1979-81 UNIVERSITY OF MINNESOTA BULLETIN

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Cover: Based on an illustration by Andreas Vesalius, a sixteenth century anatomist. Design by Gadbois Art Works.

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Medical School

UNIVERSITY OF MINNESOTA

How to Use This Bulletin

Contents

The Admission section of this bulletin is your guide to all official policies and procedures related to application for admission to the Medical School.

The departmental listings of courses represent selections that are relevant primarily to the interests of medical students and, in some instances, those who plan to pursue graduate studies in certain health sciences areas.

For information about special fields or specific baccalaureate or graduate degree programs, you may also want to consult the following University of Minnesota bulletins:

Graduate Programs in the Health Sciences
Medical Technology
Occupational Therapy/Physical Therapy
Other undergraduate health science fields
College of Liberal Arts

This biennial bulletin contains information that is current as of fall quarter 1979. For information about policy changes, procedural revisions, or new requirements that may have occurred after publication of the bulletin, consult administrative officials in the Office of Student Affairs and Admissions.

Medical School

I. GENERAL INFORMATION

History

The first classes in medicine at the University of Minnesota began in 1888 when three of the four private or proprietary medical schools in Minneapolis and St. Paul offered their charters and resources to the state. In accepting this offer, the Board of Regents assumed responsibility for medical education on behalf of the people of the state of Minnesota. In 1908 the remaining proprietary school was incorporated into the University of Minnesota Medical School. In 1969 the legislature appropriated planning funds for a 2-year medical basic science program at the University of Minnesota, Duluth, and in 1971 provided additional support for development of the Duluth school and endorsed an additional undergraduate medical school at Rochester, to be designated the Mayo Medical School of the University of Minnesota. The charter class in each of these two new medical schools began in 1973.

In 1905 money for the construction of a hospital was offered to the University by the executor of a private estate. Various delays were encountered, but eventually legislative approval and additional money were obtained. The Elliot Memorial Hospital, the first unit of University Hospitals, was dedicated in 1911. The act of acceptance passed by the legislature stated that the hospital would belong to and be a part of the University, that indigent residents of Minnesota would receive free care and treatment, and that the hospital would be managed and controlled by the regents of the University. Additional hospital and medical school buildings have been added along a similar pattern of private donation to the University, with control and management by the regents and with legislative appropriations to supplement the gifts of private donors. These include the Todd Hospital, Eustis Hospital, Mayo Memorial Building, Variety Club Heart Hospital, Masonic Memorial Hospital, Veterans of Foreign Wars Cancer Research Center, Children's Rehabilitation Center, Phillips-Wangensteen Building, and Dwan Variety Club Cardiovascular Research Center—all designated collectively as the University Hospitals.

The history of the Medical School at Minnesota has a rich tradition of research and clinical achievement. The excellence of the Medical School's programs can be traced to strong departments in the basic medical sciences and clinical sciences. These departments share a tradition of research and a spirit of inquiry.

Administration

The Medical School is one of several health science units organized through the office of the vice president for health sciences. The other units are the School of Dentistry, School of Nursing, College of Pharmacy, School of Public Health, and University Hospitals. The chief administrative officer of the Medical School is the dean. The dean is assisted by several associate and assistant deans in carrying out the policies developed by the faculty to achieve the goals set forth in the Board of Regents Statement of the Mission of the Health Sciences, as it pertains to the Medical School. The administrative offices of the Medical School are located in Owre Hall on the Twin Cities campus/Minneapolis.

The dean's office is responsible for the general administration of the Medical School, for the administration of selected aspects of graduate education programs,

and for school budget and fiscal matters. Those involved in these activities include Dean N. L. Gault, Jr., Associate Dean H. M. Cavert, and Assistant Dean E. W. Drehmel. Special administrative support is provided for the Rural Physician Associate Program and for the Department of History of Medicine.

The Student Affairs and Admissions office is concerned with admissions, student counseling, maintaining student records, and monitoring student progress toward graduation. Those responsible for these activities include Associate Dean W. A. Sullivan, Jr., Assistant Deans P. P. Rosenberg and G. E. Williams, and Assistant to the Dean Cassius Ellis.

The Curriculum Affairs office provides support for faculty teaching activities, assists in curriculum administration and evaluation, and aids in development of all aspects of undergraduate educational programs. It is responsible for central class scheduling and student registration for elective courses. The office is administered by Associate Dean R. J. McCollister.

The Continuing Education office develops a variety of educational programs for physicians of the state. It is supervised by Director of Continuing Education D. A. Fenderson.

Faculty

The full-time faculty of the Medical School numbers approximately 800. The executive faculty, consisting of the full-time professors and associate professors and 10 members elected from the instructor and assistant professor ranks, is the faculty governing body responsible for policy making. The executive faculty has delegated to its appropriate committees the responsibility for determining student qualifications for admission and readmission and for decisions pertaining to student scholastic standing and dismissal from the Medical School.

The Medical School Admissions Committee selects each year's entering class and approves applications for transfer or readmission to the Medical School. The Student Scholastic Standing Committee evaluates each student's academic and clinical performance and developing personal and professional attributes periodically throughout the course of medical study in light of the requirements expected of a practicing physician. Each year this committee decides which students are permitted to progress to the succeeding class or phase. The committee reviews each student's academic record for satisfactory completion of all required and elective course work and of other school requirements before recommending that the M.D. degree be granted by the University. Students may appeal decisions made by this committee. The Educational Policy Committee develops and evaluates undergraduate and graduate educational programs and conducts ongoing curriculum review. Committee recommendations for curriculum change are submitted for discussion and final approval by the executive faculty. Each of these major committees includes within its membership at least one student representative.

Physical Facilities

The basic science complex and administrative offices of the Medical School are located in a quadrangle of buildings adjacent and connected to the Mayo Memorial Building, Health Sciences Unit A, and Phillips-Wangensteen Building. Within Unit A are health science classrooms and seminar rooms, health science student areas, the Spectrum Cafeteria, some basic medical science laboratories, as well as Medical School, School of Public Health, and School of Dentistry departmental space. In the Phillips-Wangensteen Building are medical center outpatient clinics, a large clinical

amphitheater, a Health Sciences Learning Center, audiovisual support units, as well as several Medical School clinical departmental offices and laboratories. Other units, each close to and connected with the complex, include the several buildings of University Hospitals, Variety Club Heart Hospital, Masonic Memorial Hospital, Veterans of Foreign Wars Cancer Research Center, and Children's Rehabilitation Center. The close physical relationship of the Medical School and its associated units facilitates professional and scientific communication across departmental lines. The Medical School maintains affiliate relationships with many hospitals in the Twin Cities metropolitan area. These affiliations provide resources that afford medical students access to a wide spectrum of health care institutions and, through them, to patients with a variety of medical problems.

Resources and services of the Bio-Medical Library are spaciously housed on three floors of Diehl Hall, located immediately adjacent to the Medical School and the University Hospitals. The library contains extensive collections of periodical reference materials and subscribes to more than 2,500 periodicals. There are more than 270,000 volumes in the library, almost all of which are shelved on open stacks. Photoduplication services, computer-assisted literature searches, and interlibrary loans are available.

Departmental libraries within the Medical School are maintained to supplement the Bio-Medical Library collections. Walter Library on the East Bank, Wilson Library on the West Bank, and departmental libraries are available for the use of students and faculty members. A collection of medical books of historical interest, with many rare and valuable items, is located in the comfortably appointed Owen H. Wangensteen Historical Library of Biology and Medicine on the fifth floor of Diehl Hall.

The Learning Resources Center is located in the Bio-Medical Library. Learning carrels, equipped with audiotape players and slide or filmstrip projectors, are available for student use. The growing collection of audiovisual instructional resources is housed in this center, which is open more than 90 hours per week. Other resources incorporated in the Learning Resources Center include models, viewing areas for motion picture and videotapes, texts, test files, and a variety of print materials organized to serve the several instructional programs. Terminals with access to a number of computer-assisted instructional programs are also available for use.

Minnesota Medical Foundation

Since its founding in 1939, the Minnesota Medical Foundation (MMF) has been an advocate and benefactor of medicine at the University of Minnesota. It operates a broad program of private assistance to the University's medical schools at Minneapolis and Duluth. The foundation annually receives many gifts and grants, from alumni and other benefactors, for various medical education and research purposes at the University. The foundation manages these funds and contributes more than $1,000,000 in private assistance annually to the two medical schools. Typically, each year nearly one-half of the graduating medical students receive aid and dozens of faculty members obtain grants for biomedical research from the foundation.

Offices of the foundation, located at 5412 Powell Hall (telephone 373-8023), are under the supervision of Eivind O. Hoff, executive director and chief executive officer. Foundation policies are established by a board of trustees that includes more than 35 distinguished volunteer members, lay and medical. The MMF program is considered a model for other medical school foundations, and MMF officers are frequently consulted by similar organizations at other U.S. medical schools.

Student Aid

The student aid program, a major foundation activity, awards funds on the basis of need and emphasizes the recycling of medical student aid dollars as well as providing for the needs of future students.

Educational loans are awarded to qualified students without interest charges during their Medical School years. They must be repaid within 5 years after graduation. A maximum simple interest rate of 8 percent per annum begins accruing upon graduation. The rate is discounted in the first few years after graduation.

Students can also receive grants-in-aid from MMF's Reciprocal Aid Bank. Those who do are asked to voluntarily pledge to restore the funds in the future to perpetuate the Reciprocal Aid Bank for other medical students at Minnesota.

Several emergency loan funds are also operated by the foundation, affording medical students an opportunity to obtain ready cash, without interest charges, for educational expenses. Emergency loans must be repaid within 90 days.

Awards

Medical Student Achievement Awards of $1,000 each are offered each year to students who demonstrate exceptional accomplishment in academic work, community service, or student leadership. Several other annual prizes are conferred on students for achievement in laboratory research. Coveted Distinguished Teaching Awards are bestowed on faculty members whose teaching ability has been recognized by the student body.

Research

For students with a serious interest in biomedical research and potential for the field of academic medicine, the foundation offers stipends of $400 per month for full-time research endeavors completed during free or elective periods. Both basic and clinical research projects are supported. Projects are completed under the supervision of Medical School faculty members.

Publications

The foundation is publisher of the *University of Minnesota Medical Bulletin*, a quarterly publication for alumni of the Medical School, physicians practicing in Minnesota, and contributors to the foundation. A *Directory of Medical Students* is also published annually.

Fund Raising

The foundation coordinates fund raising activities on behalf of the two medical schools, conducting annual fund drives and promoting the cause of private support for the institutions. The foundation staff directs these activities, with the assistance of its trustees and the faculty members, alumni, and students.

Outreach

The foundation sponsors several special activities, including a welcome day for entering students, a parents day, a graduation day reception, and a medical student phonathon, an annual event to raise funds from alumni. Medical School alumni reunions are also supported, at the University and in other states.

Continuing Medical Education

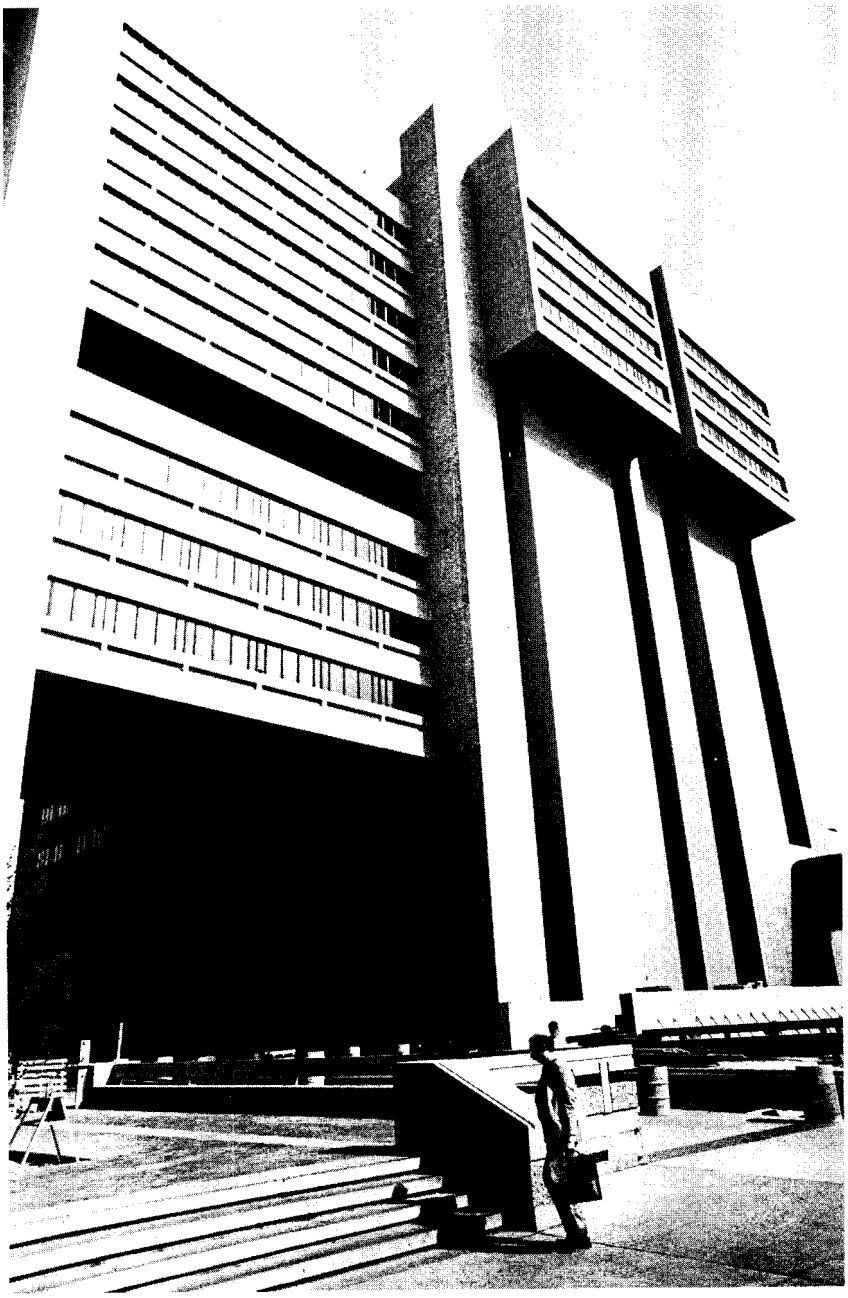
The award of a degree in any profession is only a milestone in a continuum of education. Physicians faced with rapid advances in medical science and in applied clinical knowledge are obliged to continue as students of medicine for the duration of their professional careers. Recognition of this important educational need led, in 1936, to the opening of the Center for Continuation Study, unique for its time, at the University of Minnesota. In 1937 this nation's first organized Department of Continuing Medical Education was founded to regularly offer a recurring program of short postgraduate courses for physicians.

