University of Turku, 1958.

Alfred B. Knight, B.S., Massachusetts Institute of Technology, 1968; M.D., Case Western Reserve University, 1972.

Carolyn M. Martin, B.A., Lindenwood College, 1970; M.D., Washington University, 1976.

D. Michael Nelson, B.A., Cornell College, 1971; M.D., Washington University, 1977; Ph.D., 1977.

Jorge Pineda, B.S., University of Honduras, 1964; M.D., 1972.

Lee A. Rigg, B.A., Arizona State University, 1961; Ph.D., University of Colorado, 1965; M.D., Washington University, 1971.

Research Assistant Professors

Sau Wai Cheung, B.S., New Asia College, 1966; M.S., University of Louisville, 1969; Ph.D., Indiana University, 1975.

Chang-chen Chin, B.S., National University, 1944; Ph.D., Oklahoma State University, 1967.

Gary L. Murdock, B.S., University of Iowa, 1971; Ph.D., Medical University of South Carolina, 1976.

Assistant Professors Emeriti (Clinical)

William Berman, A.B., Washington University, 1931; M.D., 1935.

Arthur R. Bortnick, M.D., Washington University, 1935.

Arthur T. Esslinger, M.D., Washington University, 1940.

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 (Clinical)

Robert L. Becker, B.A., Cornell University, 1965; M.D., Washington University, 1969.

Robert S. Cohen, B.S., Union College, 1958; M.D., State University of New York, 1962.

C. Richard Gulick, B.A., Westminster College, 1966; M.D., University of Rochester, 1971.

Jacob Klein, B.S., Muhlenberg College, 1964; M.D., Jefferson Medical College, 1968.

Laurence E. Maze, M.D., Washington University, 1948.

Seymour M. Monat, A.B., University of Pennsylvania, 1935; M.D., Long Island College, 1939.

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.

Chotchai Srisuro, M.D., Faculty of Medical Sciences, 1967.

Eugene D. Taylor, B.S., Virginia State College, 1948; M.D., Howard University, 1954.

M. Bryant Thompson, A.B., Eastern New Mexico University, 1957; M.D., University of California, 1961.

Albro C. Tobey, B.S., Butler University, 1965; M.D., Trinity College, University of Dublin, 1972.

J. Leslie Walker, B.A., Vanderbilt University, 1957; M.D., University of Tennessee, 1960.

Instructors

Diane F. Merritt, A.B., Miami University, 1971; M.D., New York University, 1976.

Alan S. Wasserman, B.A., University of Missouri at Kansas City, 1979; M.D., 1979.

Instructors Emeriti (Clinical)

Hubert L. Allen, A.B., University of Kansas, 1932; M.D., Tulane University, 1936.

Frances H. Stewart, M.D., Washington University, 1927.

Instructors (Clinical)

Scott R. Barrett, Jr., M.D., Howard University, 1975.

James E. Belcher, B.S., Texas University, 1972; M.D., Washington University, 1976.

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.

Charles W. Butrick, B.S., Kansas State University, 1977; M.D., Kansas University, 1980.

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.



Gordon D. Daugherty, A.B., Colby College, 1957; M.D., University of Michigan, 1961.

Raymond P. Davidson, B.S., Washington University, 1974; M.D., 1978.

David E. Dugger, B.E., Vanderbilt University, 1972; M.D., 1976.

Ira C. Gall, B.S., University of Cincinnati, 1948; M.D., 1951.

Richard A. Hartman, B.S., Massachusetts Institute of Technology, 1974; M.D., University of Missouri, 1978.

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. Kraner, M.D., University of Michigan, 1949.

David J. Levine, B.A., Rutgers College, 1972; M.D., Autonomous University of Guadalajara, 1976.

Darryl H. McKinney, B.A., Yale University, 1976; M.D., Washington University, 1980.

Theodore Merrims, A.B., Washington University, 1949; M.D., 1954.

Jerry N. Middleton, B.A., Westminster College, 1959; M.D., Washington University, 1963.

F. Delbert Moeller, B.S., Muskingum College, 1965; M.D., Ohio State University, 1969.

Sam Momtazee, M.D., Shiraz Medical School, 1961.

Vivian F. Moynihan, B.S., University of Dayton, 1977; M.D., Ohio State University, 1980.

Nathaniel H. Murdock, B.S., Harvard University, 1958; M.D., Meharry Medical College, 1963.

Gerald Newport, A.B., Washington University, 1948; M.D., 1953.

Joseph D. O'Keefe, A.B., University of Colorado, 1946; M.D., Washington University, 1950.

Carlton S. Pearse, B.S., University of Colorado, 1973; M.D., Washington University, 1978.

Chinda Vanasin Rojanasathit, M.D., Siriraj Medical School, 1967.

Jerome D. Sachar, B.A., Amherst College, 1975; M.D., University of Missouri, Columbia, 1979.

Gary M. Wasserman, B.A., University of Missouri at Kansas City, 1980; M.D., 1980.

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 ELECTIVE

Clinical Clerkship in Ophthalmology

One student rotates through the Department of Ophthalmology for either a six-week period or a twelve-week

period. The student 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). The student is expected to present cases at rounds and conferences. This elective is geared to the student who plans to enter the specialty of ophthalmology.

RESEARCH ELECTIVES

Experimental and clinical research in glaucoma.

(Dr. Kass)

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)

Experimental research in visual physiology.

(Dr. Brown)

Research in external diseases.

(Dr. Gans)

Faculty of the Department of Ophthalmology

Professor and Head of Department

Bernard Becker, A.B., Princeton University, 1941; M.D., Harvard University, 1944.

Professors

Joel E. Brown, B.S., M.S., Massachusetts Institute of Technology, 1960; Ph.D., 1964. (See Departments of Cell Biology and Physiology and Anatomy and Neurobiology.)

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 Anatomy and Neurobiology.)

Nigel W. Daw, B.A., Trinity College, 1956; M.A., 1961; Ph.D., Johns Hopkins University, 1967. (See Department of Cell Biology and Physiology.)

James A. Ferrendelli, A.B., University of Colorado, 1958; M.D., 1962. (See Departments of Pharmacology and Neurology and Neurological Surgery.)

Michael A. Kass, B.S., Northwestern University, 1966; M.D., 1966.

Allan E. Kolker, A.B., Washington University, 1954; M.D., 1957.

Robert F. Miller, M.D., University of Utah, 1967. (See Department of Cell Biology and Physiology.)

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)

Robert C. Drews, A.B., Washington University, 1952; M.D., 1955.

Benjamin Milder, M.D., Washington University, 1939.

James E. Miller, B.S., Tulane University, 1946; M.D., 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.

Elsie F. Meyers, B.A., Indiana University, 1947; M.D., 1950. (See Department of Anesthesiology.)

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.



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

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.

Harry D. Rosenbaum, M.D., Washington University, 1934.

Bernd Silver, B.S., University of Louisville, 1952; M.D., 1956.

Assistant Professors

Fred C. Chu, A.B., Princeton, 1967; M.D., Cornell, 1971.

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

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.

Research Assistant Professors

Christine Blazynski, B.S., University of Scranton, 1976; Ph.D., Purdue University, 1981.

Mae E. Gordon, B.A., Portland State University, 1967; M.S., University of Wisconsin, 1970; Ph.D., 1978.

Peter Reinach, B.S., New York University, 1964; Ph.D., 1972.

Gary L. Trick, B.A., University of Miami, 1974; Ph.D., Indiana University, 1978.

Assistant Professors Emeriti (Clinical)

Edmund B. Alvis, M.D., Washington University, 1934.

Daniel Bisno, B.A., University of Wisconsin, 1927; M.D., Johns Hopkins University, 1931.

James H. Bryan, A.B., Washington University, 1932; M.D., 1936.

William H. Meinberg, B.S., Washington University, 1932; M.D., 1932.

Lawrence T. Post, Jr., M.D., Washington University, 1948.

Assistant Professors (Clinical)

Neva P. Arribas, M.D., Manila Central University, 1954.

Stanley C. Becker, A.B., Washington University, 1948; M.A., 1950; Ph.D., 1951; M.D., Chicago Medical School, 1955.

Edward F. Berg, A.B., Washington University, 1960; M.D., 1964.

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.

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.

Robert M. Feibel, A.B., Johns Hopkins University, 1965; M.D., Harvard University, 1969.

James M. Gordon, B.A., University of Minnesota, 1962; M.D., 1966.

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

Stephen A. Kamenetzky, A.B., Washington University, 1967; M.D., 1970.

Harry L. Knopf, A.B., Harvard University, 1963; M.D., Harvard Medical School, 1967.

Barry D. Milder, B.S., Massachusetts Institute of Technology, 1969; M.D., Washington University, 1973.

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

Robert Joseph Olk, A.B., Johns Hopkins University, 1969; M.L.A., 1971; M.D., Rush Medical College, 1975.

F. Thomas Ott, B.A., Southern Methodist University, 1963; M.D., Washington University, 1965.

Lawrence H. Schoch, B.Ch.F., University of Louisville, 1972; M.D., 1976.

Philip T. Shahan, A.B., Harvard College, 1938; M.D., Washington University, 1942.

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

Philip Venable, B.S., Wayne State University, 1935; M.D., 1940.

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

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

Mitchel L. Wolf, B.A., Yeshiva College, 1964; M.D., Albert Einstein College of Medicine, 1968.

Instructors

Bruce H. Cohen, A.B., Harvard College, 1976; M.D., Johns Hopkins Medical School, 1980.

Robert L. Roseman, B.A., University of Pennsylvania, 1977; M.D., Case-Western Reserve, 1981.

Research Instructors

Stephen R. Bolsover, B.A., Cambridge University, 1976; M.A., 1980; Ph.D., 1979.

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

Stuart C. Mangel, B.A., Columbia University, 1973; M.A., University of Oregon, 1976; Ph.D., University of Virginia, 1981.

Stephen C. Massey, B.A., London University, 1975; Ph.D., 1980.

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

Gillian Roper-Hall, D.B.O., Moorfield Eye Hospital, 1966; D.B.O.(D), 1969; Certified Orthoptist, U.S. Board, 1973.

Leona J. Rubin, B.A., Temple University, 1972; M.S., Rutgers University, 1977; Ph.D., University of Colorado, 1982.

Instructors (Clinical)

Nevinkumar J. Amin, I.S.C., Bombay University, 1960; M.B.B.S., 1966.

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.

Sidney J. Hanish, B.A., University of North Dakota, 1969; M.L.A., 1971; M.D., Rush Medical College, 1975.

Michael J. Isserman, A.B., Harvard University, 1971; M.D., Washington University, 1975.

William S. Joffe, A.B., Washington University, 1959; M.D., 1963.

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

John C. Perlmutter, B.A., Queens College, 1967; M.D., Cornell University Medical College, 1971.

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

Michael B. Rumelt, B.S., Lamar State College of Technology, 1962; M.D., Washington University, 1966.

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

Assistants

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

Louis J. Rosenbaum, B.A., University of Michigan; M.D., Washington University, 1963.

Research Assistants

Dorothy G. Cooper, R.N., Washington University, 1953; B.S.N., 1964; M.S.N., 1966.

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

Floyce A. Scherrer, R.N., Washington University, 1960.



Department of Otolaryngology

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. (Drs. Paige, Stroud, Smith, Goebel)

Clinical Audiology. (Dr. Skinner)

Inner ear microanatomy and pathology. (Dr. Bohne)

Voice Function. (Dr. Bastian)

Facial Plastic Surgery. (Dr. Thomas)

Speech Laboratory. (Dr. Painter)

Microvascular Surgery. (Dr. Hayden)

Vestibular System. (Dr. Highstein)

Faculty of the Department of Otolaryngology

Lindburg Professor and Head of Department

John M. Fredrickson, B.A., University of British Columbia, 1953; M.D., 1957; FRCS(C), 1963; M.D. (hon.), Sweden, 1975.

Professors

Stephen M. Highstein, B.S., Rensselaer Polytechnic Institute, 1961; M.D., University of Maryland Medical School, 1965; Ph.D., University of Tokyo Faculty of Medicine, 1976.

Colin Painter, B.A., University of London, England, 1958; Ph.D., 1969.

Donald G. Sessions, A.B., Princeton University, 1958; M.D., Washington University, 1962.

Gershon J. Spector, A.B., Johns Hopkins University, 1960; M.D., University of Maryland, 1964.

Malcolm H. Stroud, M.D., Ch.B., University of Birmingham, 1945; L.R.C.P., M.R.C.S., 1946; F.R.C.S., 1949.

Ruediger Thalmann, M.D., University of Vienna, 1954.

Research Professor Emeritus and Lecturer

Hallowell 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 Cell Biology and Physiology.) (Also Central Institute for the Deaf.)

Professor Emeritus

S. Richard Silverman (Audiology), A.B., Cornell University, 1933; M.S., Washington University, 1938; Ph.D., 1942. (Also Central Institute for the Deaf and Faculty of Arts and Sciences.)

Research Professors

Donald H. Eldridge, S.B., Harvard University, 1943; M.D., 1946. (Also Central Institute for the Deaf and Faculty of Arts and Sciences.)

Ira J. Hirsh (Audiology), New York State College for Teachers (Albany), 1942; M.A., Northwestern University, 1943; M.A., Harvard University, 1947; Ph.D., 1948. (Also Central Institute for the Deaf and Faculty of Arts and Sciences.)

Professors Emeriti (Clinical)

Benard C. Adler, B.S., Washington University School of Medicine, 1937; M.D., 1937.

Harold M. Cutler, A.B., University of Maine, 1930; M.D., Tufts College, 1937.

Professor (Clinical)

Morris Davidson, B.S., Indiana University, 1936; M.D., 1938.

Associate Professors

Barbara A. Bohne, A.B., Washington University, 1967; Ph.D., 1971.

Joseph E. Harvey (Experimental-Otolaryngology), B.A., University of California, Berkeley, 1954; M.A., 1964; Ph.D., 1968.

Stanley E. Thawley, B.A., University of Texas, 1963; M.D., University of Texas Medical Branch, 1967.

Associate Professors Emeriti (Clinical)

William T. K. Bryan, A.B., Washington University, 1929; M.D., 1933.

Guerdan Hardy, M.D., Washington University, 1929.

Robert E. Votaw, B.S., State University of Iowa, 1927; M.D., 1929.

Associate Professors (Clinical)

Carl F. Ehrlich, B.S., St. Louis University, 1961; M.D., University of Missouri, Columbia, 1965.

Charles C. Jacobs, A.B., Washington University, 1942; M.D., 1945.

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 Professors

Robert Bastian, B.A., Greenville College, 1974; M.D., Washington University, 1978. (Jewish Hospital.)

Linda D'Antonio (Speech Science/Pathology), A.B., University of California—Berkeley, 1975; Ph.D., University of California—San Francisco, 1982.

Dennis P. Fuller (Speech Pathology), B.S., Northeast Missouri State University, 1969; M.A., St. Louis University, 1974; Ph.D., 1982. (See Department of Preventive Medicine and Public Health.)

Richard Hayden, B.Sc., Mount Allison University, 1968; M.Sc., Edinburgh University, 1970; M.D., C.M., McGill University, 1974.

Roanne G. Karzon (Audiology), B.A., University of Connecticut, 1974; M.Ed., University of Virginia, 1976; Ph.D., Washington University, 1982.

Laurence A. Levine, B.A., Hofstra University, 1962; M.A., 1963; D.D.S., New York University, 1967; M.D., Albany Medical College, 1971. (Jewish Hospital.)

Rodney F. Lusk, B.A., McPherson College, 1970; M.D., University of Missouri, 1977. (See Department of Pediatrics.)

Daniel C. Marcus, B.S., Antioch College, 1968; M.S., Washington University, 1971; D.Sc., 1976.

Harlan R. Muntz, B.S., Miami University, 1973; M.D., Washington University School of Medicine, 1977.

Gary D. Paige, B.S., University of California, Irvine, 1974; Ph.D., University of Chicago, 1980; M.D., 1981. (See Department of Ophthalmology.)



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.

Antoinette Steinacker, B.S., Western Maryland College, 1960; Ph.D., University of the Pacific, San Francisco, 1972.

J. Regan Thomas, A.B., Drury College, 1968; M.D., University of Missouri, 1972.

Research Assistant Professors

Alec N. Salt, B.Sc., University of East Anglia, 1973; M.Sc., University of Birmingham, 1974; Ph.D., 1977.

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

Assistant Professor Emeritus (Clinical)

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.

Sheldon Davis, B.S., Wayne State University, 1969; M.D., University of Michigan, 1973.

Norman S. Druck, A.B., Washington University, 1967; M.D., University of Illinois, 1970.

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.

Supote Phipatanakul, M.D., Chulalongkorn Hospital Medical School, 1965.

Lloyd Thompson, B.A., Union College, 1960; M.D., Howard University, 1964.

Instructor

Joel Goebel, B.S., University of Notre Dame, 1976; M.D., Washington University, 1980.

Instructor Emeritus

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

Instructors (Clinical)

Gerald Bart, M.B.B.S., Karnataka University, 1963.

John W. McKinney, B.S., Southeast Missouri State University, 1975; M.D., University of Missouri, 1979.

Steven B. Overton, B.S., University of Michigan, 1963; M.D., 1967; M.S., 1972.

Albert F. Ruehl, B.S., Washington University, 1961; M.S., 1964; M.D., St. Louis University School of Medicine, 1973.

Robert Ryan, Jr., B.S., St. Louis University, 1968; M.D., 1973.

Richard E. Schrick, B.S., University of Missouri, Rolla, 1968; M.S., University of Missouri, Columbia, 1972; M.D., 1977.

Research Instructors

Thomas H. Comegys, B.A., Central Methodist College, 1966.

Nancy Marcus, B.S., Antioch College, 1968; M.A., Washington University, 1970.

Research Associates

William Clark, B.A., University of Michigan, 1969; M.S., 1973; Ph.D., 1975. (Also Central Institute for the Deaf.)

Gertraude Thallinger

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. Jacques Baenziger.

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. (Staff)

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 con-



ferences afford students an opportunity to interpret the clinical observations in light of the postmortem findings. One hour a week during the year. (Staff)

Laboratory Medicine Conference

One hour each week for twelve weeks during Internal Medicine rotations. Problem cases and general principles of Laboratory Medicine are discussed. (Staff)

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. (Staff)

RESEARCH

Bio 590.

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

Biochemistry of protein handling in immune induction. (Dr. Allen)

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)

Human lung cancer antigens. (Dr. Bell)

Mechanism of antigen recognition by cytolytic T lymphocytes. (Dr. Braciale)

Hormones and calcium transport. (Dr. Chan)

Quantitative erythrocyte and platelet serology; immunoglobulins and complement subcomponents. (Dr. Chaplin)

Immunohistochemical studies of myelination; regulation of cerebral vascular permeability. (Dr. Clark)

Collagen metabolism and pulmonary pathology. (Dr. Crouch)

Clinicopathologic and experimental correlations in gastrointestinal and endocrine disorders. (Dr. DeSchryver)

Glucose metabolism in bacteria. (Dr. Dietzler)

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)

Mechanisms of antimalarial action, malaria and red cell deformability. (Dr. Krogstad)

Experimental pulmonary diseases. (Dr. Kuhn)

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

Metabolism of ionized calcium, sodium and potassium. (Dr. Ladenson)

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

Molecular biology of the blood group glycosyltransferase genes; bacterial expression of mammalian genes. (Dr. Lowe)

Experimental diabetes: biochemical studies of insulin release mechanisms in vitro. (Dr. McDaniel)

Biology of breast cancer. (Dr. McDivitt)

Hormonal regulation and intracellular calcium metabolism. (Dr. McDonald)

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

Developmental expression of genes regulated by nerve growth factor. (Dr. Milbrandt)

Molecular biology of blood coagulation. (Dr. Miletich)

Cell mediated immunity and systemic mycoses. (Dr. Moser)

Studies on antibiotic susceptibility of aerobic and anaerobic bacteria. (Dr. Murray)

Analysis of human lymphocyte subsets. (Dr. Nahn)

Pathology and pathogenesis of lesions associated with vitamin E deficiency. Biology of brain tumors. (Dr. Nelson)

Statistical theory and computer technology applications in laboratory medicine. (Dr. Parvin)

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

Human histocompatibility and immune regulation. (Dr. Rodey)

Experimental cardiovascular pathology; structure-function relationships in ischemic heart disease. (Dr. Saffitz)

Biochemical mechanisms of cell-substrate and cell-cell adhesion as manifest by blood platelets. (Dr. Santoro)

Experimental diabetic neuropathy. (Dr. Schmidt)

Immunopathology of renal disease. (Dr. Schreiner)

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

Metabolic bone disease. (Dr. Teitelbaum)

Arachidonic acid biochemistry and the regulation of insulin secretion. (Dr. Turk)

Immunobiology and immunopathology of lymphocyte-macrophage interactions. (Dr. Unanue)

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

Vascular structure and function; pathophysiology of diabetic and ischemic vascular disease. (Dr. Williamson)

Immunocytochemistry 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 held during periods 4-8. Students assist in performing autopsies and participate fully in the activities of the Autopsy Service. Supervision is by faculty and housestaff pathologists. Emphasis is placed on the student learning as much gross pathology as possible as a preparation to be a pathologist or to serve as a general background in medical, surgical, and neurologic diseases. Weekly conferences include gross and microscopic neuropathology, specialty pathology conference, two research seminars, CPC and autopsy case review conference. Students will help prepare preliminary and final autopsy reports and will do a clinicopathologic project and present their results to the housestaff and attending faculty. (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)

Cell Biology of the Immune System

This is a seminar course on the biology of lymphocytes and macrophages and their interaction in normal and pathological conditions. Some background in Immunology is desirable. The course places emphasis on current research on how macrophages function in regulating the immune system in normal conditions, in infectious diseases, and in autoimmunity. Students will read and discuss two to three papers per session. (Dr. Unanue and Staff)

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

See Department of Medicine. (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. Pierce)

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/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)

Obstetrical and Gynecological Surgical Pathology

This 6-week elective offers an intensive experience in Ob-Gyn Pathology involving current surgical material from the Ob-Gyn service. Students will be expected to participate fully in the daily activities in the examination of specimens under the supervision of the senior staff. Slide reviews and conference material will be discussed. Students will attend departmental conferences and the Gyn Tumor Conference. (Dr. Gersell and Staff)

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 5271. Topics in Immunology

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

Emil R. Unanue, B.S., Institute Secondary Ed., Havana, 1952; M.D., University of Havana, 1960.

Professors Emeriti

Lauren V. Ackerman (Pathology and Surgical Pathology), A.B., Hamilton College, 1927; M.D., University of Rochester, 1932. (Also Consultant.)

Ruth Silberberg, M.D., University of Breslau, 1931. (Also Lecturer.)

Professors

Jacques U. Baenziger, B.A., New College, 1969; M.D., Washington University, 1975.

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, 1962; M.A., 1964; Ph.D., 1966; M.D., Washington University, 1968. (See Department of Microbiology and Immunology.)

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.) (Jewish Hospital.)

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 L. Kroc Professor

Paul E. Lacy, B.A., Ohio State University, 1945; M.D., 1948; M.S., 1948; Ph.D., University of Minnesota, 1955.

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



Robert W. McDivitt, M.D., Yale Medical School, 1956. (Jewish Hospital.)

Jay McDonald, B.S., Tufts University, 1965; 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.)

Wilma and Roswell Messing Professor

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.)

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.)

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.

Joseph R. Williamson, A.B., Phillips University, 1954; M.D., Washington University, 1958.

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

Professors (Visiting Staff)

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.)

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.)

Thomas J. Braciale, B.S., St. Joseph's College, 1968; M.D., University of Pennsylvania, 1975; Ph.D., 1975.

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.)

Donald J. Krogstad, A.B., Bowdoin College, 1965; M.D., Harvard Medical School, 1969. (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.

Daniel W. McKeel, B.S., Hampden-Sydney College, 1961; M.D., University of Virginia, 1966.

Patrick Murray, B.S., Saint Mary's College, 1969; Ph.D., University of California, 1974. (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.)

Associate Professor (Visiting Staff)

Wagih M. Abdel-Bari, B.A., School of Science, 1948; M.D., Ein Shams University, 1953; Ph.D., Washington University, 1965.

Assistant Professors

Paul M. Allen, B.S., University of Michigan, 1974; M.S., 1977; Ph.D., 1981.

Thomas M. Aune, B.S., Southwestern at Memphis, 1973; Ph.D., University of Tennessee, 1976. (Jewish Hospital.)

Ralph P. Bucy, B.A., Austin College, 1975; M.D., Washington University, 1981; Ph.D., 1981.

Kwok-Ming Chan, B.S., Hong Kong Baptist College, 1971; Ph.D., University of South Dakota, 1977. (See Department of Medicine.)

Howard Brent Clark, B.A., Macalester College, 1970; M.D., Washington University, 1978; Ph.D., 1978.

Edmond C. Crouch, B.S., Washington State University, 1972; M.D., University of Washington, 1979; Ph.D., 1978.

Steven Dresler, B.A., Reed College, 1971; M.D., University of Oregon, 1976; M.S., 1978; Ph.D., Washington University, 1983.

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.)

Keith Fulling, A.B., Johns Hopkins University, 1971; M.D., Washington University, 1975.

Deborah Gersell, B.S., University of Michigan, 1971; M.D., Washington University, 1975.

Carlos J. Goldenberg, M.D., Universidad Nacional de Buenos Aires, 1967.

Rogers C. Griffith, B.S., University of Arkansas, 1968; M.D., 1972.

Christine G. Janney, B.A., St. Louis University, 1975; M.D., 1979.

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.

John B. Lowe, B.A., University of Wyoming, 1976; M.D., University of Utah College of Medicine, 1980. (See Department of Medicine.)

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

Jeffrey D. Milbrandt, B.S., University of Nebraska, 1974; M.D., Washington University, 1978; Ph.D., University of Virginia, 1983.

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.)

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.)

Jeffrey Saffitz, B.A., Case Western Reserve University, 1971; M.S., 1971; Ph.D., 1977; M.D., 1978.

Robert E. Schmidt, A.B., Washington University, 1969; M.D., 1976; Ph.D., 1976.

George F. Schreiner, A.B., Harvard College, 1971; M.D., Harvard Medical School, 1977; Ph.D., Harvard University, 1977. (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)

Parveen Ahmed, M.B.B.S., Karachi University, 1970.

Research Assistant Professor

Vivian Braciale, A.B., Cornell University, 1969; Ph.D., University of Pennsylvania, 1973.

Assistant Professors (Visiting Staff)

John D. Bauer, B.Sc., University of Innsbruck, 1938; L.R.C.P. and S., University of Glasgow, 1944; M.D., Marquette University, 1947.

William H. Boyce, Jr., B.S., St. Benedict's College, 1967; Ph.D., St. Louis University, 1973.

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. Ogilvie, B.A., University of Utah, 1943; M.D., 1946.

John W. Oldfather, B.S., Ohio State University, 1970; M.S., 1976; Ph.D., 1980.

Donald J. Parker, B.S., Duquesne University, 1959; M.S., 1964; Ph.D., Kansas State University, 1967.

Richard Payne, B.S., Ohio University, 1960; M.D., Washington University, 1963.

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

C. Bruce Graves, B.A., St. Olaf College, 1974; Ph.D., Washington University, 1981.

Mary Anne Rudloff, B.A., University of North Carolina, 1971; M.D., Washington University, 1979. (Jewish Hospital.)



Instructor (Clinical)

Laurel Krewson, B.S., Carroll College, 1974. (See Department of Medicine.)

Research Instructors

Katherine C. Chang, B.S., University of Taiwan, 1969; Ph.D., University of Iowa, 1974.

Edward H. Finke, B.S., Washington University, 1962.

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.)

Ronald G. Tilton, B.S., University of South Florida, 1971; Ph.D., Washington University, 1977.

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.

Samuel E. Hirsch, B.S., Purdue University, 1974; M.D., St. Louis University, 1978.

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.

Michael A. McCarty, A.B., Washington University, 1969; M.D., 1973.

Carlos Perez-Mesa, M.D., University of Havana, 1950.

Antonio Salvador, M.D., University of Porto, 1963.

Ursula Sclafford, B.S., Howard University, 1942; M.D., 1945.

Gregorio Sierra, B.S., Institute of Manzanillo, 1945; M.D., University of Havana, 1954.

Research Assistants

V. Wayne Engleman, B.A., University of Missouri, 1976.

Dorothy J. Fiete, B.S., Marymount College, 1966.

C. Joan Fink, B.A., Lindenwood College, 1958.

Wit A. Jamry, M.D., Medical Academy of Poznan, 1974.

Jean M. Kiely, B.S., Bates College, 1968; M.S., Rutgers, 1971.

Mary P. Leckie, B.S., University of Toledo, 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 teaching program of the Department of Pediatrics is to stimulate interest in developmental biology, especially human growth and development, and to provide the student with a foundation sufficiently comprehensive so that he will have an appreciation of pediatric problems regardless of his future career choice in medicine.

The major clinical and research facilities are in Children's Hospital, St. Louis County Hospital, and the newborn services at Barnes Hospital and Jewish Hospital. Children's Hospital is a new facility with 235 beds and accepts patients through 21 years of age with all types of medical problems. Hospital admittances average 8,000 annually. The Pediatric Ambulatory Division averages about 80,000 visits a year. More than 4,000 infants are born annually in the Medical Center.

SECOND YEAR

The student is introduced to pediatrics and to the faculty through a series of lectures and symposia designed to acquaint him with the concepts of human growth and development and the effects of age and maturity on reactions to injury and disease. The unique aspects of the physical examination of the infant and child are presented in the Introduction to Clinical Medicine Course. Members of the faculty are active participants in the Sophomore Pathophysiologic Course.

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 resident physicians.
2. Daily rounds and bedside conferences with house staff and attending physicians.
3. Patient management conferences on basic pediatric problems emphasizing pathophysiologic mechanisms.
4. Weekly grand rounds.
5. Weekly case conference.

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—Children's Hospital

The student will be assigned patients on the general pediatric divisions 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. Goldring)



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 program practice located on the Medical School campus. (Two optional alternate facilities are located in St. Louis County.) (Dr. Simons)

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. (Dr. Hillman)

Neonatology

Clinical Elective

The time is spent at Children's Hospital in the intensive care nursery learning the care of severely ill newborns and prematures. During the entire four 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 Children's Hospital. Opportunities are available for clinical research in perinatal medicine.

(Drs. Hillman, Marshall, Perlman, Thach)

Sudden Infant Death Syndrome (SIDS)—Medical and Psychological Aspects

Dr. Hillman, as a neonatologist, will join the SIDS Resources, Inc., Executive Director 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, Martin, Strauss)



Clinical Elective—Outpatient

The student will see patients attending all of the outpatient units 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, Martin, 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

Clinical Elective

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 the elective.

(Drs. Bier, Gingerich, Hillman, Santiago, Tollefsen, White, Whyte)

Research Electives

We are involved in developing and employing insulin infusion devices (artificial pancreas, insulin infusion pumps) and novel insulin formulations in patients with insulin dependent diabetes. We are studying the mechanisms of normal and abnormal glucose counter-regulation during hyperinsulinemia. In addition, there are several on-going studies to characterize the natural history of diabetic complications and studies of behavior modification and stress reduction in diabetic children.

(Drs. Bier, Santiago, Tollefsen, White)

On-going clinical research in growth disorders includes the study of children with idiopathic and organic hypopituitarism, gonadal dysgenesis, delayed puberty, and short stature of unknown causes. Laboratory research is aimed at identifying variant forms of growth hormone which may have decreased biological activity. Techniques used include isoelectric focusing, gel filtration, and radioimmunoassays with both monoclonal and polyclonal antibodies.

(Dr. Bier)

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 outpatient unit, 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 *H. 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* otitis media.

(Drs. Barenkamp, Granoff, Munson)

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.

(Dr. Shackelford)

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 see outpatients with Dr. Dodge one day a week, during which time he will be able to evaluate outpatient problems.

(Drs. Dodge, Volpe)

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 conferences 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, Vehaskari)

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

Placenta biochemistry and physiology: amino acid and glucose 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. Prensley, A.B., Cornell University, 1951; M.D., New York University, 1955. (See Department of Neurology and Neurological Surgery.)

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 Neurology and Neurological Surgery and Biological Chemistry.)

Professors Emeriti

David Goldring, A.B., Washington University, 1936; M.D., 1940. (Also Lecturer.)

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.)

Dan M. Granoff, B.A., Johns Hopkins University, 1965; M.D., 1968. (See Department of Microbiology and Immunology.)

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.)

James P. Keating, A.B., Harvard University, 1959; M.D., 1963.

John M. Kissane, A.B., University of Rochester, 1948; M.D., Washington University, 1952. (See Department of Pathology.)

Richard E. Marshall, B.A., Wesleyan University, 1954; M.D., Yale University, 1962.

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. (Also Pediatric Nurse Practitioner Program.)

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.)

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.)

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.)

Bradley T. Thach, A.B., Princeton University, 1964; M.D., Washington University, 1968.

Jean H. Thurston, B.A., University of Alberta, 1938; M.D., 1941. (See Department of Neurology and Neurological Surgery.)

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.

Maurice J. Lonsway, Jr., A.B., Washington University, 1946; M.D., 1950.



James E. Miller, B.S., Tulane University, 1946; M.D., Medical College of Alabama, 1949. (See Department of Ophthalmology.)

Helen E. Nash, A.B., Spelman College, 1941; M.D., Meharry Medical College, 1945.

George Sato, M.D., Washington University, 1947.

Argyrios A. Tsifutis, M.D., Aristotelion University of Thessalonika, 1954.

Associate Professor Emeritus

Dorothy J. Jones, A.B., Oberlin College, 1930; M.D., Washington University, 1934. (Also Pediatric Nurse Practitioner Program.) (Also Lecturer.)

Associate Professors

Barbara R. Cole, B.A., Doane College, 1963; M.D., University of Kansas, 1967.

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.)

Felton J. Earls, B.S., Howard University, 1963; M.D., 1967. (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.

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.)

Vita J. Land, B.S., McGill University, 1961; M.D., 1965.

Charles B. Manley, Jr. (Genitourinary Surgery), A.B., University of Missouri, 1955; M.D., 1958. (See Department of Surgery.)

Jeffrey L. Marsh, B.A., Johns Hopkins University, 1967; M.D., 1970. (See Department of Surgery.)

Helen Palkes (Psychology), B.S., Washington University, 1966; M.A., 1968.

Penelope G. Shackelford, B.S., University of Wisconsin, 1964; M.D., Washington University, 1968. (See Department of Microbiology and Immunology.)

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.)

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)

Gordon R. Bloomberg, A.B., University of Illinois, 1955; B.S., 1955; M.D., 1959.

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 of Illinois, 1946; M.D., 1948.

Kenneth A. Koerner, A.B., Washington University, 1935; M.D., 1941.

John C. Martz, A.B., University of Missouri, 1938; M.D., Washington University, 1942.

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.

Assistant Professors

Stephen J. Barenkamp, B.A., Carleton University, 1973; M.D., University of Chicago, 1977.

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. (See Department of Genetics.)

Clark W. Distelhorst, B.A., Ohio State University, 1968; M.D., 1971.

John E. Forestner, B.A., Northwestern University, 1966; M.D., 1970. (See Department of Anesthesiology.)

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

Michael L. Landt (Laboratory Medicine), B.S., Whitworth College, 1970; Ph.D., University of Oregon, 1976. (See Department of Pathology.)

Uwe Manthei, M.D., Georg-August-University, 1974.

Thomas C. Martin, A.B., Cornell University, 1973; M.D., University of Michigan, 1976.

Robert S. Munson, B.A., University of Connecticut, 1968; Ph.D., 1976.

Harlan R. Muntz, B.S., Miami University, 1973; M.D., Washington University, 1977. (See Department of Otolaryngology.)

Michael J. Noetzel, A.B., Yale University, 1973; M.D., University of Virginia, 1977.

Jeffrey M. Perlman, M.B., Ch.B., University of Cape Town, 1974.

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

Jerry L. Rosenblum, B.A., Emory University, 1970; M.D., Washington University, 1974.

Robert J. Rothbaum, B.A., Brown University, 1972; M.D., University of Chicago, 1976.

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

H. William Schnaper, B.A., Yale University, 1971; M.D., University of Maryland, 1975.

Gregory A. Storch, A.B., Harvard University, 1969; M.D., New York University School of Medicine, 1973. (See Department of Medicine.)

Sherida A. Tollefsen, B.A., Grinnell College, 1971; M.D., Washington University, 1975.

V. Matti Vehaskari, M.D., Helsinki University, 1970.

Zila Welner, M.D., Hebrew University, 1961. (See Department of Psychiatry.)

Neil H. White, B.S., State University of New York, Albany, 1971; M.D., 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.

Suzanne G. Busch (Psychology), A.B., University of Maryland, 1969; M.A., Washington University, 1976; Ph.D., 1981.

Alan M. Delamater, B.A., Carnegie-Mellon University, 1975; M.S., University of Georgia, 1979; Ph.D., 1981. (Also Department of Psychology.)

Ronald L. Gingerich, B.A., Goshen College, 1970; Ph.D., Indiana University, 1975. (See Department of Medicine.)

Barbara K. Talent (Psychology), B.A., DePauw University, 1972; Ph.D., Washington University, 1978.

Assistant Professors Emeriti (Clinical)

Martin Calodney, B.S., College of the City of New York, 1930; M.D., New York University, 1936.

Samuel W. Gollub, 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)

Jill M. Baer, B.S., University of Kentucky, 1972; M.D., 1975.

Edward T. Barker, A.B., Princeton University, 1953; M.D., Washington University, 1957.

Walter F. Benoist, A.B., University of Pennsylvania, 1968; M.D., Washington University, 1972.

Max H. Burgdorf, A.B., Washington University, 1970; M.D., 1974. (See Medical Care Group.)

James M. Corry, B.S., Grinnell College, 1970; M.D., Washington University, 1974.

Charles H. Dougherty, A.B., College of the Holy Cross, 1969; M.D., University of Rochester, 1973.

Gerald J. Duling, B.S., Xavier University, 1955; M.D., St. Louis University, 1959.

Ira J. Friedman, B.S., University of Arkansas, 1955; M.D., 1960.

Tessa D. Gardner, B.S., Massachusetts Institute of Technology, 1968; M.D., Harvard University, 1972.

Elliot F. Gellman, B.S., State University of Iowa, 1957; M.D., University of Missouri, 1961.

Santosh Gupta, M.B.B.S., Lucknow University, 1963; D.C.H., University of London, 1966.

J. Larry Harwell, A.B., Washington University, 1958; 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.

M. Michael Maurer, B.A., Washington University, 1968; M.D., 1972.

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.)

Susan Pittman, A.B., University of Missouri, 1959; M.D., 1963.

Steven I. Plax, A.B., University of Missouri, 1957; M.D., 1961.

James R. Rohrbaugh, B.A., Yale University, 1971; M.D., Ohio State University, 1974.

William J. Ross, B.A., Miami University, 1968; M.D., Washington University, 1972.

Robert C. Schaan, A.B., Washington University, 1949; M.D., 1953.

Alfred S. Schwartz, A.B., Amherst College, 1932; M.D., Johns Hopkins University, 1936.

Mary A. T. Tillman, M.D., Howard University, 1960.

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.

Patricia B. Wolff, B.A., University of Minnesota, 1968; M.D., 1972. (See Medical Care Group.)

Gerald Wool, A.B., Princeton University, 1958; M.D., Washington University, 1962.

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.)

Jane E. Kosa, B.A., West Virginia University, 1975; M.D., 1979. (See Department of Anesthesiology.)

Patricia A. Parsons (Dental Medicine), B.S., San Diego State College, 1953; D.D.S., Washington University, 1957.

Mehernoor F. Watcha, M.B., B.S., University of Bombay, 1972; M.D., 1973. (See Department of Anesthesiology.)

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.

Bonnie J. Aust, B.A., University of Texas, Austin, 1975; M.D., University of Texas, San Antonio, 1979.

Susan L. Baumer, B.A., University of Oregon, 1969; M.D., University of Pennsylvania, 1975.

Pardeep Bhanot, M.B.B.S., Medical College of Amritsar, 1974.

Huldah C. Blamoville, B.S., Queens College, 1959; M.D., Meharry Medical College, 1965.

Eyla G. Boies, B.S., College of Idaho, 1974; M.D., Washington University, 1978.

Charles E. Canter, Sc.B., Brown University, 1974; Sc.M., 1976; M.D., St. Louis University, 1979.

Ray S. Davis, M.D., University of Louisville, 1978.

Sandra J. Dodson, B.S., Cornell University, 1970; M.D., Northwestern University, 1976.

Florentina U. Garcia, M.D., University of the Philippines, 1965.

Joseph K. Goldenberg, B.A., University of Missouri, Kansas City, 1980; M.D., 1980.

Roman E. Hammes, B.A., University of Iowa, 1950; M.D., 1954.

Aaron Hamvas, B.S., Rensselaer Polytechnic Institute, 1977; M.D., Washington University, 1981.

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.

Aidan W. Ip, B.A., University of Chicago, 1975; M.D., 1979.

Larry A. Jones, A.B., Johns Hopkins University, 1972; M.D., 1976.

Sheldon Kessler, M.D., St. Louis University, 1951.

Katherine L. Kreusser, B.S., University of Pennsylvania, 1973; M.D., Indiana University, 1978.

Norton S. Kronemer, A.B., Washington University, 1958; M.D., University of Missouri, 1962.

Leland M. Laycob, A.B., Washington University, 1964; M.D., University of Missouri, 1968.

Richard L. Lazaroff, B.A. Brown University, 1974; M.D., St. Louis University, 1978.

Despine Liebhaber, B.A., Smith College, 1958; M.D., Columbia University, 1962.

Barry Light, A.B., University of Missouri, Columbia, 1973; Ph.D., 1977; M.D., 1980.

Robert D. Lins, A.B., University of Missouri, 1965; M.D., 1969.

John F. Mantovani, B.A., University of Evansville, 1971; M.D., University of Missouri, 1974.

Olin B. Mauldin, B.A., University of Mississippi, Oxford, 1969; M.D., University of Mississippi, Jackson, 1973.



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

Susan J. Nelson, A.B., Oberlin College, 1969; M.A., 1971; M.D., Washington University, 1978.

David S. Olander, A.B., Washington University, 1964; M.A., 1965; Ph.D., 1967; M.D., 1974.

Eugenia M. Pierce, M.D., St. Louis University, 1958.

Juanita C. Polito, B.A., University of Dallas, 1975; M.D., Southwestern University, 1979.

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.

Mohammad H. Rahman, M.B.B.S., University of Karachi, 1960.

Jesse R. Ramsey, B.A., Texas Wesleyan College, 1970; D.O., Texas College of Osteopathic Medicine, 1974.

Martin D. Rudloff, B.A., Central Methodist College, 1977; M.D., Washington University, 1981.

Janet M. Ruzycski, B.A., Washington University, 1977; M.D., 1981.

Richard W. Sato, B.A., Johns Hopkins University, 1973; M.D., Washington University, 1977.

Howard J. Schlansky, B.A., University of Missouri, Kansas City, 1976; M.D., 1978.

Seymour M. Schlansky, 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. Voegel, B.S., University of Illinois, 1950; M.D., Washington University, 1957.

Roger J. Waxelman, A.B., Washington University, 1965; M.D., University of Missouri, 1969.

David H. Weed, B.S., Ohio State University, 1972; M.D., 1975.

Jeffrey M. Wright, B.S., Vanderbilt University, 1975; M.D., Washington University, 1979.

H. Benjamin Zwirn, M.D., University of Basel, 1954.



Research Associates

Charles E. Crawford, Jr., B.S., Washington University, 1956; M.S., Lindenwood College, 1983.

Richard E. Hauhart, B.S., University of Missouri, St. Louis, 1969; M.S., 1982.

Charles A. Reed, A.B., Washington University, 1961.

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.)

Susan K. Keating (Health Services), B.S., University of North Carolina School of Nursing, 1965; P.N.P., Washington University, 1970.

Mary J. Stralka (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 Assistant

Lorraine L. Thomas, A.B., St. Louis University, 1971; M.S., Southern Illinois University, 1973.

Assistants (Clinical)

Juli A. Antonow, B.A., Carleton College, 1972; M.D., University of Minnesota, 1975.

Earl C. Beeks, Jr., B.S., Howard University, 1977; M.D., University of Missouri, Columbia, 1981.

Marietta O. Belen, M.D., Far Eastern University, 1963.

Michele R. Berman, B.A., Johns Hopkins University, 1977; M.D., Washington University, 1981.

William T. Chao, B.S., University of Illinois, Urbana, 1975; M.D., University of Illinois, Chicago, 1979.

Manjul S. Dixit, B.S., University of North Carolina, 1977; M.D., East Carolina University, 1981.

Joseph G. Gibbons, B.S., Georgetown University, 1977; M.D., Ohio State University, 1980.

Mark F. Herbers, B.A., University of Missouri, Columbia, 1976; M.D., 1980.

Richard J. Iken, B.A., University of Wisconsin, 1973; M.D., University of Missouri, Columbia, 1978.

J. Keith McKelvey, B.S.E.E., Washington University, 1975; M.D., St. Louis University, 1979.

Habibur Rahman, M.B.B.S., Dacca University Medical College, 1972.

Sudhir R. Raikar, M.B., University of Bombay, 1969.

Karen L. Remley, B.A., University of Missouri, Kansas City, 1980; M.D., 1980.

Hsin-Chin Shih, M.D., Kaoshiung Medical College, 1964.

Nareshkumar Solanki, B.M., B.S., University of Nairobi, 1975.

Marc E. Weber, A.B., Franklin and Marshall College, 1979; M.D., University of Tennessee, 1974; J.D., St. Louis University, 1982.

Lecturer

David Goldring, A.B., Washington University, 1936; M.D., 1940.

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 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.

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 arrhythmia; electrophysiology; membrane chemistry, and autonomic neural effects. (Dr. Corr)

Preparation and biochemical characterization of mechanism-based inhibitors of steroid biosynthesis; development of anticonvulsant drugs; 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)

Biosynthesis, secretion, and metabolism of atrial natriuretic peptides. (Dr. Geller)



The biosynthesis and chemical and biological characterization of leukotrienes and other arachidonate metabolites. (Dr. Jakschik)

Normal and abnormal development of the sympathetic and sensory nervous system; physiology and pathophysiology of the sympathetic and sensory nervous system. (Dr. Johnson)

Mechanism of insulin action; neural control of skeletal muscle enzymes. (Dr. Lawrence)

Neurochemistry; regulation of metabolism; quantitative histochemistry; the chemistry of individual human muscle fibers. (Dr. Lowry)

Molecular basis of recognition of biological compounds using NMR, analog synthesis, computer modeling, and other methods. (Dr. Marshall)

Synthesis, assembly, and function of the nicotinic acetylcholine receptor. (Dr. Merlie)

Role of membrane lipids on renal epithelial cell function. (Dr. Morrison)

Role of arachidonic acid metabolism in normal and pathophysiological processes; the biochemical pharmacology of atrial peptides. (Dr. Needleman)

Regulation and modulation of ion channels by intracellular "second" messengers; design and characterization of photolabile intracellular probes. (Dr. Nerbonne)

Biology of cytotoxic lymphocytes and mechanisms of immune damage. (Dr. Russell)

Arachidonic acid metabolism in pancreatic islets. (Dr. Turk)

ELECTIVES

Descriptions of the following courses are shown in the Division of Biology and Biomedical Sciences:

Bio 509, 510. Current Topics in Pharmacology

Bio 5402. Molecular Biology of Transmitters and Receptors

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

Faculty of the Edward Mallinckrodt Department of Pharmacology

Alumni Professor and Head of Department

Philip Needleman, B.S., Philadelphia College of Pharmacy and Science, 1960; M.S., 1962; Ph.D., University of Maryland, 1964.

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.

Professor Emeritus

F. Edmund Hunter, Jr., B.S., Mount Union College, 1938; Ph.D., University of Rochester, 1941.

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.)

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, 1975. (See Department of Medicine.)

Douglas F. Covey, B.S., Loyola College, 1967; M.A., Johns Hopkins University, 1969; Ph.D., 1973.

David M. Geller, B.A., Amherst College, 1952; Ph.D., Harvard University, 1957.

John P. Merlie, B.S., Villanova, 1967; Ph.D., University of Pennsylvania, 1973.

Aubrey R. Morrison, M.B., B.S., University of London, 1970. (See Department of Medicine.)

John H. Russell, B.S., Juniata College, 1968; Ph.D., Washington University, 1974.

Assistant Professors

John C. Lawrence, Jr., A.B., Duke University, 1971; Ph.D., University of Virginia, 1978.

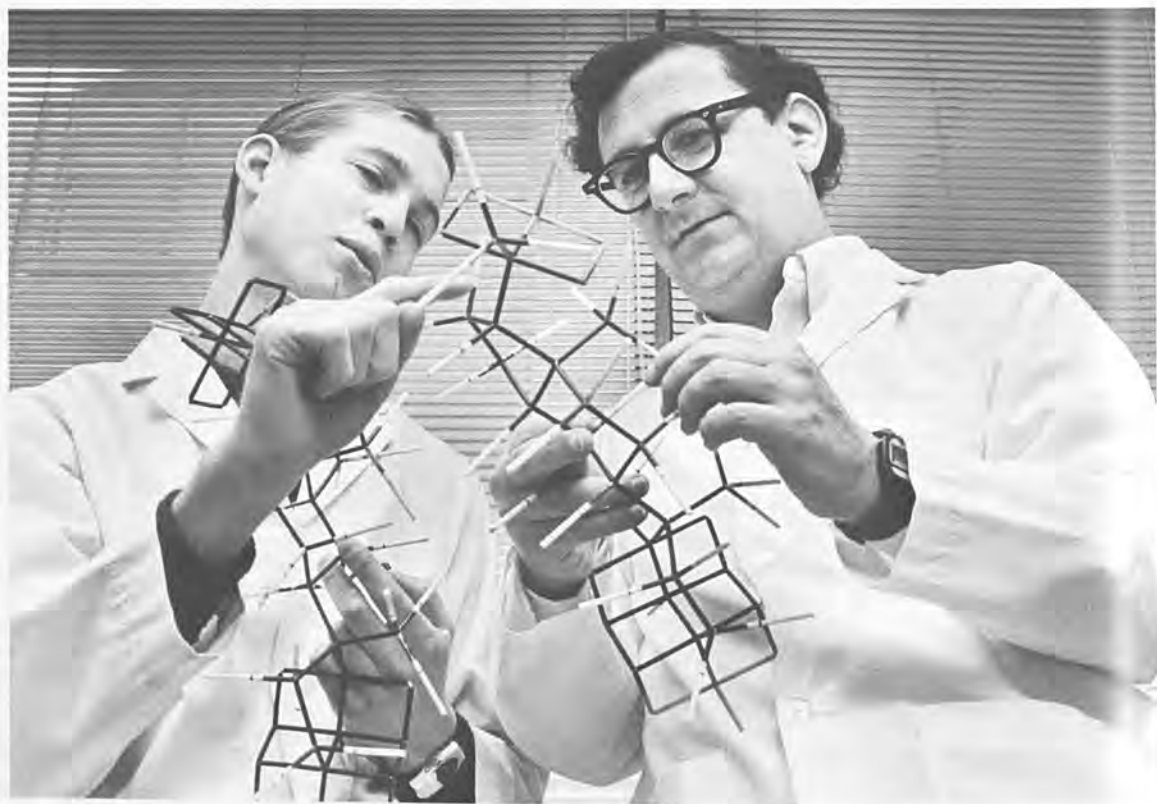
Jeanne M. Nerbonne, B.S., Framingham State College, 1974; Ph.D., Georgetown University, 1978.

Research Associate Professor

Sr. Barbara A. Jakschik, B.S., Duquesne University, 1963; M.S., 1965; Ph.D., Washington University, 1974.

Adjunct Assistant Professor

Pamela T. Manning, B.S., Wright State University, 1973; M.S., 1975; Ph.D., Ohio State University, 1980.



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 trimester of the first year, the course *Medicine in Modern Society* provides background information, and students are encouraged to participate in discussion of important and evolving issues of medical care. A course in statistical methods in medicine given in the first trimester 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 experience are provided by the following organizational units within the department or cooperating with it:

Division of Biostatistics, *Dr. D. C. Rao*

Division of Health Care Research, *Dr. Lee Benham*

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 statisti-

cal techniques illustrating the use of statistical principles in experimentation and clinical research are discussed. First trimester. (Drs. Schechtman and Spitznagel)

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 as its 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 an overview of medical practice in internal medicine, 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.

(Dr. Garrett)

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 commitment to evaluate 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)

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, Shriners 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 will 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 ultimately 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 PROGRAM (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 firsthand 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)

SEMINAR ELECTIVE

Applied Biostatistical Techniques

The seminar is intended for students who have completed a basic biostatistics course and who want to increase their understanding of contemporary statistical techniques, particularly those commonly applied in clinical research. Students will be expected to participate in analysis and critique of studies appearing in the medical literature. The emphasis will be on the appropriateness of the statistical techniques and underlying rationale rather than on mathematical details of the techniques. Both basic (e.g., t tests, chi-squared tests, correlation, regression) and more advanced multivariate techniques (e.g., multiple regression, discriminant analysis, analysis of variance) will be covered during the seminar.

(Mr. Miller and Staff)

RESEARCH ELECTIVES

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)

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.)

Professor and Director of Division of Biostatistics

Dabeeru C. Rao, B.S., Indian Statistical Institute, 1967; M.S., 1968; Ph.D., 1971. (See Departments of Psychiatry and Genetics.)

Professors Emeriti

C. Howe Eller (Public Health), A.B., Stanford University, 1927; M.D., University of Colorado, 1930; Ph.D., Johns Hopkins University, 1934.

Robert E. Shank, A.B., Westminster College, 1935; M.D., Washington University, 1939. (See Department of Medicine.)

Professors

Michael H. Brooke (Rehabilitation), M.B., B.Ch., Cambridge University, 1958. (See Department of Neurology and Neurological Surgery and Irene Walter Johnson Institute of Rehabilitation.)

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

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.)

Jean-Marc Lalouel (Biostatistics), D.E.A., Faculté des Sciences de Paris, 1969; M.D., Faculté de Médecine de Paris, 1970; D.Sc., Université Pierre et Marie Curie, 1975.

John D. Vavra, B.A., University of Colorado, 1950; M.D., Washington University, 1954. (See Administration and Department of Medicine.)

Reimut Wette (Biostatistics), B.S., University of Heidelberg, 1949; M.S., 1952; D.Sc., 1955.

Professor (Adjunct) (Nutrition)

Clifton A. Baile, B.S., Central Missouri State College, 1962; Ph.D., University of Missouri, 1965.

Associate Professor Emeritus

M. Frances Watson (Social and Environmental Studies), B.S., Northeast Missouri State Teachers College, 1932; M.S.W., Washington University, 1949.

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 and Irene Walter Johnson Institute of Rehabilitation.)

Edwin B. Fisher, Jr., B.A., Amherst College, 1968; Ph.D., State University of New York, 1972. (See Department of Medicine.) (Also Department of Psychology.)

John K. Gohagan (Health Care Research), B.A., LaSalle College, 1964; M.A., Temple University, 1968; Ph.D., Massachusetts Institute of Technology, 1973. (Also School of Engineering and Applied Science.)

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. (See Department of Medicine.) (University Health Service.)

John P. Rice (Biostatistics), B.A., Cornell University, 1969; M.A., Washington University, 1972; Ph.D., 1975. (See Department of 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.)

Associate Professor (Clinical)

Franz U. Steinberg, M.D., University of Berne, 1938. (See Departments of Medicine and Surgery.) (Jewish Hospital.)

Assistant Professors Emeriti

Edward J. Berger, M.D., Washington University, 1937. (Medical Director, Labor Health Institute.)

Barbara B. Hixon (Biostatistics), B.S., University of Illinois, 1941.



Assistant Professors

Dennis P. Fuller (Speech Pathology), B.S., Northeast Missouri State University, 1969; M.A., St. Louis University, 1974; Ph.D., 1982. (See Department of Otolaryngology.)

Robert S. Woodward (Health Care Research), B.A., Haverford College, 1965; Ph.D., Washington University, 1972. (See Health Administration Program.)

Research Assistant Professors

M. Carolyn Baum (Occupational Therapy), B.S., University of Kansas, 1966; M.A., Webster College, 1979. (See Department of Neurology and Neurological Surgery.)

Thomas G. Cole (Biochemistry), B.S., St. Benedict's College, 1970; M.S., University of Missouri, 1974; Ph.D., 1980.

James M. Hagberg (Applied Physiology), B.S., Carthage College, 1972; M.S., University of Wisconsin, 1974; Ph.D., 1976. (See Department of Medicine.)

Carol L. McLaughlin, B.S., Oberlin College, 1965; M.S., West Chester State College, 1977; Ph.D., University of Pennsylvania, 1981.

Research Assistant Professor (Adjunct)

Mary Anne Della-Fera, B.A., University of Delaware, 1975; V.M.D., University of Pennsylvania, 1979; Ph.D., 1980.

Instructors

Susy Alias (Rehabilitation), B.Sc., University of Kerala, 1964; M.D., Calicut Medical College, 1969. (Jewish Hospital.)

Anne C. Goldberg, B.A., Harvard University, 1973; M.D., University of Maryland, 1977. (See Department of Medicine.)

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.)



Diana L. Reed (Social Work), A.B., Washington University, 1968; M.S.W., 1970.

Kenneth B. Schechtman (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.) (Jewish Hospital.)

In Sook Sunwoo (Rehabilitation), M.D., Woo Sok University, 1959. (Jewish Hospital.)

Research Instructor

Barbara A. Pflieger, B.S., St. Louis University, 1957.

Research Assistant

May W-S. Chen, B.S., Baker University, 1963. (See Department of Medicine.)

Lecturer

Richard A. Sutter (Industrial Medicine and Rehabilitation), A.B., Washington University, 1931; M.D., 1935.

Department of Psychiatry

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.

(Dr. Cloninger and Staff)

THIRD YEAR

Psychiatry Clerkship

Students in groups of about 15 spend six weeks on the inpatient services of Barnes, Jewish, and Bliss Hospitals.

(Dr. Rubin and Staff)

FOURTH-YEAR ELECTIVES

"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 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.

(Dr. Smith)

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.

(Dr. Kneesevich)





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.

(Dr. M. Herjanic)

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.

(Dr. F. Earls)

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 neurochemical 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 depressions as a benchmark.

(Dr. E. Robins)

Faculty of the Department of Psychiatry

Spencer T. Olin Professor and Head of Department

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

Wallace Renard Professor

Eli Robins, 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 Department of 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; M.D. (hon.), Umea University, Sweden, 1983. (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.

Marijan 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. Olney, B.A., Iowa University, 1956; M.D., 1963. (See Department of Pathology.)

Sheldon H. Preskorn, B.A., Wichita State University, 1970; M.D., University of Kansas, 1974.

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.)

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.

Sydney B. Maughs, A.B., Westminster College, 1931; M.D., Washington University, 1935.

Professors (Clinical)

Richard W. Hudgens, B.A., Princeton University, 1952; M.D., Washington University, 1956.

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

Mary L. Carlson (Neurobiology), B.S., University of Wisconsin, 1961; M.A., Northwestern University, 1964; Ph.D., Tulane University, 1967. (See Department of Anatomy and Neurobiology.)

John P. Rice (Mathematics), B.A., Cornell University, 1969; M.A., Washington University, 1972; Ph.D., 1975. (See Department of Preventive Medicine and Public Health.)

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.)

John T. Biggs, Jr., A.B., Drury College, 1963; M.S., University of Tennessee, 1965; M.D., 1968.

Jack L. Croughan, B.A., University of Kansas, 1964; M.D., Kansas University, 1968.

Robert B. Deitchman, B.A., University of Virginia, 1949; M.D., 1953.

Robert S. Hicks, A.B., Hendrix College, 1951; M.D., University of Arkansas, 1958.

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.

Jay L. Liss, A.B., Washington University, 1962; M.D., 1966.

Joe K. McKinney, B.A., Westminster College, 1954; M.D., Washington University, 1958.

Jay Meyer, A.B., Washington University, 1956; M.D., St. Louis University, 1960.

Paul M. Packman, A.B., Washington University, 1959; M.D., 1963.

Thomas F. Richardson, B.A., Millikin University, 1959; M.D., Washington University, 1963.

Marcel T. Saghir, B.Sc., American University of Beirut, 1959; M.D., 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 Neurological Surgery.)

Harold D. Wolff, A.B., Washington University, 1952; B.S., University of Missouri, 1953; M.D., State University of Iowa, 1955.