Today the Office of Continuing Medical Education serves the educational needs of the physician and lifelong student of medicine through its annual series of programs, which are taught by faculty members in various disciplines in the Health Sciences Center.

Each year about 40 individual courses are conducted, utilizing several formats including a variety of combinations of lectures, workshops, seminars, and individual instruction. New and innovative programs are being developed to meet the changing needs of members of the medical profession and to utilize technological advances in the use of the various media. Currently, emphasis is being placed on developing regional programs that can reach physicians in their own communities and involve them as active learners, participating in programs that offer opportunity to address educational needs relevant to their medical practice.

Close liaison with the other medical schools in the state allows the Medical School to offer a program that is well rounded, strong, and complementary to other continuing education opportunities, so that physicians may select those most appropriate to their own educational goals.

The class of 1890 paused for a group portrait on the first day of school.



The Phillips-Wangensteen Building, dedicated in 1979 in honor of Mr. Jay Phillips and Dr. Owen Wangensteen, houses clinical departmental offices, laboratories, and outpatient clinics.

II. ADMISSION

Information Sources

Staff members in the Medical School Student Affairs office, Owre Hall, are prepared to discuss premedical programs with students, college teachers, and advisers, either in person or through correspondence. *Medical School Admission Requirements* is a useful reference booklet that summarizes the admission requirements of each of the medical schools in the United States and Canada. This annual publication can be purchased for $5 from the Association of American Medical Colleges, 1 Dupont Circle N.W., Washington, D.C. 20036, and is available in most college reference libraries. Another useful reference is the *American Medical College Application Service (AMCAS) Information Booklet*, which contains details about application procedures. This publication is available from AMCAS, 1776 Massachusetts Avenue N.W., Washington, D.C. 20036.

Academic Requirements

Although academic excellence is necessary in order to complete studies in the Medical School, neither high grades nor high New MCAT scores are alone adequate to gain admission. The Medical School Admissions Committee is also looking for candidates who possess personal integrity, motivation, intellectual curiosity, enthusiasm, and a sense of dedication in service to others.

Students must earn a bachelor's degree before entering the Medical School. A minimum of 3 years (135 quarter credits or 90 semester hours) of college course work must be completed before matriculation. Credits in physical education, military science, and religion courses can not be included in this total.

Since physicians have an increasing responsibility to understand and deal with the social, cultural, and psychological forces that may adversely affect their patients, studies in the humanities, social and behavioral sciences, and English and literature are required in addition to preparation in the physical and biological sciences.

The following table lists minimum course and credit hour requirements. Students will complete additional courses and credits, depending on their own special interests, baccalaureate degree or the other college requirements, and the counsel of their college advisers. Those students with special interests in basic science, research, or careers in academic medicine are encouraged to complete advanced level course work in preparation for entering Medical School.

COURSE REQUIREMENTS

	Semester Credits	Quarter Credits
General Biology or Zoology	7	10
Chemistry	15	22
General or inorganic, quantitative, and organic required (must include laboratory exercises)		
English and Literature	8	12
Additional literature courses are strongly encouraged		
Mathematics	7	10
College algebra, trigonometry, and introductory calculus required		
Physics	8	12
Must include laboratory exercises		
Social and Behavioral Sciences and Humanities	18	27
As examples, psychology, anthropology, history, sociology, economics, philosophy, or a modern language		
Additional academic courses to complete minimum required credits	90	135

Residence

Preference for admission to the Medical School is given to residents of Minnesota who are U.S. citizens. Nonresident applicants (excluding those who apply under equal opportunity program) will be considered for admission *only* under the early decision program. Determination of residency, as defined by regulations of the University of Minnesota, is the responsibility of the Board of Review for Residence Classification, Office of Admissions and Records, Williamson Hall, Twin Cities campus/Minneapolis.

Application Procedures

The University of Minnesota Medical School is a participant in the American Medical College Application Service (AMCAS), which is sponsored by the Association of American Medical Colleges. All applications to the Medical School for the entering freshman class must be processed through AMCAS. Application forms, with detailed instructions for their completion, can be obtained from AMCAS, 1776 Massachusetts Avenue N.W., Washington, D.C. 20036. Applications should be completed and returned to AMCAS between June 15 and November 15 of the *calendar year before* the student plans to enter the Medical School. Since all first-year students begin the course of study in September, the application is thus made a little more than a year before matriculation. Additional information concerning letters of evaluation and special tests required will be provided to applicants *after* the completed application forms have been sent to the school by AMCAS.

All applicants for the freshman class are required to complete several special tests, including the Minnesota Multiphasic Personality Inventory (MMPI), the Strong-Campbell Interest Inventory (SCII), and the *New* Medical College Admission Test (New MCAT). These tests measure the candidate's factual knowledge and help the Admissions Committee learn more about the individual's aptitudes and suitability for a career in medicine. With the exception of the Medical College Admission Test, the Medical School Student Affairs and Admissions office assists in arranging for students to take the tests at their own college or other convenient testing center.

Premedical students must make individual arrangements to take the Medical College Admission Test. A booklet detailing application deadlines, dates of the tests, sample questions, and testing centers can be obtained by writing to the Medical College Admission Test, American College Testing Program, P.O. Box 414, Iowa City, Iowa 52240. This booklet is also available from college premedical advisers. The test is given throughout the country at many colleges in May and September of each year. Applicants should take the MCAT in May prior to submitting their applications for admission. The test results are sent to the student. There is a fee for the examination, which entitles the student to have the scores sent to several medical schools.

In accordance with the acceptance procedures approved by the Association of American Medical Colleges, applicants are notified of the decision of the Admissions Committee between December and May prior to matriculation. Applicants participating in the Early Decision Program will be notified by October 1.

Admitted students will receive a separate application for admission from the University Office of Admissions. This form should be returned as soon as possible along with the University credentials examination fee of $15 ($5 for students who have been granted baccalaureate degrees from the University).

Early Decision Program

The Medical School participates in the Early Decision Program sponsored by the Association of American Medical Colleges in which early acceptance is granted to students choosing to apply *only* to this Medical School. Applicants must have impeccable academic and nonacademic qualifications and must follow the rules set forth for application to this program. Information about application procedures is available from the American Medical College Application Service.

Transfers

Transfers to the University of Minnesota Medical School in Minneapolis are accepted from students enrolled in the accredited 2-year medical school at the University of Minnesota, Duluth.

Transfers from 4-year medical schools, dental schools, or osteopathic schools in the United States and Canada are ordinarily not considered. The Medical School does *not* participate in the COTRANS program for U.S. citizens studying in foreign medical schools, nor in the fifth pathway program of special clinical studies for students who have completed academic programs in foreign medical schools.

Tuition and Fees

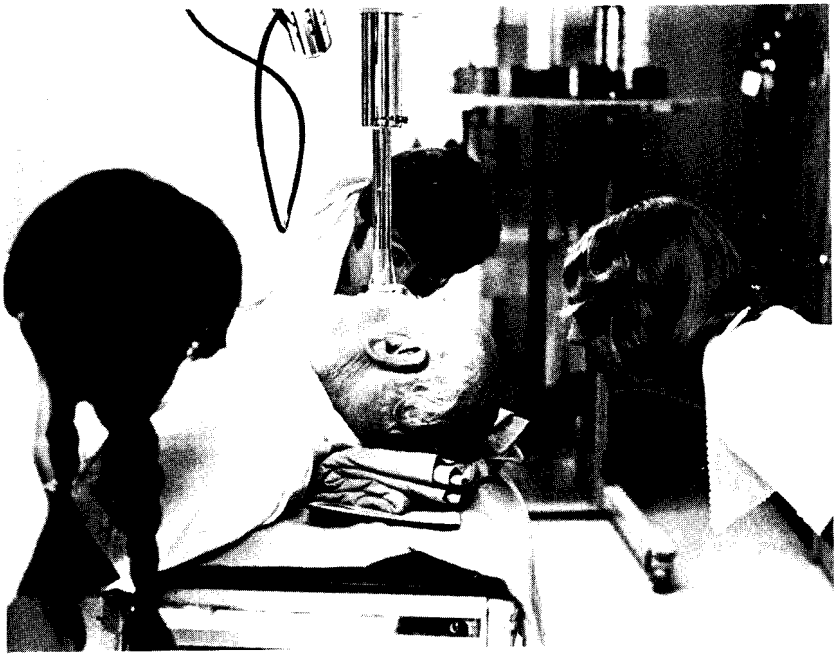
Tuition for the academic year 1979-80 for residents of Minnesota enrolled in the Medical School is $739 per quarter for students taking 10 credits or more. Students taking 9 credits or less per quarter pay half fee. Tuition for nonresidents is $2,032 per quarter for students taking 10 credits or more and half this fee for students taking 9 credits or fewer. A student services fee of $63.35 per quarter is required of both residents and nonresidents. Tuition and fees are subject to change. Students who complete the 4-year Medical School curriculum and who make satisfactory progress may arrange two free or vacation quarters for which tuition is not assessed. For more information abut tuition and fees, see the *General Information Bulletin.*

Books, instruments, and other necessary equipment must be provided by the student. Information about required items is sent to all entering students during the summer before entering Medical School. A microscope equipped with three objectives, including an oil immersion lens, and with substage lighting, is required for the first full year of Medical School. First-year students can rent a binocular microscope for a full year on a shared basis, thanks to a project of the Minnesota Medical Alumni Association designed to aid students in the early stages of their medical education. Detailed information about microscope rental is provided to entering students during the summer prior to matriculation.

Loan Funds, Scholarships, and Prizes

Financial aid is available in the form of federal loans to students in the health professions, special loan funds, and certain regional scholarships. With few exceptions, students must have been regularly enrolled to qualify for these funds. Most financial assistance is administered by the University's Office of Student Financial Aid, 210 Fraser Hall, which is the first source students should consult after acceptance for questions concerning financial need. The Minnesota Medical Foundation also provides financial assistance for medical students and for special programs. The foundation periodically publishes a newsletter on financial aid, which is available in the foundation office, 5412 Powell Hall.

A limited number of student research grants are available for vacation or free-time work in several Medical School departments. These grants support students who are pursuing medical or basic science research interests. Medical School faculty members provide advice and counsel for student investigative work. Students with training in education may be able to pursue special projects in medical education and curriculum evaluation.



Students observe the determination of the treatment site for radiation therapy.

III. THE MEDICAL STUDENT

The Adytum and Other Facilities

A major center of medical student activities is the Medical Student Adytum. This spacious, comfortably appointed area is centrally located on the first floor of the Mayo Memorial Building. It is a place for students to eat and relax, and it has a quiet room for study. Funds for constructing and equipping the Adytum were donated by the Minnesota Medical Alumni Association. The facilities were dedicated in 1964 and are reserved exclusively for medical students and their guests. A center for medical students is also located in Health Sciences Unit A, convenient to lockers, health science classrooms, and the cafeteria. Active exchange among students from a variety of health professions is fostered through the sharing of these facilities.

Living Arrangements

Dormitory housing with meals is available to medical students on an annual contract basis in University-operated residence halls conveniently located near the medical center. Arrangements for dormitory housing are made through the University Housing Office, Comstock Hall, 210 Delaware Street S.E. The cost of a single room with maintenance is $669.50 per quarter for the 1979-80 school year. Accommodations with meals are also available on a space-available basis in the several medical fraternities located near the medical center. Privately owned apartments adjacent to the campus are rented by students, often on a shared basis.

Students may purchase meals in University Hospitals, Coffman Union, or the Spectrum cafeteria in Health Sciences Unit A. The lunch shop in University Hospitals as well as sandwich and beverage vending machines in other convenient locations offer alternative food sources.

Boynton Health Service

The Boynton Health Service provides medical care for full-time students and maintains outpatient clinic facilities close to the medical center. All students are entitled to certain outpatient services as part of their quarterly student services fee payment. Students desiring medical-surgical hospital insurance coverage through the University-sponsored program must purchase it each quarter at registration. The cost is added to the fee statement. Supplementary health care benefits, including hospital coverage during vacation, extended benefits, and family coverage, are available for an additional charge through a group plan. For more details, see the *General Information Bulletin*.

Employment

The Medical School undergraduate program is organized on a schedule that ordinarily requires the student's full-time commitment to make the most of the course work and experience. Therefore, students are urged not to seek employment or schedule other activities and obligations outside their medical studies that could significantly interfere with the pursuit of their medical education. Prospective students should carefully scrutinize their projected financial needs for their complete Medical School program and should make appropriate long-range plans to meet these needs through personal savings, the help of parents, and loans when needed.

Medical Student Government and Student Societies

The Medical Student Council, the student governing body, is composed of representatives from each class and from several minority groups who are elected each year. Council members meet regularly and frequently to discuss problems common to members of the student body and to plan a variety of projects and service activities. The council represents the interests of the medical students to the administration and the faculty. The medical students, through the council, have adopted an honor code covering examination procedures. Upon acceptance by the Medical School, each student, after suitable briefing, signs a statement indicating that he or she is well acquainted with the provisions of this code and agrees to abide by it. The Ethics Committee of the Medical Student Council is responsible for investigating reports of any suspected violations of this code.

There are several medical fraternities available for men. These organizations play a major role in the social life of many medical students.

The national medical scholastic society, Alpha Omega Alpha, selects academically high-ranking students from the junior and senior classes for election to membership. The Cyrus P. Barnum, Jr., Society, an organization of students working toward the combined M.D.-Ph.D. degree, meets regularly for scientific and informative evening discussions to which speakers are invited.

The local chapter of the American Medical Student Association (AMSA) is incorporated as an integral part of the Medical Student Council. The association chairperson acts as local AMSA chapter president. This group sponsors certain school-wide functions through the student council. The membership fee is nominal, and members receive monthly copies of the national periodical.

The wives of many medical students are active in the Women's Auxiliary of the Student American Medical Association (WA-SAMA). This group holds monthly meetings featuring speakers who discuss topics of interest.

First-year medical students share academic and personal concerns during a discussion led by Assistant Dean Pearl Rosenberg.

IV. M.D. PROGRAM

The Medical School provides the faculty and facilities for instruction of students in the course in medicine. The primary goal of medical education is to produce good physicians possessing sound training in quantitative human biology. Beyond the Medical School and the award of the M.D. degree, all graduates are obliged, by requirements for specialization and/or licensure, to undertake additional formal education or training. And beyond these formal programs are the continuing education activities that individuals in practice must participate in to keep abreast of developments in medicine. Much of the success of the sequence of undergraduate-graduate-continuing education, called the continuum of medical education, is dependent on individual responsibility and initiative. Therefore, to encourage such development in medical students, the concept of the student as an independent learner is emphasized in the curriculum.

The course of study for the M.D. degree consists of a core program of 8 academic quarters and a track (option, elective) program of 5 academic quarters. Within the core program, the first 4 quarters, termed Phase A, include course work in basic medical sciences, behavioral science, and introductory experiences with patients. The next 4 academic quarters of the core program, termed Phase B, consist of integrated interdepartmental courses organized and taught along organ, system, and topical lines. In the Phase D portion of the curriculum, students, with the help of an adviser, plan a program of elective courses. All students must include in this program experience in both medicine and surgery that will provide suitable preparation for advanced clinical responsibilities in subsequent training after completion of work for the M.D. degree. Students making satisfactory progress may, after adviser, track, and special committee review, be approved to complete Phase D in fewer than 5 academic quarters (minimum 3 quarters of study). In such cases, arrangements for a first year of graduate study in a teaching hospital must be made. Students who complete 5 quarters in Phase D have no restrictions or requirements regarding their selection of graduate program activity. Students are required to take and pass parts I and II of the National Board Examinations as a requirement for graduation and the M.D. degree.

Phase A

In the first 4 quarters of the Medical School program, studies cover the structure and function of the human organism and the emotional, social, and psychological development of the individual. In Phase A, the student begins clinical activities through tutorial assignments and clinical correlation sessions in Introduction to Clinical Medicine. The Phase A program is intended to involve the student physician in individual synthesis and correlation of the basic sciences with clinical applications and in direct, personal confrontation with human illness and patient care. The required program in Phase A consists of the following courses:

Gross Anatomy (Anat 5100)
Human Histology (Anat 5103)
Embryology (Anat 5106)
Medical Biochemistry (MdBc 5100)
Introduction to Clinical Medicine (InMD 5100-5103)
Medical Physiology (Phsl 5110-5111)
Pathology (Path 5101)
Neuroanatomy (Anat 5111)
Microbiology (MicB 5205-5206)
Pharmacology (Phcl 5110)
Human Behavior (AdPy 5107)

In both fall and winter quarters, students may elect to attend one of several weekly small group meetings at which topics of personal concern, current interest, or medical importance are brought up for discussion.

Phase B

The 4-quarter sequence of Phase B begins in the fall and consists of integrated interdepartmental courses designed to highlight fundamental principles in clinical medicine and to emphasize pathophysiologic concepts. The courses are organized in relation to organs, systems, or topics. Two courses in the Phase B sequence, Student as Physician and Psyche, are designed, respectively, to develop the student's clinical skills and knowledge and to enhance the student's awareness of psychopathology and psychological factors related to illness.

Core activities in some courses consist of small group discussions, with lectures and other formal presentations optional. Extensive syllabi and reference lists are provided for each student. The student is encouraged to exercise independent and mature judgment during the learning process by arranging her or his own activities. The student may utilize this time for study in the Learning Center, participation in additional clinical experiences, or completion of elective courses available to students in Phase B. The formal Medical School activities in Phase B are divided into three categories:

1. **Core Time**—Lectures or small group discussions related to a specific organ, system, or topic, and weekly clinical tutorials. Attendance is expected.
2. **Optional Activities**—Supplementary scheduled activities, such as lectures that expand on material presented in the core or, in some cases where lectures are optional, films, additional clinical experiences, laboratories, demonstrations, clinical rounds, teaching rounds, or clinical-pathological conferences. Attendance is voluntary.
3. **Electives**—Courses offered throughout the year covering various topics of interest to medical students but not necessarily related to the core program.

The required program in Phase B consists of the following courses:

REQUIRED PHASE B COURSES

InMD 5110—Human Genetics	2 cr
InMD 5220—Cardiovascular	3 cr
InMD 5221—Respiratory	3 cr
InMD 5228—Ear, Nose, and Throat	2 cr
InMD 5212—Psyche	5 cr
InMD 5231—Gut	4 cr
InMD 5234—Biometry and Epidemiology	1 cr
InMD 5226—Blood	3 cr
InMD 5222—Fluid and Electrolytes	3 cr
InMD 5223—Kidney and Urinary Tract	3 cr
InMD 5230—Nervous System and Muscle Disorders	5 cr
InMD 5232—Bones, Joints, and Connective Tissue	4 cr
InMD 5224—Endocrine and Metabolism	4 cr
InMD 5225—Reproduction	4 cr
InMD 5227—Skin	2 cr
InMD 5229—Eye	2 cr
InMD 5233—Human Sexuality	3 cr

Student as Physician Tutorials

Medicine Tutorial	4 cr
Pediatrics Tutorial	3 cr
Obstetrics-Gynecology Tutorial	2 cr
Psychiatry Tutorial	1 cr
Surgery Tutorial	3 cr
Family Practice and Community Health Tutorial	3 cr
Physical Medicine and Rehabilitation Tutorial	1 cr
Laboratory Medicine	1 cr

Phase D

Phase D is designed to extend the curriculum goals of relevance, flexibility, and the student as learner. Prior to completion of Phase B, students select a track and a faculty member within that track to act as an adviser for the balance of the Medical School program. Students are reminded not to confuse the selection of a track at this point with the need to eventually choose a practice specialty. The six broadly defined career pathways or tracks, encompassing all disciplines and providing varied options for all students, are the following:

Track 1—Medicine, Pediatrics, Medical Specialties including Obstetrics

Track 2—Surgical Specialties

Track 3—Psychiatry and Behavioral Sciences

Track 4—Neurological Sciences

Track 5—Family Practice

Track 6—Medical Investigation and Special Programs

The student, with the help of the adviser, develops an individualized elective program of study related to personal interests and career goals. Each student's program is approved and progress monitored by the appropriate track committee.

There are electives strongly recommended for the several tracks. In general, and as a logical extension of the core material and tutorial format in Phase B, each student is advised to spend 12 to 18 weeks in externship-type electives such as those offered in medicine, neurology, obstetrics, pediatrics, psychiatry, and surgery. The balance of the individual program is drawn from the extensive elective courses offered by each Medical School department. Students may consider elective work in other medical schools, in the United States or elsewhere. Up to 1 quarter of credit for such activities may be approved by the adviser and track committee depending upon the length of the Phase D program and the length of time spent away from the Medical School and its affiliated hospitals. The flexibility of the elective program and the general nature of the pathways provide an opportunity for creative and interested students to avail themselves of the wide spectrum of educational activities to further their professional growth.

Students are eligible to begin Phase D on completion of Phases A and B and after taking part I of the national boards. Students with deficiencies in Phase A or B or who have taken but not passed part I are reviewed by the Student Scholastic Standing Committee for a decision regarding arrangement of their continuing academic program. The content of Phase D, which must be approved by the adviser and Phase D track committee, is determined by a review of each student's educational needs in light of his or her projected career goals. There are no restrictions on the type of internship or first-year training program for students graduating in 4 years, in the standard 13-quarter curriculum. In the case of 3-quarter Phase D programs, students

must provide evidence that they will spend their first postdoctoral year (internship or first year of graduate training) in a university or other major affiliated teaching hospital.

Evaluation and Academic Progress

Examinations and other forms of performance evaluation of medical students, both subjective and objective, are administered by the various departments and interdepartmental teaching sections. Feedback is available to all students regarding their performance on examinations. There is an opportunity for personal review of clinical work with the faculty supervisor. Written evaluations of each student's clinical performance are submitted so that students may be apprised of their educational progress and may take steps to improve areas in which deficiencies may exist.

Grades are reported as O (outstanding), S (satisfactory), I (incomplete), and N (no credit, fail). Beginning with the entering class in 1979, an additional grade of E (excellent) was added for performance at a suitable level between the evaluations S and O. Students who receive I or N grades in courses are reviewed by the Student Scholastic Standing Committee. Opportunity for makeup work is one option that permits students to satisfy course requirements and continue their progress toward the M.D. degree. According to provisions of an honor code, detailed in the Statement of Intellectual Responsibility students sign and pledge to abide by on admission to the program in medicine, the faculty does not monitor Medical School examinations, and students are strictly on their individual honor to maintain ethical personal conduct during examinations. The statement is also a guide to professional conduct for medical students as both students and developing professionals.

Scholastic Standing and Dismissal

A student may be dismissed from Medical School if, in the opinion of the Student Scholastic Standing Committee, he or she has not performed at a satisfactory academic level in individual courses or if there are other factors, such as personality, attitude, or emotional stability, that would prevent the individual from responsibly undertaking the duties of a physician. Academic probationary status is one mechanism used by the Student Scholastic Standing Committee to signal to the student that his or her standing as a medical student is in jeopardy.

Access to Student Educational Records

In accordance with regents' policy on access to student records, information about a student generally may not be released to a third party without the student's permission. The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information—name, address, telephone number, dates of attendance, college and class, major, adviser, and degrees earned—is considered public or directory information. To prevent release of such information outside the University while in attendance at the University, a student must notify the records office on his or her campus.

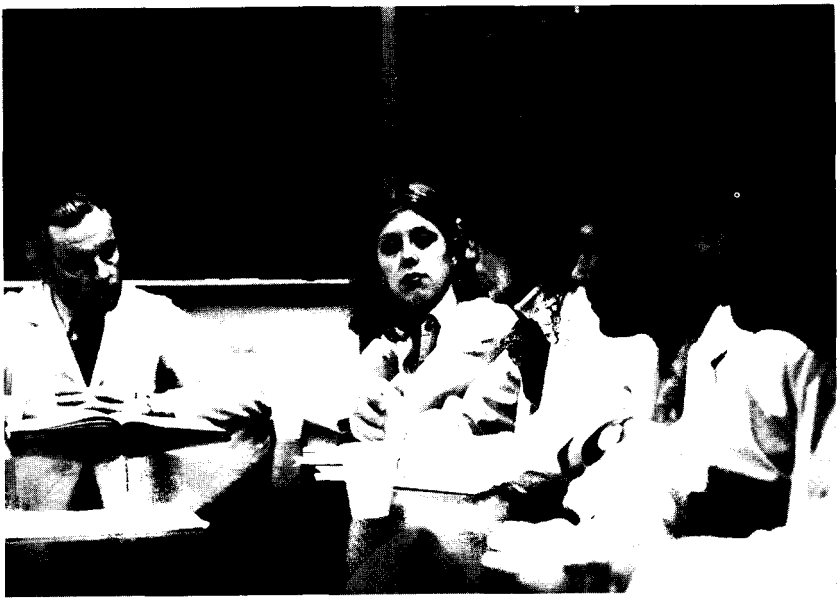
Students are notified annually of their right to review their educational records. The regents' policy, including a directory of student records, is available for review at the information booth in Williamson Hall, Twin Cities campus/Minneapolis, and at the records offices on other campuses of the University. Questions may be directed to the Office of the Coordinator of Student Support Services, 260E Williamson Hall, (612) 373-2106.

Graduation

Requirements for graduation and award of the M.D. degree include satisfactory performance in all courses in the Phase A and Phase B programs plus satisfactory completion of the adviser- and track-approved Phase D program. Students completing fewer than 5 quarters of Phase D work must have the approval of their adviser, their track committee, and the Student Scholastic Standing Committee. In addition, passing scores on parts I and II of the National Board Examinations must be earned and final review and approval by the Student Scholastic Standing Committee must be obtained before a recommendation that the M.D. degree be granted is forwarded to the Board of Regents.

Most students elect to graduate in June, just prior to beginning their specialty training. Students who wish to graduate in midyear must make special arrangements through the Student Affairs office. On Recognition Day, usually held in early June, a program is organized to honor the graduating class and to recognize special achievements.

Dr. Carl Kjellstrand explains a diagnostic procedure to third-year medical students during ward rounds.



Students assigned to the internal medicine rotation discuss a patient history with Dr. Thomas Ferris during a seminar session.

Dr. John Najarian (left) and his assistant prepare a kidney for transplant.

V. GRADUATE STUDY PROGRAMS AND RESEARCH OPPORTUNITIES

In addition to completing the prescribed course of study leading to the M.D. degree, there are excellent opportunities for qualified students to earn the master's and/or Ph.D. degrees in a variety of medical science fields. Medical School facilities are available for original investigations. Some students work with established faculty researchers as assistants and coworkers. The formally established programs are outlined here; other programs of study and research are arranged individually within the department in which the student's work is to be conducted.

Generally, students completing graduate programs register and enroll in the Graduate School of the University. The *Graduate School Bulletin*, the *Graduate Programs in the Health Sciences Bulletin*, and the department in the field of the student's interest should be consulted for information about graduate study opportunities and programs as well as requirements and procedures for admission to specific programs.

A combined MD.-Ph.D. program may be planned by an academically superior medical student with an interest in graduate study in a fundamental medical or related biomedical science. The combined program allows distribution of the student's time between a graduate degree program and the core medical curriculum of Phases A and B and the track program in Phase D, extending the period for completion of both doctor's degrees over 5 or more years. The program emphasizes flexibility and is adaptable to each student's individual needs and research interests. A student is usually accepted for the M.D.-Ph.D. program after completion of the first year of the core Medical School curriculum. Frequently, selection is based in part on the quality of the work completed during that year. Application is made through the dean's office of the Medical School and the basic health science department of the student's interest. The student must be eligible or accepted for admission to the Graduate School in her or his chosen medical science field.

All of the basic health science departments, under the aegis of the Graduate School, conduct active and extensive programs of graduate student research and study leading to the M.S. or Ph.D. degree. Some research fellowships, teaching assistantships, or scholarships are available to academically qualified students in these fields. Inquiry should be directed to a faculty member or to the departmental office of the field of the student's interest.

More than 1,000 physicians are enrolled each year in post-M.D. graduate training programs in the clinical departments of the Medical School and its affiliated hospitals. These physicians are engaged in training as specialists in their chosen fields. They have qualified for registration as medical fellows in the Graduate School or as medical fellow specialists in the Medical School and receive academic credit during their residency training.

The Mayo Graduate School of Medicine in Rochester, Minnesota, is affiliated with the Graduate School of the University. Graduate students and physicians engaged in postdoctoral training and research at Rochester may receive graduate credit for their work and may earn advanced degrees from the University.

Students have the opportunity to observe surgical teams at work in operating rooms.

VI. DESCRIPTION OF SELECTED COURSES

Symbols—The following symbols are used throughout the course descriptions in lieu of page footnotes:

§ Credit will not be granted if the equivalent course listed after the section mark has been taken for credit.

¶ Concurrent registration is allowed (or required) in the course listed after the paragraph mark.

Consent of instructor is required prior to registration.

△ Consent of division, department, or school offering the course is required prior to registration.

f,w,s,su Following a course number indicate fall, winter, spring, or summer quarters.

A hyphen between course numbers (e.g., 5142-5143-5144) indicates a sequence of courses that must be taken in the order listed.

A comma between course numbers (e.g., 8234, 8235, 8236) indicates a series of courses that may be entered any quarter.

Anatomy (Anat)

David W. Hamilton, Ph.D., professor and head

Professor

G. Eric Bauer, Ph.D.
Anna-Mary Carpenter, M.D., Ph.D.
Padmakar Dixit, Ph.D.
Stanley L. Erlandsen, Ph.D.
Carl B. Heggestad, M.D., Ph.D.
Judson D. Sheridan, Ph.D.
Morris Smithberg, Ph.D.
R. Dorothy Sundberg, M.D., Ph.D.