Assistant Professors

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.

Bary A. Hong (Medical Psychology), B.A., Concordia Senior College, 1969; M.Div., Concordia Seminary, 1972; Ph.D., St. Louis University, 1978.

Keith E. Isenberg, B.A., Wabash College, 1974; M.D., Indiana University, 1978.

John W. Knesevich, A.B., Indiana University, 1971; M.D., McGill University, 1974.

Collins E. Lewis, B.A., Rutgers University, 1967; M.D., Harvard University, 1971; M.P.H., 1975.

Patrick J. Lustman (Medical Psychology), B.S., University of Illinois, 1972; M.S., University of Wisconsin, 1974; Ph.D., Michigan State University, 1980.

Eugene H. Rubin, B.A., University of Rochester, 1971; M.D., Ph.D., Washington University, 1978.

Richard H. Sundermann, Jr., B.A., Vanderbilt University, 1975; M.D., Washington University, 1983.

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.)

Charles F. Zorumski, B.A., St. Louis University, 1974; M.D., 1978. (See Department of Neurology and Neurological Surgery.)

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.)

Madelon T. Price (Neurobiology), A.B., Washington University, 1953; Ph.D., 1973.

Elizabeth M. Smith (Social Work), B.A., University of Nebraska, 1960; M.S.W., 1962; Ph.D., Washington University, 1978.

Assistant Professors Emeriti (Clinical)

Robert M. Bell, M.D., St. Louis University, 1928.

Hyman H. Fingert, B.A., State University of Iowa, 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.

John F. Bergmann, A.B., Washington University, 1950; M.D., 1954.

Robert D. Brookes, A.B., DePauw University, 1934; M.D., Washington University, 1938.

William W. Clendenin, M.D., University of Tennessee, 1963.

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.

Alejandro M. Datuin, 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.

Plaridel C. Deza, M.D., University of Santo Tomas, 1956. (Malcolm Bliss Hospital.)

Fred W. Gaskin, B.S., University of Minnesota, 1966; M.D., 1968.

James N. Haddock, A.B., University of Missouri, 1940; 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.)

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.)

Mary A. Montgomery, A.B., Vassar College, 1967; M.D., Northwestern University, 1973.

Rashmi R. Nakra, M.B.B.S., Lady Hardinge, 1970.

Earni Pal, M.B.B.S., Andhra University, 1965. (Malcolm Bliss Hospital.)

William M. Riedesel II, A.B., University of Rochester, 1968; M.D., Cornell University, 1973.

Jo-Ellyn M. Ryall, B.A., Rutgers University, 1971; M.D., Washington University, 1975.

Paul W. Sheffner, B.A., Wabash College, 1970; M.D., Washington University, 1974.

Reed E. Simpson, B.A., Wabash College, 1972; M.D., Washington University, 1976. (Malcolm Bliss Hospital.)

James B. Smith, A.B., University of Missouri, 1963; M.D., 1967.

Wayne A. Stillings, B.A., Oberlin College, 1971; M.D., Washington University, 1975.

Leonard J. Wiedersheim, A.B., Washington University, 1943; M.D., 1946.

Edwin D. Wolfram, B.A., State University of Iowa, 1954; M.D., 1959.

Instructors

Asaf Aleem, M.D., University of Delhi, 1978.

Kathryn G. Bennett (Social Work), B.A., University of Kansas, 1938; M.S.W., Smith College, 1940. (Jewish Hospital.)

Eric Reiman, B.S., Duke University, 1977; M.D., Duke Medical School, 1980.

Research Instructor

Juanita L. Carl (Biochemistry), B.S., Drury College, 1959; A.M., Washington University, 1962.

Instructors (Clinical)

Anna K. Bradley (Social Work), B.J., University of Missouri, 1956; M.S.W., Washington University, 1958. (Malcolm Bliss Hospital.)

Randy L. Hammer (Medical Psychology), B.A., Washington University, 1970; Ph.D., 1975. (Jewish Hospital.)

Gaelan M. Heisten, M.D., University of Toronto, 1968. (Malcolm Bliss Hospital.)

Sonya N. Joseph, M.D., Cairo University, 1964. (Malcolm Bliss Hospital.)

Virgil L. Malmberg, B.S., University of Illinois, 1968; M.S., 1970; M.D., University of Missouri, 1978.

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.)

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.)

Barbara A. Rosenberg (Medical Psychology), B.A., Barnard College, 1968; Ph.D., Yale University, 1977. (Malcolm Bliss Hospital.)

Jonathan D. Rosenboom (Medical Psychology), B.A., Sterling College, 1976; M.S., Fort Hays State University, 1978; Ph.D., Baylor University, 1984. (Malcolm Bliss Hospital.)

Luzviminda Santos, M.D., University of Santo Tomas, 1968. (Malcolm Bliss Hospital.)

Robert K. Shaw (Medical Psychology), B.A., University of Texas at Austin, 1975; M.A., University of Missouri, 1983; Ph.D., 1984. (Malcolm Bliss Hospital.)

Lenore Teter, A.B., Immaculate College, 1971; M.D., Temple University, 1978. (Malcolm Bliss Hospital.)

Rodney D. Vanderploeg (Medical Psychology), B.A., Calvin College, 1975; M.A., Fuller Theological Seminary, 1981; Ph.D., 1982. (Malcolm Bliss Hospital.)

Lecturers

Virginia Johnson-Masters (Human Sexuality), D.Sc. (hon.), University of Louisville, 1978.

William H. Masters (Human Sexuality), B.S., 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 Department of Psychology.)

WILLIAM GREENLEAF ELIOT DIVISION OF CHILD PSYCHIATRY

The Division of Child Psychiatry offers a varied teaching program for medical students, residents in psychiatry, and fellows in child psychiatry at Children's Hospital. Outpatient services are organized through the Child Guidance Center located in Children's Hospital and

inpatient services are provided through a 16-bed psychiatric unit. Active consultation with all medical and surgical units of the hospital is also maintained. Trainees are assigned to these various services, 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

E. James Anthony (Child Psychiatry), B.S., University of London, 1938; M.R.C.S., L.R.C.P., 1941; M.B., B.S., 1942; D.P.M., 1947; M.D., 1949.

Assistant Professor Emeritus

Loretta K. Cass Seleski (Medical Psychology), B.A., Colorado College, 1934; M.A., 1942; Ph.D., Ohio State University, 1950.

Assistant Professor

Zila Welner (Child Psychiatry), M.D., Hebrew University Hadassah Medical School, 1961. (See Department of Pediatrics.)

Research Assistant Professor

Gwendolyn G. Reich (Anthropology Child Psychiatry), B.A., McGill University, 1962; M.A., Washington University, 1969; Ph.D., 1978.

Assistant Professors (Clinical)

James E. Edwards (Child Psychiatry), B.A., University of Tennessee, 1959; M.D., 1962.

Haruo Kusama (Child Psychiatry), A.B., Washington University, 1960; M.D., 1965.

Paul H. Painter (Child Psychiatry), M.D., St. Louis University, 1947. (See Department of Pediatrics.)

Adolfo E. Rizzo (Child Psychiatry), M.D., Buenos Aires University, 1955.

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

Elizabeth A. Sirles (Social Work Child Psychiatry), B.G.S., University of Kansas, 1978; M.S.W., 1980; Ph.D., Washington University, 1984.

Jeffrey A. Smith (Medical Psychology Child Psychiatry), B.A., State University of New York at Stony Brook, 1979; M.A., Washington University, 1982; Ph.D., 1984.

Research Instructor

Arlene R. Stiffman (Social Work Child Psychiatry), B.A., University of Cincinnati, 1963; M.S.W., Washington University, 1975; Ph.D., 1980.

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 thirteen-story Mallinckrodt Institute of Radiology, but also occupies space in the West Pavilion and Queeny Tower of Barnes Hospital, Barnard Hospital, Wohl Hospital, the Clinical Sciences Research Building, Children's Hospital, the East Building on Scott Avenue, and the 4511 Forest Park facility. The department provides diagnostic radiology, nuclear medicine, radiation physics, and/or radiation oncology services to Barnes, Jewish, and Children's Hospitals.

Clinical facilities for the Division of Radiation Oncology are located on the ground and first floors of the Institute and in Barnard Hospital. Therapy equipment consists of advanced 35, 20, 6, and 4 MV linear accelerators and Cobalt 60 therapy. Also available are facilities and an ample stock of Cesium 137 sources for both interstitial and intracavity therapy and advanced equipment for interstitial and external hyperthermia.

The first floor of the Institute houses administrative offices, a film library, the reception and scheduling area, consulting viewing rooms, and the 150-seat Scarpellino Auditorium.

Seventy examination rooms for diagnostic radiology are available in the Institute, Queeny Tower, West Pavilion, Wohl Hospital, the East Building, and Children's Hospital. Institute clinical facilities are located on the second floor (chest, musculoskeletal radiology, and mammography); third floor (neuroradiology, digital vascular imaging, computed head tomography, and genitourinary radiology); fourth floor (gastrointestinal radiology, ultrasound, and computed body tomography); and the fifth floor (magnetic resonance imaging). Cardiovascular 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. In the north wing of Children's Hospital, the first floor houses a complete pediatric radiology facility offering ultrasound, nuclear medicine, computed tomography, and cardiac catheterization. The modern features of the Institute include five CT scanners, three digital subtraction systems, and two magnetic resonance imaging systems.

The sixth floor of the Institute contains the Division of Radiation Sciences which utilizes a PET imaging system and two medical cyclotrons in Barnard Hospital. Additional research facilities are located on the seventh floor (nuclear medicine), ninth floor (diagnostic radiology), tenth floor (digital imaging processing laboratory), the third and sixth floors of Barnard Hospital (radiation oncology), the 4511 Forest Park facility (cancer biology), the Clinical Sciences Research Building (radiation oncology, radiation sciences, nuclear medicine, and



computer science), and the East Building (magnetic resonance imaging).

Administrative, teaching, and support functions occupy the eighth and eleventh floors of the Institute. 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 inter-departmental conferences, consultations, and group discussions.

SECOND YEAR

Twenty 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. Simpson or Perez)

Radiology Electives—Mallinckrodt Institute

The role of radiology in the solution of clinical diagnostic problems is emphasized in this clerkship. Each student on the rotation will spend one or two weeks on each of two or three subspecialty sections within the department (abdomen, bone and joint, cardiac, chest, neuroradiology, nuclear medicine, pediatric radiology, radiation oncology, and West Pavilion 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 experience. (Dr. Aronberg)

Clerkships in diagnostic radiology are also 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)



Faculty of the Department of Radiology

Elizabeth E. Mallinckrodt

Professor and Head of Department and Director of the Mallinckrodt Institute of Radiology

Ronald G. Evens, A.B., Washington University, 1961; M.D., 1964.

Professors

Mokhtar Gado, M.B., B.Ch., Cairo University, 1953; DMRE, 1960.

Louis A. Gilula, M.D., University of Illinois, 1967.

Robert L. Grubb, Jr. (Radiation Sciences), A.B., University of North Carolina, 1961; M.D., 1965. (See Department of Neurology and Neurological Surgery.)

Fred J. Hodges III, B.A., University of Wisconsin, 1944; M.D., 1946.

R. Gilbert Jost, A.B., Harvard University, 1964; M.D., Yale University, 1969.

Hsiu-san Lin, M.D., Taiwan University, 1960; Ph.D., University of Chicago, 1968. (See Department of Microbiology and Immunology.)

Philip A. Ludbrook, M.B., B.S., University of Adelaide, 1963. (See Department of Medicine.)

James E. Marks, A.B., Knox College, 1961; M.D., Washington University, 1965.

William H. McAlister, B.S., Wayne State University, 1950; M.D., 1954. (See Department of Pediatrics.)

Bruce L. McClellan, B.S., Union College, 1963; M.D., State University of New York, Upstate, 1967.

G. Leland Melson, B.A., Ottawa University, 1961; M.D., Washington University, 1965.

William A. Murphy, Jr., B.S., University of Pittsburgh, 1966; M.D., Pennsylvania State University, 1971.

Carlos A. Perez, B.S., University of Antioquia, 1952; M.D., 1960.

James A. Purdy (Radiation Physics), B.S., Lamar University, 1967; M.A., University of Texas, 1969; Ph.D., 1971.

Marcus E. Raichle (Radiation Sciences), B.S., University of Washington, 1960; M.D., 1964. (See Department of Neurology and Neurological Surgery.)

Stuart S. Sagel, B.A., Temple University, 1961; M.D., 1965.

Gary D. Shackelford, B.A., Northwestern University, 1964; M.D., Washington University, 1968. (See Department of Pediatrics.)

Barry A. Siegel, A.B., Washington University, 1965; M.D., 1969. (See Department of Medicine.)

Michel M. Ter-Pogossian (Radiation Sciences), B.A., University of Paris, 1943; M.S., Washington University, 1948; Ph.D., 1950. (Also School of Engineering and Applied Science.)

Leonard J. Tolmach (Radiation Biology), B.S., University of Michigan, 1943; Ph.D., University of Chicago, 1951. (See Department of Anatomy and Neurobiology.)

Teresa J. Vietti (Radiation Oncology), A.B., Rice University, 1949; M.D., Baylor University, 1953. (See Department of Pediatrics.)

Michael J. Welch (Radiation Chemistry), B.A., Cambridge University, 1961; M.A., 1964; Ph.D., University of London, 1965. (Also Faculty of Arts and Sciences.)

Professor Emeritus (Clinical)

Hyman R. Senturia, A.B., Washington University, 1929; M.D., 1933.

Associate Professors

Dixie J. Aronberg, B.A., Hendrix College, 1967; M.D., Washington University, 1971.

Daniel R. Biello, B.A., Ohio Wesleyan University, 1969; M.D., Case Western Reserve, 1973.

Ralph V. Clayman, B.S., Grinnell College, 1969; M.D., University of California, 1973. (See Department of Surgery.)

John O. Eichling (Radiation Sciences), B.S., Northeastern Oklahoma State College, 1958; M.S., Oklahoma State College University, 1959; Ph.D., Washington University, 1970.

Bahman Emami, M.D., Tehran University, 1968.

Glenn P. Glasgow (Radiation Physics), B.S., Western Kentucky State College, 1965; M.S., University of Kentucky, 1969; Ph.D., 1974.

John K. Gohagan, B.A., LaSalle College, 1964; M.A., Temple University, 1968; Ph.D., Massachusetts Institute of Technology, 1973. (See Department of Preventive Medicine and Public Health.) (Also School of Engineering and Applied Science.)

Rexford L. Hill (Computer Sciences), B.S., University of Cincinnati, 1964; M.S., 1966. (See Biomedical Computer Laboratory.)

Joseph K. T. Lee, B.Sc., Chinese University of Hong Kong, 1968; M.D., Washington University, 1973.

Robert G. Levitt, B.A., University of California, 1968; M.D., 1972.

Robert C. McKnight, B.S., Florida State University, 1957; M.D., Washington University, 1961. (See Department of Medicine.)

Tom R. Miller, B.S., California Institute of Technology, 1966; M.S., Stanford University, 1969; Ph.D., 1971; M.D., University of Missouri, 1976.

Alexander N. Nakeff (Cancer Biology), B.S., University of Toronto, 1962; M.S., 1965; Ph.D., University of Rochester, 1969.

Gilbert H. Nussbaum (Radiation Physics), B.S., City College of New York, 1960; M.A., Harvard University, 1962; Ph.D., 1967.

Miljenko V. Pilepich, M.D., University of Zagreb, 1965.

Joseph L. Roti Roti (Cancer Biology), B.S., Michigan Technological University, 1965; Ph.D., University of Rochester, 1972.

Klaus Sartor, B.S., University of Tübingen, 1962; M.D., University of Düsseldorf, 1965.

Marilyn J. Siegel, A.B., Washington University, 1965; M.D., State University of New York, 1969. (See Department of Pediatrics.)

Patrick R. M. Thomas, B.S., London University, 1965; M.B., 1968.

Michael W. Vannier, B.S., Colorado State University, 1971; B.S.M.E., University of Kentucky, 1971; M.D., 1976.

Bruce J. Walz, A.B., Washington University, 1962; M.D., 1966.

Todd H. Wasserman, A.B., University of Rochester, 1968; M.D., University of Rochester School of Medicine and Dentistry, 1972.

Philip J. Weyman, B.A., Yale University, 1968; M.D., 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.D., St. Louis University, 1948.

Christopher J. Moran, B.S., University of Notre Dame, 1970; M.D., St. Louis University, 1974.

Noah Susman, A.B., Washington University, 1948; M.D., 1952. (Jewish Hospital.)

Assistant Professors

Charles L. Abramson, A.B., New York University, 1957; M.D., University of Basel, 1963.

Frederick G. Abrath (Radiation Physics), B.S., University of Wisconsin, 1967; Ph.D., North Texas State University, 1974.

Dennis M. Balfe, B.S., University of Santa Clara, 1968; M.D., Medical College of Wisconsin, 1975.

Judy M. Destouet, B.S., University of Southwestern Louisiana, 1969; M.D., Baylor College of Medicine, 1975.

Venkata R. Devineni, M.D., Osmania Medical College, 1974.

Armand Diaz (Technical Administration), R.N., R.T., Havana University School of Medicine, 1948.

W. Thomas Dixon (Radiation Sciences), B.M.E., University of Minnesota, 1967; Ph.D., University of California, 1980.

Delia M. Garcia, B.S., Western Illinois University, 1976; M.D., Southern Illinois University, 1979.

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

Harvey S. Glazer, B.A., Washington University, 1971; M.D., 1976.

Fernando R. Gutierrez, M.D., University of Valladolid, 1974.

David C. Hardy, M.D., University of Utah, 1977.

Jay P. Heiken, B.A., Williams College, 1974; M.D., Columbia University, 1978.

Peter Herscovitch (Radiation Sciences), B. Eng., McGill University, 1971; M.D., C.M., 1975. (See Department of Neurology and Neurological Surgery.)

Donald V. Huebener (Dental Medicine), D.D.S., Washington University, 1969. (See Department of Pediatrics.) (Also School of Dental Medicine.)

Michael R. Kilbourn (Radiation Sciences), B.S., University of Michigan, 1975; Ph.D., University of Illinois, 1979.

Andrei Laszlo (Cancer Biology), B.S., University of Chicago, 1970; M.S., University of California, 1972; Ph.D., 1981.

David Ling, A.B., Princeton University, 1973; M.D., Duke University, 1977.

Mark A. Mintun, B.S., Massachusetts Institute of Technology, 1977; M.D., Washington University, 1981.

Barbara Monsees, B.A., Brandeis University, 1971; M.D., Washington University, 1975.

Robert J. Myerson, B.A., Princeton University, 1969; Ph.D., University of California, 1974; M.D., University of Miami, 1980.

William J. Powers (Radiation Sciences), A.B., Dartmouth College, 1971; M.D., Cornell University, 1975. (See Department of Neurology and Neurological Surgery.)

William R. Reinus, B.A., Amherst College, 1975; M.D., New York University, 1979.

Joseph R. Simpson, A.B., Cornell University, 1963; Ph.D., University of Chicago, 1967; M.D., Harvard University, 1973.

Emily L. Smith, A.B., Washington University, 1964; M.D., 1968.

James J. Spadaro, Jr., B.S., Louisiana Tech University, 1973; M.D., Louisiana State University, 1976. (See Department of Medicine.)

Alan J. Tiefenbrunn, A.B., Washington University, 1970; M.D., 1974. (See Department of Medicine.)

William G. Totty, B.A., David Lipscomb College, 1969; M.D., University of Tennessee, 1975.

John Wai-chiu Wong (Radiation Physics), B.A.Sc., University of Toronto, 1974; M.Sc., 1977; Ph.D., 1982.

Research Assistant Professors

Peter T. Fox (Radiation Sciences), B.A., St. John's College, 1975; M.D., Georgetown University, 1979. (See Department of Neurology and Neurological Surgery.)

Joel S. Perlmutter (Radiation Sciences), A.B., Princeton University, 1975; M.D., University of Missouri, 1979. (See Department of Neurology and Neurological Surgery.)

Assistant Professor Emeritus (Clinical)

Wayne A. Simril, A.B., Culver-Stockton College, 1941; M.D., Washington University, 1944.

Assistant Professors (Clinical)

Robert J. Baglan, B.S., University of Kentucky, 1965; Ph.D., University of California, 1970; M.D., Washington University, 1976.

John L. Bardsley, B.A., University of Illinois, 1961; M.D., 1964.

Enrique Cubillo, M.D., University of Madrid, 1962.

James W. Debnam, Jr., B.A., University of Louisville, 1958; M.D., 1962.

Keith C. Fischer, A.B., Oberlin College, 1967; M.D., Johns Hopkins University, 1971.

Guillermo C. Geisse, B.A., University of Chile, 1957; M.D., 1965.

Albert E. Hesker, A.B., University of Missouri, 1961; M.D., 1964.

Fransiska Lee, A.B., Washington University, 1962; M.D., 1966.

MacDonald B. Logie, B.S., Northwestern University, 1965; M.D., 1967.

Ben R. Mayes, Jr., B.A., Vanderbilt University, 1962; M.D., Washington University, 1966.

Allan H. McCown, B.S., University of Idaho, 1962; M.D., Washington University, 1964.

Gary H. Omell, M.D., University of Tennessee, 1967.

Arthur A. Porporis, A.B., Washington University, 1946; M.D., 1948.

Robert F. Scheible, A.B., Johns Hopkins University, 1968; M.D., Washington University, 1972.

Chandrakant C. Tailor, M.B., B.S., Maharaja Sayajirao University of Baroda, 1972.

Instructors

Alan B. Fein, B.A., University of Rochester, 1974; M.D., Columbia University College of Physicians and Surgeons, 1978.

Seymour Fox (Computer Sciences), B. Comm., McGill University, 1971; M.S., University of Oregon, 1972; Ph.D., University of Oklahoma, 1977.

Russell L. Gerber (Radiation Physics), B.S., Southern Illinois University, 1974.

Carl A. Geyer, B.A., Johns Hopkins University, 1973; M.D., Brown University, 1980.

Ryuji Higashikubo (Cancer Biology), B.S., Rikkyo University, 1969; M.A., Bowling Green State University, 1972; Ph.D., 1978.

Richard A. Keys (Radiation Physics), B.A., St. Louis University, 1972; M.A., University of Missouri, 1974.

Charles K. Keyser, B.A., Oberlin College, 1968; M.D., Case Western Reserve University, 1981.

Robert R. Kuske, B.A., Swarthmore College, 1976; M.D., University of Cincinnati, 1980.

David McNaney, B.S., University of London, 1973; M.B., B.S., 1976.

Daniel F. Mullen, B.S., University of Missouri, 1972; M.S., 1983; D.D.S., 1977.

Daniel D. Picus, B.S., University of Illinois, 1977; M.D., University of Chicago, 1981.

Gary A. Press, B.S., Yale University, 1975; M.D., Washington University, 1980.

Michael P. Ward, B.A., Rice University; M.D., Louisiana State University, 1979.

James D. Winthrop, B.A., Duke University, 1974; M.D., University of Virginia, 1981.

Janette L. Worthington, B.S., Medical College of Virginia, 1974; M.D., 1981.

Research Instructor

Kondapuram S. Sampathkumaran (Nuclear Medicine), 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.

Edward Cohen, A.B., Washington University, 1961; M.D., University of Missouri, 1969.

Gene L. Davis, Jr., B.A., University of Virginia, 1968; M.D., 1972.

Albert M. Hammerman, A.B., Washington University, 1973; M.D., 1976.

Lawrence M. Kotner, Jr., B.A., Washington University, 1965; M.D., 1968.

Daniel J. Leary, Jr., B.S., St. Louis University, 1962; M.D., Washington University, 1966.

Edward F. Ragsdale, B.A., University of Arkansas, 1960; M.D., Washington University, 1964.

Gary A. Ratkin, B.A., Rice University, 1963; M.D., Washington University, 1967. (See Department of Medicine.)

Naris Rujanavech, M.D., Faculty of Medicine, Siriraj Hospital, 1972.

Gerald L. Shaikun, B.S., University of Kentucky, 1960; M.D., University of Chicago, 1964.

Gene W. Spector, B.A., Amherst College, 1954; M.D., Yale University, 1959.

Frederick R. Zivnaska, B.S., St. Procopius College, 1961; M.S., Marquette University, 1964; M.D., University of Wisconsin, 1970.

Research Associates

Karen L. Beetham, B.A., St. Olaf College, 1968; M.S., University of Iowa, 1971; Ph.D., 1974.

James W. Brodack, B.S., Eastern Illinois University, 1979; Ph.D., Massachusetts Institute of Technology, 1983.

David C. Ficke, B.S.E.E., Southern Illinois University, 1974.

Paul A. Jerabek, B.S., Lewis and Clark College, 1974; Ph.D., University of California, Irvine, 1982.

Fyllis L. Otsuka, B.S., Purdue University, 1974; Ph.D., University of California, San Diego, 1980.

Research Assistants

David G. Ballinger, B.S., Tufts University, 1984.

Carmen S. Dence, B.S., Universidad del Atlantico, 1967; M.S., Florida State University, 1972.

Gary R. Hoffman, B.A., University of Missouri, 1976.

David G. Politte, B.S., Washington University, 1981; M.S., 1983.

Consultants

Jose Maria V. Sala, B.S., Universidad del Litoral, 1936; M.D., 1944.

Mildred Trotter (Anatomy), A.B., Mount Holyoke College, 1920; Sc.M., Washington University, 1921; Ph.D., 1924; Sc.D., (hon.), Western College, 1956; Sc.D., (hon.), Mount Holyoke College, 1960; Sc.D., (hon.), Washington University, 1980. (See Department of Anatomy and Neurobiology.)

Mary Culver Department of Surgery

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 is spent at a hospital in the Washington University Medical Center. 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, 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 or Jewish Hospital. Students are active participants in the care of 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 those 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. Cox and Staff)

Plastic and Reconstructive Surgery Elective

The clerkship on Plastic Surgery is available for 6-12 weeks. The rotation may be either spent in a clinical or laboratory setting. The clinical rotation provides for the student to spend one week with each attending surgeon. Each service provides a unique opportunity for patient care; Dr. Marsh—congenital anomalies, craniofacial and maxillofacial surgery, Dr. Weeks—hand surgery, Dr. Young—reconstructive plastic surgery and microsurgery, Ward-Resident Service—general plastic surgery, Dr. Logan—reconstructive plastic surgery, Dr. Clement—cosmetic and reconstructive plastic surgery.

There are five weekly conferences, including an x-ray conference. The laboratory rotation must be arranged with Dr. Weeks prior to the rotation so that a project may be developed or the student may join in the completion of

an ongoing project. Ongoing projects include wound healing studies, limb transplantation, and computerized three-dimensional modeling. (Dr. Weeks and Staff)

Orthopedic Surgery Elective

Clinical clerkship electives are available for six weeks, during which time the student attends conferences and outpatient clinics. Students become an active part of the orthopedic team at Barnes Hospital and may spend part of their time at the Shriner's Hospital for Crippled Children and Veterans Hospital, the exact program to be worked out on an individual basis with the chairman of the division. (Dr. Manske and Staff)

Urology Elective

A six-week clinical clerkship is designed to provide the student with 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. Catalona 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)

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.

John M. Schoenberg Professor of Cardiovascular Surgery

Nicholas T. Kouchoukos, M.D.,
Washington University, 1961. (Jewish
Hospital.)

Professors

John P. Boineau, B.S., University of
South Carolina, 1955; M.D., Duke
University, 1959.

Clarence S. Weldon, A.B., University
of Michigan, 1951; M.D., Johns
Hopkins University, 1955. (See
Department of Pediatrics.)

Professors (Clinical)

Thomas B. Ferguson, B.S., Duke
University, 1947; M.D., 1947.

Charles L. Roper, A.B., University of
Colorado, M.D., 1953.

Associate Professor (Clinical)

Martin Bergman, A.B., Washington
University, 1942; M.D., 1945. (Jewish
Hospital.)

Research Associate Professor

Ignacio Christlieb, B.A., Colegio
Frances de Preparatoria, 1945; M.D.,
National Autonomous University of
Mexico, 1952.

Assistant Professors

R. Morton Bolman III, B.A., Williams
College, 1969; M.D., St. Louis
University, 1973.

Richard A. Hopkins, B.A., Duke
University, 1970; M.D., 1974.

William G. Marshall, M.D., Johns
Hopkins University, 1973. (Jewish
Hospital.)

Jon F. Moran, B.A., Yale University,
1968; M.D., Washington University,
1973.

Thomas L. Spray, B.A., Haverford
College, 1970; M.D., Duke University,
1973.

Research Assistant Professor

Richard B. Schuessler, B.S.,
University of Missouri, Rolla, 1972;
Ph.D., Clemson University, 1977.

DIVISION OF GENERAL SURGERY

Head of Division

Charles B. Anderson, A.B., Johns
Hopkins University, 1958; M.D., Yale
University, 1962.

Harry Edison Professor of Surgery

Gordon W. Philpott, B.S., Yale
University, 1957; M.D., Washington
University, 1961. (Jewish Hospital.)

Professors

Walter F. Ballinger, M.D., University
of Pennsylvania, 1948.

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.)

M. Wayne Flye, B.S., University of
North Carolina, Chapel Hill, 1964;
M.D., 1967; M.A., Duke University,
1972; Ph.D., 1980.

William W. Monafio, A.B., Harvard
University, 1953; M.D., Tufts
University, 1957.

Professors Emeriti

Eugene M. Bricker, M.D., Washington
University, 1934.

J.G. Probst, M.D., Loyola
University, 1917.

Associate Professors

John D. Halverson, B.A., Hamilton
College, 1963; M.D., State University
of New York, 1967.

David W. Scharp, M.D., Washington
University, 1970.

Gregorio Sicard, B.S., St. Louis
University, 1965; M.D., University of
Puerto Rico, 1972.

Associate Professors (Clinical)

Richard V. Bradley, M.D., Washington
University, 1952.

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.

Robert H. Lund, B.S., Miami
University, 1945; M.D., Washington
University, 1949.

Leo A. Sachar, A.B., Washington
University, 1936; M.D., 1940. (Jewish
Hospital.)

William D. Shieber, M.D., Washington
University, 1953. (Jewish Hospital.)

Richard G. Sisson, A.B., Harvard
University, 1943; M.D., Yale
University, 1946. (Jewish Hospital.)