Associate Professor

Orion D. Hegre, Ph.D.
Jonathan A. Parsons, Ph.D.
Donald Robertson, Ph.D.
Robert Sorenson, Ph.D.

Assistant Professor

H. David Coulter, Ph.D.
Robert P. Elde, Ph.D.
Lucille J. Hoilund, M.D.
Hue Lee Kaung, Ph.D.
Paul C. Letourneau, Ph.D.
Donald C. Quick, Ph.D.
Judith E. Schollmeyer, Ph.D.
Ivan Suzman, Ph.D.

The course work in the Department of Anatomy provides an opportunity for students to examine the structure of the human body. In gross anatomy, the three-dimensional architecture in all body regions is studied through dissection and X-rays. In microscopic anatomy, the organization of cells, tissues, and organs is assessed from stained sections using light microscopy and electron micrographs. In embryology, normal development and anomalies of each body system are presented. The topics in the three above-mentioned courses are integrated in time. Neuroanatomy is taught in conjunction with neurophysiology. Where appropriate, the courses are correlated with the various clinical disciplines. The courses are designed to help students enhance their powers of observation, their ability to communicate using specific terminology, and their synthesis of morphology with biochemistry and physiology. Greater depth in any of the subjects can be obtained through advanced course work completed during elective time.

REQUIRED COURSES

5100. GROSS HUMAN ANATOMY. (8-11 cr. prereq regis med fr or grad student with #)
Dissection of the human body.

5103. HUMAN HISTOLOGY. (3-6 cr. prereq regis med fr or grad student with #)
Microscopic structure, cytochemical and functional aspects of cells, tissues, and organs.

5106. HUMAN EMBRYOLOGY. (3 cr. prereq regis med fr or grad student with #)
Development of the human body.

5111. HUMAN NEUROANATOMY. (3 cr. prereq regis med fr)
Structure and function of the nervous system including the organs of special sense.

ELECTIVE COURSE

5190. ADVANCED ANATOMY. (2 cr. prereq regis med. 5103)
Instruction in teaching methods or supervision of student's original research or combination of both.

ADVANCED CREDIT COURSES

5765-5766. HEMATOLOGY. (4 cr per qtr, prereq 5103 or #)
Blood and blood-forming organs; emphasis on blood and bone marrow from the standpoint of diagnosis and prognosis.

5767. SEMINAR: HEMATOLOGY. (1 cr. prereq 5766)
Discussion of literature and research.

8101. ADVANCED GROSS HUMAN ANATOMY

8102. FUNCTIONAL MORPHOLOGY

8104. ADVANCED HISTOLOGY

8105. PROBLEMS IN HISTOLOGY AND CELL BIOLOGY

8107. PROBLEMS IN MODERN DEVELOPMENTAL BIOLOGY

8111. HUMAN NEUROANATOMY

8135. BIOLOGICAL ELECTRON MICROSCOPY—TECHNICS

8136. BIOLOGICAL ELECTRON MICROSCOPY—TECHNICS

8137. BIOLOGICAL ELECTRON MICROSCOPY—INTERPRETATION

8141. NEUROANATOMICAL METHODS

8153, 8154, 8155, 8156. ADVANCED ANATOMY

8160. INTRODUCTION TO HISTOLOGIC AND MORPHOLOGIC-HISTOCHEMICAL TECHNICS

8161, 8162, 8163. METHODS IN ANATOMICAL RESEARCH

8166. CYTOLOGICAL ASPECTS OF PROTEIN SYNTHESIS AND SECRETION

8201, 8202, 8203, 8204. RESEARCH IN ANATOMY

8205, 8206, 8207. SEMINAR: ANATOMY

8211. NEUROCYTOLOGY

8301. FUNCTIONAL ANATOMY OF THE SPINE

Anesthesiology (Anes)

Joseph J. Buckley, M.D., M.S., professor and head

Professor

John R. Gordon, M.D., M.S.

Associate Professor

James F. Cumming, M.D., Ph.D.
Edward C. Hanisch, Jr., M.D.
Ji-Chia Liao, M.D., Ph.D.

Assistant Professor

William W. Anderson, M.D., Ph.D.
Jorse A. Estrin, M.D.
Ian J. Gilmour, M.D., F.R.C.P. (C)
Douglas E. Koehntop, M.D., M.S.
Russel H. Larsen, M.D., M.S.
Josephine Lo, M.D., M.S.
Khalid A. Sami, M.D., M.S.
William W. Sargent, M.D., M.S.

ELECTIVE COURSE

5181. EXTERNSHIP IN CLINICAL PRACTICE OF ANESTHESIOLOGY. (Cr ar; prereq regis med)

ADVANCED CREDIT COURSES

8265. GENERAL ANESTHESIA

8266. REGIONAL ANESTHESIA

8267. PRE- AND POST-ANESTHETIC EVALUATION

8268. SEMINAR: ANESTHESIOLOGY

8269. RESEARCH IN ANESTHESIA

Biochemistry (MdBc)

Harry P. C. Hogenkamp, Ph.D., professor and head

Professor

James W. Bodley, Ph.D.
Charles W. Carr, Ph.D.
Mary E. Dempsey, Ph.D.
Ivan D. Frantz, Jr., M.D., Ph.D.
Helmut R. Gutmann, Ph.D.
Ralph T. Holman, Ph.D.
James F. Koerner, Ph.D.
Andreas Rosenberg, D.Sc., Ph.D.
Leon Singer, Ph.D.
Frank Ungar, Ph.D.
John F. Van Pilsum, Ph.D.

Adjunct Professor

Quenton T. Smith, Ph.D.

Associate Professor

Ronald D. Edstrom, Ph.D.
Ernest D. Gray, Ph.D.
James B. Howard, Ph.D.
Robert J. Roon, Ph.D.

Assistant Professor

Kenneth Adolph, Ph.D.
John D. Lipscomb, Ph.D.
Dennis M. Livingston, Ph.D.
Theodore R. Oegema, Ph.D.
Agnes W. Tan, Ph.D.
David D. Thomas, Ph.D.
Howard C. Towle, Ph.D.

Adjunct Assistant Professor

Daniel P. Gilboe, Ph.D.
Govin T. Vatassery, Ph.D.

Lecturer

Charles H. Blomquist, Ph.D.

Biochemistry occupies a central position in all medical science and in clinical medicine. The required courses deal with general biochemistry and treat the chemical transformations fundamental to life processes occurring at the cellular and subcellular levels. Major emphases are on the integration of biochemical processes and on the regulation and coordination of metabolic reactions. Biochemical abnormalities in disease are examined to strengthen the student's understanding of normal processes and to demonstrate the application of principles of biochemistry to future studies of disease processes.

The lectures furnish comprehensive surveys of some of the main topics, but they require supplementation through reading or advanced course work for exploration in depth. Laboratory work is used to examine some of the ways through which biochemical knowledge is obtained.

Discussions of biochemical aspects of medicine are presented in Phase B of the medical curriculum.

REQUIRED COURSE

5100. BIOCHEMISTRY. (10 cr; prereq regis med fr; physics, organic chemistry)

ELECTIVE COURSE

5053. PROBLEMS IN BIOCHEMISTRY. (Cr ar [may be repeated for cr]; prereq 5101)

ADVANCED CREDIT COURSES

8150. SEMINAR: BIOCHEMISTRY

8206. ADVANCED ENDOCRINOLOGY AND STEROID CHEMISTRY

8211. NUCLEIC ACID STRUCTURE AND FUNCTION

8217. PROTEIN CHEMISTRY

8218. STRUCTURE AND MECHANISM IN ENZYME CATALYSIS

8219. BIOCHEMISTRY OF SPECIALIZED TISSUES

8220. CARBOHYDRATE METABOLISM

8230. MEMBRANE BIOCHEMISTRY

8231. LIPIDS

8300. RESEARCH IN BIOCHEMISTRY

Dermatology (Derm)

Robert W. Goltz, M.D., professor and head

Professor

Robert J. Gorlin, D.D.S.
Kenneth P. Manick, M.D.
Carl J. Witkop, Jr., D.D.S.

Clinical Professor

Bruce J. Bart, M.D.
Harry I. Katz, M.D.
Milton Orkin, M.D.
Franklin Pass, M.D.
Willard C. Peterson, Jr., M.D.
Harold G. Ravits, M.D.
Alvin S. Zelickson, M.D.

Associate Professor

Mark V. Dahl, M.D.
William C. Gentry, Jr., M.D.

Clinical Associate Professor

Manuel Jaffe, M.D.
Irvine M. Karon, M.D.
Sheldon I. Mandel, M.D.
William Schorr, M.D.
Stephen B. Webster, M.D.

Assistant Professor

J. Corwin Vance, M.D.

Clinical Assistant Professor

Thomas H. Alt, M.D.
David W. Anderson, M.D.
Charles J. Balogh, M.D.
John Bergman, M.D.
Daryl Brockberg, M.D.
Lee Cowan, M.D.
R. Chris Diercks, M.D.
Carl E. Ehmann, M.D.
LeRoy Geis, M.D.
Fred S. Gurtman, M.D.
Ngo Thanh Hien, M.D.
H. Spencer Holmes, M.D.
Eugene O. Hoxtell, M.D.
Daniel L. Jones, M.D.
Dennis Knutson, M.D.
Thomas Kalb, M.D.
Dennis Leahy, M.D.
Donald J. Miech, M.D.
Orville Ockuly, M.D.
Steven Prawer, M.D.
Edwin G. Rice, M.D.
Nadine Smith, M.D.
Carol A. Soutor, M.D.
John A. Stansbury, M.D.
Paul R. Vandersteen, M.D.
C. Gordon Vaughn, M.D.

Instructor

John R. Fenyk, M.D.
Noel A. Hauge, M.D.

The elective program in the clinics of major hospitals offers the student an opportunity to acquire diagnostic skills and to learn medical and surgical techniques for treatment of diseases of the skin. This program prepares the graduate for the management of dermatologic problems as a family practitioner or as a clinician in pediatrics or internal medicine.

ELECTIVE COURSES

5181. CLINICAL PROBLEMS IN DERMATOLOGY

5182. PRECEPTORSHIP IN DERMATOLOGY

5183. ADVANCED COURSE IN DERMATOLOGY

5184. SPECIAL COURSE: DERMATOLOGY

ADVANCED CREDIT COURSES

8225. CLINICAL DERMATOLOGY

8226. CLINICAL SEMINAR: DERMATOLOGY

8227. HISTOLOGY OF THE SKIN

8228. RESEARCH: DERMATOLOGY AND SYPHILOLOGY

8229. ELECTRON MICROSCOPY IN DERMATOLOGY

8230. FUNCTIONAL BIOLOGY OF THE SKIN

8231. CLINICS: DERMATOLOGY: NONDERMATOLOGISTS

8232. SEMINAR: DERMATOLOGIC HISTOPATHOLOGY, MYCOLOGY

Family Practice and Community Health (FPCH)

Edward W. Ciriacy, M.D., professor and head

Professor

Eldon Berglund, M.D.
John T. Kelly, M.D.
John B. O'Leary, M.D.
John E. Verby, M.D.
Vernon E. Weckwerth, Ph.D.

Clinical Professor

David Craig, M.D.
Herman Drill, M.D.
John H. Flinn, M.D.
Benjamin Fuller, M.D.
James T. Garvey, M.D.
Martin J. Janssen, M.D.
James LaFave, M.D.
Bruce F. Williams, M.D.

Associate Professor

Donald S. Asp, M.D.
Carole J. Bland, Ph.D.
Joseph P. Connolly, M.D.
Robert A. Derro, M.D.
Vincent R. Hunt, M.D.
Harold R. Ireton, Ph.D.
James W. Maddock, Ph.D.
John W. McConnell, M.D.
Karen Olness, M.D.
Charles R. Peluso, M.D.
Krishna Saxena, M.D.
David L. Spencer, M.D.
Stuart V. Thorson, M.D.

Clinical Associate Professor

Milton Baker, M.D.
Peter J. Bartzen, M.D.
Raymond C. Bonnabeau, M.D.
Terrance Capistrant, M.D.
Joseph Cella, M.D.
Arie W. Dieperink, M.D.
Ronald W. Ellis, M.D.
John D. Farr, M.D.
Louis J. Filiatrault, M.D.
Robert S. Flom, M.D.
William Jacott, M.D.
James Janacek, M.D.
F. Bruce Lewis, M.D.
Charles McCarthey, M.D.
Frank S. Preston, M.D.
William Remole, M.D.
Donald Swenson, M.D.

Assistant Professor

Patricia J. Aletky, Ph.D.
James R. Blackman, M.D.
James L. Canine, M.D.
Ray M. Conroe, Ph.D.
Michael L. Daly, M.D.
Michael Danyluk, M.D.
R. Galen Hanson, Ph.D.
Harold J. Hofstrand, M.D., Ph.D.
Richard L. Holloway, Ph.D.
Donald Houge, Ph.D.
Edward J. Hughes, M.S.W.
John H. Kiernan, Jr., M.D.
David Klain, M.D.
John A. McLeod, M.D.
David J. Mersy, M.D.
Neil J. Nathan, M.D.
Delbert R. Nelson, M.D.
Edward Nelson, M.D.
Elof G. Nelson, S.T.D.
Leon J. Nesvacil, M.D.
Thomas Norris, M.D.
Bernard L. O'Neil, M.D.
Daniel Ostergaard, M.D.
Eugene C. Ott, M.D.
James J. Pattee, M.D.
David R. Preston, M.H.A.
Gerald Ronning, M.D.
Robert Rotenberg, M.D.
Jane S. Rozsnafszky, Ph.D.
M. Olwen Sanderson, M.D.
John H. Sargent, M.D.
Sharon Satterfield, M.D.
Jack B. Schaffer, Ph.D.
Leif I. Solberg, M.D.
Robin J. Staebler, M.D.
Nancy L. Tubesing, Ed.D.
Carl E. Vorhes, M.D.
Patricia M. Wagner, Ph.D.

Clinical Assistant Professor

Johannes Aas, M.D.
Martha Aas, M.D.
Alexander Abrams, M.D.
Donald J. Abrams, M.D.
Bruce Adams, M.D.
Jan Adams, M.D.
Patrick J. Adams, M.D.
James T. Adkins, M.D.
Robert C. Ahlstrom, M.D.
James R. Allen M.D.
Werner W. Amerongen, M.D.
Thomas W. Amsden, M.D.
Arden O. Anderson, M.D.
Franklin C. Anderson, M.D.
Jo E. Anderson, M.D.
John W. Anderson, M.D.
Richard W. Anderson, M.D.
Ross Anderson, M.D.
James J. Arms, M.D.
Frederick D. Arny, M.D.
Byron C. Backus, M.D.
Lloyd B. Backus, M.D.
Jean L. Bader, M.D.
Charles Bagley, M.D.
John W. Balkins, M.D.
Joel Bamford, M.D.
Patrick J. Barrett, M.D.
Charles J. Beck, M.D.
Roger W. Becklund, M.D.
Lee H. Beecher, M.D.
Royden A. Belcher, M.D.
Alphonso A. Belsito, M.D.
Clyde Bentzin, M.D.
Dean H. Bergerson, M.D.
Barbara Berggren, M.D.
Douglas Berry, M.D.
Thomas G. Birkey, M.D.
William A. Black, M.D.
Stephen Bloom, M.D.
Clifford J. Blum, M.D.
Joseph Bocklage, M.D.
Raymond Bonnabeau, M.D.
Stephan Boros, M.D.
Donald E. Brandt, M.D.
Henry E. Brandt, M.D.
Larry J. Brettingen, M.D.
Carl O. Bretzke, M.D.
Thomas G. Briggs, M.D.
Harold R. Broman, M.D.
Michael Bronson, M.D.
Glen W. Brown, M.D.
Robert S. Brown, M.D.
William B. Buege, M.D.
Robert E. Bundt, M.D.
Dayton D. Burkholder, M.D.
Edgar C. Burseth, M.D.
Bruce P. Cameron, M.D.
Joseph T. Capell, M.D.
William J. Carr, M.D.
Kenneth R. Carter, M.D.
Frank J. Carthey, M.D.
Peter H. Cermak, M.D.
Chris H. Chapman, M.D.
Sherman B. Child, M.D.
Raymond G. Christensen, M.D.
David A. Christenson, M.D.
Leland R. Christenson, M.D.
William L. Christian, M.D.
Bruce T. Clayton, M.D.
Charles L. Cohen, M.D.
Milton A. Cornwall, M.D.
Enrique Cortez, M.D.
Glen G. Cramer, M.D.
George M. Crow, M.D.
Bart S. Cuderman, M.D.
Diane A. Dahl, M.D.
Allen W. Delzell, M.D.
Paul B. Dickinson, M.D.
Roy W. Dickman, M.D.
William Doebler, M.D.
James H. Dokken, M.D.
Charles Dunham, M.D.
John L. Durkin, M.D.
Paul J. Dyrdal, M.D.
Stephen H. Earl, M.D.
Walter P. Eder, M.D.
Thomas Edwards, M.D.
Myles E. Efteland, M.D.
John G. Eichten, M.D.
Fredrick Ekberg, M.D.
Joseph S. Emond, M.D.
Paul L. Eneboe, M.D.
E. Duane Engstrom, M.D.
Gary L. Falk, M.D.
John Fangman, M.D.
A. W. Fenske, M.D.
Albert D. Fetzek, M.D.
Richard T. Foreman, M.D.
Donald Foss, M.D.
Donald B. Frane, M.D.
Bayard T. French, M.D.
Bradford E. Friedrich, M.D.
Charles A. Friend, M.D.
Paul Fruen, M.D.
Edson V. Fuglestad, M.D.
Edgar R. Gamm, M.D.
Joseph M. Gasik, M.D.
Richard Gehrz, M.D.
LeRoy F. Geis, M.D.
Joseph L. Gendron, M.D.
Robert W. Gibbs, M.D.
David L. Gilbertson, D.O.
Malcolm E. Gillespie, M.D.
Gary D. Good, M.D.
John C. Grant, M.D.
James Green, M.D.
Patrick Greenwood, M.D.
Richard P. Griffen, M.D.
Paul T. Grimes, M.D.
David W. Grube, M.D.
Joseph J. Gutenkauf, M.D.
Stephen L. Hadley, M.D.
Norman L. Hagberg, M.D.
William G. Halverson, M.D.
Peter O. Hansen, M.D.
George W. Haugen, M.D.
Robert J. Havel, M.D.
Robert Heeter, M.D.
Robert L. Hegrenes, M.D.
James K. Heid, M.D.
Terrance P. Henderson, M.D.
Kenneth V. Hodges, M.D.
Ronald Hoekstra, M.D.
John Holcomb, M.D.
Robert Holmen, M.D.
Douglas J. Holt, M.D.
Glen Holt, M.D.
John R. Holten, M.D.

Leong Y. W. Hom, M.D.
Roderick Hood, M.D.
George J. Hopkins, M.D.
Allen Horn, M.D.
James Hover, M.D.
Richard Hovland, M.D.
Newell Howe, M.D.
Frank J. Indihar, M.D.
William C. Jackson, M.D.
Dennis R. Jacobson, M.D.
William L. Jefferies, M.D.
Gerald Jenson, M.D.
Alan R. Johnson, M.D.
Bradley D. Johnson, M.D.
Carolyn Johnson, M.D.
Gordon E. Johnson, M.D.
O. Guy Johnson, M.D.
Spencer Johnson, M.D.
Stanley Johnson, M.D.
Theodore Johnson, M.D.
David Johnsrud, M.D.
Arthur Kaemmer, M.D.
Milton L. Kaiser, M.D.
Dale Kaye, M.D.
Joseph M. Keenan, M.D.
Patrick A. Keenan, M.D.
Curtis D. Keller, M.D.
Robert T. Kelly, M.D.
Thomas Kiefer, M.D.
James F. Knapp, M.D.
John Knoedler, M.D.
Gary G. Kohls, M.D.
Peter S. Koontz, M.D.
William Kosiak, M.D.
Larry Koteck, M.D.
Michael J. Kozak, M.D.
Walter E. Krafft, M.D.
James E. Krook, M.D.
James Kullblom, M.D.
James N. Kvale, M.D.
Jerome Kwako, M.D.
David Lamusga, M.D.
Vincent LaPorte, M.D.
Dorette Larson, M.D.
Roland R. Larter, M.D.
Gordon E. Lee, M.D.
Joseph Leek, M.D.
Donald Lehman, M.D.
Robert E. Leiferman, M.D.
Cecil M. Leitch, M.D.
Kenneth Lerdahl, M.D.
Richard J. Lessard, M.D.
Gordon J. Lester, M.D.
Alexander A. Levitan, M.D.
Raymond J. Lindeman, M.D.
Selmer Loken, M.D.
Thomas A. Love, M.D.
Olaf Lukk, M.D.
Kristofer T. Lund, M.D.
William Lundberg, M.D.
Donald R. Lynch, M.D.
Charles MacDonald, M.D.
Roger MacDonald, M.D.
Neil Macheledt, M.D.
Hugh MacMenamin, M.D.
Raymond Carl Magnuson, M.D.
Khalid Mahmud, M.D.
J. Anthony Malerich, M.D.
John Manion, M.D.
Merle S. Mark, M.D.
George H. Marking, M.D.
Robert Marshall, M.D.
Charles Paul Martin, M.D.
Frederick F. Martin, M.D.
George R. Martin, M.D.
Donald J. Maus, M.D.
David K. McAfee, M.D.
Samuel K. McHutchinson, M.D.
Eva E. McKenzie, M.D.
David W. McQuoid, M.D.
Thomas Mears, M.D.
Frederick A. Melms, M.D.
Robert Merrill, M.D.
Donald D. Metz, M.D.
George M. Miks, M.D.
H. Dawes Miller, M.D.
James Miller, M.D.
William P. Miller, M.D.
Robert E. Molenaar, M.D.
John L. Morgan, M.D.
Mark A. Muesing, M.D.
Albrecht E. Muller, M.D.
John William Myer, M.D.
Timothy E. Nealy, M.D.
John D. Nehring, M.D.
Edward Nelson, M.D.
Leo K. Nelson, M.D.
Maxine P. Nelson, M.D.
Robert P. Nelson, M.D.
Ronald J. Nelson, M.D.
Paul Nerothin, M.D.
Thomas O. Nichols, M.D.
Neil D. Nickerson, M.D.
David J. Nielson, M.D.
Kenneth O. Nimlos, M.D.
Joseph L. Norquist, M.D.
Daniel Nussbaum, M.D.
Dean O. Nywall, M.D.
Olin M. Odland, M.D.
Myron Olmanson, M.D.
Vern C. Olmanson, M.D.
Kenneth Olson, M.D.
Richard E. Olson, M.D.
Robert Olson, M.D.
Burton A. Orr, M.D.
John R. Parod, M.D.
Charles R. Pelzi, M.D.
Herschel L. Perlman, M.D.
Norman Peterson, M.D.
David R. Philp, M.D.
Donald A. Pine, M.D.
Rolland D. Pistulka, M.D.
David A. Pope, M.D.
Lawrence Poston, M.D.
Robert L. Powers, M.D.
Paul V. Quinn, M.D.
John R. Ragan, M.D.
Larry L. Rapp, M.D.
Ronald E. Rehmann, M.D.
Leland G. Reichelt, M.D.
Fred B. Riegel, M.D.
Lawrence R. Ringhofer, M.D.
Donald Roach, M.D.
William H. Rock, M.D.
William W. Rodman, M.D.
James Rohde, M.D.
Pat Rollins, M.D.
David J. Rosenbaum, M.D.
Hana Rosenstein, M.D.
Philemon C. Roy, M.D.

Thomas Rozycki, M.D.
Paul Rud, M.D.
M. Ruegsegger, M.D.
Peter L. Russell, M.D.
Harry M. St. Cyr, M.D.
John J. Salchert, M.D.
Edward Salovich, M.D.
Paul S. Sanders, M.D.
Kusum Saxena, M.D.
Hugh A. Scanlon, M.D.
Robert Schindler, M.D.
Martin J. Schirber, M.D.
Ruben F. Schmidt, M.D.
John R. Scholtzko, M.D.
Christian Schrock, M.D.
William R. Schroeder, M.D.
Roger D. Schroeppel, M.D.
Jerome E. Schulz, M.D.
E. Robert Schwartz, M.D.
James Sebastian, M.D.
Milton H. Seifert, Jr., M.D.
Harold C. Seim, M.D.
Richard J. Sells, M.D.
Peter Setness, M.D.
Robert I. Shragg, M.D.
Franklin D. Sidell, M.D.
Leighton Siegel, M.D.
Richard K. Simmons, M.D.
Kathleen K. Simo, M.D.
James W. Sipe, M.D.
Carl Sjoding, M.D.
William Slack, M.D.
Archie M. Smith, M.D.
George Smith, M.D.
George R. Smith, M.D.
John E. Smith, M.D.
John J. Smyth, M.D.
Vernon Sommerdorf, M.D.
Ernest J. Sowada, M.D.
A. A. Spagnolo, M.D.
Maurice Spangler, M.D.
Paul M. Spilseth, M.D.
Clifford D. Stiles, M.D.
Curtis W. Stolee, M.D.
Robert A. Stoy, M.D.
Herbert S. Strait, M.D.
John Streitz, M.D.
Richard E. Streu, M.D.
John E. Sutherland, M.D.
Lawrence J. Swanson, M.D.
Ralph H. Swanson, M.D.
Floyd J. Swenson, M.D.
Orville P. Swenson, M.D.
Richard W. Swenson, Jr., M.D.
Leslie A. Syverson, M.D.
Wayne E. Tate, M.D.
James J. Tiede, M.D.
Chris Tountas, M.D.
James E. Troy, M.D.
Romil Valgamae, M.D.
John M. Vener, M.D.
Norman Virnig, M.D.
Thomas W. Votel, M.D.
Frederick E. Walker, Jr., M.D.
Stuart B. Walker, M.D.
Richard Warhol, M.D.
Phillip Warrell, M.D.
Alvin W. Waters, M.D.
Sidney Watson, M.D.
Marwood E. Wegner, M.D.
Joseph F. Wethington, M.D.
Lloyd A. Whiteself, M.D.
Paul Wicklund, M.D.
Paul A. Williams, M.D.
Richard E. Williams, M.D.
Robert E. Wilson, M.D.
Elton G. Wing, M.D.
Herbert C. Winge, M.D.
Frank Wolf, M.D.
Phillip J. Worrell, M.D.
Donald L. Wright, M.D.
Richard E. YaDeau, M.D.
Matthew D. Yelle, M.D.
John D. Zapf, M.D.
Leo A. Zaworski, M.D.
Robert L. Zemke, M.D.

Instructor

Thomas M. Altemeier, M.D.
Barry L. Baines, M.D.
Edmond J. Coleman, Ph.D.
Philip L. Colgan, M.A.
Diane Daehlin, M.S.W.
Luis de Cubas, M.D.
M. Collin Eid, M.P.H.
James Lawson, M.B.A.
Charlotte Lee, M.D.
Daniel O'Brien, M.D.
McKim Peterson, M.D.
Robert W. Reif, M.D.

Clinical Instructor

Geoffrey T. Abbott, M.S.W.
John D. Adolphson, M.D.
Bruce Agneberg, M.D.
Gregory Amer, M.D.
Craig E. Anderson, M.D.
Stanley J. Antolak, M.D.
Charles H. Beck, M.D.
John T. Beecher, M.D.
Clyde K. Bentzin, M.D.
Dale Berry, M.D.
Barry A. Bershow, M.D.
John Bordwell, M.D.
Mark H. Brakke, M.D.
Michael Bushian, M.D.
John Canfield, M.D.
Darrell L. Carter, M.D.
John Canfield, M.D.
Darrell L. Carter, M.D.
Irene G. Cass, M.D.
James Cicero, M.D.
David Claudon, M.D.
Michael Coomes, M.D.
Gayle J. Cousins, M.D.
Robert Dahms, M.D.
Thomas Day, M.D.
John A. Dow, D.P.M.
Brian T. Ebeling, M.D.
David R. Eckes, M.D.
Robert Florence, M.D.
Allen Fongemie, M.D.
Ralph Frascone, M.D.
Peter Garske, M.D.
James Gehant, M.D.
George Gorden, M.D.
Robert D. Hart, M.D.
John Haugen, M.D.
Gerald Heideman, M.D.
Clarence E. Henke, M.D.

William R. Hilgedick, M.D.
Douglas Hiza, M.D.
Kenneth Irons, M.D.
Joel J. Jarvis, M.D.
Byron E. Johnson, M.D.
Deane Johnson, M.D.
Robert J. Johnson, M.D.
James Kalpaxis, M.D.
Julie Klosterman, M.D.
James Klotter, M.D.
Daniel Kohen, M.D.
Lorraine Kretchman, M.D.
Daniel Lambrides, D.Min.
John Lamey, M.D.
Richard Lamon, M.D.
Timothy Lane, M.D.
Dennis Lofstrom, M.D.
Thomas G. Mayer, M.D.
Steven McCabe, M.D.
Ronald Menk, M.D.
James Mohs, M.D.
James P. Noreen, M.D.
David Olson, M.D.
Harold M. Pearson, M.D.
John K. Peters, M.D.
D. William Pfeffer, M.D.
Henry S. Rupp, M.D.
David Sanderson, M.D.
Timothy Scanlon, M.D.
Ronald Sha, M.D.
William Shores, M.D.
Michael Smith, M.D.
Larry Stetzner, M.D.
Marlen Strefling, M.D.
C. L. Thiesenhusen, M.D.
Clark D. Tungseth, M.D.
Jeffrey Vadheim, M.D.
Paul Van Gorp, M.D.
William Walsh, M.D.