George L. Tucker, A.B., Columbia
University, 1952; M.D., Harvard
University, 1956.

Willard B. Walker, M.D., Washington
University, 1946.



Assistant Professor

Douglas W. Hanto, B.A., St. Olaf College, 1973; M.D., University of Arizona, 1977.

Associate Professor Emeritus

C. Alan McAfee, B.S., Washington State College, 1938; M.D., Washington University, 1942.

Research Associate Professor

William G. Dilley, B.A., University of California, 1965; M.A., 1967; Ph.D., 1970.

Assistant Professors (Clinical)

Kenneth J. Arnold, B.A., Notre Dame University, 1964; M.D., Washington University, 1968.

Kenneth J. Bennett, M.D., Tulane University, 1965. (Jewish Hospital.)

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.)

Richard H. Fallon, B.S., Boston College, 1952; M.D., Harvard University, 1956; A.M., Washington University, 1971.

Robert D. Fry, A.B., Oklahoma City University, 1968; M.D., Washington University, 1972. (Jewish Hospital.)

Alvin Goldfarb, A.B., Washington University, 1940; M.D., 1943. (Jewish Hospital.)

Fleming B. Harper, M.D., Medical College of Virginia, 1947.

Ira J. Kodner, A.B., Washington University, 1963; M.D., 1967. (Jewish Hospital.)

Jerome F. Levy, A.B., Washington University, 1954; M.D., 1958.

Stanley L. London, M.D., Washington University, 1949. (Jewish Hospital.)

Sherwin H. Malt, A.B., Washington University, 1962; M.D., University of Missouri, 1966. (Jewish Hospital.)

Jerry R. Meyers, B.A., University of Texas, 1962; M.D., Washington University, 1966.

Shale M. Rifkin, M.D., Washington University, 1948. (Jewish Hospital.)

Andrew D. Spencer, A.B., Indiana University, 1951; M.D., 1954.

Research Assistant Professors

Harry W. Margraf, Ph.D., Polytechnic Milan, 1943; Sc.D., Washington University, 1971. (Jewish Hospital.)

John D. Tyler, B.B.A., University of Michigan, 1969; Ph.D., State University of New York, 1978.

Instructors (Clinical)

Robert R. Anscheutz, M.D., Washington University, 1940.

John B. Buettner, A.B., Dartmouth College, 1963; M.D., Washington University, 1967.

Arthur R. Dalton, B.S., University of Missouri, 1939; B.S.Med., Northwestern University, 1940; M.D., 1941.

Ronald J. Gaskin, A.B., Washington University, 1966; M.D., 1970.

Jay W. Haines, B.A., Trinity University, 1970; M.D., Chicago Medical School, 1974.

John D. Hirsch, B.A., Case Western Reserve University, 1969; M.D., Washington University, 1973. (Jewish Hospital.)

Robert J. Kingsbury, A.B., Asbury College, 1956; M.D., University of Michigan, 1960.

David P. Krajcovic, A.B., Washington University, 1965; M.D., 1969.

G. Lynn Krause, Jr., A.B., Amherst College, 1950; M.D., University of Pennsylvania, 1954.

Alan M. Londe, A.B., Washington University, 1957; M.D., 1961.

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.

Charles L. Parks, B.A., University of North Dakota, 1967; M.D., Washington University, 1969.

Joseph C. Peden, Jr., B.S., Harvard University, 1940; M.D., 1943.

Mather Pfeifferberger, 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. (Jewish Hospital.)

Donald C. Sauer, A.B., Washington University, 1956; M.D., 1960. (Jewish Hospital.)

Belmont R. Thiele, M.D., St. Louis University, 1948.

Instructors Emeriti

Virgil O. Fish, M.D., Washington University, 1930.

George C. Wee, M.D., University of Louisville, 1931.

Research Instructor

Judith M. Connett, B.A., University of Chicago, 1968; Ph.D., Washington University, 1979. (Jewish Hospital.)

Assistants (Clinical)

Arthur I. Auer, B.S., Massachusetts Institute of Technology, 1952; M.D., Washington University, 1956.



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 Omaha, 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, B.S., Holy Cross, 1960; M.S., Cornell University, 1962; D.M.D., Temple Health Science Center, 1973; M.S.D., New York University Medical Center, 1973.

Professor

Louis Altshuler, D.D.S., Ohio State University, 1945.

Assistant Professors

Marc B. Abrams, B.S., University of Missouri, 1968; D.D.S., 1972.

Allen Sclaroff, B.A., University of Colorado, 1968; D.D.S., Temple Health Science Center, 1972.

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

Fred C. Reynolds Professor and Head of Division

Paul R. Manske, B.A., Valparaiso University, 1960; M.D., Washington University, 1964.

Professor

Lee T. Ford, M.D., University of Tennessee, 1940.

Professor Emeritus

Fred C. Reynolds, A.B., Washington University, 1931; M.D., 1934.

Associate Professor

Perry L. Schoenecker, B.S., University of Wisconsin, 1964; M.D., 1968.

Associate Professors (Clinical)

Marshall B. Conrad, A.B., Westminster College, 1942; M.D., Washington University, 1945.

Harry C. Morgan, B.A., University of Missouri, 1949; B.S., 1951; M.D., Harvard University, 1953.

Research Associate Professor

David J. Simmons, B.A., Boston University, 1954; M.A., Clark University, 1956; Ph.D., University of Chicago, 1959.

Assistant Professors

Vilray P. Blair III, B.A., Harvard University, 1973; M.D., Duke University, 1977.

Keith H. Bridwell, A.B., Washington University, 1973; M.D., 1977.

Wayne J. Daum, B.S., John Carroll University, 1967; M.D., St. Louis University, 1971.

Lawrence A. Kriegshauser, B.S., Regis College, 1974; M.D., University of Missouri, 1978.

Margaret Rich, B.S., Northwestern University, 1972; M.D., 1976; Ph.D., 1977.

Robert A. Shively, B.S., University of Illinois, 1965; M.D., 1969.

William B. Strecker, B.A., University of Missouri, 1971; M.D., St. Louis University, 1975.

Assistant Professors (Clinical)

James C. Ellsasser, B.S., Duke University, 1960; M.D., Washington University, 1964.

Jerome J. Gilden, A.B., Washington University, 1948; M.D., 1952. (Jewish Hospital.)

Jordon H. Ginsburg, B.A., University of Michigan, 1968; M.D., University of Illinois, 1972. (Jewish Hospital.)

Earl P. Holt, Jr., A.B., Duke University, 1942; M.D., 1945.

Robert F. Kuhlman, A.B., Washington University, 1953; M.D., 1956.

Marvin R. Mishkin, B.A., Roosevelt College, 1950; M.D., University of Illinois, 1955. (Jewish Hospital.)

George E. Scheer, B.A., Municipal University of Wichita, 1940; M.D., Washington University, 1943.

Assistant Professor Emeritus

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.

Research Assistant Professors

Jean E. Childers, B.A., Cornell University, 1965; Ph.D., Rice University, 1970.

David R. Lange, A.B., Dartmouth College, 1970; M.D., Washington University, 1974.

Leo A. Whiteside, B.S., University of Oklahoma, 1965; M.D., University of Texas, 1969.

Instructors (Clinical)

Donald R. Bassman, A.B., Washington University, 1971; M.D., 1975. (Jewish Hospital.)

Vilray P. Blair, Jr., B.A., University of Virginia, 1935; M.D., Washington University, 1939.

Donald H. Brancato, B.A., Northwestern University, 1963; M.D., 1967.

William S. Costen, A.B., Princeton University, 1950; M.D., Washington University, 1954.

Ronald C. Hertel, A.B., Washington University, 1952; M.D., 1956.

Barrett K. Holder, B.A., Southern Illinois University, 1965; M.D., Washington University, 1969.

Robert C. Lander, B.A., University of Michigan, 1968; M.D., University of Illinois, 1972.

W. Edward Lansche, A.B., Washington University, 1948; M.D., 1952.

Charles Mannis, A.B., Washington University, 1965; M.D., University of Missouri, Columbia, 1969. (Jewish Hospital.)

Alan H. Morris, B.A., University of Illinois, 1959; M.D., 1963. (Jewish Hospital.)

Margaret M. Oakley, B.S., University of Illinois, 1955; M.D., St. Louis University, 1959. (Shriners Hospital for Crippled Children.)

Robert L. Pierron, M.D., University of Missouri, 1975. (Shriners Hospital for Crippled Children.)

Barry L. Samson, B.A., University of Wisconsin, 1970; M.D., Washington University, 1974. (Jewish Hospital.)

John J. Sheridan, B.A., University of Notre Dame, 1965; M.D., Washington University, 1969. (Shriners Hospital for Crippled Children.)

Keith R. Swanson, B.S., Midwestern University, 1967; M.D., University of Texas, Galveston, 1971. (Shriners Hospital for Crippled Children.)

Michael H. Winer, A.B., Washington University, 1964; M.D., University of Illinois, 1968. (Jewish Hospital.)

Research Instructors

S. Vic Glogovac, A.B., Washington University, 1969; M.D., 1973.

Peggy A. Lesker, B.A., Illinois College, 1965.

Assistants (Clinical)

John P. Arnot, B.A., Rice University, 1954; M.D., Yale University, 1958.

Kyu Sop Cho, M.D., Yon-Sei University, 1954.

Herman E. Russell, B.A., New York University, 1950; M.D., University of Geneva, 1956.

George R. Schoedinger III, M.D., University of Oregon, 1962.

DIVISION OF PEDIATRIC SURGERY

Head of Division

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 Professor

Richard J. Bower, B.S., Northern Illinois University, 1965; M.D., University of Virginia, 1969. (See Department of Pediatrics.)

DIVISION OF PLASTIC AND RECONSTRUCTIVE SURGERY

Head of Division

Paul M. Weeks, A.B., Duke University, 1954; M.D., University of North Carolina, 1958. (See Irene Walter Johnson Institute of Rehabilitation.)

Professor Emeritus

Minot P. Fryer, A.B., Brown University, 1936; M.D., Johns Hopkins University, 1940; D.S.C., Brown University, 1972.

Associate Professors

Jeffrey L. Marsh, B.A., Johns Hopkins University, 1967; M.D., 1970. (See Department of Pediatrics.)

Vernon L. Young, B.A., University of Kentucky, 1966; M.D., 1970.



Assistant Professors

Samuel E. Logan, B.S., California Institute of Technology, 1968; M.S., Ph.D., 1972; M.D., University of California—Los Angeles, 1976.

Thomas A. Mustoe, B.A., Harvard College, 1973; M.D., Harvard Medical School, 1978.

Michael W. Vannier, B.S., Colorado State University, 1971; B.S.M.E., University of Kentucky, 1971; M.D., 1976. (See Department of Radiology.)

Assistant Professors (Clinical)

Joseph W. Eades, A.B., Amherst College, 1952; M.D., Washington University, 1960. (Jewish Hospital.)

George H. Zografakis, M.S., Rutgers University, 1955; M.D., State University of New York, Upstate, 1959.

Instructor

Richard E. Clement, M.D., University of Virginia, 1979.

Instructors (Clinical)

David A. Caplin, A.B., Kenyon College, 1971; M.D., University of Cincinnati, 1975. (Jewish Hospital.)

Richard Shatz, B.A., University of Missouri, 1968; M.D., St. Louis University, 1972. (Jewish Hospital.)

Bruce I. White, M.D., Washington University, 1964. (Jewish Hospital.)

DIVISION OF UROLOGIC SURGERY

Head of Division

William J. Catalona, B.S., Otterbein College, 1964; M.D., Yale University, 1968.

Professors

Saul Boyarsky, B.S., University of Vermont, 1943; M.D., 1946.

Charles B. Manley, Jr., A.B., University of Missouri, 1955; M.D., 1958. (See Department of Pediatrics.)

Professors (Clinical)

Morris Abrams, B.S., University of Illinois, 1934; M.D., 1937. (Jewish Hospital.)

Robert K. Royce, B.S., University of Mississippi, 1939; M.D., Washington University, 1942.

Associate Professor

Ralph V. Clayman, B.A., Grinnell College, 1969; M.D., University of California, San Diego, 1973.

Associate Professors (Clinical)

William T. Bowles, A.B., Stanford University, 1952; M.D., 1955.

M. Richard Carlin, B.A., Dartmouth College, 1944; M.D., Yale University, 1947.

Associate Professor Emeritus

Carl A. Wattenberg, A.B., University of Kansas, 1934; M.D., 1937.

Research Associate Professor

Timothy L. Ratliff, B.S., University of Texas, 1971; M.S., East Texas University, 1974; Ph.D., University of Arkansas, 1977. (Jewish Hospital.)

Assistant Professors

Gerald L. Andriole, B.S., Pennsylvania State University, 1976; M.D., Jefferson Medical College, 1978.

Robert R. Bahnson, A.B., Carleton College, 1975; B.S., University of South Dakota, 1977; M.D., Tufts University, 1979.

Dov Kadmon, M.D., Hebrew University Hadassah Medical School, 1970. (Jewish Hospital.)

Assistant Professors (Clinical)

Lawrence M. Aronberg, A.B., Washington University, 1932; M.D., 1936. (Jewish Hospital.)

James G. Bucy, B.S., Haverford College, 1958; M.D., Northwestern University, 1962.

Richard P. Parsons, B.D., Missouri Valley College, 1954; M.D., Washington University, 1958.

Instructors (Clinical)

Saul Klein, M.D., Syracuse University, 1959. (Jewish Hospital.)

Thomas Lyles, B.A., Southern Illinois University, 1969; M.D., Washington University, 1975. (Jewish Hospital.)

Neal Neuman, M.D., St. Louis University, 1971. (Jewish Hospital.)

Herbert Sunshine, A.B., Washington University, 1950; M.D., 1954. (Jewish Hospital.)

Research Assistant Professor

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

Research Associate

Rose Boyarsky, B.S., University of Vermont, 1944; M.A., Columbia University, 1946; Ph.D., Duke University, 1969.



Teaching and Research Divisions

INSTITUTE FOR BIOMEDICAL COMPUTING

The Institute for Biomedical Computing is an inter-school facility which spans computing research activities at both the School of Medicine and the School of Engineering and Applied Science. The Institute consists of two research-laboratory components, the Biomedical Computer Laboratory (BCL) and the Computer Systems Laboratory (CSL), both of which have close ties with the departments of Computer Science and Electrical Engineering as well as with most departments in the School of Medicine.

The BCL emphasizes the development of specialized computer systems for use in the solution of research problems in biomedicine. Several systems now in clinical use have seen a progression from exploratory pilot studies, through major development projects, to public availability through commercial manufacture. In general, BCL focuses on applications which require strong coupling of the computer to its environment for digital signal processing and quantitative biomedical imaging. Such applications employ computers and microprocessors in conjunction with specialized hardware designed and built locally. Many applications have been addressed by bringing signals from hospital wards and research laboratories to BCL or more frequently by taking the computers to investigators' laboratories or patients' bedsides.

The central theme of CSL's program has been the development of tools for building specialized computer systems for challenging applications, and the construction of high-performance systems using these tools. The emergence of design and fabrication technologies for Very-Large-Scale Integrated (VLSI) circuits over the last several years has been a major stimulus to the CSL program. Current research is focused on the development of theory and derivative computer-aided design tools for the specification and construction of highly parallel computer systems. This work draws on long experience in the design of asynchronous circuits and systems.

The purpose of the Institute for Biomedical Computing is to foster the development and application of advanced computing and engineering technologies to problems in biomedical science. In addition to its activities in collaborative research, the Institute serves as a focal point for interdisciplinary teaching and student research in areas not ordinarily included in conventional curricula.

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 concentration, 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

Topics in the theoretical foundations of tracer-kinetic methods include 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)

Research Opportunities

Research activities of the Institute for Biomedical Computing span a wide range from basic biological science and clinical research to topics in biomedical engineering, signal processing, computer architectures, and integrated circuit design. Many research projects of the Institute involve collaboration with researchers in the basic sciences and clinical departments of the School of Medicine, or in the Departments of Computer Science and Electrical Engineering of the School of Engineering

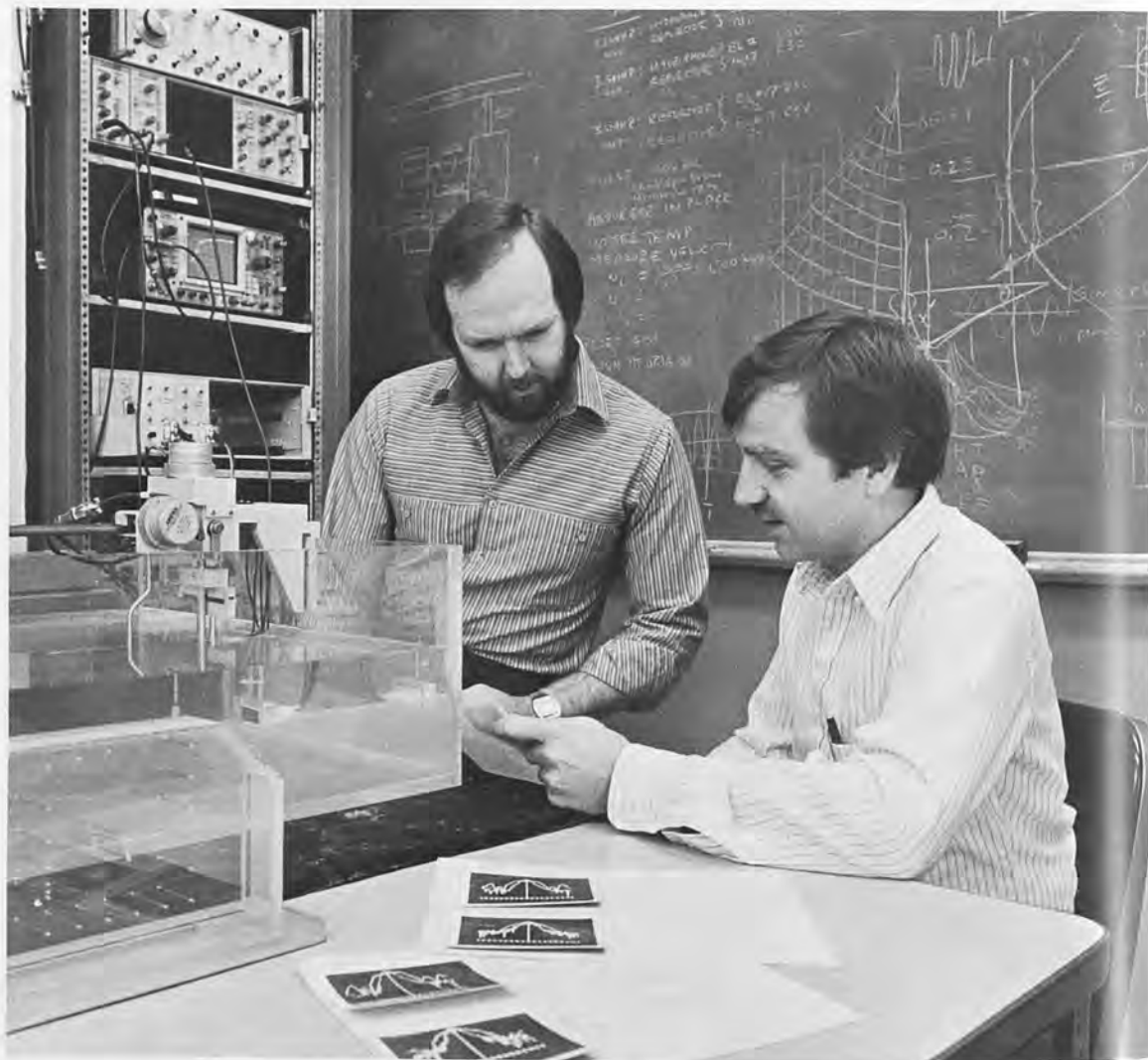
and Applied Science. Additional collaborations take place through the interdepartmental program in Biomedical Engineering.

Current emphasis in the core research program of the Biomedical Computer Laboratory is on quantitative biomedical imaging, which includes: modeling of biological phenomena as image sources; transduction processes; instrumentation characteristics; data analysis strategies for extraction of information from images; algorithms for image construction and analysis; tissue characterization via quantitative ultrasonic imaging; and development of a distributed facility for image presentation, analysis, and quantification.

Present collaborative projects in BCL include research in: 1) the pathogenesis, treatment, and sequelae of ischemic heart disease; 2) the development of methods for precise, three-dimensional dose computations in radiation treatment planning; 3) the noninvasive delineation of pharmacology, blood flow, and metabolism in the

brain; 4) the improvement of analysis methods for neuroanatomical imaging; 5) the development of advanced picture archive and communication systems for electronic radiology; 6) the improvement of positron-emission tomography systems employing photon time-of-flight information; 7) the development of a global method for physical mapping of DNA; and 8) the pathophysiology of glaucoma employing retinal imaging for regional blood-flow estimation.

The core research project of the Computer Systems Laboratory is development of techniques for designing very-large-scale integrated computer systems (VLSI) specialized for biomedical applications requiring unusual computing capability. Collaborative application projects include support of BCL projects as well as other collaborations in the areas of drug design, molecular graphics and modeling, auditory, physiology, and information-systems research. (Drs. Molnar and Thomas)



**Professor and Director,
and Director of CSL**

Charles E. Molnar, B.S.E.E., Rutgers University, 1956; M.S.E.E., 1957; Sc.D., Massachusetts Institute of Technology, 1966. (See Department of Cell Biology and Physiology.) (Also School of Engineering and Applied Science.)

**Associate Professor and
Associate Director,
and Director of BCL**

Lewis J. Thomas, Jr., B.S., Haverford College, 1953; M.D., Washington University, 1957. (See Departments of Anesthesiology and Cell Biology and Physiology.) (Also School of Engineering and Applied Science.)

**Associate Professor and
Associate Director of BCL**

G. James Blaine III, B.S., Washington University, 1959; M.S., 1961; D.Sc., 1974. (Also School of Engineering and Applied Science.)

**Associate Professor and
Associate Director of CSL**

Frederick U. Rosenberger, B.S., Washington University, 1961; M.S., New York University, 1963; D.Sc., 1969. (Also School of Engineering and Applied Science.)

Assistant Director of CSL

Gerald C. Johns, B.S., Washington University, 1966.

**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 Cell Biology and Physiology.) (Also School of Engineering and Applied Science.)

Richard A. Dammkoehler, B.S., Washington University, 1956; M.S., 1959. (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. Snyder, B.S., University of Southern California, 1961; M.S., Massachusetts Institute of Technology, 1963; Ph.D., 1966. (Also School of Engineering and Applied Science.)

Donald F. Wann, B.S., Yale University, 1953; M.S., Washington University, 1957; D.Sc., 1961. (Also School of Engineering and Applied Science.)



**Professors and
Research Associates**

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.)

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.)

James G. Miller, A.B., St. Louis University, 1964; M.A., Washington University, 1966; Ph.D., 1969. (See Department of Medicine.) (Also Faculty of Arts and Sciences.)

**Associate Professor and
Research Associate**

William M. Hart, Jr., Ph.D., University of Maryland, 1970; M.D., 1970. (See Department of Ophthalmology.)

Associate Professors

Rexford L. Hill, B.S., University of Cincinnati, 1964; M.S., 1966. (See Department of Radiology.)

J. Philip Miller, A.B., Washington University, 1965. (See Department of Preventive Medicine and Public Health.)

**Assistant Professors and
Research Associates**

Michael I. Miller, B.S., State University of New York (Stony Brook), 1976; M.S., Johns Hopkins University, 1978; Ph.D., 1983. (Also School of Engineering and Applied Science.)

Jan T. Udding, B.S., Eindhoven University of Technology, 1975; M.S., 1980. (Also School of Engineering and Applied Science.)

Research Associates

Thomas J. Chaney, B.S., Kansas State University, 1962; M.S., Washington University, 1969.

Kenneth W. Clark, B.S., St. Louis University, 1965; M.S., 1967.

A. Maynard Engebretson, B.S., University of Minnesota, 1958; M.S., Washington University, 1963; D.Sc., 1970. (Also Central Institute for the Deaf.)

Ting-P. Fang, B.S., National Taiwan University, 1967; M.S., Washington University, 1975; D.Sc., 1979.

Kenneth B. Larson, Met.E., Colorado School of Mines, 1954; S.M., Massachusetts Institute of Technology, 1958; Ph.D., 1964.

John W. Matthews, B.S., Washington University, 1968; M.S., 1972; D.Sc., 1980.

John W. Wong, B.S., University of Toronto, 1974; M.S., 1977; Ph.D., 1978. (See Department of Radiology.)

THE MEDICAL CARE GROUP OF ST. LOUIS (MCG)

MCG is a prepaid group practice providing comprehensive health services to more than 40,000 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 campus of the School of Medicine 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.



Director

Lawrence I. Kahn (Health Care Research), A.B., University of Alabama, 1941; M.D., Louisiana State University, 1945. (See Departments of Pediatrics and Preventive Medicine and Public Health.) (Also Pediatric Nurse Practitioner Program.)

Staff

Gail Ahumada, A.B., Stanford University, 1961; M.A., 1962; M.D., University of California, San Diego, 1972. (See Department of Medicine.)

Scott Anderson, B.A., University of California, San Diego, 1975; Ph.D., Duke University, 1981; M.D., 1982. (See Department of Medicine.)

Bonnie Aust, B.A., University of Texas, 1975; M.D., University of Texas Medical School at San Antonio, 1979. (See Department of Pediatrics.)

Jill Baer, B.S., University of Kentucky, 1972; M.D., 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.)

Carl Blatt, B.A., Vanderbilt University, 1976; M.D., Georgetown University, 1980. (See Department of Medicine.)

Joyce Boehmer, B.S., New College, 1975; M.D., University of Missouri, 1979. (See Department of Medicine.)

Eyla Boies, B.S., College of Idaho, 1974; M.D., Washington University School of Medicine, 1978. (See Department of Pediatrics.)

Charles Butrick, B.S., Kansas State University, 1977; M.D., Kansas University Medical School, 1980. (See Department of Obstetrics and Gynecology.)

Lauren Clark-Rice, B.S., University of California at Los Angeles, 1973; M.D., University of Missouri at Columbia, 1977. (See Department of Obstetrics and Gynecology.)

John C. Davis, B.S., Michigan State University, 1976; M.D., University of Michigan, 1980. (See Department of Pediatrics.)

Irl J. Don, A.B., Washington University, 1968; M.D., 1972. (See Department of Medicine.)

Branka Ford, B.S., New York University, 1965; M.D., McMaster University, 1975. (See Department of Medicine.)

Kathy Garcia, B.S., University of California, 1976; M.D., Harvard Medical School, 1980. (See Department of Medicine.)

John J. Garrett, B.S., Niagara University, 1942; M.D., Harvard Medical School, 1951. (See Department of Medicine.)

Daniel Gluckstein, B.S., University of Michigan, 1977; M.D., Washington University, 1981. (See Department of Medicine.)

Diana L. Gray, B.S., University of Illinois, 1977; M.D., University of Illinois, 1981. (See Department of Obstetrics and Gynecology.)

Guner Gulmen, M.D., Hacettepe University Medical School, 1969. (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.)

Faith H. Holcombe, B.A., Radcliffe, 1976; M.D., Washington University School of Medicine, 1980. (See Department of Medicine.)

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.)

A. Donna King, B.A., Western Maryland College, 1960; M.S.W., Washington University, 1966. (See Department of Preventive Medicine and Public Health.)

Donald K. King, A.B., Fairfield University, 1966; M.D., Johns Hopkins University, 1970. (See Department of Medicine.)

Richard Lazaroff, B.A., Brown University, 1974; M.D., St. Louis University, 1978. (See Department of Pediatrics.)

Ronald Leong, A.B., Washington University, 1976; M.D., 1981. (See Department of Medicine.)

Jerald Maslanko, M.D., Emory University, 1975. (See Department of Medicine.)

Joan Mass, B.A., Washington University, 1971; M.D., Temple University, 1977. (See Department of Medicine.)

Thomas C. McKinney, Jr., B.A., Illinois Wesleyan University, 1976; M.D., Washington University, 1980. (See Department of Pediatrics.)

Casey A. Moauro, B.S., University of Illinois, 1977; M.D., 1981. (See Department of Obstetrics and Gynecology.)

Vivian Moynihan, B.S., University of Dayton, 1977; M.D., Ohio State University College of Medicine, 1980. (See Department of Obstetrics and Gynecology.)

Susan Nelson, B.A., Oberlin College, 1969; M.A., 1971; M.D., Washington University School of Medicine, 1978. (See Department of Pediatrics.)

G. 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.)

John Rice, B.A., St. Louis University, 1976; M.D., University of Missouri at Columbia, 1980. (See Department of Medicine.)

Janet Ruzycki, B.A., Washington University, 1977; M.D., 1981. (See Department of Pediatrics.)

Paul S. Simons, B.A., University of Texas, 1963; M.D., Washington University, 1967. (See Department of Pediatrics.)

Wanda Terrell, A.B., Washington University, 1975; M.D., 1979. (See Department of Medicine.)

Alice Trotter, B.A., Mount Holyoke College, 1962; M.D., Washington University, 1969. (See Department of Medicine.)

David Tucker, B.S., University of Notre Dame, 1977; M.D., St. Louis University, 1981. (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 the treatment of 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

Executive Committee

Anesthesiology
William D. Owens

Cardiothoracic
Thomas B. Ferguson

Internal Medicine
Stuart A. Kornfeld
Alan Lyss

Neurology and Neurological Surgery
William S. Cox

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

Radiology
Carlos A. Perez
James E. Marks
Joseph R. Simpson
Bruce J. Walz

Surgery
Harvey R. Butcher, Jr.
John D. Halverson
Gordon W. Philpott

Urology
William J. Catalona

THE IRENE WALTER JOHNSON INSTITUTE OF REHABILITATION

The teaching of rehabilitation is conducted by members of various allied health and medical specialty services. The Irene Walter Johnson Institute of Rehabilitation is a modern five-story building housing both clinical and research facilities. Its many programs serve adults and children with a wide variety of acute and chronic disabilities.

Traineeship Elective

Traineeships in Physical Disability and Rehabilitation of eight weeks' duration may be elected during the interval between the end of spring trimester and beginning of the fall trimester by two students who have completed the first year of the medical school curriculum. Specific instruction is given by means of informal lec-

tures, 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 psychology, 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 Cardiac Rehabilitation Center.

Interests of the students will be met by arranging experience in rehabilitation at extramural facilities, including Jewish Hospital and community independent living centers.