Lecturer

Faruk Abuzzahab, M.D., Ph.D.

Research Specialist

Jolene K. Berg, M.D.
Debra Froberg, M.A.
Herbert H. Laube, Ph.D.
Stephen Prestwood, M.A.

Research Fellow

Adell Johannes, Ph.D.
Sandra L. Nohre, M.A.
Vincent Rogalski, M.A.
Jane E. Stoller, A.B.D.

Coordinator

Maureen Moo-Dodge, M.A.

Course work in the Department of Family Practice and Community Health introduces students to the fundamentals of continuing and comprehensive patient care within the context of the patient's family and community. Consistent with the breadth of interests and responsibilities of the family physician, training in all basic areas of medical knowledge is stressed. Preventive medicine and the behavioral science aspects of patient care are also emphasized.

During Phase A, the Department of Family Practice and Community Health participates in planning, teaching, and providing clinical facilities for Introduction to Clinical Medicine. Department faculty members share responsibility for teaching the medical history taking, interviewing techniques, and physical diagnosis sections of the course. The Department of Family Practice and Community Health also contributes small group leaders to Social Behavior, an elective counseling course for Phase A students.

In Phase B, students spend ½ day each week for 16 weeks with a family physician, caring for patients in the clinic and hospital. Through this experience, students gain firsthand knowledge of the role of the family physician in the health care system. The Department of Family Practice and Community Health also collaborates with the Department of Psychiatry to provide advanced training in medical interviewing for Phase B students.

During Phase D, students have the opportunity to participate in a variety of family practice programs and courses. Before completing the M.D. requirements, students may elect to spend 9 months or 1 year with a rural family doctor as part of the Rural Physician Associate Program, a combined educational-service program of the Medical School administered by Department of Family Practice and Community Health faculty. The program is designed to acquaint students with the world of rural family practice. For a similar but shorter experience, Phase D students may elect to complete a 6-week preceptorship with a family physician. The department offers a variety of elective courses relevant to family practice, and these are listed below.

Model family practice units have been established at the University and at five additional sites located within or near hospitals affiliated with the department. These units are designed primarily for the graduate education of residents in the family

practice training program. In addition, they serve as classrooms for teaching continuing and comprehensive primary health care to medical students. The patients represent a cross section of age and socioeconomic status. Students may elect to participate in the ongoing care of patients in these model family practice units.

The Program in Human Sexuality is an administrative and academic unit of the Department of Family Practice and Community Health. It conducts the Human Sexuality course in the Phase A and B core curricula and offers several elective courses in Phase D as well as advanced workshops and internships for residents and practicing physicians.

Additional educational opportunities in the Department of Family Practice and Community Health are available through the offices of individual practicing physicians and through affiliated hospitals in both rural and urban settings.

ELECTIVE COURSES

5500. PRECEPTORSHIP IN CLINICAL PRACTICE. (9 cr; prereq regis med)
Participation in delivery of primary medical care as performed by a practitioner within the community.

5501. RURAL PHYSICIAN ASSOCIATE PROGRAM. (36 cr; prereq minimum, completion of Phase A and B curricula of University of Minnesota Medical School)
Nine-month (optional for 12 months) participation in the practice of an outstate clinical faculty member. Patient care in a nonurban community. Extensive exposure to clinical medicine and delivery of primary health care. Includes stipend.

5502. THE PHYSICIAN AS COUNSELOR IN MARRIAGE AND FAMILY PROBLEMS. (2 cr; prereq 5501)
Four seminars, 3 hours each, held over 7 months for RPAP participants. Opportunity to do clinical interviewing, examine relevant literature, and review case studies.

5504. MEDICAL ETHICS. (2 cr; prereq regis med or #)
Readings and discussions on major ethical issues relevant to the practice of medicine. Critical review of case studies to gain exposure to solution of medical ethics problems.

5510. MIGRANT WORKER PROGRAM. (9 cr; prereq regis med and #)
Delivery of primary health care to migrant workers, primarily Mexican-Americans, in Minnesota and California.

5515. PRECEPTORSHIP IN GERONTOLOGIC COMMUNITY HEALTH. (9 cr; prereq regis med)
In-depth experience in all facets of health care for elderly patients.

5516. RESEARCH IN HUMAN SEXUALITY. (Cr ar; prereq #)
Clinical and/or laboratory research related to human sexuality. Adaptable to interests of the student and faculty member. Ongoing research projects include such areas as incest, rape, sexuality of prisoners, and sexual dysfunctioning. Contact Donald Houge, Ph.D., to make arrangements.

5520. RURAL HEALTH CARE MODEL, ONAMIA, MINNESOTA. (9 cr; prereq regis med)
Participation in delivery of primary medical care in a small town setting with an emphasis on a team approach.

5530. CLINICAL PROBLEMS IN FAMILY PRACTICE. (9 cr; prereq regis med)
Participation in patient care in a model family practice clinic.

5535. COMMUNITY HEALTH IN FAMILY PRACTICE. (9 cr; prereq regis med or #)
Introduction to community health problems and to resources available in different practice settings. Practicum, readings, and seminars.

5560. ALCOHOL AND DRUG ADDICTION TREATMENT CENTER. (4.5 cr; prereq regis med)
Current methods and approaches to therapy and rehabilitation of chemically dependent patients.

5562. INTERVIEWING, PHYSICAL EXAMINATION, AND PATIENT COUNSELING. (Cr ar; prereq 5501)
Practicum and seminar course designed to provide the RPAP student with the basic skills and attitudes necessary to effectively interview, physically examine, and counsel the ambulatory patient. Use of videotaping and critique methods.

5565. HUMAN RELATIONS FOR THE PHYSICIAN. (2 cr; prereq regis med or #)
Interpersonal dynamics of relationships formed in carrying out the physician role. Videotaping of participants in specific exercises. Group discussions, lectures, readings.

5566. FUNDAMENTALS OF COUNSELING. (3 cr; prereq regis Phase D or #)
Introduction to short term psychological counseling in the family practice setting. Two 4-week sessions: (1) counseling skills training, (2) conducting counseling under supervision.

5575. MANAGEMENT CONCEPTS AND APPLICATIONS IN MEDICAL PRACTICE. (2 cr; prereq regis med)
Basic management topics such as accounting, finance, personnel management, and operations analysis. Topics specific to clinic management: staff policies, task analysis, clinic organization, credit control, purchasing, financial management, and data processing.

5580. INDEPENDENT STUDY ON MANAGEMENT CONCEPTS AND SYSTEMS WITHIN MEDICAL PRACTICES. (2 cr; prereq 5575)
Independent study for students who wish to pursue further work in practice management concepts and systems of medical care delivery.

5585. SEXUAL PROBLEMS IN CLINICAL PRACTICE. (Cr ar; open to medical students only; prereq #)
Clinical management of sex-related problems.

5599. INDEPENDENT STUDY. (Cr ar; prereq regis med)
On- or off-campus learning experiences individually arranged between the student and a faculty member for earning credit in areas not covered by regular courses. May include basic science research, library research, or special projects.

ADVANCED CREDIT COURSES

0555f, 0556w, 5557s. SPECIAL TOPICS IN PSYCHOLOGICAL MEDICINE

5563. CLINICAL NEUROPSYCHOPHARMACOLOGY

5567. COMMUNICATIONS

5570. PRACTICUM IN COUNSELING TECHNIQUES

5581. PRACTICE MANAGEMENT, PERSONAL FINANCES, AND PROFESSIONAL RELATIONS

5583. PERSONAL AND FINANCIAL PLANNING

5598. INTRODUCTION TO THE PHYSICIAN'S ROLE IN NURSING HOMES

5903. COMMUNITY HEALTH

5904. COMMUNITY HEALTH

5950. SEXUAL HEALTH SEMINAR

5951. RESEARCH IN HUMAN SEXUALITY

5952-5953-5954. PRACTICUM IN SEXUAL COUNSELING

5955. DIRECTED STUDY

5956. HUMAN SEXUALITY IN THE LIFE CYCLE

5957. FEMALE SEXUALITY

5958. SMALL GROUP PROCESS

8201. CLINICAL FAMILY MEDICINE

8202. DYNAMICS OF MARRIAGE AND FAMILY

8204. SEMINAR: QUANTITATIVE STRATEGIES IN HEALTH CARE PRACTICE AND RESEARCH

8205. SEMINAR: MEDICAL RECORDS SYSTEMS

8207. SEMINAR: COMMON DISEASES SEEN IN FAMILY PRACTICE

8208. FAMILY MEDICINE CONFERENCES

8209. FAMILY MEDICINE X-RAY CONFERENCE

8210. FAMILY MEDICINE GRAND ROUNDS

8212. CLINICAL PSYCHIATRY ROUNDS

8215. SEMINAR: PSYCHOSOMATIC MEDICINE

8216. SEMINAR: PSYCHOLOGICAL PROBLEMS OF CHILDREN

8217. SEMINAR IN COUNSELING

8223. INTRODUCTION TO GERONTOLOGY AND GERIATRIC MEDICINE

8224. SEMINAR: COMMUNITY HEALTH

8225. MEDICAL SOCIOLOGY

8226. SEMINAR: MEDICAL SOCIOLOGY

8228. SEMINAR: INTERDISCIPLINARY HEALTH

8240. COMMUNITY RESOURCES

8243. FAMILY MEDICINE IN THE RURAL AREA

8245. ANALYSIS OF INSTRUCTION AND EDUCATIONAL EVALUATION

8250. QUANTITATIVE STRATEGIES IN HEALTH CARE PRACTICE AND RESEARCH II

8253. RESEARCH PROBLEMS

8582. PRACTICE MANAGEMENT II

History of Medicine (HMed)

Leonard G. Wilson, M.Sc., Ph.D., professor and head

Associate Professor

John M. Eyler, Ph.D.

The history of medicine is essential to the understanding of the present state of medicine. It explores the historical foundations of medical knowledge, the sources of medical concepts, and the development of the traditions of medical theory and practice. Knowledge of the history of medicine is valuable to a physician because it helps to clarify the physician's knowledge and promotes a view of medicine in historical perspective.

Courses in the department are intended to provide students with a broad survey of the history of medicine, which may be followed by a seminar dealing more intensively with specific developments in the history of medicine. Seminars give students an opportunity to read original literature and to investigate a historical problem for themselves, with assistance from faculty members as needed.

The department also offers a series of public noon hour lectures on selected subjects to acquaint both faculty members and students with the interests and diversity of medical history.

ELECTIVE COURSES

5024f, 5025w, 5026s. HISTORY OF MEDICINE. (4 cr per qtr. intended primarily for CLA and premedical students) Eyler

An introduction to the social and intellectual history of medicine with emphasis on such topics as the historical importance of disease, attitudes toward and treatment of the sick, development of the medical profession and of healing institutions, and the history of fundamental medical ideas.

5102s. SEMINAR: MEDICINE AND SOCIETY IN THE ENLIGHTENMENT. (3 cr, prereq #) Eyler

The interrelations of medicine and society from the late 17th to the early 19th centuries.

5120-5130. HISTORICAL TOPICS: MEDICINE AND THE MODERN STATE. (4 cr per qtr [sequence may be repeated for a max of 16 cr], prereq #) Eyler

A seminar on the historical relations between medicine and the state from the 18th to 20th centuries. Topics vary from year to year.

5400f. EARLY HISTORY OF MEDICINE. (3 cr, 2 lect and 1 seminar hrs per wk) Wilson

The archaeology of disease, disease concepts in primitive medicine, Near and Far Eastern medicine, Hippocratic medicine, medical science in Alexandria, Galen and Greek medicine in Rome, the transmission of Greek medicine through the Arabic and Byzantine cultures, medical theory and practice in the Middle Ages.

5401w. MEDICINE DURING THE SCIENTIFIC REVOLUTION, 1500-1800. (3 cr, 2 lect and 1 seminar hrs per wk) Wilson

The recovery of ancient Greek medical writings, Vesalius and the revival of anatomy, Harvey and the discovery of circulation of the blood, emergence of new chemical and mechanical theories of medicine, classification of disease, rise of medical teaching.

5402s. MEDICINE IN THE 19TH AND 20TH CENTURIES. (3 cr; 2 lect and 1 seminar hrs per wk) Wilson
The impact of physics and chemistry on physiology; cell theory and cellular pathology; the germ theory of disease; anesthesia and the revolution in surgery; the rise of bacteriology, immunology, endocrinology, reproductive physiology, and chemotherapy; the reform of medical education, and the rise of modern medical research.

5410f, 5411w, 5412s. SEMINAR: THE EMERGENCE OF MODERN MEDICINE, 1750-1900. (3 cr per qtr, one 2-hr seminar per wk) Wilson
Study of the development of modern medicine through reading, discussion, and pursuit of a selected problem in depth. Ordinarily, students do general reading during fall quarter, select a topic for intensive study and write the first draft of a paper on it during winter quarter, and revise the first draft and submit their paper in final form during spring quarter. Intended to enable students to gain experience in research and writing in the history of medicine.

8220f, 8221w, 8222s. HISTORY OF THE BIOLOGICAL SCIENCES. (3 cr per qtr) Wilson

8230f, 8231w, 8232s. READINGS: HISTORY OF SCIENCE. (3 cr per qtr) Wilson

8630f, 8631w, 8632s. DIRECTED STUDY. (3-15 cr; prereq #) Staff

Interdisciplinary Medicine (InMd)

The courses listed under this heading are part of the core curriculum for undergraduate medical students and are offered in Phase A and Phase B. Direct administrative responsibility for these courses is vested in the individual course directors; planning, teaching, and evaluation of the courses and of student performance is carried out by interdepartmental committees.

REQUIRED COURSES

5100f. INTRODUCTION TO CLINICAL MEDICINE. (2 cr; prereq regis med) Petzel and staff
Interviewing techniques and communication with patients.

5101w. INTRODUCTION TO CLINICAL MEDICINE. (2 cr; prereq regis med) Petzel and staff
Medical history taking.

5102s. INTRODUCTION TO CLINICAL MEDICINE. (3 cr; prereq regis med) Petzel and staff
Physical diagnosis technique and practice.

5103su. INTRODUCTION TO CLINICAL MEDICINE. (2 cr; prereq regis med) Petzel and staff
Physical diagnosis and medical problems.

5110. HUMAN GENETICS. (2 cr; prereq regis med) King and staff
Principles of genetics and their application to human diseases.

5212. PSYCHE. (5 cr; prereq regis med) Westermeyer and staff
Normal development and the manner in which deviations lead to disordered behavior. Treatment methods, clinical presentations, and patient interview techniques.

5220. CARDIOVASCULAR. (3 cr; prereq regis med) Asinger and staff
Fundamental concepts in cardiovascular system pathophysiology and clinical application in diagnosis and management.