Director

Michael H. Brooke, M.B., B.Ch., Cambridge University, 1958. (See Departments of Neurology and Neurological Surgery and Preventive Medicine and Public Health.)

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, organized in 1973, is a consortium of eight university departments which together provide interdisciplinary training for Ph.D. students. This unique organization was formed because of the realization that research and training in modern biology transcend the limits of departmental structure. The faculty consists of members of seven preclinical departments in the School of Medicine—Anatomy and Neurobiology, Biological Chemistry, Cell Biology and Physiology, Genetics, Microbiology and Immunology, Pathology, and Pharmacology—and of the Department of Biology in the Graduate School of Arts and Sciences. These 200 faculty are affiliated with one or more of five broad training programs: Cell and Integrative Biology, Molecular Biology and Biochemistry, Neural Sciences, Plant Biology, and Population Biology. Faculty in these programs take responsibility for all Divisional activities, including recruiting, admissions, advising, and research training, and in addition many Divisional courses and seminars are offered by the participating faculty.

Currently over 220 graduate students are enrolled in the Division, including 100 students pursuing both the Ph.D. and the M.D. through the Medical Scientist Training Program (see page 8). Requirements for the Ph.D. in each Divisional Program are highly flexible. They include a series of courses tailored to a student's background and interests, qualifying examinations usually taken during the second year, execution of laboratory research, and defense of a dissertation generated through original scientific investigation. Although students enter the Division through an affiliation with one of the five programs, it is often possible for a student to transfer to another program as interests evolve. During the first year, advisers are appointed to assist students in selecting courses and seminars as well as to help them in choosing laboratories in which they will spend several months becoming acquainted with a particular area of scientific research. At the end of the first year, it is expected that each student will choose a research adviser, whereupon the student will be housed in one of the departments of the Division. Continued participation in both Divisional and departmental activities assures the versatility of interests developed during the first year.

Applications for admission to the Ph.D. programs of the Division are due no later than January 15 for matriculation the following fall. Admission is based on demonstrated ability, future promise, and the number of positions currently available. Applicants should have completed undergraduate training in biology, chemistry, or physics at a high level of scholastic achievement; such training should include courses in biology, genetics, chemistry (including analytical, organic, and physical), physics, and calculus. In exceptional cases, deficiencies

in basic requirements may be made up by appropriate course selection during the first year of study. It is strongly recommended that each applicant take both the aptitude and advanced tests of the Graduate Record Examination. Additional information and application for admission to the Ph.D. programs may be obtained by writing to the Office of Graduate Affairs, Box 8072, Washington University School of Medicine, 660 South Euclid Avenue, St. Louis, Missouri 63110.

Students admitted to the graduate programs are guaranteed full stipend and tuition support for a minimum of four years, contingent upon satisfactory performance. Currently the stipend is \$7250 annually. For the 1985-86 academic year, the tuition fee for a full-time student is \$9650 per year. This fee includes the cost of participation in the Medical Center Student Health Service. The Division provides support for its Ph.D. students from a number of sources, including federally funded training grants provided by the National Institutes of Health. Support through such grants is subject to payback agreement and taxability provisions appropriate to the award.



It is expected that each student in a Ph.D. training program will devote full time to that endeavor. The Division will not accept students for part-time study, nor will it enroll students interested in a Master's degree.

The following graduate courses are offered by the Division of Biology and Biomedical Sciences, and they are available both to Ph.D. and M.D. students who meet the prerequisites stated for the appropriate course. Those courses particularly relevant to a given department are cross-listed under the department in this *Bulletin*. The faculty member in charge of the course and his departmental affiliation are shown at the end of each course description.

Bio 401. Vertebrate Physiology

This three credit-hour lecture series is a coverage of the integrated functional operation of the organ systems of vertebrates exclusive of the nervous and endocrine 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.

Suga (Biology)

Bio 405. Physiological Basis of Acoustical Communication

Lectures and seminars in hearing and acoustic signals of animals, from invertebrates to humans. Structural and functional adaptation for processing the signals for communication and echolocation are considered. Credit 2 units.

Suga (Biology)

Bio 408. Evolution of Man and Culture

The fossil evidence for human and nonhuman primate evolution. Classification and genetics in evolutionary perspectives, relations between biology and culture in ancient and modern populations. Credit 3 units.

Molnar (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.

M.J. 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 4132. Plant Diversity

Concepts of classification and specification emphasizing the diversity of flowering plants. Laboratory will focus on evolutionary mechanisms, utilizing accepted systems of angiosperm phylogeny. A nine-week course, first in a series of three. Credit 3 units.

Lewis (Biology), Staff

Bio 4133. 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.

Beachy (Biology)



Bio 4134. 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 4151. 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. Evolutionary Biology

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 4181. 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 4201. 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 4251. 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 4281. Principles of Neural Development

A comprehensive review of neural development, including the history of major ideas and figures in this field, an overview of current research, and a discussion of present controversies. The approach will be based on the book *Principles of Neural Development* by D. Purves and J.W. Lichtman. Students will also be exposed to in-depth coverage of special topics with student presentations and reading of original literature. Three class hours per week. Credit 3 units.

Purves, Lichtman (Anatomy and Neurobiology)

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 4 units.

Jen (Biology)



Bio 4391. History of Scientific Thought I: Ancient and Medieval Science

This course will focus on the development of western science from the period of Egypt and Mesopotamia, through the Greeks and Romans to the high Middle Ages (12th-13th centuries). Emphasis will be placed on development of astronomy, cosmology, medicine, and mathematics (no technical mathematics required). Development of these areas of science will be treated in their historical, social, political, and economic contexts. Readings will be taken from primary sources, such as Plato, Aristotle, Hippocrates, Democritus, Augustine, and others. Credit 3 units. Hall/Allen (Biology)

Bio 4392. 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. 4393. 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 445. Microbial Genetics

A course providing lectures and laboratory experience on: mutation, mutagenesis, and mutant isolation; bacteriophage genetics; gene transfer by transformation, transduction, and conjugation; and complementation analysis and gene regulation. Credit 4 units.

Curtiss (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—micro-technique; Section 5—chemosystematics. Credit 1 or 2 units for each section.

Staff (Biology)

Bio 449. Microbiology

A lecture course covering the growth and regulation of both prokaryotic and eukaryotic microbes and their viruses, with emphasis on gene regulation, molecular biology, physiology and growth. Credit 3 units.

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.

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

Allen (Biology)

Bio 4581. 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; biological 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 (Cell Biology and Physiology)

Bio 459. Vision

A course bringing together the anatomy, physiology, psychology, and cell biology 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 (Cell Biology and 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.

Gentry (Biology)

Bio 469. Structure and Composition of Tropical Forests

An introduction to tropical forest ecology and floristics, emphasizing the unique features that make these the most complex ecosystems on earth. Will include focus on patterns of structural and taxonomic diversity, pollination and dispersal biology, floristic composition, and the recognition of the distinguishing features of major tropical forest plant taxa. Credit 2 units.

Gentry (Biology)

Bio 471. Phytogeography

An introduction to the current and past geographical distributions of plants, emphasizing ecological, geological, and historical factors. Credit 3 units.

Gentry (Biology)

Bio 4851. 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. 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 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, an honors thesis must be prepared. 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. Credit/No Credit only.

Staff (Biology)

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), Conroy, Loewy, Nemeth, Phillips-Conroy

Bio 502. General Physiology

A basis for understanding general physiological mechanisms and the functional organization of physiological systems. Credit 8 units.

Reuss (Cell Biology and Physiology)

Bio 5031. 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.

Boime (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 5051. 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.

Braciale (Pathology)

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 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 Cell Biology and Physiology Department. 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, cell-cell interactions. Three lectures each week during the first trimester are supplemented with demonstrations and small group conferences. The latter focus on problem sets and discussion of recent and/or classical publications. Credit 3 units.

Fischbach (Anatomy/Neurobiology), 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 5081. Molecular Basis of Mediator Action

In this course a limited number of neurotransmitters, hormones, and interleukins will be selected in order to analyze recent advances in understanding the mechanisms of action of intercellular messengers. The analysis will include a consideration of potential second messenger molecules (cyclic nucleotides, inositol phosphates, Ca^{+2} , H^{+}), sites of actions of these intracellular mediators, and molecular mechanisms responsible for eliciting the biological response in the target cells. Credit 2 units.

Russell (Pharmacology)

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 5111. Intracellular Transport of Macromolecules in Animal Cells

A discussion of 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 (Cell Biology and Physiology)

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 lecturers whose research is at the forefront of the areas 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.

Duncan (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 (Cell Biology and Physiology)

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.

Staff (Pathology)

Bio 5171. Medical Immunology

An introduction to basic concepts in immunology and immunopathology. Lectures will focus on antigen-antibody interactions, immunoglobulin structure and genetics, the cellular basis of the immune response and immune regulation, T cell effector mechanisms, the inflammatory response, complement, the positive and negative roles of hypersensitivity, and immune deficiency. Credit 2 or 3 units.

M. Schlesinger (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 5202. Microbiology and Infectious Diseases

Pathophysiology of infectious diseases taught from the standpoint of principles of pathogenicity; and relevant microbial physiology and ecology. Credit 6 units.

D. Schlessinger (Microbiology/Immunology)

Bio 5221. Molecular Basis of Microbial Pathogenesis

Primarily for graduate and MSTP students, this seminar course will involve discussion of current research on pathogenic microorganisms and their virulence determinants. Emphasis will be on new research strategies for studying the molecular mechanisms of pathogenesis and the factors controlling host-pathogen interactions. One class hour per week, 1 unit credit.

Goldman (Microbiology)

Bio 525. Fundamental Concepts in Cell Membrane Physiology and Biophysics

A lecture course on the theoretical principles underlying the physiological properties of biological membranes. Topics 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 (Cell Biology and Physiology), 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 (Cell Biology and Physiology), Reuss

Bio 5271, 5272. 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 5281. Developmental 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, *C. elegans*, *Drosophila*, and mouse. Credit 3 units.

Waterston (Genetics), Staff

Bio 5301. Laboratory Computer Programming

Basic computer skills are learned using a modern time-shared computer. The lectures cover the programming language PASCAL and the VAX/UMS operating system. A major portion of learning time is devoted to solving a series of programming problems which stress interactive techniques, files, data structures, and graphics. Credit 3 units.

Holmes (Biochemistry), Wrenn

Bio 531. Advanced Biochemistry

A modular course designed to teach biochemistry to students with a background in biochemistry as well as to beginning students. The emphasis of the course is on the regulation of complex biochemical processes, hormone action, cell growth, etc., and will include extensive reading of the original literature. Students with no background in biochemistry will receive intensive individualized instruction for 4 weeks to prepare them for the course. 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 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 5341. Principles of Gene Manipulation

An introduction to the techniques of *in vitro* mutagenesis and sequencing, with hands-on laboratory experience. Designed for graduate students nearing the completion of



their rotation schedule, and especially for those who expect to enter research laboratories in which gene manipulation is not yet practiced. Credit 4 units.

Barnes (Biochemistry)

Bio 5351. Molecular Biology

Basic principles of prokaryotic and eukaryotic molecular biology. Credit 3 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.

Banaszak (Biochemistry), 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.

Elson (Biochemistry)

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.

M. 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 5402. Molecular Biology of Neurotransmitters and Receptors

This course will cover the molecular biology and biochemistry of synaptic function, receptor recognition and regulation. Topics will include the structure and function of neurotransmitter receptors, ion channels, and the mechanisms involved in the metabolism, storage and release of neurotransmitters. Examples will be chosen (from cholinergic, adrenergic and peptidergic systems) to illustrate applications of biochemistry and molecular biology to the analysis of these areas. Lectures, problem sets, reading, and presentation of original articles. Credit 3 units.

Cohen, Krause (Anatomy),
Merlie (Pharmacology)

Bio 5411. 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 5421, 5422. 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 5432. Regulatory Phenomena in Cell and Molecular Biology

Three six-week sessions consisting of intensive lectures and discussions of current research. Topics will vary from year to year. Each session may be taken independently. Credit: 1-3 units (1 unit per 6 weeks).

S. Elgin (Biology), D. Schlessinger (Microbiology)

Bio 5451. Introductory Biophysical Chemistry

Introductory physical chemistry with examples relevant to biochemistry. This autotutorial course is intended as an elementary introduction for students with little or no background in physical chemistry. Thermodynamics and spectroscopy will be emphasized. Credit 2 units.

Elson (Biochemistry)

Bio 5461. Molecular Recognition

The physical basis of molecular recognition as exemplified in biological systems will be examined from several viewpoints: quantum chemistry, molecular mechanics, molecular dynamics and Monte Carlo simulations, and structure-activity relations. Molecular modeling and computer graphics techniques as well as current approaches in quantitative structure-activity relations based on correlation of physical properties of drug molecules, and computer-aided drug design will be reviewed. Credit 3 units.

Marshall, Covey, Motoc (Pharmacology),
Dammkoehler (Computer Science)

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. 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 on topics including population and quantitative genetics, clinical cytogenetics, biochemical genetics and metabolic defects, counseling, and immunogenetics. 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 (Neural Sciences Program)

Bio 5532. Topics in Developmental Neurobiology

Selected topics will include extracellular matrix and cell surface, growth cone biology and function, glial cells, and cortical development. Reading and discussion of original literature will be emphasized. Credit 2 units.

R. Bunge, Johnson, Sanes
(Anatomy/Neurobiology)

Bio 554. Neural Sciences

An integrated course dealing with the structure and function of the nervous system at the cellular level, leading on to a consideration of neural systems. A microscope is required. Lectures and laboratories. Credit 5 units.

Purves, Price (Anatomy/Neurobiology)

Bio 5571. Cellular Neurobiology

A survey of the basic principles of nerve cell structure and function, including quantitative analysis of voltage and/or chemically gated ion channels, synaptic transmission and sensory transduction. Lectures, laboratories and conferences supplemented with readings of classic and contemporary papers. Credit 4 units.

Steinbach, Staff (Anatomy/Neurobiology)

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 one-hour seminars based on assigned original papers. Credit 2 units.

Rovainen (Cell Biology and Physiology)

Bio 5651. Neural Systems

Introduction to the structure and function of the major systems within the central nervous system. Selected topics are chosen to provide an overview of the brain with emphasis on major general concepts. Laboratories and readings of the primary literature are an integral part of this course. Credit 4 units.

Woolsey (Neural Sciences), Staff

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.

Cohen (Anatomy/Neurobiology), Staff

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. 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 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. Credit 3 units.

Staff (Biology)

Bio 590. Research

Credit to be arranged.

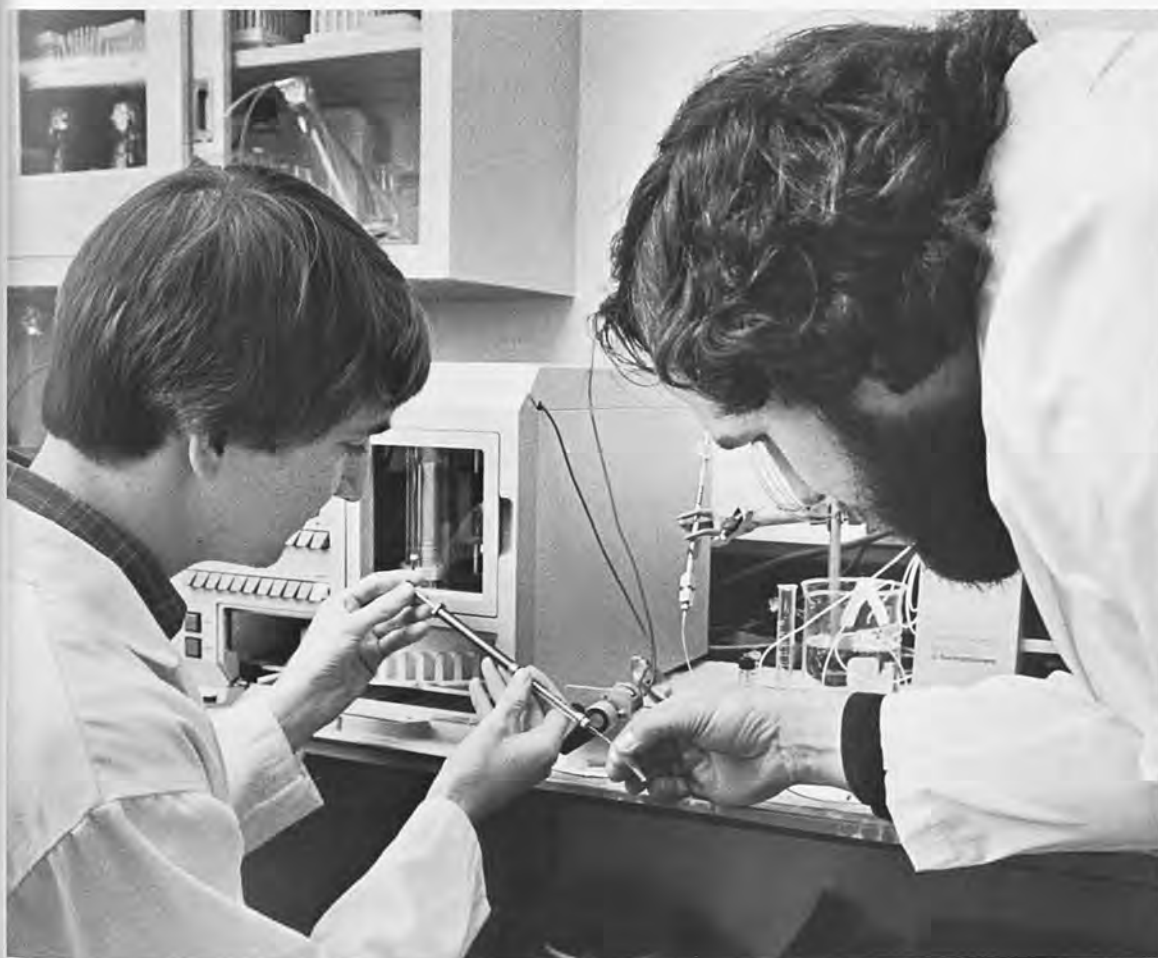
Staff (Biology)

Bio 5911. 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. 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, electrobiology, 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, Cell Biology and Physiology, Preventive Medicine and Public Health, Radiology, 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*.

Professor and Chairman Harold W. Shipton

Professors

R. Martin Arthur
Jerome R. Cox, Jr.
John L. Kardos
James G. Miller
Charles F. Molnar
William F. Pickard
Marcus E. Raichle

Robert E. Sparks
Salvatore P. Sutura
Michel M. Ter-Pogossian
Curt Thies
Donald F. Wann
Reimut Wette
George I. Zahalak

Associate Professors
Stuart Boxerman
William F. Holmes

Duck O. Kim
Robert F. Miller
Thomas R. Miller
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, nurse anesthesia, 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 PROGRAM

The Philosophy

The faculty of the Health Administration Program of Washington University believes that administrative personnel in health organizations require not only a solid foundation in management but also an understanding of those aspects of finance, regulation, and 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 62 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 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 15 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 Program and the School of Law. In addition, there are joint degrees that are under development between the Health Administration 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 health care 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 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	\$4,600
Books and supplies (per semester)	435
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. Firsthand 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. Marc Smith)

Health Administration Program

Professor and Director

James O. Hepner, B.A., University of Iowa, 1955; M.H.A., Washington University, 1959; Ph.D., University of Iowa, 1964.

Professor

David A. Gee, B.A., DePauw University, 1949; M.H.A., Washington University, 1951.

Associate Professor

Stuart B. Boxerman, B.S.E.E., Washington University, 1963; M.S.E.E., 1965; D.Sc., 1970.

Associate Professors (Adjunct)

Ted Bowen, B.S., Austin College, 1941; M.H.A., Washington University, 1951.

James A. Canedy, B.A., Hastings College, 1950; M.H.A., Washington University, 1952.

James D. Harvey, B.A., University of South Dakota, 1950; M.H.A., Washington University, 1952.

David H. Hitt, B.S., University of South Dakota, 1950; M.Sc., 1950; M.H.A., University of Minnesota, 1952.

Linn B. Perkins, A.B., Amherst College, 1949; M.H.A., Washington University, 1951.

Assistant Professors

Mary Jane Griffith, B.A., University of Montevallo, 1973; M.A., Washington University, 1975; Ph.D., 1977.

Virginia D. Hennelly, B.S., Maryville College, 1966; M.H.A., Washington University, 1971; Ph.D., 1977.

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 (Seminex), 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)

Robert E. Frank, B.S., St. Louis University, 1950; M.A., 1962.

Ronald E. Gribbins, B.A., St. Norbert College, 1966; M.B.A., University of Wisconsin, 1971; Ph.D., 1975.

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. Scates, B.A., Baylor University, 1939.

Instructors (Adjunct)

Richard M. Abell, B.A., Western Kentucky University, 1963; M.A., 1965; M.H.A., Washington University, 1972.

Merle L. Aukamp, B.A., University of Illinois, 1957; M.H.A., Washington University, 1968.

Ernest O. Bacon, Jr., B.A., University of Tennessee, 1960; M.H.A., Virginia Commonwealth University, 1968.

Barry T. Bedenkop, Sr., B.S., Purdue University, 1954; M.B.A.H.A., University of Chicago, 1961; J.D., University of Toledo, 1972.

David B. Blackburn, B.S., Ohio State University, 1962; M.B.A., Xavier University, 1971.

Frederick L. Brown, B.S., Northwestern University, 1962; M.H.A., George Washington University, 1966.

Richard W. Brown, B.A., Phillips University, 1968; M.H.A., Washington University, 1970.



Sister Betty Ann Brucker, B.A., St. Louis University, 1951; M.A., 1959; M.H.A., 1972.

L. Gerald Bryant, B.B.A., University of Oklahoma, 1964; M.H.A., Washington University, 1968.

Sarah G. Burtram, B.A., Dominican College, 1970; M.H.A., Washington University, 1972.

Keith L. Callahan, B.A., Trinity College, 1974; M.B.A., Washington University, 1976; M.H.A., 1977.

Eugene K. Cashman, Jr., B.A., Auburn University, 1964; M.A., American University, 1974.

Keith W. Curtis, B.A., Colorado State College, 1960; M.B.A., Syracuse University, 1974; Ph.D., University of Oklahoma, 1973.

Jeptha W. Dalston, B.A., Texas A&M University, 1952; M.A., University of Oklahoma, 1966; M.H.A., University of Minnesota, 1969; Ph.D., University of Oklahoma, 1970.

A. B. Davis, Jr., B.A., University of Kansas, 1950.

Paul F. Detrick, B.A., Kansas State Teachers College, 1949; M.H.A., Northwestern University, 1951.

Eugene M. Devine, B.A., Union College, 1970; M.H.A., University of Pittsburgh, 1973.

Virginia M. Dollard, B.S., Trinity College; M.A., Pepperdine University.

G. T. Dunlop Ecker, B.A., Washington-Lee University, 1962; M.H.A., Iowa University, 1964; L.L.B., Samford University, 1973.

Richard C. Ellerbrake, B.A., Elmhurst College, 1955; B.D., Eden Theological Seminary, 1958; M.H.A., Washington University, 1964.

Gerald V. Esparcia, Jr., B.A., California State University, 1960; M.H.A., Washington University, 1962.

William H. Flannigan, B.A., Hampton-Sydney, 1971; M.H.A., Virginia Commonwealth University, 1971.

Sidney M. Ford, B.S., University of Corpus Christi, 1961; M.B.A. (H.A.), George Washington University, 1963.

Thomas W. Fourqurean, B.B.A., Texas College of Arts and Industries, 1939; M.B.A., University of Chicago, 1949.

John M. Fraser, B.A., Washington University, 1976; M.H.A., 1978.

James A. Goldmann, B.A., Harvard University, 1975; M.H.A., Washington University, 1979.

Donald S. Good, B.S., Ohio State University, 1958; M.H.A., Medical College of Virginia, 1964.

Phillip H. Goodwin, B.A., Hendrix College, 1943; M.H.A., Washington University, 1968.

Robert L. Graves, B.S., Muskingum College, 1968; M.H.A., Washington University, 1975.

H. Rich Grisham, B.A., University of Oklahoma, 1968; M.H.A., Washington University, 1973.

Thomas J. Hartford, Jr., B.A., George Washington University, 1950; M.H.A., Washington University, 1958.

Howard L. Hays, B.S., University of Omaha, 1957; M.H.A., Washington University, 1959.

M. James Henderson, B.S., Stanford University, 1967; M.H.A., Washington University, 1975.

Robert A. Hille, B.A., University of Connecticut, 1954; M.A., Baylor University, 1969.

Duane T. Houtz, B.A., University of Kansas, 1955; M.H.A., Washington University, 1960.

James B. Humphreys, B.A., Westminster College, 1963; M.H.A., Trinity University, 1969.

James M. Jensen, B.S., Wheaton College, 1964; M.A., University of Minnesota, 1966; M.H.A., 1972.

David A. Johnson, A.B., Augustana College, 1951; M.B.A.(H.A.), University of Chicago, 1954.

Charlotte Lehmann, B.S., Washington University, 1963; M.H.A., 1979.

Charles G. Lohr, B.A., Westminster College, 1950; M.H.A., Washington University, 1952.

Garry A. Maness, B.A., Memphis State University, 1973; M.H.A., 1977.

Charles H. Mason, B.A., Emory & Henry College, 1963; M.H.A., Washington University, 1965.

Larry D. Matheny, A., Florissant Valley Community College, 1966; B.S., University of Missouri, 1969; M.H.A., St. Louis University, 1972.

Larry L. Mathis, B.S., Kansas State College, 1965; M.H.A., Washington University, 1972.

Wade Mountz, B.A., Baldwin Wallace College, 1948; M.H.A., University of Minnesota, 1951.

Joseph J. Neidenbach, B.A., College of the Holy Cross, 1967; M.H.A., Washington University, 1974.

John F. Norwood, B.S., North Carolina State University, 1952; M.H.A., Northwestern University, 1958.

Harry A. Nurkin, B.A., Duke University, 1966; M.H.A., 1968; Ph.D., 1983.

Robert J. O'Brien, B.S., Phillips University, 1960; M.H.A., Washington University, 1965.

D. Kirk Oglesby, B.A., Davidson College, 1952; Certificate in Hospital Administration, Duke University, 1954.

Gary R. Olson, B.A., Illinois State University, 1972; M.H.A., Washington University, 1976.

Elwood P. Opstad, B.S., State University of Iowa, 1947; M.H.A., Washington University, 1949.

James R. Petersdorf, A., Austin State Jr. College, 1957; B.S., University of Minnesota, 1959; M.H.A., 1964.

Max H. Poll, B.B.A., Western Michigan University, 1972; M.H.A., University of Minnesota, 1974.

Glenn E. Potter, B.A., Ottawa University, 1965; M.H.A., Washington University, 1972.

Boone Powell, Jr., B.A., Baylor, 1959; M.A., University of California, 1960.

Joseph H. Powell, B.A., University of Tennessee, 1950; M.H.A., University of Minnesota, 1955.

E. Wynn Presson, B.B.A., University of Texas, 1963; M.H.A., Washington University, 1965.

Jasper J. Purvis, B.S., University of Tennessee, 1968; M.H.A., Washington University, 1970.

David S. Ramsey, B.A., University of Michigan, 1953; M.A., 1954; M.H.A., 1962.

J. Larry Read, B.S., Lamar University, 1968; M.H.A., Washington University, 1974.

Haynes Rice, B.S., West Virginia State College, 1953; M.H.A., University of Chicago, 1964.

Daniel F. Russell, B.S., University of Miami, 1963; M.H.A., Washington University, 1966.

Mark R. Russell, B.A., Marquette University, 1971; M.H.A., Washington University, 1973.



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C. Edward Schwartz, B.A., Kentucky Wesleyan College, 1962; M.Div., Methodist Theological School in Ohio, 1965; M.H.A., Washington University, 1968.

Earl G. Skogman, B.A., University of Nebraska, 1953; M.H.A., Northwestern University, 1955.

Edward A. Smith, B.A., Carson-Newman College, 1960; M.H.A., Virginia Commonwealth University, 1964.

Charles B. Stearns, B.S., Northwestern University, 1960; M.H.A., Washington University, 1962.

Daniel L. Stickler, B.A., West Virginia University, 1960; M.H.A., University of Pittsburgh, 1970.

Chester L. Stocks, B.S., Alabama Polytechnic Institute, 1949; M.H.A., Washington University, 1955.

Martin J. Strussion, B.S., St. Louis University, 1969; M.H.A., Washington University, 1978.

Sister Patricia C. Sullivan, R.N., Mercy Hospital School of Nursing, 1954; B.S.N., College of St. Mary, 1955; M.H.A., St. Louis University, 1971.

Ponnuswamy Swamidoss, B.S., Pennsylvania State University, 1969; M.A., George Washington University, 1972; Dr.P.H., Howard University, 1981.

Charles E. Thoele, B.Sc., St. Louis University, 1953; B.S., 1961; M.B.A., Southern Illinois University, 1976.

Martin E. Tullis, B.A., University of Evansville, 1963; M.H.A., University of Minnesota, 1965.

Mark A. Wallace, B.A., Oklahoma Baptist University, 1975; M.H.A., Washington University, 1978.

Robert F. Wallace, B.A., St. Leo College, 1972; M.H.A., Washington University, 1974.

Samuel T. Wallace, B.A., University of Missouri, 1965; M.H.A., Washington University, 1970.

Dan S. Wilford, B.A., University of Mississippi, 1962; M.H.A., Washington University, 1966.

Ned B. Wilford, B.A., University of Mississippi, 1962; M.H.A., Washington University, 1966.

Thomas C. Winston, B.A., Memphis State University, 1965; M.H.A., Washington University, 1967.



Paul R. Wozniak, B.A., St. Louis University, 1950; M.H.A., 1955.

Paul H. Wunderlich, B.A., Valparaiso University, 1962; M.H.A., Washington University, 1967.

Colonel Richard C. Yeomans, B.G.E., University of Nebraska, 1961; M.P.H., Yale University, 1967.

Lecturer

Merlin E. Lickhalter, B.A., Massachusetts Institute of Technology, 1957.

Lecturers (Adjunct)

Lynn W. Brightwell, B.A., Middle Tennessee State University, 1971; M.H.A., Washington University, 1982.

John W. Carver, B.A., Trinity University, 1974; M.H.A., Washington University, 1976.

James C. Crews, B.S., Wisconsin State University, 1959; M.H.A., University of Iowa, 1964.