5221. RESPIRATORY. (3 cr; prereq regis med) Drage and staff
Clinical and laboratory applications of respiratory anatomy, pathology, physiology, pharmacology, and microbiology; essentials of normal respiration and respiratory disease.

5222. FLUID AND ELECTROLYTES. (3 cr; prereq regis med) Ehlers and staff
Fluid, electrolytes, and acid-base balance.

5223. KIDNEY AND URINARY TRACT. (3 cr; prereq regis med) Davidson and staff
Comprehensive review of anatomy, embryology, and pathophysiology in relation to renal function and disease processes affecting the organ system.

5224. ENDOCRINE AND METABOLISM. (4 cr; prereq regis med) Steffes and staff
Integrated basic science and clinical presentations in endocrinology and metabolism with emphasis on self-learning and group discussions.

5225. REPRODUCTION. (4 cr; prereq regis med) Foreman and staff
Human reproductive physiology, clinical problems and management, including practical consideration of contraception and population control.

5226. BLOOD. (3 cr, prereq regis med) Johnson and staff
Homeostatic mechanisms influencing cellular elements of blood and hemeostasis. Pathophysiology and study of hematologic disease, with emphasis on morphology. Includes laboratory studies and group discussions.

5227. SKIN. (2 cr, prereq regis med) Manick and staff
Study of biochemical, immunologic, microbiologic, and histopathologic disturbances in a variety of normal and abnormal processes affecting the integument.

5228. EAR, NOSE, AND THROAT. (2 cr; prereq regis med) Adams and staff
Pathophysiological mechanisms in relation to clinical medicine and the ear, nose, and throat.

5229. EYE. (2 cr, prereq regis med) Cantrill and staff
Anatomy, embryology, and physiology of the human eye, common ocular problems and management of the patient.

5230. NERVOUS SYSTEM AND MUSCLE DISORDERS. (5 cr; prereq regis med) Klassen and staff
A correlated presentation of clinical neurological science.

5231. GUT. (4 cr; prereq regis med) Soltis and staff
Normal function, pathophysiology, and clinical aspects of the gastrointestinal tract, liver and pancreas.

5232. BONES, JOINTS, AND CONNECTIVE TISSUE. (4 cr; prereq regis med) House and staff
Integrated basic science and clinical approach to pathophysiology of disease affecting these tissues. Emergency room care, treatment of trauma, chronic care, and rehabilitation also emphasized.

5233. HUMAN SEXUALITY. (3 cr; prereq regis med) Satterfield and staff

5234. BIOMETRY AND EPIDEMIOLOGY. (1 cr, prereq regis med) Staff

5280. STUDENT AS PHYSICIAN—MEDICINE I TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5281. STUDENT AS PHYSICIAN—PEDIATRICS TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5282. STUDENT AS PHYSICIAN—OBSTETRICS-GYNECOLOGY TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5283. STUDENT AS PHYSICIAN—PSYCHIATRY TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5284. STUDENT AS PHYSICIAN—NEUROLOGY TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5285. STUDENT AS PHYSICIAN—SURGERY TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5286. STUDENT AS PHYSICIAN—FAMILY PRACTICE AND COMMUNITY HEALTH TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5287. STUDENT AS PHYSICIAN—PHYSICAL MEDICINE AND REHABILITATION TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5288. STUDENT AS PHYSICIAN—MEDICINE II TUTORIAL. (Cr ar; prereq regis med) Clawson and staff

5290f. LABORATORY MEDICINE. (Cr ar, prereq regis med) Bradley and staff

Laboratory Medicine and Pathology (LaMP)

Ellis S. Benson, M.D., professor and head

Professor

Eugene Ackerman, Ph.D.
Kahlil Ahmed, M.D.
W. Robert Anderson, M.D.
Miguel Azar, M.D., Ph.D.
Fritz Bach, M.D.
Henry Balfour, M.D.
Donna Blazevic, M.P.H.
David M. Brown, M.D.
Richard Brunning, M.D.
John I. Coe, M.D.
Agustin Dalmasso, M.D.
Louis Dehner, M.D.
John Eaton, Ph.D.
Grace Mary Ederer, M.S.
J. Roger Edson, M.D.
Jesse Edwards, M.D.
Richard Estensen, M.D.
Esther F. Freier, M.S.
Kazimiera Gajl-Peczalska, M.D.
Franz Halberg, M.D.
Ruth Hovde, M.S.
John Kersey, M.D.
Paul H. Lober, M.D., Ph.D.
Jeffrey McCullough, M.D.
Kenneth Osterberg, M.D.
Herbert Polesky, M.D.
Norman Ratliff, M.D.
Verna Rausch, M.S.
Juan Rosai, M.D.
Andreas Rosenberg, Ph.D.
R. Dorothy Sundberg, M.D., Ph.D.
Lee W. Wattenberg, M.D.
James G. White, M.D.
Jorge J. Yunis, M.D.

Clinical Professor

Donald Gleason, M.D.

Associate Professor

Marilyn Bach, Ph.D.
G. Mary Bradley, M.D.
Robert Bridges, M.D.
Barbara A. Burke, M.D.
M. Desmond Burke, M.D.
John Crosson, M.D.
Stanley Finkelstein, M.D.
Leo Furcht, M.D.
Lael Gatewood, Ph.D.
Leonard Greenberg, Ph.D.
Erhard Haus, M.D., Ph.D.
Charles Horwitz, M.D.
Patrick Manning, M.D.
Toni Mariani, Ph.D.
Robert McKenna, M.D.
Michael Steffes, M.D., Ph.D.
Lorraine G. Stewart, M.S.
William Swaim, M.D.
Patrick C. J. Ward, M.D.
Walid G. Yasmineh, Ph.D.

Clinical Associate Professor

Edward Segal, M.D.
Martin Segal, M.D.

Assistant Professor

Thomas Arlander, M.D.
Calvin Bandt, M.D.
Ming Chern, Ph.D.
Connie Clark, Ph.D.
Donald Connelly, M.D.
John Eckfeldt, M.D.
Lynda Ellis, Ph.D.
Stephen Ewing, M.D.
Glauco Frizzera, M.D.
Danuta Giganti, Ph.D.
Robert Gruninger, M.D.
Seymour Handler, M.D.
Duane Hasegawa, M.D.
David Lakatua, M.D.
Paul Larson, M.D.
Joseph Leverone, M.D.
Catherine Limas, M.D.
Stephen Marker, M.D.
Garry F. Peterson, M.D.
Lance Peterson, M.D.
LoAnn Peterson, M.D.
Irene Posalaky, M.D.
Zoltan Posalaky, M.D.
Frank Rhame, M.D.
Walter J. Runge, M.D.
Robert E. Rydell, M.D.
Thomas Semba, M.D.
Richard Sibley, M.D.
Nancy Staley, M.D.
Robert Strom, M.D.
Thomas Swallen, M.D.
Michael Tsai, Ph.D.
Charles Weigent, M.D.
Michael Wilson, Ph.D.
Bertram Woolfrey, M.D., Ph.D.
Kathryn Zieske, M.S.

Clinical Assistant Professor

Richard W. Anderson, M.D.
Henry Bates, M.D.
David Blomberg, M.D.
Leonard Crowley, M.D.
Ralph Franciosi, M.D.
Vincent Garry, M.D.
Thomas Hallin, M.D.
Charles Jarvis, M.D.
F. Donald Kapps, M.D.
Frederick Lott, M.D.
Donald Nollet, M.D.
John Raich, M.D.
Richard Reece, M.D.
John Uecker, M.D.

Instructor

Joseph Horstmann, M.D.
James O'Leary, M.D.
Kiyoshi Mukai, M.D.
Nancy Wang, M.D.

Clinical Instructor

C. T. Anderson, M.D.
William Bendel, M.D.
Charles Chedister, M.D.
William A. Foley, M.D.
Abe Fox, M.D.
Craig Freeman, M.D.
J. Roald Fuglestad, M.D.
William Glenny, M.D.
Jerome Harty, M.D.
Norman Horns, M.D.
Allen Judd, M.D.
Nicola D. Kostich, M.D.
John E. Kyllo, M.D.
Richard P. Lynch, M.D.
Ellias N. Manoles, M.D.
Robert J. McClellan, M.D.
Ronald Munkittrick, M.D.
Frederick Muschenheim, M.D.C.M.
Paul Nordlie, M.D.
John G. Popowich, M.D.
Marshall H. Short, M.D.
Walter Subby, M.D.
John O. Swanson, M.D.
Robert L. Woodburn, M.D.

Pathology is defined as the study of disease, and it constitutes a large proportion of the scientific basis for all clinical medicine. Courses offered by the Department of Laboratory Medicine and Pathology provide a common thread relating to all parts of the curriculum of study.

In Phase A, the General Pathology course introduces students to the major general principles of pathology, principles that are essential to the understanding of all disease processes including those related to cell injury, inflammation and repair, immunopathology, circulatory disturbances, metabolic and endocrine disorders, molecular and genetic pathology, and neoplasia. Examples of specific diseases are

used to illustrate these principles, to prepare students for the study of specific diseases in Phase B. In Phase B, a separate course in laboratory medicine (InMd 5290) together with the systemic pathology covered in the major organ system courses help students acquire a thorough understanding of disease processes. In Phase D, the department contributes to all tracks and also provides its own pathway within the medical specialties track. Students are expected to learn and develop the ability to interpret laboratory data concerning the management of patients.

The major areas of the department include clinical chemistry, blood banking, hematology (with coagulation), diagnostic microbiology, surgical pathology, autopsy pathology, genetics, immunology, and computer medicine. In addition, there are many specialized laboratory divisions and research activities in which study may be elected.

REQUIRED COURSE

5101s. GENERAL PATHOLOGY. (Cr ar; prereq regis med fr or grad student; #)

ELECTIVE COURSES

General Courses in Anatomic Pathology

5150. ANATOMIC PATHOLOGY IN A HOSPITAL SETTING—University Hospitals. (Cr ar; prereq Phase B)
The student works in the anatomic pathology department taking part in autopsy pathology, surgical pathology, and clinicopathology correlation sessions.

5151. ANATOMIC PATHOLOGY IN A HOSPITAL SETTING—Hennepin County General Hospital. (Cr ar; prereq Phase B) Anderson
For a description, see 5150.

5152. ANATOMIC PATHOLOGY IN A HOSPITAL SETTING—Veterans Administration Hospital. (Cr ar; prereq Phase B) Weigent
For a description, see 5150.

5153. ANATOMIC PATHOLOGY IN A HOSPITAL SETTING—St. Paul-Ramsey Hospital. (Cr ar; prereq Phase B) Posalaky
For a description, see 5150.

General Courses in Clinical Pathology

5186. CLINICAL PATHOLOGY EXTERNSHIP—Hennepin County General Hospital. (Cr ar; prereq #) Strom, Bandt, Crosson
Students study a variety of laboratory analyses in hematology, microbiology, and chemistry and accompany laboratory physicians on ward rounds. Individual cases studied. Laboratory and clinical conferences. One week at Minneapolis War Memorial Blood Bank optional.

5187. CLINICAL PATHOLOGY EXTERNSHIP—Mt. Sinai Hospital. (Cr ar; prereq #) Ward, Burke, Horwitz
Daily teaching sessions are conducted by three pathologists in the following areas: laboratory aspects and diagnosis of acid-base and electrolyte disturbances; hematologic and coagulative disorders; immunologic disorders; endocrinologic disease; enzymology and isoenzyme screening procedures; SMA12-60 chemical profile; renal disease; cerebrospinal fluid; synovial fluid.

5188. CLINICAL PATHOLOGY EXTERNSHIP—Methodist Hospital. (Cr ar; prereq #) E Segal, M Segal
Students study a variety of laboratory analyses in hematology, microbiology, chemistry, radioisotope use, and blood banking and accompany physicians on ward rounds. Individual cases involving cytology, surgery, and pathologic anatomy studied. Daily laboratory and weekly clinical conferences.

5189. APPLIED CLINICAL PATHOLOGY—St. Paul-Ramsey. (Cr ar; prereq Phase D) Haus, Lakatua
The background, uses, and limitations of frequently used clinical laboratory examinations. Appropriate choice and evaluation of laboratory testing in clinical medicine.

5190. LABORATORY MEDICINE IN A COMMUNITY HOSPITAL—Duluth. (Cr ar; prereq Phase D; #) D M Larson
Overview of the practice of laboratory medicine in a community hospital. Offered at St. Luke's Hospital, Duluth.

5192. LABORATORY MEDICINE FOR PRIMARY CARE. (Cr ar; prereq Phase D)
Students participate in certain daily activities of the laboratory to learn what services are available, how they are provided, and how they are best utilized by primary care physicians. Through selected case studies students examine the cost-benefit aspects of laboratory services and how these services contribute to health care costs. Offered at Virginia Municipal Hospital, Virginia, Minnesota.

5193. CLINICAL PATHOLOGY EXTERNSHIP—Hibbing. (Cr ar; prereq #) Nollet
The student works directly with hospital pathologists in all phases of laboratory practice. Emphasis on close clinical correlations, with daily rounds of selected patients and review of all laboratory work. Surgical, cytologic, and autopsy pathology material available for review. Daily conference with clinicians and radiologists.

5201. DIAGNOSTIC LABORATORY PROCEDURES—University Hospitals. (Cr ar; prereq #) Bradley
Commonly performed office procedures practiced by the student—screening tests in hematology, urology, microbiology, and immunology. Chemical screening tests evaluated.

Courses in Specialized Subjects

5113. SURGICAL PATHOLOGY—University Hospitals. (Cr ar; prereq Phase B) Rosai
The student gains experience in the macroscopic and microscopic diagnosis of biopsy and surgical material.

5114. SURGICAL PATHOLOGY—Hennepin County General Hospital. (Cr ar; prereq Phase B) Anderson
For a description, see 5113.

5115. SURGICAL PATHOLOGY—Veterans Administration Hospital. (Cr ar; prereq Phase B) Limas
For a description, see 5113.

5118. ENDOCRINE PATHOLOGY—St. Paul-Ramsey Hospital. (Cr ar; prereq Phase B, [illegible]) Haus, Lakatua
The correlation of clinical presentation, laboratory investigation, and pathologic findings concerning endocrine problems.

5119. FORENSIC PATHOLOGY—Medical Examiner's Office, Hennepin County Medical Center. (Cr ar; prereq Phase D) Coe
The function of a medical examiner's office in determining the cause and manner of types of death.

5123. PULMONARY PATHOLOGY—St. Paul-Ramsey Hospital. (Cr ar; prereq Phase B, [illegible]) Woolfrey
Pathologic anatomy of the lung correlated with physiologic findings of the pulmonary function laboratory and other parameters of pulmonary pathology.

5125. CHRONOBIOLOGY. (Cr ar; prereq Phase B, #) Halberg
Implementation of chronobiologic medicine in the many instances in which it can prevent illness or save life in established disease.