Jerry Garrett, B.S.B.A., University of Missouri, 1964; M.A., Webster College, 1979.

James L. Henry, B.A., Oklahoma Baptist University, 1951; M.H.A., Northwestern University, 1955.

William B. Hope, Jr., B.S., University of Tennessee, 1960; M.S., 1962; M.P.H., Johns Hopkins University, 1958; Sc.D., 1971.

Ned O. Lemkemeier, B.A., Wesleyan University, 1959; LL.B., Washington University, 1962.

Terry L. Nimnicht, B.S., University of Scranton, 1976; M.H.A., George Washington University, 1979.

Kenneth W. Peters, B.A., Luther College, 1950; M.H.A., Baylor University, 1958.

Robert Rubright, B.A., Westminster College, 1954; M.A., University of Wisconsin, 1958.

Darwin W. Schlag, Jr., B.S.B.A., Washington University, 1950.

Paul J. Schroeder, Jr., A.B., University of Notre Dame, 1969; J.D., Washington University, 1972.

J. Stuart Showalter, B.A., DePauw University, 1968; J.D., Washington University, 1971; M.F.S., George Washington University, 1977.

Donald B. Wagner, B.S., College of Physicians & Surgeons, 1952; M.H.A., Baylor University, 1960.

PROGRAM IN NURSE ANESTHESIA

The Department of Anesthesiology within the School of Medicine offers a program which prepares registered nurses for employment in the health care field of anesthesia. Graduates of the program are eligible for national certification, by examination through the Council on Certification of Nurse Anesthetists.

The Washington University Program in Nurse Anesthesia evolved from an anesthesia school established in 1929 and operated continuously for 54 years under the direction of Barnes Hospital.

The CRNA is a registered nurse whose advanced training enables her/him to provide a specialized nursing service. Participating as a member of the anesthesia care team, the nurse anesthetist renders anesthesia care in its entirety to surgical patients.

The curriculum covers a 24-month period, divided between didactics and clinical practicum. Educational experience is obtained at the Barnes Hospital facilities under the direction of anesthesiologists, certified regis-

tered nurse anesthetists, and allied health specialists. Graduates of the program have access to career opportunities throughout the United States.

Applicant's credentials must include:

- a. Current licensure as a registered nurse.
- b. One year's experience in a critical care setting.
- c. A Bachelor of Science Degree in Nursing, or a Bachelor's Degree which includes three humanities courses (sociology or psychology); two communications courses (English, speech, or foreign language) and five biophysical science courses (minimum 18 hours).

The program is accredited by the Council on Accreditation of Nurse Anesthesia Educational Programs. Schools and complies with its standards and guidelines.

Program specifics may be obtained from Department of Anesthesiology, Nurse Anesthesia Program, Washington University School of Medicine, Campus Box 8054, 660 South Euclid Avenue, St. Louis, Missouri 63110.

Professor and Head of Department of Anesthesiology

William D. Owens, B.A., Westminster College, 1961; M.D., University of Michigan, 1965.

Program Director

LaVerne J. Will, R.N./A.D., Belleville Community College, 1968; C.R.N.A., Barnes Hospital School of Nurse Anesthesia, 1970; B.A., Stephens College, 1978; M.S., Southern Illinois University-Edwardsville, 1980.

Chief Nurse Anesthetist

Robert E. Ayers, R.T., St. John's School of Radiologic Technology, 1956; R.N., Methodist Hospital, 1961; C.R.N.A., Barnes Hospital School of Nurse Anesthesia, 1968; B.A., Stephens College, 1977.

Educational Director

Beverly A. Krause, R.N., St. Luke's Hospital School of Nursing, 1961; C.R.N.A., Barnes Hospital School of Nurse Anesthesia, 1975; B.A., Stephens College, 1977; M.S., Lindenwood College, 1982.



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 \$4,000
 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

Mary Ann Boyle, B.S., University of Kansas, 1970; B.A., 1979; M.S.Ed., 1980; Ph.D., 1982.

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

C. Robert Almli, B.S., Michigan State University, 1966; M.A., 1968; Ph.D., 1970.

Assistant Professors

Carolyn Baum, B.S., University of Kansas, 1966; M.A., Webster College, 1979.

Elsie S. Rousch, B.S., Madison College, 1943; M.S., University of Wisconsin, 1947; Ph.D., Washington University, 1950. (See Department of Anatomy and Neurobiology.)

Garth D. Tubbs, B.S., Wisconsin State College, 1953; Cert. in O.T., Washington University, 1955.

Instructors

Joel Achtenberg, B.A., Washington University, 1968.

Gary Coffman, B.A., McMurry College, 1965; M.S., Southern Methodist University, 1970; Ph.D., University of Illinois, 1974.

Dorothy Edwards, B.A., Loyola University, 1972; Ph.D., Washington University, 1980.

Christine Feely, B.A., University of South Carolina, 1975; Ph.D., Washington University, 1984.

Pamela Grasse, B.S.O.T., University of Oklahoma, 1979.

Peter Herscovitch, B.Eng., McGill University, 1971; M.D., C.M., 1975.

Susan M. Kusama, B.S.O.T., Washington University, 1965; M.S., 1978.

Patricia D. LaVesser, B.S., University of Wisconsin, 1974.

Aimee Luebben, B.A., Illinois University, 1975; B.S., Washington University, 1984.

Margaret Rich, B.S., Northwestern University, 1974; M.D., 1976; Ph.D., 1977.

Colleen Starkloff, B.S., St. Louis University, 1974.

Instructors (Clinical)

Norma Batten
Sara Brayman
Mary Beth Brekrus
Mary Bullock
Jeff Cowdry
Sharon Danner
Sue Devine
Christine Dieckmann
Judy Doerr
Mary Donohue
Michael Fallwell
Susan Fine
Maureen Freda
Car-lyn Furushiro
William Gielow
Bette Ann Gilbert
LaVerne W. Grady
Debbie Grillon

Marian Guillard
Marjorie Hill
Michelle Isserman
Linda Knapp
Bettie Lumpkin
Carlene McComb
Mary Ann McDonough
Maryann Radowski
Debby Riley
Letty Sargent
Clarence Sicard
Fran Silverstein
Dixie Sleight
Sarah Skinner
Cecelia Speranza
Monica Stuesse
Julia Williams
Susan Wilson
Francesca Woods

Lecturers

Kathleen A. Bruns, B.S.O.T.,
Washington University, 1979.
Sallie E. Taylor, B.S., Richmond
Professional Institute (Virginia
Commonwealth), 1961; M.Ed.,
University of Florida, 1964.
Sara Vesper, B.S., University of
Kansas, 1974.
Nancy Woolsey, B.A., University of
Virginia, 1976; B.S.O.T., Washington
University, 1978; M.S., 1979.

PEDIATRIC NURSE PRACTITIONER PROGRAM

The School of Medicine, through the Department of Pediatrics, in collaboration with the Department of Nursing of Maryville College, offers a program for training pediatric nurse practitioners. The program provides the opportunity to obtain academic credit through Maryville College towards a baccalaureate degree in nursing, in addition to certification as a pediatric nurse practitioner (PNP).

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 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 an 18-week didactic and clinical portion followed by an 18-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 Nurse 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

PROGRAM IN PHYSICAL THERAPY

The program of instruction leading to the degree Bachelor of Science 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 \$4,050
Tuition for Clinical Education 150

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

Beatrice F. Schulz, B.S., Washington University, 1949; M.A., 1955.

Assistant Professor Emeritus

Lorraine F. Lake, B.S., Washington University, 1950; M.A., 1954; Ph.D., 1962.

Associate Professor and Director

Steven J. Rose, B.S., Ithaca College, 1962; Ph.D., Albert Einstein College of Medicine, 1977.

Visiting Associate Professor

Eugene Michels, B.S., University of Cincinnati, 1950; Certificate in P.T., University of Pennsylvania, 1951; M.A., University of Pennsylvania, 1967.

Assistant Professors

Robert J. Hickok, B.S., Washington University, 1953; M.H.A., 1971. (See Administration and Health Administration Program.)

Shirley A. Sahrman, B.S.

Washington University, 1958; M.A., 1971; Ph.D., 1973. (See Departments of Neurology and Neurological Surgery and Cell Biology and Physiology.)

Instructors

Gail W. Baudendistel, B.S., St. Louis University, 1974; M.S., 1977.

Marybeth Brown, B.S., Russell Sage College, 1967; M.S., University of Southern California, 1974; Ph.D., 1984.

Devoree Ann Clifton, B.S./Chem., Regis College, 1975; M.D., Washington University School of Medicine, 1980.

Anthony Delitto, B.S., State University of New York at Buffalo, 1979; M.H.S./P.T., Washington University, 1983.

Robert H. Deusinger, B.S., Slippery Rock State College, 1967; M.S., University of Massachusetts, 1968; Ph.D., The University of Iowa, 1981.

Susan S. Deusinger, B.S., University of Kansas, 1968; M.A., Washington University, 1980.

Peter Fox, B.A., St. Johns College, 1975; M.D., Georgetown University, 1979.

James M. Hagberg, B.S., Carthage College, 1972; M.S., University of Wisconsin, 1974; Ph.D., 1976.

Joseph R. Haralson, B.A., California State University at Northridge, 1967; B.S., 1969; M.B.A., St. Louis University, 1975.

Ronna S. Kaiser, B.S., State University of New York at Buffalo, 1979; M.H.S./P.T., Washington University, 1985.

John W. Kneisevich, A.B., Indiana University, 1971; M.D., C.M., McGill University, 1974.

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

Michael Mueller, B.S., Washington University, 1979; M.H.S./P.T., 1985.

Barbara J. Norton, B.S., Washington University, 1966; M.H.S./P.T., 1984.

David F. Russell, B.A., University of California at San Diego, 1971; Ph.D., 1977.

David R. Sinacore, B.S., B.A., State University of New York at Buffalo, 1979; M.H.S./P.T., Washington University, 1983.

Lecturers

Gene R. Brown, B.S., University of Iowa, 1971; M.A., 1975.

Suzanne M. Cornbleet, B.S., University of Colorado, 1975.

John Dueker, B.S./P.T., St. Louis University, 1978.

Jack Gamet, B.S., University of Oregon, 1952.

Linda Guth, B.S., St. Louis University, 1978.

Kathleen M. Haralson, B.S., University of Kansas, 1965.

Mary Kate McDonnell, B.S./P.T., St. Louis University, 1981.

Kathryn E. Roach, B.A., Indiana University, 1972; B.S./P.T., University of Illinois, 1974.

Vivian L. Smith, B.S., State University of New York, 1979; B.S./P.T., New York University, 1980.

Jennifer S. Stith, B.S., University of California at Davis, 1976; M.S., University of Southern California, 1978.

Janet A. Tenhula, B.S., University of Wisconsin, 1964.

Linda Van Dillen, B.S., University of Missouri-Columbia, 1979.

Research Assistant

Julie M. McClure, B.A., Brown University, 1975.

Instructors (Clinical)

Mr. Steve Allen

Ms. Sue Allen

Ms. Dianna Antonacci

Ms. Michelle Audet

Ms. Colleen Backus

Ms. Susan Barr

Ms. Brenda Bander

Ms. Jackie Bender

Ms. Lynn Berry

Ms. Cathy Bottom

Capt. Mary Bong Brinkman

Ms. Carol Bryan

Ms. Janet Buechle

Ms. Sue Cannon

Mr. Lawrence F. Chojecki

Ms. Pam Dehne

Mr. Steven A. Dickoff

Mr. Paul Drennan

Ms. Patricia M. Ellis

Ms. Mary Erhart

Ms. Frances Erlacker

Ms. Susan Finan

Ms. Cindy Finke

Ms. Karinne Fish

Ms. Laura Flanagan

Ms. Pauline Flesch

Ms. Diane Foster

Ms. Dianna Foster

Ms. Sharon Foster

Mr. William Fromherz

Ms. Linda Gal

Ms. Zena Gee

Ms. Sue Graber

Mr. Bernie Grazka

Ms. Carol Guise

Ms. Linda Haar

Ms. Iola Haddock

Ms. Donabell Hansen

Ms. Sandy Hartner

Ms. Judith A. Henbree

Ms. Pamela Hoffman

Ms. Jeanine Horgan

Mr. Rick Huelsing

Ms. Bonnie Johnson

Ms. JoAnn Jones

Mr. Dan Kelley

Ms. Jacqueline King

Dr. Gerald C. Kraft

Ms. Laurie Kroupa

Mr. Eric Kushell

Ms. Debbie Lambert

Ms. Maggie Lane

Mr. Nick Laubenthal

Ms. Judy Lepping

Ms. Mary B. Liedloff

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Ms. Barbara Woodall

Ms. Maureen P. Wulf

Ms. Lynn Zoellner





PROGRAMS IN RADIOLOGIC TECHNOLOGY

The Department of Radiology, which has its headquarters in the Edward Mallinckrodt Institute of Radiology, offers a basic 24-month course in X-ray technology, and a 12-month postgraduate course in Radiation Therapy technology.

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.

The first six months of student training is considered a probationary period during which students will be evaluated carefully to determine their suitability for the program. Upon satisfactory completion of this probationary period, the students will begin to receive a monthly stipend of \$75 which shall continue for the next six months of training. As the student moves into the third six-month period, the stipend amount increases to \$100 per month, and rises, finally, to \$125 per month for the last six months of training.

Candidates for admission must be at least 18 years of age and present evidence of successful completion of four years of education in an accredited high school, or equivalency. Special consideration will be given to applicants who have passed college entrance examinations and to those who have earned college credits, especially in courses such as science, algebra, chemistry, and physics.

Graduate Course in Radiation Therapy Technology

The Division of Radiation Oncology offers a 12-month postgraduate course in radiation therapy technology. The course of training consists of didactic material and extensive practical experience and training in the clinical application and dosimetry procedures of radiation therapy. Approximately 1,500 new patients are treated each year. The equipment includes a 35 MV linear accelerator, a Clinac 20 linear accelerator, a 6 MV linear accelerator, a 4 MV linear accelerator, a cobalt unit, a superficial ortho-voltage machine, and three simulators. Students obtain experience on each of the on-site therapy machines and in the affiliate training centers, as well as in the dosimetry and treatment planning area and in nursing procedures. 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

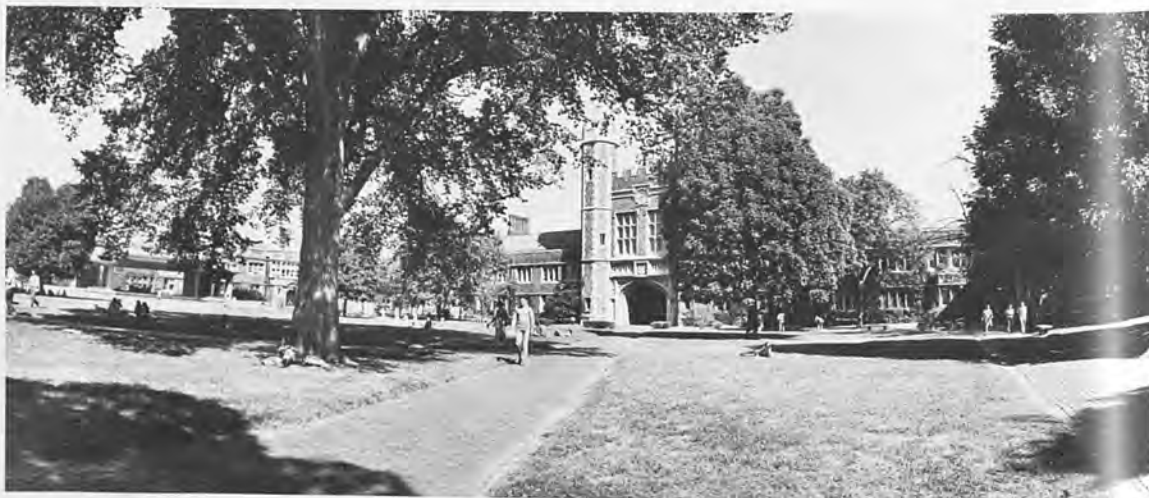
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Chancellor

Ralph E. Morrow, 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. Fetter, B.A., M.Ed.
*Assistant Vice Chancellor for
Medical Affairs, Assistant Dean
and Chief Financial and Planning
Officer*

Robert J. Hickok, B.S., M.H.A.
*Assistant Vice Chancellor for
Medical Affairs, Assistant Dean
and Chief Facilities Officer*

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, Director of
Student Financial Aid*

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
Assistant Registrar

THE MEDICAL CENTER

The Washington University Medical Center comprises seven institutions: Barnard Free Skin and Cancer Hospital, Barnes Hospital, Central Institute for the Deaf, Jewish Hospital, Children's Hospital, the Washington University School of Dental Medicine, 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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Clinical Representative to the Executive Committee of the Faculty Council

Garrett M. Brodeur
Clinical Representative to the Executive Committee of the Faculty Council

Joseph P. Miletich
Clinical Representative to the Executive Committee of the Faculty Council

Sondra Schlesinger
Preclinical Representative to the Executive Committee of the Faculty Council

Leonard J. Banaszak
Preclinical Representative to the Executive Committee of the Faculty Council

Edward M. Geltman
Clinical Representative to the Executive Faculty

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John F. Walters
Director of Student Financial Aid

Robert Lee

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Selected faculty members

Committee on Academic Review and Promotions II

Selected faculty members

Committee on Academic Review and Promotions III

Selected faculty members

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Chairman

Barbara I. Brown

Elmer B. Brown

Robert C. Collins

Julian B. Fleischman

John J. Jeffrey, Jr.

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Vita J. Land

Robert Lee

Stephen S. Lefrak

Jeffrey L. Marsh

John S. Meyer

Mary Beth Pereira

Joseph F. Ruwitch, Jr.

John L. Schultz

J. Regan Thomas

John F. Walters

Neil H. White

Walter G. Wiest

Committee for the Beaumont-May Institute of Neurology

William M. Landau
Chairman

¹Parttime faculty representative to the Executive Faculty during 1984-85.

²Representing the Faculty Council during 1985-86.

¹The dean is ex officio a member of all standing committees.



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Mary Parker
Jeff Perlman
Eli Robins
Steve Rovak
Peter H. Ruger
Judy Schulte
Barry Siegel
Margaret Skinner
Leslie Strohm
W. Thomas Thach, Jr.
John L. Trotter
Mary Tureen
Lloyd Vasquez
Ray Witter
Harold Zarkowsky
Gary R. Zuckerman

Medical Science Training Placement and Curriculum Committee (MSTPCC)

Mabel L. Purkerson
Chairman, ex officio
David H. Alpers
George Drysdale
John C. Herweg
ex officio
Richard E. Hillman
Roy R. Peterson
John L. Schultz
ex officio

Medical Scientist Training Program Committee

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Program Director
Carl Frieden
Co-Program Director
Irving Boime
Thomas J. Braciale
Jonathan Cohen
Paul J. DeWeer
Elliot L. Elson
David I. Gottlieb
David Schlessinger
Douglas Tollefsen
John L. Schultz
ex officio

Teaching Program Coordination Committee

Roy R. Peterson
Chairman
Sue Cullen
Gerald D. Fischbach
Rosalind Kornfeld
Gary D. Shackelford
John Trotter
John C. Herweg
ex officio
Jean Stumbaugh
ex officio
Mabel L. Purkerson
ex officio
John L. Schultz
ex officio

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Chairman
Mary Androff
Student Representative
Dixie Aronberg
Lewis Chase
Gerald Fischbach
Rachel Haft
Student Representative
Katherine Knutzen
Student Representative
David Silbert
Philip Stahl
Peter Tuteur
Samuel A. Wells
John C. Herweg
ex officio
Mabel L. Purkerson
ex officio
John L. Schultz
ex officio

Register of Students

DOCTOR OF MEDICINE AND DOCTOR OF PHILOSOPHY DEGREES

Medical Scientist
Training Program

Graduating Class—
May 17, 1985

Daily, Bill Bates, Jr., B.A.,
Northwestern University, '78—
Midland, Michigan

Darnell, Robert Bernard, A.B.,
Columbia University, '79—Larchmont,
New York

Faustman, Denise Louise, B.S.,
University of Michigan, '78—Dearborn
Heights, Michigan

Floeter, Mary Kay, B.S., University of
Illinois at Urbana, '78—Crystal Lake,
Illinois

Goldberg, Daniel Eliot, A.B., Harvard
University, '78—Brookline,
Massachusetts

Harding, Clifford Vincent III, A.B.,
Harvard University, '79—Detroit,
Michigan

Kreisle, Regina Ann, B.A.,
Kalamazoo College, '77—South Bend,
Indiana

McCluskey, Edward Robert, B.S.,
Stanford University, '75—Palo Alto,
California

Milstone, Dave Stanley, B.A.,
University of California at Santa
Barbara, '76—Mountain View,
California

Lentz, Steven Russell, B.S., Iowa
State University of Science and
Technology, '79—St. Paul, Minnesota
Neufeld, Ellis Jacob, B.A., Wesleyan
University, '79—Bethesda, Maryland

Seventh-Year Trainee 1984-85

Ginsberg, Ann Meredith, A.B.,
Radcliffe College, '77—New York City,
New York

Sixth-Year Trainees 1984-85

Hollifield, William Claude, Jr., B.S.,
University of California at Berkeley,
'74; M.A. '78—Sacramento, California
Martin, Paul Langlie, A.B., Harvard
University, '79—New Britain,
Connecticut



Nelson, Raoul Devin, B.A., St. Olaf
College, '79—Bloomington, Minnesota

Usdin, Ted Bjorn, B.A., Johns
Hopkins University, '78—Arlington,
Virginia

Fifth-Year Trainees 1984-85

Arkin, Martin Samuel, B.S.,
University of Michigan at Ann Arbor,
'80—Novi, Michigan

Barr, Frederic Glenn, B.A., Williams
College, '80—Baltimore, Maryland

Boguski, Mark Stanley, B.A., Johns
Hopkins University, '76—Philadelphia,
Pennsylvania

Chan, 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, A.B., Brandeis
University, '80—Rochester, New York

Mirski, Marek Alexander, B.S.,
Massachusetts Institute of Technology,
'80—Washington, D.C.

Seiden, Michael Van, B.A., Oberlin
College, '80—Pittsburgh, Pennsylvania

Simmons, Barbara Marie, B.A.,
Johns Hopkins University, '80—St.
Louis, Missouri

Starren, Justin Bruce, A.B.,
Washington University, '80—San
Diego, California

Wilson
Kalan
Illinoi
Four
Baun
Unive
—Der
Behlk
Mass
'81—
Chou
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Santa
Corle
Unive
'81—
Faust
Unive
B.S.,
'81—
Gran
Unive
Green
of Wis
Misso
Henk
South
Lawre
Hing,
Unive
Kane
Unive
Ohio
MacA
Unive
'81—
Mink
Weste
Minne
Sellec
of Wa
Wash
Smith
Unive
Taniu
Unive
Tripp
Unive
St. Lo
Thir
Apko
Unive
Mass
Auch
Mass
'82—
Axelr
Unive

Wilson, David Brian, B.A.,
Kalamazoo College, '80—Winfield,
Illinois

Fourth-Year Trainees 1984-85

Baum, Charles Michael, B.A.,
University of Colorado at Boulder, '80—
Denver, Colorado

Behlke, Mark Aaron, B.S.,
Massachusetts Institute of Technology,
'81—El Paso, Texas

Chou, Hubert Shin-Han, B.S.,
University of California at Irvine, '81—
Santa Ana, California

Corless, Christopher Lee, B.A.,
University of California at Berkeley,
'81—Orinda, California

Faust, Phyllis Lynn, B.A., State
University College at Potsdam, '80;
B.S., Clarkson College of Technology,
'81—Locust Valley, New York

Grant, Paula M., B.S., M.S., Catholic
University, '81—Stratford, Connecticut

Green, Eric Douglas, B.S., University
of Wisconsin, '81—Frontenac,
Missouri

Henkel, Timothy John, B.S.,
Southwestern at Memphis, '81—
Lawrenceburg, Tennessee

Hing, Andrew William, B.A., Duke
University, '81—San Jose, California

Kane, Steven A., B.S., Miami
University, '81—University Heights,
Ohio

MacArthur, Craig Alan, B.S.,
University of California at 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

Taniuchi, Megumi, B.S., M.S., Yale
University, '81—Bethesda, Maryland

Tripp, Catherine Susan, B.A.,
University of New Hampshire, '78—
St. Louis, Missouri

Third-Year Trainees 1984-85

Apkon, Michael, B.S., Northwestern
University, '82—Framingham,
Massachusetts

Auchus, Richard Joseph, S.B.,
Massachusetts Institute of Technology,
'82—Totowa, New Jersey

Axelrod, Jeffrey David, Sc.B., Brown
University, '81—Rochester, New York

Chu, Tommy Wah, B.S., University of
Illinois, '82—Danville, Illinois

Crowder, Charles Michael, B.A.,
Hendrix College, '82—Camden,
Arkansas

Dieckgraefe, Brian Keith, B.A.,
Kansas University, '82—St. Louis,
Missouri

Duncan, James Richard, B.S.,
University of Michigan, '82—Hinckley,
Ohio

Kucik, Dennis Frank, B.S., University
of Wisconsin, '82—Madison,
Wisconsin

Loftus, David John, B.A., Pomona
College, '81—Palo Alto, California

MacDonald, Margaret Russell, B.A.,
Oregon State University, '79—
Corvallis, Oregon

Masakowski, Victoria Rose, B.S.,
Washington University, '82—Garrett
Park, Maryland

Porter, Forbes Dennison, B.A.,
Washington University, '82—
Worthington, Ohio

Quade, Bradley Joseph, B.A.,
MacAlester College, '82—New Hope,
Minnesota

Scott, Leland James, B.S., Stanford
University, '82—Red Bluff, California

Silverman, Neil Jerome, B.S.,
University of California at Los
Angeles, '82—Los Angeles, California

Standaert, David George, B.A.,
Harvard University, '82—Bethesda,
Maryland

Sweetser, David Alan, B.S., M.S.,
Stanford University, '82—Fairfield,
California

Tong, Patrick Yat-Fu, B.S.,
Massachusetts Institute of Technology,
'82—Fremont, California

Second-Year Trainees 1984-85

Brown, Lawrence Robert, B.S.,
University of Wisconsin, '82—Golden
Valley, Minnesota

Chesis, Paul Lee, B.A., University of
California at Berkeley, '83—Tarzana,
California

Dean, Andy Chen, A.B., Harvard
College, '83—Elmhurst, New York

Diaz, Ruben, B.S., Duke University,
'83—Chattanooga, Tennessee

Fine, Steven Mark, B.A., Wesleyan
University, '83—Rochester, New York

Folz, Rodney Joseph, B.S., Indiana
University, '83—Evansville, Indiana

Heuckeroth, Robert Otto, B.S.,
University of Maryland, '83—Silver
Spring, Maryland

Inhorn, Roger Charles, B.S.,
University of Wisconsin, '83—
Madison, Wisconsin

Li, Dean, B.A., University of Chicago,
'83—Chicago, Illinois

Matzuk, Martin Matthew, B.A.,
University of Chicago, '82—Colonie,
New Jersey

Rich, Mark Monroe, B.A., Bethel
College, '83—Bluffton, Ohio

Schmidt, Norman Dagobert, B.S.,
University of California at Davis, '82—
Lodi, California

Silverman, Edwin Kepner, A.B.,
Washington University, '83—Altoona,
Pennsylvania

Sivak, Louise Elizabeth, B.S.,
Wesleyan University, '83—Washington,
D.C.

Sweetser, Marianne Tryphonas, B.S.,
M.S., Stanford University, '83—
Sunnyvale, California

Towler, Dwight Arnold, B.A.,
Moorhead State University, '83—St.
Louis, Missouri

First-Year Trainees 1984-85

Carnes, Kenneth Michael, B.S.,
Brown University, '84—North
Hollywood, California

Cookson, Brad T., B.S., University of
Utah, '83—Ogden, Utah

Green, Rebecca Paula, B.S.,
University of Iowa, '83—Davenport,
Iowa

Hillier, David Alfred, B.A., B.S.,
Swarthmore College, '84—Stanford,
California

Lorenz, Robinna Gail, B.S., Stanford
University, '84—Okeene, Oklahoma

Muszynski, Cheryl Ann, B.A.,
Kalamazoo College, '84—Southfield,
Michigan

Roberts, Charlotte Justine, B.A.,
Agnes Scott College, '84—Clemson,
South Carolina

Segal, Yoav, B.S.E., Princeton
University, '84—Tinton Falls, New
Jersey

Sha, William Chih-Ping, B.S.,
University of Chicago, '83—Oakbrook,
Illinois

Smith, Cynthia Mae, B.S., M.S.,
Stanford University, '84—St. Louis,
Missouri

Solomon, Joel Stuart, B.A., Johns
Hopkins University, '84—Shaker
Heights, Ohio

Thio, Kwee Liu Lin, Sc.B., Brown
University, '84—Marietta, Georgia

Wagman, Iris Leslie, A.B., Duke University, '84—Raleigh, North Carolina

Weiner, Scott Jeffrey, A.B., Harvard College, '84—Lafayette Hill, Pennsylvania

MASTER OF ARTS AND DOCTOR OF MEDICINE DEGREES

Graduating Class— May 17, 1985

Rowley, Howard Andrew, B.S., University of Illinois at Urbana, '80—Lockport, Illinois. University of California Hospitals, San Francisco, CA

Vehe, Richard Karl, B.S., University of Wisconsin, '80—Mt. Prospect, Illinois. University of Minnesota Hospitals, Minneapolis, MN

Trainees 1984-85

Godet, Andre Scruggs, B.Sc., Morehouse College, '83—Nassau, Bahamas

Griffin, Anthony Charles, A.B., Brown University, '82—Kenosha, Wisconsin

DOCTOR OF MEDICINE DEGREE

Graduating Class— May 17, 1985

Armistead, Joseph Jackson, B.S., Washington University, '81—Olive Branch, Mississippi. Cleveland Clinics Hospital, Cleveland, OH

Auchus, Alexander Patrick, B.A., Johns Hopkins University, '81—Totown, New Jersey. Thomas Jefferson University, Philadelphia, PA

Awad, Joseph Albert, B.A., Vanderbilt University, '80—Ada, Ohio. Barnes Hospital, St. Louis, MO

Azrin, Michael A., B.S., Brandeis University, '81—Carbondale, Illinois. Jewish Hospital, St. Louis, MO

Baudendistel, Allen D., A.B., St. Louis University, '81—St. Louis, Missouri. St. John's Mercy Medical Center, St. Louis, MO

Belnick, Lucille, B., A.B., University of California-Berkeley, '77—Berkeley, California. Jewish Hospital, St. Louis, MO

Bennett, Vera Elizabeth, A.B., Harvard University, '81—Bloomfield, Connecticut. University of Maryland Hospital, Baltimore, MD

Bergmann, Steven R., B.A., George Washington University, '72; Ph.D., Hahnemann Medical College, '78—St. Louis, Missouri

Bersagel, Eric John, B.A., Augustana University, '81—Vermillion, South Dakota. Mount Carmel Medical Center, Columbus, OH

Celin, Scott Edward, B.S., University of Pittsburgh, '81—Pittsburgh, Pennsylvania. Allegheny General Hospital, Pittsburgh, PA

Chang, Elise Sophia, A.B., Harvard University, '78—San Francisco, California. Cincinnati General Hospital, Cincinnati, OH

Chang, Thomas Sehoon, B.S., Massachusetts Institute of Technology, '81—Rockville, Maryland. Pennsylvania Hospital, Philadelphia, PA

Cohen, Jeffrey, B.A., Washington University, '80—Plantation, Florida. Jewish Hospital, St. Louis, MO

Cohn, Steven Mark, B.S., Duke University, '76; Ph.D., Washington University, '82—St. Louis, Missouri. Barnes Hospital, St. Louis, MO

Colberg, John Wayne, B.S., North Dakota State University, '81—Fargo, North Dakota. Yale-New Haven Medical Center, New Haven, CT

Collin, Gary Richard, B.A., Dartmouth College, '81—Guttenberg, New Jersey. Morristown Memorial Hospital, Morristown, NJ

Colombo, Mark Anthony, B.A., Johns Hopkins University, '81—Aurora, Ohio. Framingham Union Hospital, Framingham, MA

Coplen, Sharon Elizabeth, B.S., Butler University, '81—Warsaw, Indiana. Barnes Hospital, St. Louis, MO

Demonchaux, Elisabeth Lucile, B.A., Northwestern University, '81—Topeka, Kansas. Emory University School of Medicine, Atlanta, GA

El-Badry, Amr Morry, B.A., Haverford College, '80—New York. New York. Jewish Hospital, St. Louis, MO

Evans, Gregory, B.A., Herbert H. Lehman College of the City University of New York, '81—New York. New York. State University, Kings County, New York, NY

Ford, Neville Finch, B.S., University of Bristol, '55; Ph.D., '58—Millington, New Jersey. Jewish Hospital, St. Louis, MO

Gaines, Sharon Elaine, B.A., Atlantic Union College, '81—Nashville, Tennessee. University of Maryland Hospital, Baltimore, MD

Garner, Barbara Anne, B.S., University of North Dakota, '77—Williston, North Dakota. Barnes Hospital, St. Louis, MO

Gitelman, Darren Ross, B.A., Washington University, '81—Brooklyn, New York. Presbyterian Hospital, New York, NY

Goldblum, Kenneth David, B.A., Washington University, '80—Broomall, Pennsylvania. Hospital of the University of Pennsylvania, Philadelphia, PA





Griffith, Patrick Keith, B.A., Northwestern University, '81—Chicago, Illinois. West Virginia University Medical Center, Morgantown, WV

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. Loma Linda University Medical Center, Loma Linda, CA

Halverson, Karen Johnson, B.S., University of North Dakota, '81—Yankton, South Dakota. Barnes Hospital, St. Louis, MO

Halverson, Lewis Carl, B.A., Augustana College, '81—Yankton, South Dakota. Jewish Hospital, St. Louis, MO

Heffner, Christopher Dabney, B.A., Brown University, '82—Iowa City, Iowa. Barnes Hospital, St. Louis, MO

Helfer, Donald Lee, B.A., University of Illinois, '81—Morton, Illinois. St. Luke's Hospital, St. Louis, MO

Hershey, Jonathan Marc, B.A., Johns Hopkins University, '81—Glencoe, Illinois. McGaw Medical Center, Chicago, IL

Himelstein, Andrew Louis, B.A., Harvard University, '81—Garden City, New York. Mount Sinai Hospital, New York, NY

Hingsbergen, Elizabeth Ann, B.A., Northwestern University, '81—Delaware, Ohio. Mac Neal Memorial Hospital, Berwyn, IL

Hopson, David Kent, B.S., Southeast Missouri State University, '80—Chesterfield, Missouri. St. Luke's Hospital, St. Louis, MO

Huppenbauer, Bob, B.A., University of California-Berkeley, '80—Plymouth, Michigan. LSU Affiliated Hospitals, New Orleans, LA

Huppert, Jill Suzanne, B.A., Johns Hopkins University, '81—Perry Hall, Maryland. Case Western Reserve University Affil. Hospitals, Cleveland, OH

Hutchison, Anne Victoria, B.A., Capital University, '81—Livonia, Michigan. Children's Hospital, St. Louis, MO

Jankowski, Dorian Elaine, B.S., Massachusetts Institute of Technology, '80—Highland Springs, Virginia. University of Utah Affil. Hospitals, Salt Lake City, UT

Jarka, Robert Michael, B.S., University of Notre Dame, '81—Grand Rapids, Michigan. University of California, Davis, Affil. Hospitals, Sacramento, CA

Jarvis, Michael Richard, B.S., University of Minnesota-Minneapolis, '77; M.S., University of Illinois-Urbana, '80; Ph.D., '82—Woodbury, Minnesota. Barnes Hospital, St. Louis, MO

Johnson, Corbin Ross, B.A., Harvard University, '81—N. Miami Beach, Florida. Presbyterian-St. Luke's Hospital, Chicago, IL

Jones, Dennie Vance, B.S., Washington University, '81—Chicago, Illinois. Baylor College of Medicine, Houston, TX

Jones, Sheila Bertha, B.S., Yale University, '80—Philadelphia, Pennsylvania. Walter Reed Medical Center, Washington, DC

King, Karl Wei-Han, B.A., Washington University, '80—Omaha, Nebraska. Jewish Hospital, St. Louis, MO

Klein, Marisa Sue, B.A., M.S., Stanford University, '80—Aptos, California. Presbyterian Hospital, New York, NY

Klein, Mitchell Alan, B.A., Washington University, '81—Pembroke Pines, Florida. Wayne State University Affil. Hospitals, Detroit, MI

Kleinschmidt, Donn Craig, B.A., University of Wisconsin-Madison, '75; M.A., Washington University, '85—Oshkosh, Wisconsin. St. Louis University Hospitals, St. Louis, MO

Kritz, Alan Daniel, B.A., University of Pennsylvania, '81—Baldwin, New York. Presbyterian Hospital, New York, NY

Larson, LeAnn Janet, B.A., St. Olaf College, '80—Madison, Wisconsin. St. John's Mercy Medical Center, St. Louis, MO

Lenzi, Victor Daniel, B.S., University of Illinois, '81—Farmington, Illinois. SUNY, Upstate Medical Center, Syracuse, NY

Levine, Sari Ruth, B.A., Stanford University, '81—Fargo, North Dakota. Hospital of the University of Pennsylvania, Philadelphia, PA

Levisohn, Dianne Rae, B.A., Washington University, '76; P.A. Certificate, Yale University, '78—Lakewood, Colorado. Jewish Hospital, St. Louis, MO

Litwin, Sheldon Ellis, B.S., Colorado College, '81—Topeka, Kansas. University of Arizona Affil. Program, Tucson, AZ

Locke, Susan Marie, B.A., Washington University, '81—University City, Missouri. West Suburban Hospital, Oak Park, IL

Lund, Herluf Gyde, Jr., B.A., Tufts University, '78—Frontenac, Missouri. University of Texas Medical School, Houston, TX

Machlin, Steven Robert, B.A., Washington University, '81—Livingston, New Jersey. Johns Hopkins Hospital, Baltimore, MD

Magnusson, Mark Robert, B.A., Columbia University, '76; M.S., University of North Dakota, '79; Ph.D., '81—Grand Forks, North Dakota. Children's Hospital, Philadelphia, PA

Manber, Yvonne Marie, B.S., B.A., University of Illinois, '81—Canton, Illinois. University of Michigan Affiliated Hospitals, Ann Arbor, MI

Mathews, Karen Michelle, B.S., Bowling Green State University, '81—Dayton, Ohio. David Grant Medical Center, Travis AFB, CA

- Melnyk, Christine Marie, B.S.,** University of Illinois, '81—Dixon, Illinois. University of Arizona Affil. Program, Tucson, AZ
- Mensah, George Akowua, B.A.,** Harvard University, '80—Kokofu, Ashanti, Ghana. The New York Hospital, New York, NY
- Mirowitz, Scott Alan, B.A.,** St. Louis University, '81—Ballwin, Missouri. Jewish Hospital, St. Louis, MO
- Mittl, Robert Louis, B.S., M.S.,** Yale University, '81—Convent Station, New Jersey. Barnes Hospital, St. Louis, MO
- Muchmore, Heather Edwina, B.S.,** University of Illinois, '81—Carbondale, Illinois. Hennepin County Medical Center, Minneapolis, MN
- Nattiv, Aurelia, B.S.,** University of California-Los Angeles, '81—W. Los Angeles, California. Community Hospital, Sonoma Co., Santa Rosa, CA
- Noordsy, Douglas Louis, B.S.,** St. Lawrence University, '81—Dewitt, New York. Dartmouth-Hitchcock Medical Center, Hanover, NH
- Nowotny, Thomas John, B.S.,** Washington University, '80—St. Louis, Missouri. Barnes Hospital, St. Louis, MO
- O'Neill, Conor William, B.A.,** College of St. Thomas, '81—St. Paul, Minnesota. Duke University Medical Center, Durham, NC
- Organ, Gregory Michael, B.S.,** Stanford University, '80—Omaha, Nebraska. Roosevelt Hospital Division, New York, NY
- Pearlstone, Anthony Craig, B.S.,** Washington University, '81—Creve Coeur, Missouri. Brigham & Women's Hospital, Boston, MA
- Pennington, MaryJane, B.S.,** Duke University, '81—Birmingham, Alabama. University of Utah Affil. Hospitals, Salt Lake City, UT
- Perkins, Sherrie Lynn, B.A.,** Colby College, '77; M.A., San Francisco State University, '80—Santa Fe, New Mexico. Barnes Hospital, St. Louis, MO
- Pohl, David Lee, B.A.,** Miami University, '76—Osgood, Ohio. St. Louis University Hospitals, St. Louis, MO
- Randle, Gregory Clayton, B.A.,** Washington University, '81—St. Louis, Missouri. S.W. Michigan Area Health Education Prog., Kalamazoo, MI
- Resta, Regina Marie, B.A.,** Washington University, '81—Brooklyn, New York. Hospital of the University of Pennsylvania, Philadelphia, PA
- Rokaw, Joshua Alan, B.A.,** Washington University, '81—Downey, California. Veterans Administration Hospital, Sepulveda, CA
- Roth, Judith Ann, B.S.,** Indiana University, '76—St. Louis, Missouri. Presbyterian-St. Luke's Hospital, Chicago, IL
- Rosenthal, Richard, B.S.,** Cornell University, '77; Ph.D., Washington University, '82—Plantation, Florida. George Washington University Hospital, Washington, D.C.
- Rurik, Gregory, B.S.,** Stanford University, '81—Fresno, California. Stanford University Hospital, Stanford, CA
- Sande, Craig Martin, B.S.,** Stanford University, '81—Reno, Nevada. Jewish Hospital, St. Louis, MO
- Scates, Steven Michael, A.A.,** Modesto Junior College, '75; B.S., University of California, '78—Modesto, California. UCLA Medical Center, Los Angeles, CA
- Schertz, Larry David, B.A.,** Northwestern University, '81—Lombard, Illinois. West Suburban Hospital, Oak Park, IL
- Scholz, Thomas Dean, B.S.,** Swarthmore College, '81—Clarendon Hills, Illinois. University of Iowa Hospitals, Iowa City, IA
- Sedlack, Jeffrey David, B.A.,** Northwestern University, '81—Rochester, Minnesota. Georgetown University Hospital, Washington, DC
- Shapiro, Michael Alan, B.A.,** Dartmouth College, '81—Watchung, New Jersey. Worcester City Hospital, Worcester, MA
- Sivier, Robert Alan, B.A.,** Illinois Wesleyan University, '81—Mahomet, Illinois. Scott AFB Medical Center, IL
- Smart, Steven Craig, B.A.,** Harvard University, '81—Milwaukee, Wisconsin. Barnes Hospital, St. Louis, MO
- Smith, Page Armand, B.A.,** University of California, '77—San Francisco, California. University of Missouri, Kansas City, Kansas City, MO
- Spitzer, Sheryl Ann, B.S.,** North Dakota State University, '79—Ashley, North Dakota. University of North Dakota Affil. Hospitals, Grand Forks, ND
- Steele, Dean Wesley, B.A.,** Washington University, '81—Anchorage, Alaska. St. Louis University Hospitals, St. Louis, MO
- Stern, Richard Curtis, B.A.,** Brandeis University, '81—Valley Stream, New York. Barnes Hospital, St. Louis, MO
- Stevens, John Kirwin, Jr., B.S.,** Washington University, '81—St. Louis, Missouri. Children's Hospital, St. Louis, MO
- Stewart, Lynette Durant, B.A.,** Tuskegee Institute, '81—Christiansted, Virgin Islands. Catholic Medical Center, Jamaica, NY
- Strickland, Adrienne Patrice, B.A.,** Duke University, '81—Tampa, Florida. Wright State University, Dayton, OH
- Sun, Francis Roma, B.S.,** Massachusetts Institute of Technology, '81—Hebron, Indiana. Harbor-UCLA Medical Center, Torrance, CA
- Swanson, Todd Victor, B.A.,** Augustana College, '81—Brooks, South Dakota. University of California, Davis Affil. Hospitals, Sacramento, CA
- Szeles, Leslie Steven, B.A.,** Dartmouth College, '81—Granite City, Illinois. University of Cincinnati, Cincinnati, OH
- Tannin, Grace Michele, B.A.,** Washington University, '81—Chappaqua, New York. Presbyterian Hospital, New York, NY
- Tenaglia, Alan Nicholas, B.S.,** University of Pennsylvania, '78—Philadelphia, Pennsylvania. The New York Hospital, New York, NY
- Thompson, William Dean, B.A.,** Stanford University, '81—Vermillion, South Dakota. Jewish Hospital, St. Louis, MO
- Tobin, Garry Stuart, B.S.,** University of Missouri-Rolla, '81—St. Louis, Missouri. Barnes Hospital, St. Louis, MO
- Villanueva, Mercedes Santos, B.A.,** Harvard University, '81—New York, New York. Michael Reese Hospital, Chicago, IL
- Vo, Thuy-Lieu Thi, B.A.,** Augustana College, '81—Sioux Falls, South Dakota. University of Iowa Hospitals, Iowa City, IA
- Volck, Brian Edward, B.A.,** Washington University, '81—Cincinnati, Ohio. Case Western Reserve Affil. Hospitals, Cleveland, OH
- Wangstrom, Neil William, B.A.,** University of South Dakota, '81—Vermillion, South Dakota. University of Chicago Clinics, Chicago, IL
- Watson, Blanche Evangeline, B.A.,** Washington University, '77—Los Angeles, California. Martin Luther King Hospital, Los Angeles, CA

Weiner, Nancy Canter, B.A., Wellesley College, '81—Augusta, Georgia. St. Luke's Hospital, St. Louis, MO

Weiss, Peter John, B.A., Washington University, '81—St. Petersburg, Florida. Bethesda Naval Medical Center, Bethesda, MD

Whiting, David Wade, B.S., Stanford University, '81—Stanford, California. Hennepin County Medical Center, Minneapolis, MN

Willerford, Dennis Michael, B.A., University of California, '81—Kensington, California. Barnes Hospital, St. Louis, MO

Winokur, Patricia Lee, B.A., Brown University, '81—Iowa City, Iowa. University of Iowa Hospitals, Iowa City, IA

Wolford, Thomas Leo, B.A., St. Louis University, '76—Louisville, Kentucky. Barnes Hospital, St. Louis, MO

Wong, Ella Hoy, B.S., Caltech University, '78—Skokie, Illinois. University of Chicago Clinics, Chicago, IL

Wren, Megan Elizabeth, B.A., Washington University, '81—Pennington, New Jersey. Jewish Hospital, St. Louis, MO

Yerman, Howard Mark, B.S., University of Michigan, '81—Oak Park, Michigan. University of Illinois Affil. Hospitals, Chicago, IL

Zuckerman, Jordan Spence, B.A., Washington University, '81—Bayside, New York. Montefiore Hospital Center, New York, NY

Third-Year Class 1984-85

Allen, Carl Edward, B.A., Vanderbilt University, '82—Cleveland, Mississippi

Anderson, Allen David, B.A., Northwestern University, '82—Lombard, Illinois

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

Axford, Trevor Charles, B.S., University of Illinois-Urbana, '82—Urbana, Illinois

Barteau, Jeffrey Andrew, B.A., Wabash College, B.S., Washington University, '82—Creve Coeur, Missouri



Bartlett, Marissa Ramos, B.A., University of California-Berkeley, '79; M.A., University of South Dakota, '81—Vermillion, South Dakota

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

Bergman, Lawrence Russell, B.A., Washington University, '82—New York, New York

Bodine, Christopher Kenneth, B.A., Lafayette College, '82—Lexington Park, Maryland

Boggs, David Peter, B.A., University of Colorado-Boulder, '79—Boulder, Colorado

Bracy, Waldo Parden, B.A., Brown University, '81—St. Louis, Missouri

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—Whitesboro, 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—Reedley, 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

Christensen, Michael W., B.S., University of North Dakota, '82—Cincinnati, Ohio

Christoph, Ian Howard, B.A., Dartmouth College, '81—Bloomington, Indiana

Chrysikopoulos, Charalabos Spyridon, B.A., Washington University, '83—Corfu, 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

- Compton, Wilson Martindale III**, B.A., Amherst College, '81—New Vernon, New Jersey
- Daftery, Ashi Rasik**, B.S., University of Illinois-Urbana, '82—Decatur, Illinois
- Dawson, Steven Michael**, B.S., Arizona State University, '80—Wallingford, Iowa
- Demmer, Laurie Ann**, B.A., Dartmouth College, '82—Concord, Massachusetts
- 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
- Erdmann, Dallas Don**, B.A., Augustana College, '81—Aberdeen, South Dakota
- 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
- Frattoni, 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
- Gross, Fredric Jay**, B.A., Washington University, '82—Plantation, Florida
- Haft, Rachel Freda**, B.A., Washington University, '82—New Rochelle, New York
- 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
- 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 Sound, '82—Longview, Washington
- Koo, Michele Deehwa**, 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 Gangadhar**, B.S., Ohio State University, '82—Chillicothe, Ohio
- Lown, Kenneth Samuel**, B.S., University of Michigan—Ann Arbor, '82—Paducah, Kentucky
- Lubben, John Raymond**, B.A., Calvin College, '82—Bucanan, Michigan
- McCloud, 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
- McDonnell, Timothy James**, A.A., U. S. International University, '74; B.A., University of California, '77; M.S., University of North Dakota, '80; Ph.D., '82—Ramona, California
- 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
- Molleston, Michael Choate**, A.B., Washington University, '82—Newport, Arkansas
- Monafo, William Joseph**, B.A., Dartmouth College, '82—St. Louis, Missouri
- Morrison, Curtis**, B.S., Dayton University, '81—Batavia, Ohio
- Nordlund, John Richard**, B.S., Rensselaer Polytechnic Institute, '75—St. Louis, Missouri
- Peck, Rebecca Davis**, A.B., Washington University, '82—Prairie Village, Kansas
- Pitts, Eric Wayne**, B.A., Yale University, '81—Kansas City, Kansas
- Porter, Forbes Dennison**, B.A., Washington University, '82—Worthington, Ohio
- Potter, Michael Jonathan**, S.B., Massachusetts Institute of Technology, '82—Vancouver, Canada
- Powell, John Clark**, University of Kentucky—Harrodsburg, Kentucky
- Presti, 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
- Robinson, Gordon Howard**, B.A., St. Louis University, '80—St. Louis, Missouri
- Roter, Bradley Scott**, Northwestern University—St. Louis, Missouri
- Rouse, Andrew McCown**, 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—Hindsdale, Illinois

Stevens, Eric Eugene, B.A., Yale University, '80—Cumberland, Rhode Island

Strominger, Mitchell Brent, A.B., Washington University, '82—Albany, New York

Stumpp, Juanita Louise, B.A., Pomona College, '82—Los Angeles, California

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

Winter, Douglas Stephen, B.S., University of South Dakota, '82—San Diego, 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

Yang, Jaehyen, B.S., Brown University, '77; M.S., '80; Ph.D., '82—Tokyo, Japan

Zier, Judith Lynn, B.S., University of Illinois-Urbana, '82—Kewanee, Illinois

Second-Year Class 1984-85

Aronson, William Jacob, B.S., University of Wisconsin-Madison, '83—Milwaukee, Wisconsin

Bade, Priscilla Faith, B.S., Washington University, '83—Mankato, Minnesota

Baird, John Bradley, A.B., Washington University, '83—Fiora, Illinois

Ball, Daniel Webster, B.A., Wesleyan University, '83—Chicago, Illinois

Barth, Gregory Louis, B.S., University of Notre Dame, '83—Granite City, Illinois

Baumann, Dirk Stephen, B.S., Rice University, '83—Pittsburgh, Pennsylvania

Bennie, Jeffrey Barker, B.S., David Lipscomb College, '83—Monroe, Ohio

Bickler-Bluth, Michelle Ellen, B.S., State University New York-Buffalo, '71; M.S., University of Wisconsin-Madison, '79—Oceanside, New York

Bierut, Laura Jean, B.A., Harvard University, '82—Arlington Heights, Illinois

Birkenmeier, Gail Louise, B.A., Washington University, '83—St. Louis, Missouri

Bowen, Elton Cornelius, Jr., B.A., Emory University, '83—Decatur, Georgia

Bredt, Robert Jay, B.A., Pomona College, '83—Northridge, California

Brundidge, Phyllis Kaye, B.A., Emory University, '83—Lakeland, Florida

Burri, Robert Alan, B.S., California State University-Long Beach, '82—Berkeley, California

Buznego, Carlos, A.B., Washington University, '82—Miami, Florida

Chesis, Paul Lee, B.A., University of California-Berkeley, '83—Tarzana, California

Chiao, Gene Zin-Nan, B.S., University of California-Berkeley, '83—Walnut Creek, California

Churchwell, Keith Burnell, B.S., Harvard University, '83—Nashville, Tennessee

Countiss, John Spencer, A.B., Washington University, '83—Columbus, Ohio

Cragle, Stephen Paul, B.A., Bethel College, '83—Hudson, Iowa

Curran, Steven Alan, B.A., University of Nebraska-Omaha, '83—Omaha, Nebraska

D'Amico, James Michael, B.S., Marquette University, '72; D.D.S., Marquette School of Dentistry, '76—Springfield, Ohio

Daniels, Brian Fredrick, B.S., M.S., Massachusetts Institute of Technology, '81—San Francisco, California

Dodson, Brian Daniel, B.S., Wheaton College, '82—Homewood, Illinois

Donovan, John Stephen, B.S., Stanford University, '82—Stanford, California

Drlik, Jan, B.A., University of California-Santa Cruz, '83—Santa Cruz, California

Eichler, Marc Edward, B.S., University of Michigan-Ann Arbor, '83—Rockville, Maryland

Feldman, Jeffrey Stuart, B.S., Haverford College, '83—Spring Valley, New York

Forstot, Robert Marc, B.A., Williams College, '83—New Milford, New Jersey

Frank, Edward William, B.S., Stanford University, '83—San Rafael, California

Friedman, Deborah Louise, B.A., Vanderbilt University, '80—St. Louis, Missouri

Frikke, Maureen Jane, B.A., University of Minnesota-Duluth, '69; Ph.D., Washington University, '76—Clara City, Minnesota

Fuhlbrigge, Robert Conrad, B.S., University of Wisconsin-Madison, '82—Toledo, Ohio

Gabianelli, Eugene Benedict, B.A., Dartmouth College, '81—St. Louis, Missouri

Gibson, Laverne Elspeth, B.S., Massachusetts Institute of Technology, '83—Silver Spring, Maryland

Giles, Wayne Howard A., B.A., Washington University, '83—Malvern, Pennsylvania

Goldring, James Michael, B.A., Washington University, '72; Ph.D., '77—St. Louis, Missouri

Gooden, Earl Anthony, B.A., Boston University, '81—Bronx, New York

Greene, Kelly Elizabeth, B.A., Carroll College, '83—Longmont, Colorado

Gretch, Gary Joseph, B.S., College of Great Falls, '83—Great Falls, Montana

Haden, David Samuel, B.S., College of William and Mary, '82—Elkton, Virginia

Hanaway, Patrick James, B.S., University of Wisconsin-Madison, '81—DePere, Wisconsin

Jick, David Ethan, A.B., Washington University, '82—St. Louis, Missouri

Johnson, Douglas Jay, B.S., Purdue University, '83—Carterville, Illinois

Johnson, Yvette Renee, B.S., Tufts University, '82—Boston, Massachusetts

Joyce, Michael Edward, B.A., Miami University, '81—Wexford, Pennsylvania

Kilo, Charles Michael, B.S., University of Missouri-Kansas City, '83—Kansas City, Missouri

Kliwer, Peter James, B.S., Oregon State University, '82—Corvallis, Oregon



Knutzen, Kathryn Lee, B.S., University of Virginia, '79—Trabuco Canyon, California

Layton, Brent Thomas, B.A., Weber State College, '83—Salt Lake City, Utah

Lee, Nancy Ann, B.A., Brown University, '83—Chatham, New Jersey

Lee, Philip Curtis, B.A., University of California-Berkeley, '81—Hillsborough, California

Lim, Yin Yin, B.A., Washington University, '80—San Francisco, California

Little, Jesse Samuel, Jr., Oklahoma University—Santa Fe, New Mexico

Little, Susan Janet, B.A., Carleton College, '83—St. Louis, Missouri

Mackendrick, William Phillip, B.A., University of Colorado-Boulder, '83—Hotchkiss, Colorado

Mahaffy, Sara Ann, B.S., Washington University, '83—San Mateo, California

Major, Godfrey Wilshire, B.A., Canisius College, '83—Eleuthera, Bahamas

Makeever, Robert Mark, B.S., University of Illinois-Urbana, '79—Normal, Illinois

Manerikar, Sucheta Dattatray, B.S., Washington University, '83—Park Forest, Illinois

Marshall, Marie Wilson, B.A., University of Chicago, '83—Markham, Illinois

Martin, Stanley Barlow, B.A., Amherst College, '83—St. Louis, Missouri

Matossian, Viken Raffi, B.A., Swarthmore College, '83—Bethesda, Maryland

McManis, Susan Elizabeth, B.S., University of Maryland, '83—Lanham, Maryland

Meyer, Christopher Andrew, B.S., University of Virginia, '83—Cincinnati, Ohio

Mistry, Dinu Gertrud, A.B., University of Illinois-Urbana, '82—Champaign, Illinois

Montie, Gerald Lee, B.A., University of Wisconsin-Madison, '82—Green Bay, Wisconsin

Mumford, Margaret C., B.A., Williams College, '83—Plymouth, New Hampshire

Naureckas, Edward Theodore, B.S., Marquette University, '83—Gurnee, Illinois

Nguyen, Tramy Thi, B.S., University of California-Irvine, '83—Irvine, California

Nickles, George Bruce, B.A., West Virginia University, '72; D.D.S., '78—Wheeling, West Virginia

Nordlund, Julie C., B.A., University of Virginia, '80—Charlottesville, North Carolina

Noren, Richard Lowell, B.A., Washington University, '83—Highland Park, Illinois

Nouhan, Regina Marie, B.A., University of Virginia, '83—St. Louis, Missouri

Onder, Robert Frank, Jr., B.A., Washington University, '83—St. Louis, Missouri

Orgel, Laurie Spellman, B.A., Brandeis University, '74; M.S.W., Boston College, '78—St. Louis, Missouri

Palma, Anne Tilly, B.S., University of California-Irvine, '83—Costa Mesa, California

Parks, William Antone, Jr., B.S., University of Michigan-Ann Arbor, '83—Fremont, Michigan

Perry, Mark Alan, B.A., University of Missouri-Columbia, '83—Kansas City, Missouri

Phillips, Christopher Jay, B.S., University of Dayton, '83—Dayton, Ohio

Pixley, Lee Ann, B.A., Washington University, '83—Latham, Illinois

Plautz, William Andrew, B.S., University of Michigan-Ann Arbor, '82—Indianapolis, Indiana

Pluard, Timothy Joseph, B.S., Washington University, '83—Evergreen Park, Illinois

Rayne, Susan Christie, B.M., Indiana University-Bloomington, '79—Pittsburgh, Pennsylvania

Rogero, Grant William, B.S., University of California-Los Angeles, '83—Lodi, California

Rokusek, Laura Adele, B.A., Washington University, '83—Rockford, Illinois

Rumbarger, Tara Ann, B.A., Johns Hopkins University, '82—Hagerstown, Maryland

Salimpour, Pejman, B.S., University of California-Los Angeles, '83—Woodland Hills, California

Sandiford, Patrick Bertram, B.S., McGill University, '83—Montreal, Canada

Scavone, Barbara Mary, A.B., B.S., University of Illinois-Urbana, '82—Glen Ellyn, Illinois

Schwab, William Stix III, B.H., School of Visual Arts, '78—Joplin, Missouri

Sikich, Linmarie, B.A., Washington University, '81—Potosi, Missouri

Smith, Peter Lloyd, B.S., University of Notre Dame, '83—Fort Wayne, Indiana

Stephens, Andrea Lee, B.A., University of California-San Diego, '82; M.S., University of California-Los Angeles, '83—Dickinson, North Dakota

Sullivan, Carolyn Ann, A.B., Washington University, '83—West Babylon, New York

Thompson, Paul Alan, B.S., Washington University, '83—San Jose, California

Tolan, Robert Warren, Jr., A.B., Indiana University, '82; M.A., '83—Kokomo, Indiana

Walker, William Victor, A.B., Washington University, '82—Mesa, Arizona

Watson, Yasmira Ivett, B.A., Washington University, '83—St. Louis, Missouri

White, Gary Michael, B.A., University of California-San Diego, '83—Redding, California

Wiggins, Trina Rene, B.A., Stanford University, '82—Oakland, California

Wilborn, Jerome, B.S., University of Michigan-Ann Arbor, '83—Detroit, Michigan

Zager, Scott Anthony, B.S., University of California-Los Angeles, '83—Woodland Hills, California

Zasi, Alan John, B.A., Southern Illinois University-Carbondale, '83—Elk Grove Village, Illinois

First-Year Class 1984-85

Andersen, Peter Edward, B.S., University of Oregon, '84—Sherwood, Oregon

Anderson, Milton Webster, B.A., Washington University, '84—White Hall, Maryland

Androff, Mary Elizabeth, B.S., University of Illinois-Urbana, '84—Des Plaines, Illinois

Armstrong, Brian Athan, B.A., Pittsburgh State University, '84—Spring, Texas

Bane, Charles Leo, B.S., University of Illinois-Urbana, '84—Arrowsmith, Illinois

Batanghari, Budianto Teddy, B.A., University of California-San Diego, '84—Jakarta, Indonesia

Bautista, Joel Olarte, B.A., Washington University, '83—Moberly, Missouri

Bell, Richard Carl, B.A., Northwestern University, '84—Houston, Texas

Bloomberg, Judy Ferer, B.A., Northwestern University, '84—St. Louis, Missouri

Borowsky, Steven Jay, A.B., Harvard College, '83—St. Louis, Missouri

Botney, Richard, B.S., University of California-Berkeley, '77—Tarzana, California

Bowman, Steven Howard, B.A., Stanford University, '84—Chicago, Illinois

Bugs, Mablene, A.B., Brown University, '84—St. Louis, Missouri

Campbell, Mary Louise, B.A., Wellesley College, '84—Concord, Massachusetts

Castelbaum, Arthur Jay, B.A., Washington University, '84—West Caldwell, New Jersey

Chor, Paula Jean, A.S., Belleville Area College, '78; B.S., University of Illinois-Edwardsville, '84—Fairview Heights, Illinois

Clancy, Cornelius Joseph, B.A., Johns Hopkins University, '84—Somerset, New Jersey

Clyne, Patrick Stephen, B.A., Illinois Wesleyan University, '84—Waukegan, Illinois

Constantino, John Nicholas, B.S., Cornell University, '84—St. Louis, Missouri

Cranshaw, Janet Louise, B.A., Wesleyan University, '82—Wellesley, Massachusetts

DiValerio, Richard Michael, Jr., B.S., University of Notre Dame, '84—Orchard Park, New York

Dohe, Emily Karen, B.A., Colorado College, '84—Aurora, Colorado

Dunford-Shore, Jane Elizabeth, B.A., Washington University, '84—Topeka, Kansas

Dyer, Laura Ella, B.A., Duke University, '84—Paducah, Kentucky

Eisenbeis, John Francis, B.S., University of Notre Dame, '84—Warson Woods, Missouri

Elliott, Jeffrey Leigh, B.A., Washington University, '84—Cliffside Park, New Jersey

Fedrizzi, Rudolph Peter, B.S., St. Lawrence University, '84—Liverpool, New York

Filmyer, William George, Jr., B.S., Tufts University, '81; M.S., '81—Philadelphia, Pennsylvania

Forsen, James William, Jr., A.B., Princeton University, '83—St. Louis, Missouri

Forsyth, Christopher Burton, B.A., University of Missouri-St. Louis, '82—Clayton, Missouri

Frenkel, Neal Allen, B.A., Yale University, '84—Tulsa, Oklahoma

Gassner, Lawrence Phillip, B.A., Duke University, '79—Woodland Hills, California

Godfrey, Wayne Russell, B.A., University of California-Santa Barbara, '82; M.S., Stanford University, '83—Los Altos, California

Grady, Ronald Mark, B.A., Princeton University, '84—St. Louis, Missouri

Graves, Kimberly Sue, B.A., University of Missouri-Columbia, '84—Jefferson City, Missouri

Hack, Howard Mark, B.A., University of Pennsylvania, '84—Fox Point, Wisconsin

Hatley, Thomas Edward, B.A., University of Illinois-Edwardsville, '76—Granite City, Illinois

Hillsley, Russell Edward, B.S., Virginia Polytechnic Institute and State University, '84—Potomac, Maryland

Hoehne, Terry Glenn, B.A., Central Methodist College, '84—St. Louis, Missouri

Holland, John Michael, B.A., Carroll College, '84—Portland, Oregon

Inhofe, Perry Dyson II, B.S., Duke University, '84—Tulsa, Oklahoma

Jackson, Jeffrey Layton, B.S., University of Kansas, '83—Kansas City, Kansas

Johnston, Anne Louise, B.S., University of Wisconsin-Madison, '83—Rochester, Minnesota

Jones, Leroy Alphonso, B.A., University of Colorado-Boulder, '83—Brooklyn, New York



Kaniecki, Robert Gerard, B.S., University of Notre Dame, '84—Pittsburgh, Pennsylvania
Kim, Thomas Aquinas, B.A., Michigan State University, '84—Hopkinsville, Kentucky
Kitchen, Brenda Joyce, S.B., Massachusetts Institute of Technology, '83—Kansas City, Missouri
Kleerup, Eric Christopher, B.S., Stanford University, '84—Villa Park, California
Kriesel, John Douglas, B.S., University of Illinois-Urbana, '83—Lake Bluff, Illinois
Kurose, George Alan, B.A., Wesleyan University, '83—Norwalk, Connecticut
Lambrecht, Andrew John, B.A., Washington University, '83—Greenfield, Wisconsin
Landes, Andrew Bruce, B.A., Wesleyan University, '84—Boca Raton, Florida
Lewis, Stacy Kay, B.A., Washington University, '84—Seymour, Indiana
Lyketos, Kostas George, B.A., Northwestern University, '84—Athens, Greece
Magee, Ronald Ray, B.S., Washington-Lee University, '84—Dallas, Texas
McCarthy, Margaret Linton, B.A., University of Missouri-St. Louis, '83—St. Louis, Missouri

McKenzie, Margaret Louisa, B.S., Portland State University, '81; M.S., Howard University, '84—Portland, Oregon
McKinney, Elizabeth Theresa, B.A., Fisk University, '84—Portland, Oregon
Miller, Boyd Donald, B.A., Lawrence University, '84—Waukesha, Wisconsin
Minger, Susan Elizabeth, B.A., University of San Francisco, '78—Oakland, California
Misick, Lofton Nathaniel, A.A., Miami Dade Community College, '82; B.S., Howard University, '83—Turks/Caicos Island, West Indies
Moellenhoff, Sharon Lynn, B.A., Vanderbilt University, '84—St. Louis, Missouri
Morishima, Chihiro, B.A., Washington University, '84—Des Plaines, Illinois
Moulton, Michael Lowell, B.A., Augustana College, '84—Brunswick, Maryland
Ockner, Daniel Matthew, A.B., Washington University, '84—Shaker Heights, Ohio
Optican, Robert Joseph, B.A., Duke University, '83—St. Joseph, Missouri
Paisley, Rosalie Jane, B.S., Washington University, '83; M.S., '84—Long Beach, California
Parks, David Jay, B.S., State University of New York-Binghamton, '83—Long Beach, New York
Peterseim, David Scott, A.B., Duke University, '84—Nashville, Tennessee
Pieper, Stephen James, A.B., Washington University, '83—St. Louis, Missouri
Plumb, Mark David, B.S., Washington University, '84—Pewaukee, Wisconsin
Poorman, Jay Clifford, B.S., Oregon State University, '84—Portland, Oregon
Quast, Robert Francis, B.A., Saint Louis University, '84—Brookfield, Wisconsin
Reed, Philip Andrew, B.A., Carleton College, '84—Webster Groves, Missouri
Rha, Janice Jung, B.S., Seoul National University, '74; B.A., California State University-Northridge, '84—Granada Hills, California
Romanelli, Matthew Frederick, B.A., Yale University, '83—Dix Hills, New York

Ross, Albert Beasley, B.A., Washington University, '84—Chicago, Illinois
Rubin, William David, B.S., University of California-Berkeley, '84—Santa Monica, California
Rudnick, Judith Renee, B.A., Johns Hopkins University, '84—Croton, New York
Scharenberg, Karen Lisa, B.A., Indiana University, '84—West Lafayette, Indiana
Shaikewitz, Samuel T., B.S., Stanford University, '84—St. Louis, Missouri
Sheen, Vida Dee, B.S., University of Kentucky, '84—Lexington, Kentucky
Shen, Jason, A.B., Washington University, '84—Orinda, California
Shopper, Glenn Kenneth, B.A., Wesleyan University, '83—Clayton, Missouri
Smart, Stephen John, B.S., Washington University, '84—Burbank, Illinois
Smith, Gregory Alan, B.S., Indiana University, '84—Yellow Springs, Ohio
Sonin, Andrew Howard, B.A., Washington University, '84—Plantation, Florida
Stumbo, Elizabeth Ann, B.A., Carleton College, '83—Orinda, California
Taylor, Stephan Floyd, B.A., Northwestern University, '80—Cincinnati, Ohio
Teicher, Joel Robert, B.A., University of Michigan-Ann Arbor, '84—St. Louis, Missouri
Thompson, Geoffrey Graeme, B.A., University of California-San Diego, '79—San Francisco, California
Thornton, Michael Kent, B.A., University of Missouri-St. Louis, '84—Bridgeton, Missouri
Tiffany, Brian Robert, B.S., Bob Jones University, '84—Oneco, Florida
Turrill, Mark, B.A., University of Southern California, '83—Glendale, California
Walker, Eleanor Maud, B.S., University of Notre Dame, '84—Brooklyn, New York
Watling, David Lee, B.S., Michigan State University, '80—Lansing, Michigan
Watson, Mark Jay, B.S., San Diego State University, '84—La Jolla, California

White, Gordon Leigh, B.A., Washington University, '83—Kansas City, Missouri

Wilson, Alan D., B.S., Emporia State University, '83—Hartford, Kansas

Wilson, John Richard, B.A., Washington University, '84—Oakland, California

Winfrey, Mae Millicent, B.A., Duke University, '84—Lexington, Virginia

Wong, Edward Chun Cheung, B.S., University of California-Davis, '84—Honolulu, Hawaii

Woods, Bryan Eugene, B.A., University of California-Santa Barbara, '84—Palo Alto, California

Yeager, Terry Douglas, B.A., Augustana College, '80; M.S., University of Nebraska-Lincoln, '84—Sioux Falls, South Dakota

Yearwood, Kirtley Andrew DaCosta, B.S., Tuskegee Institute, '83—Barbados, West Indies

Zabel, Kenneth Michael, B.S., Graceland College, '84—Pittsburg, Kansas

Zohner, Jeffrey Robert, B.A., Wheaton College, '77—St. Louis, Missouri

Zupan, Andy Anthony, A.B., Washington University, '84—Columbus, Ohio

MASTER OF HEALTH ADMINISTRATION DEGREE

Graduating Class— May 17, 1985

Alcorn, W. Wright, B.A., University of Texas, '83—Houston, Texas

Boulenger, Albert L., B.A., University of Florida, '82—Tampa, Florida

Carroll, William M., B.S., Ithaca College, '75; M.A., Webster College, '81—Oak Lawn, Illinois

Chamberlain, John M., B.A., Westminster College, '72—St. Charles, Missouri

Connors, Lawrence J., B.A., SUNY-Buffalo, '81—Rochester, New York

Cori, Joyce T., B.A., Franklin & Marshall College, '82—Wayne, New Jersey

Dyer, Carla S., R.N., St. Luke's Hospital, '79; B.S.N., Webster College, '81—Chesterfield, Missouri

Elish, Marcy B., B.S.M., Tulane University, '83—East Northport, New York

Entenok, Marilyn B., B.A., Cleveland State University, '82—Cleveland, Ohio

Farrow, Paul S., B.S., Tennessee Technical University, '83—Hillsboro, Tennessee

Ferguson, Robert L., B.S., Southwest Missouri State University, '83—Rogersville, Missouri

Fisher, Bonnie H., B.A., University of Rochester, '81—St. Louis, Missouri

Greeley, Michael D., B.A., University of Wisconsin, '81—Evanston, Illinois

Green, Garry Kim, B.S., Louisiana Tech, '80; M.B.A., '84—West Frankfort, Illinois

Hanrahan, Kathleen E., B.S., Cleveland State University, '83—Cleveland, Ohio

Honig, David M., B.A., SUNY-Buffalo, '83—East Meadow, New York

Hooper, Ann M., B.S., University of Missouri-St. Louis, '81—St. Louis, Missouri

Jones, Kea P., B.A., Fisk University, '83—Chicago, Illinois

Krauss, John Penn, B.S., Occidental College, '81—St. Louis, Missouri

Lisy, Mark T., B.A., Lawrence University, '83—Elmhurst, Illinois

Lynch, John J. III, B.S., University of Scranton, '83—Washington, D.C.

McGuire, John, B.S., Christian Brothers College, '70; M.S., Memphis State University, '75—Memphis, Tennessee

Montgomery, Bradley, B.S., University of North Dakota, '83—Fargo, North Dakota

Muchisky, Linda L., B.S.B.A., Washington University, '83—St. Louis, MO

Mueller, Linda J., B.S., University of Illinois, '83—Rolling Meadows, Illinois

Peck, Thomas R., B.A., University of San Francisco, '71; M.A., Ohio State University, '74—Cincinnati, Ohio

Pritts, Robert W., B.A., University of Puget Sound, '80—Boulder City, Nevada

Prosperi, Mark S., B.S., Washington University, '83—St. Louis, Missouri

Pulie, Elizabeth A., B.A., Fairfield University, '83—Easton, Connecticut

Senneff, William P., B.S., SIU-Edwardsville, '83—Tiskilwa, Illinois

Shaker, Mark S., B.S., B.A., Ohio State University, '83—Niles, Ohio

Sobel, Michelle C., B.A., Northwestern University, '82—Lincolnwood, Illinois

Stevens, Judith A., B.M.Ed., Memphis State University, '77; M.A., '82—Memphis, Tennessee

Sturz, Bradford S., B.A., University of California-Berkeley, '81—Redding, California

Thalhimer, Leigh A., B.A., Newcomb College-Tulane, '78—Richmond, Virginia

Thorngren, Teresa A., B.S., Illinois State University, '76—Moline, Illinois

Vinyard, Roy G. II, B.S., St. Louis College of Pharmacy, '79—Hazelwood, Missouri

Walters, Nancy T., B.S., University of Illinois-Champaign, '68—Chesterfield, Missouri

Whitson, Steven K., B.B.A., Eastern Kentucky University, '83—Knoxville, Tennessee

First-Year Class 1984-85

Anderson, Amy Z., B.S., Northwestern University, '82—Mt. Prospect, Illinois

Bates, Patricia, A.B., Davidson College, '82—Little Rock, Arkansas

Berlin, Mark F., B.B.A., Loyola University, '83—Chicago, Illinois

Carey, Marjorie H., B.A., Tulane, '81—St. Louis, Missouri

Copeland, Robert Y., B.A., University of Oklahoma, '84—Frederick, Oklahoma

Del Po, John A., B.S., Stonehill College, '84—Revere, Massachusetts

Gibbons, A. Trice III, B.S., Southwestern, Memphis, '83—Metairie, Louisiana

Gruen, Marilyn, B.S., University of Illinois, '81—Chicago, Illinois

Halladay, Debra, B.A., Cal. State-Sacramento, '80—Sacramento, California

Heinze, Timothy A., B.A., Augustana College, '84—Aurora, Illinois

Holliday, Rosemary, B.B.A., Memphis State University, '84—Memphis, Tennessee

Kantor, Sharon M., B.A., Canisius College, '83—Buffalo, New York

Klein, Robert N., B.A., University of Louisville, '83—Louisville, Kentucky

Knight, Rebecca J., B.S., Missouri Southern State, '84—Carthage, Missouri

Lawing, James D., B.S., University of Georgia, '80—Atlanta, Georgia

Leitner, Mark S., B.S.B.A., University of Arizona, '84—Phoenix, Arizona

Lyons, James E., Jr., B.S., Western Kentucky University, '84—Hopkinsville, Kentucky

Mantia, Ronald, B.S., Maryville College, '76—St. Louis, Missouri

McCaleb, W. Brent, B.B.A., Texas A & M, '83—Port Neches, Texas

Militzer, Margaret A., B.S., University of Missouri, '84—Altenburg, Missouri

Moser, Thomas B., B.S.B.A., Washington University, '83—St. Louis, Missouri

Norris, Carol A., B.S., University of Illinois, '83—Pana, Illinois

Renwick, William R., B.S., Newberry College, '75—Newberry, South Carolina

Rubenstein, Lisa, B.A., Hampshire College, '79—St. Louis, Missouri

St. Arnold, Dale S., B.S., Pennsylvania State, '76—Broken Arrow, Oklahoma

Scheyer, William J., B.A. (3), University of Washington, '80; B.S., Cal. State University, '84—Port Townsend, Washington

Sirisujin, Somchai, B.S., Chiangmai University, '72; B.A., '76—Chiangmai, Thailand

Susic, Rebecca, B.S., Lindenwood College, '83—St. Louis, Missouri

Skogman, JaNeene, B.S., University of Tennessee, Chattanooga, '81—Knoxville, Tennessee

Walters, Gregory A., B.B.A., Eastern Kentucky University, '84—Catlettsburg, Kentucky

Wolfe-Mason, Tana, B.S.N., Case Western Reserve University, '78—Cleveland, Ohio

Part-Time Students 1984-85

Bornstein, Marion Hawes, R.N., St. Luke's School of Nursing, '79; B.S.N., St. Louis University, '82—St. Louis, Missouri

Erlich-Knarr, Nancy, R.N., Jewish Hospital, '69; B.S., Tarkio College, '80—Collinsville, Illinois

Faucett, Daniel G., B.S., Northeast Missouri State, '79—Arnold, Missouri

Jansson, Susanne E., B.A., SUNY University, '76; M.A., Hofstra University, '79—Brentwood, New York

Knowles, Rose V., B.S.B.A., University of Missouri-St. Louis, '78—St. Louis, Missouri

Luebbert, Christine, B.S., Indiana University, '80—St. Louis, Missouri

Repa-Eschen, Linda, M.B.A., University of Missouri, '72; M.A., Washington University, '76—St. Louis, Missouri

Schaeffer, Donna J., B.A., Butler University, '75—St. Louis, Missouri

Sorenson, Martin, B.S., Auburn University, '67; M.B.A., St. Louis University, '72—Festus, Missouri

Stoll, Martha A., B.A., University of Kentucky, '70; M.S.S.W., University of Louisville, '73—St. Louis, Missouri

Vallina, Carol A., B.A., University of Missouri-Columbia, '68—St. Louis, Missouri

BACHELOR OF SCIENCE IN PHYSICAL THERAPY DEGREE

Graduating Class— October 12, 1985

Julie Baclene, Coe College—Homewood, IL

Sue Berres, Washington University—Kenosha, WI

Tina Brooks, Washington University—Decatur, IL

Sarah Burton, University of South Alabama—Memphis, TN

Theresa Buscher, Northern Illinois University—Vandalia, IL

Jack Carmichael, Knox College—Warrensburg, MO

Carol Courtney, Wichita State University—McLouth, KS

Janet Dennis, Eastern New Mexico University—Los Alamos, NM

Eugene DesLauriers, Indiana University—South Bend, IN

Jay Diamond, Montana State University—Bozeman, MT

Janet Dinger, University of South Florida (Tampa)—Winterhaven, FL

Natalie Doi, Upper Iowa University—Skokie, IL

Carol Eldridge, Washington University—Gallatin, TN

Carol Enkoji, University of Illinois—Part Forest, IL

Pamela Evans, Indiana University—Oberlin, OH

Safia Fatakdawala, Virginia Commonwealth—Karachi, Pakistan

Karen Finehout, St. Lawrence University—LaFargeville, NY

Laura Groenewegen, St. Louis Community College—St. Louis, MO

Christine Haag, University of Illinois—Arlington Heights, IL

Sandra Hornfeck, Indiana University of Pennsylvania—Indiana, PA

Timothy Hubbard, LeMoyn College—Westmoreland, NY

Rhea Jacobson, University of Illinois—Chicago, IL

Daniel Janik, Loyola University—Downers Grove, IL

Karen Jones, Montana State University—Denver, CO

Deborah Kauders, Washington University—Fairfield, CT

Patricia Kohne, Southern Illinois University (Carbondale)—Sparta, IL

Tracy Lauer, Wartburg College—Dix Hills, NY

Shih-Ru (Sheila) Lee, Southern Illinois University (Edwardsville)—Taipei, Taiwan

Elizabeth Maynard, Vanderbilt University—Clarksdale, MS

Joe McKowen, Upper Iowa University—Washington, IA

Steve Miller, University of Kentucky—Ft. Thomas, KY

Julianna Ossman, Washington University—Cincinnati, OH

Cheryl Parsons, Augustana College—St. Louis, MO

Pamela Pilcher, Indiana University—Terre Haute, IN

Laura Roach, John A. Logan College—W. Frankfort, IL

Mary Rockenmeyer, Washington University—Dexter, MO

Dennis Roth, Florissant Valley Community College—St. Charles, MO

Mark Spalter, Wayne State University—Oak Park, MI

Lori Steinberg, Washington University—Springfield, NJ

Katherine Stoehr, Washington University—Cincinnati, OH

Maureen Traxler, Mankato State University—St. Paul, MN

Richard Wager, E. Illinois University—Belleville, IL

Ted Washburne, Rutgers University—St. Louis, MO

Laura Weyand, University of Michigan (Ann Arbor)—Wayne, MI

Shari Works, University of Nebraska at Omaha—Oakland, IA

First-Year Class 1984-85

Bruce Alter
Rene Baggett
Carolyn Barrett
Mike Beckman
Julie Bosler
Karen Boudouris
Kimberly Case
Michael Cimba
Janet Curran
Marijke de Zoeten
Nancy Dolan
John Dravillas
Elizabeth Eckart
Randy Edelman
Stephanie Fagin
Paul Fransen
Lynda Fuller
Kathleen Gaines
Elizabeth Goettman
Eve Grant
Esther Greenwald
Ruth Gronde
Sharon Grothouse
Holly Harrington
Theresa Heidmann
Kim Hink
LeAnn Jensen
Dana Kaska
Robyn Kelly
Elizabeth Klein
Jay Lamble
Kimberly Lawrence
Mary Lohse
Debbie Martin
Stephanie McClure
Sherri McMahan
Deborah Meyer
Thomas Murray
Gina Musolino
Anita Obst
Helene Pappas
Scott Shuey
Barbara Stanerson
Douglas Steele
Richard Stieglitz
Sharla Van Wattering
Teresa Vernon
Sharon Weiss
Shari Wilson
Jimmie Zinn

MASTER OF SCIENCE IN OCCUPATIONAL THERAPY DEGREE

Graduating Class— May 17, 1985

Kalscheur, Jean Ann, B.S., University
of Wisconsin, Madison, '74—
Middleton, Wisconsin
Luebben, Aimee J., B.A., Illinois
State University, '75; B.S.O.T.,
Washington University, '84—Belleville,
Illinois

McInroy, Trudie K., B.S., University
of Florida, '72—Atlanta, Georgia
Mueller, Cynthia Haffner, B.S.,
Fontbonne College, '76; B.S.O.T.,
Washington University, '79—St. Louis,
Missouri

Ragins, Terry L. Lewis, B.A., Ohio
State University, '78—New
Philadelphia, Ohio

Schwaab, Lynn Madras, B.S.,
University of Kansas, '76—Xenia,
Ohio

Trainees

Bowman, O. Jayne, B.A., Baylor
College, '58; B.S., University of
Wisconsin, '73—Torrance, California

Buckley, Margaret Mary, B.A., St.
Louis University—St. Louis, Missouri

Burson, Katherine Ann, B.S.,
Washington University, '81—St. Louis,
Missouri

DuBuske, Susan Greboski, B.S.,
University of Illinois, '78—Chicago,
Illinois

Hegberg, Anne Marie Phillips, B.A.,
Valparaiso University, '79—Wheaton,
Illinois

Kneedler, Joan Goodwin, B.A., Ithaca
College, '74—Aurora, Illinois

Kozio, Catherine Mary, B.A.,
Rockhurst College, '76—Chicago,
Illinois

Lewis, Terry Lynn, B.A., Ohio State
University, '78—New Philadelphia,
Ohio

Lofsness, Susan Gene, B.A., St. Olaf
College, '82—Apple Valley, Minnesota

Poeschel, Peggy J., B.S., University of
Missouri, '81—St. Louis, Missouri

Robertson, Katherine Ann, B.A.,
DePauw University, '82—Ft. Wayne,
Indiana

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BACHELOR OF SCIENCE IN OCCUPATIONAL THERAPY DEGREE

Graduating Class May 17, 1985

Arnold, Mary I.
Berman, Paula Katharine
Bloomer, MaryAnn
Boddicker, Robyn Renee
Boltzman, Carye J.
Dinzebach, Deborah L.
Greives, Julie Marie
Jungewaelter, Mary
Kirchhoff, Kristy Kay
LaTurno, Lisa Marie
Marolf, Suzanne S.
Mize, Beverly Ann
Niemeyer, Carla Cay
Oginsky, Rick L.
Rivera, Mildred
Skaggs, Claire Elizabeth
Tillinghast, Jo-Ann H.
Tubbs, Mary E.
White, Karen Elizabeth
Young, Stephanie Marie

First-Year Class 1984-85

Alves, Margaret A.
Baltz, Susan G.
Carroll, Patricia A.
Coates, Nancy S.
Cooksey, Jana L.
Datuin, Debra J.
Dokos, Mary L.
Dressing, Mary B.
Fagan, Kathleen M.
Fratus, Victoria L.
Geils, Teresa K.
Graham, Renee P.
Haiken, Beth A.
Jennings, Ellen K.
Jost, Lisa A.
Kritikos, Venetia
Oppenheim, Beth A.
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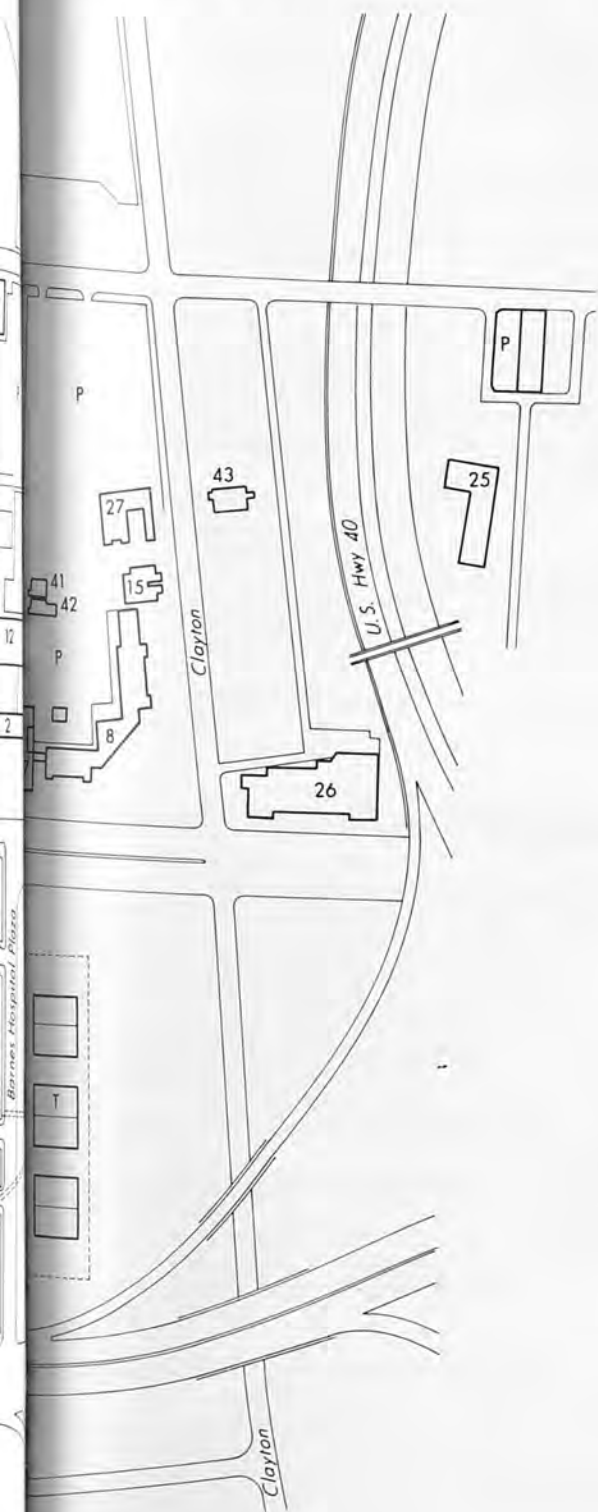
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- 3 South Medical Building
- 4 Occupational Therapy Program
- 5 Maternity Hospital
- 6 McMillan Hospital
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- 8 724 S. Euclid, Shriners
- 9 I.W.J. Rehabilitation
- 10 Olin Residence Hall
- 12 McDonnell Science Building
- 14 West Building
- 15 Health Administration
- 16 School of Nursing
- 17 Renard Hospital
- 19 Mallinckrodt Institute of Radiology
- 20 Clinical Sciences Research Building
- 21 Wohl Clinic
- 22 Wohl Hospital
- 23 Peters Building
- 25 CID Clinic/Research Building
- 26 Central Institute for the Deaf
- 27 CID Residence Hall
- 28 Barnes Service Building
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- 31 Jewish Hospital Kingshighway Building
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- 33 Shoenberg Pavilion
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- 72 West Pavilion
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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 COLLEGE OF ARTS AND SCIENCES

THE GRADUATE SCHOOL OF ARTS AND SCIENCES

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

THE SEVER INSTITUTE OF TECHNOLOGY

THE SCHOOL OF ARCHITECTURE

THE SCHOOL OF BUSINESS AND PUBLIC ADMINISTRATION

THE GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

THE SCHOOL OF FINE ARTS

THE SCHOOL OF SOCIAL WORK

THE SCHOOL OF LAW

THE SCHOOL OF MEDICINE

THE SCHOOL OF DENTAL MEDICINE

UNIVERSITY COLLEGE

THE SUMMER SCHOOL

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WASHINGTON UNIVERSITY SCHOOL OF MEDICINE

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