5141. PROBLEMS IN EXPERIMENTAL PATHOLOGY. (Cr ar; prereq Phase B, #) Wattenberg, Furcht, and staff
Work in ongoing programs in the department. Topics under investigation include membrane structure and function, chemical carcinogenesis, viral carcinogenesis, and chronobiology. Any member of the staff will discuss a project on these topics.

5158. CARDIAC PATHOLOGY—Miller Hospital. (Cr ar; prereq Phase B, #)
Work with Dr. Jesse Edwards in the cardiac pathology laboratory.

5181. LABORATORY AND CLINICAL HEMATOLOGY. (Cr ar; prereq #) Brunning, Sundberg
Peripheral blood, bone marrow morphology, and other hematologic analyses are related to case studies. Clinical case conferences, hematology slide sessions, and ward rounds.

5182. LABORATORY STUDIES OF GENETIC DISORDERS. (Cr ar; prereq #) Eaton
Methods include cytogenetic analysis of chromosomes and a variety of biochemical genetic analyses. Individual discussions of cases and of laboratory methods.

5184. IMMUNOHEMATOLOGY IN BLOOD BANKING. (Cr ar; prereq #) McCullough
Blood donor evaluation, blood collection, blood storage, and the clinical use of blood components. Suspected transfusion reactions, hemolytic diseases of the newborn, and other clinical problems studied using immunohematologic methods. Experience at the St. Paul Regional Red Cross Blood Center available.

5185. LABORATORY PROBLEMS IN BLOOD COAGULATION. (Cr ar; prereq #) Edson
Includes laboratory methods in the study of coagulative disorders, clinical ward rounds, individual case studies, conferences, and hematology rounds.

5194. COMPUTER APPLICATIONS IN MEDICINE. (Cr ar; prereq #) Gatewood
Current and anticipated uses of electronic computers. Opportunity to use a variety of computer terminals, but emphasis is on reading and seminars. Seminars include the postdoctoral and advanced predoctoral students in the Division of Health Computer Sciences.

5195. COMPUTER APPLICATIONS IN MEDICAL RESEARCH. (Cr ar; prereq #) Gatewood
Students observe operation of the nine computer facilities currently used for medical research, including monitoring in the intensive care ward and in radiation therapy. The roles of computers in current and future medical research studied through reading and special seminars.

5198. HEMATOLOGY—St. Paul-Ramsey Hospital. (Cr ar, prereq #) Staff
Peripheral blood, bone marrow morphology, and other hematologic procedures are correlated with clinical cases in the Hematology Clinic. Routine hematologic procedures and the aspiration and preparation of bone marrow.

5203. CLINICAL BLOOD BANK IMMUNOLOGY—Minneapolis War Memorial Blood Bank. (Cr ar; prereq #) Polesky
Laboratory analyses in blood banking and practical problems of blood bank immunology; clinical problems included. Conferences, study of individual cases, and investigation of practical problems.

Lecture Courses and Seminars—Predominantly for Students in the Phase D Basic Science Track and in Other Graduate Programs

5103. PRINCIPLES OF DIAGNOSTIC MICROBIOLOGY. (3 cr; prereq MdBc 3103 and 5232 or #) Blazevic, Ederer

5104. AUTOPSIES. (Cr ar; prereq Phase B) Staff

5105. DISEASES OF THE KIDNEY. (3 cr; prereq Phase B) Staff

5106. DISEASES OF THE HEART. (1 cr; prereq Phase B) Edwards

5110. SEMINAR: PATHOLOGY. (1 cr; prereq Phase B)

5111. CONFERENCE ON AUTOPSY HISTOPATHOLOGY. (1 cr; prereq Phase B) Staff

5116. DEMONSTRATION OF GROSS PATHOLOGY. (Cr ar) Staff

5131. BASIC SCIENCE OF CANCER. (Cr ar; prereq Phase B) Wattenberg

5133f. MEDICAL MYCOLOGY. (3 cr; hrs ar; prereq medical microbiology, diagnostic microbiology or #) Blazevic
Laboratory diagnosis of infections caused by yeast, dermatophytes, and systemic fungi.

5136su. ANAEROBIC BACTERIOLOGY. (4 cr; prereq biochemistry, medical microbiology, diagnostic microbiology or #) Blazevic
Anaerobic respiration in bacteria. Methods of anaerobic culture. Taxonomy and classification of anaerobes. Biochemical and gas chromatographic differentiation of anaerobes. The role of anaerobes in disease.

5138. CLINICAL MICROBIOLOGY SEMINAR. (1 cr; prereq #) Blazevic, Ederer

5106s. HUMAN CYTOGENETICS. (3 cr; prereq #; offered 1980-81 and alt yrs) J Yunis
Chromosome structure and function and genetic and clinical problems associated with the study of human chromosomes.

5161s. HUMAN CYTOGENETICS LABORATORY. (2 cr; prereq #; offered 1980-81 and alt yrs) J Yunis and staff
Techniques for study of mammalian and human chromosomes: cell culture, autoradiography, new techniques for chromosome identification, and chromosome isolation techniques.

5162s. HUMAN BIOCHEMICAL GENETICS. (3 cr; prereq #; offered 1979-80 and alt yrs) J Yunis
Molecular and genetic basis of genetic traits in mammals.

5163s. HUMAN BIOCHEMICAL GENETICS LABORATORY. (Cr ar; prereq #; offered 1979-80 and alt yrs) J Yunis and staff

5166. FORENSIC PATHOLOGY. (2 cr; prereq Phase B) Coe

5177. CLINICAL CHEMISTRY. (6 cr; prereq #) Freier and staff
Principles of modern clinical chemistry techniques with emphasis on instrumental methods.

5270f. IMMUNOHEMATOLOGY. (3 cr) Azar
The immune response. Blood cells as antigens. Antibodies to blood groups and mechanisms of their reactions. White cells as antigens and antibodies. Autoimmune hemolysis. Humoral and cellular factors in immunohematology.

5271f. IMMUNOHEMATOLOGY LABORATORY. (2 cr; prereq 5272 or #) Azar, McCullough, Swanson

5274s. MOLECULAR ASPECTS OF IMMUNOLOGY. (3 cr; prereq #) Dalmasso
Chemistry and pathobiology of immunoglobulins, complement, cell membrane, and mediators of anaphylaxis and cellular immunity.

5765f, 5766w. HEMATOLOGY. (4 cr per qtr; §Anat 5765-5766; prereq #) Sundberg and staff
Blood and blood-forming organs; blood and bone marrow from the standpoint of diagnosis and prognosis.

5767s. HEMATOLOGY SEMINAR. (1 cr; §Anat 5767; prereq #) Brunning, Edson, Sundberg

Medicine (Med)

Thomas F. Ferris, M.D., professor and head

Professor

David W. Allen, M.D.
V. Elving Anderson, M.D.
Robert Bache, M.D.
Henry W. Blackburn, Jr., M.D.
Joseph Bloomer, M.D.
J. Cervenka, M.D.
Elliot Chesler, M.D.
Jay N. Cohn, M.D.
Richard P. Doe, M.D., Ph.D.
Stephen D. Douglas, M.D.
Charles W. Drage, M.D.
John Eaton, M.D.
William R. Fifer, M.D.
Ivan D. Frantz, Jr., M.D.
N.L. Gault, Jr., M.D.
Frederick C. Goetz, M.D.
Wendell H. Hall, M.D., Ph.D.
Russell Hanson, M.D.
Robert B. Howard, M.D.
Harry S. Jacob, M.D.
Maynard E. Jacobson, M.D.
Manuel E. Kaplan, M.D.
B.J. Kennedy, M.D., M.S.
Carl M. Kjellstrand, M.D.
Richard S. Kronenberg, M.D.
Michael D. Levitt, M.D.
Frank M. MacDonald, M.D.
Ronald Messner, M.D.
Robert O. Mulhausen, M.D., M.S.
M. John Murray, M.D.
Frank Q. Nuttall, M.D., Ph.D.
Jack Oppenheimer, M.D.
L. D. Sabath, M.D.
George A. Sarosi, M.D.
Alvin L. Schultz, M.D.
Samuel Schwartz, M.D., Ph.D.
Fred Shapiro, M.D.
John Sheppard, M.D.
Stephen E. Silvis, M.D.
Werner Simon, M.D.
Luigi Taddeini, M.D.
Athanasios Theologides, M.D., Ph.D.
Louis Tobian, Jr., M.D.
Jack Vennes, M.D.
Yang Wang, M.D.
I. Dodd Wilson, M.D.
Leonard G. Wilson, M.D.
C. Paul Winchell, M.D.
Esmail Zanjani, M.D.
Leslie Zieve, M.D., Ph.D.

Clinical Professor Emeritus

Reuben Berman, M.D.
John E. Holt, M.D.
Harold E. Miller, M.D.
J. C. Miller, M.D.
Wesley W. Spink, M.D.

Clinical Professor

Rolf L. Andreassen, M.D.
Paul J. Bilka, M.D.
Robert D. Blomberg, M.D.
David M. Craig, M.D.
James L. Craig, M.D.
James C. Dahl, M.D.
Robert E. Doan, M.D.
John H. Flinn, M.D.
Benjamin F. Fuller, Jr., M.D.
Robert A. Green, M.D.
Albert J. Greenberg, M.D.
Mark C. L. Hanson, M.D.
Wilbert J. Henke, M.D.
Howard Horns, M.D.
Kjeld Husebye, M.D.
Martin E. Janssen, M.D.
John W. LaBree, M.D.
James L. McKenna, M.D.
James G. Myhre, M.D.
William O'Brien, M.D.
Herbert F. Plass, M.D., M.S.
Paul D. Redleaf, M.D.
Fred A. Rice, M.D.
Dean K. Rizer, M.D.
A. Boyd Thomes, M.D.
Francis B. Tiffany, M.D.
Lowell W. Weber, M.D.

Associate Professor

Jose Barbosa, M.D.
Clara D. Bloomfield, M.D.
John H. Bond, Jr., M.D.
Richard Branda, M.D.
Robert B. Breitenbucher, M.D.
William Callahan, M.D.
Brian C. Campion, M.D.
Christina M. Comty, M.D.
Philip Craddock, M.D.
Kent Crossley, M.D.
Peter Friend, M.D.
Arthur H. L. From, M.D.
Dale Gerding, M.D.
Morrison Hodges, M.D.
James Hoffman, M.D.
Jordan L. Holtzman, M.D.
Robert B. Howe, M.D.
Donald B. Hunninghake, M.D.
Gerhard Johnson, M.D.
J. Richard Johnson, M.D.
Charles R. Jorgensen, M.D.
Mohammed Khan, M.D.
David T. Kiang, M.D.
Richard A. King, M.D.
Robert Knodell, M.D.
Constance Limas, M.D.
Robert J. McCollister, M.D.
Charles R. Moldow, M.D.
Dennis E. Niewoehner, M.D.
Gerald R. Onstad, M.D.
Claus A. Pierach, M.D.
Michael Popkin, M.D.
Leopoldo Raij, M.D.
Harold L. Schwartz, Ph.D.
Rex B. Shafer, M.D.
William R. Swaim, M.D.
Naip Tuna, M.D., Ph.D.
Edward Weir, M.D.

Clinical Associate Professor

Robert L. Altman, M.D.
Donald S. Amatuzio, M.D.
Alfred F. Anderegg, M.D.

Thomas B. Arnold, M.D.
Thomas C. Bagnoli, M.D.
David Berman, M.D.
Malcolm N. Blumenthal, M.D.
Paul F. Bowlin, M.D.
John H. Brown, M.D.
Erskine M. Caperton, Jr., M.D.
Joseph Cardamone, M.D.
Malcolm D. Clark, M.D.
Roger S. Colton, M.D.
Wilfred A. Corson, M.D.
Kenneth Dedeker, M.D.
Jerome W. Dougan, M.D.
Donald A. Duncan, M.D.
Thomas B. Dunkel, M.D.
Ronald W. Ellis, M.D.
Rodney W. England, M.D.
Ignacio E. Fortuny, M.D.
Richard J. Frey, M.D.
Fredarick L. Gobel, M.D.
Benjie Goldfarb, M.D.
Earl Hill, M.D.
William H. Hollingshead, M.D.
Wayne L. Hoseth, M.D.
Milton M. Hurwitz, M.D., M.S.
Charles Jacobson, M.D.
Wyman E. Jacobson, M.D.
Herbert W. Johnson, M.D.
David G. Jones, M.D.
Harold B. Kaiser, M.D.
Arnold P. Kaplan, M.D.
Everett H. Karon, M.D.
James H. Kelly, M.D.
Joseph R. Kelly, M.D.
Allan C. Kind, M.D.
Irving J. Lerner, M.D.
John I. Levitt, M.D.
Michael Levy, M.D.
F. Bruce Lewis, M.D.
James P. Lillehei, M.D.
Robert E. Lindell, M.D.
Charles M. Lindemann, M.D.
Michael Lobell, M.D.
Paul T. Lowry, M.D.
James C. Mankey, M.D.
Dwight L. Martin, M.D.
Frank E. Martin, M.D.
Leonard Mastbaum, M.D.
H. Dawes Miller, M.D.
Todd C. Miller, M.D.
Gerald T. Mullin, M.D.
Charles L. Murray, M.D.
S. Scott Nicholas, M.D.
Franklin Norman, M.D.
William J. Paule, M.D.
William E. Petersen, M.D.
Charles R. Peterson, M.D.
Richard A. Pfohl, M.D.
Frank S. Preston, Jr., M.D.
David A. Randall, M.D.
Phillip Ranheim, M.D.
Thomas M. Recht, M.D.
William D. Remole, M.D.
A. McDonnell Richards, M.D.
Harold G. Richman, M.D.
Eugene Rinkey, M.D.
Lawrence A. Savett, M.D.
Raymond W. Scallen, M.D.
Leonard D. Schloff, M.D.
William F. Schoenwetter, M.D.
Burton Schwartz, M.D.
Marvin Segal, M.D.
Henry T. Smith, M.D.
Paul Steinberg, M.D.
Donald B. Swenson, M.D.
William B. Torp, M.D.
Richard B. Tregilgas, M.D.
Frank A. Ubel, Jr., M.D.
Richard M. Warhol, M.D.
Stephen C. Weisberg, M.D.
Richard C. Woellner, M.D.
A. Cabot Wohlrabe, M.D.

Assistant Professor

Arnold Adicoff, M.D.
Uma Alladi, M.D.
Richard W. Asinger, M.D.
Silvia H. Azar, M.D.
John Bantle, M.D.
Hans Bauer, M.D.
David G. Benditt, M.D.
Robert Berkseth, M.D.
Jesus Bianco, M.D.
Philip Bloom, M.D.
Thomas Bloss, M.D.
David C. Brown, M.D.
Milton L. Bullock, M.D.
Manuel G. Cosio, M.D.
John W. Cox, M.D.
Richard S. Crow, M.D.
Terry W. Crowson, M.D.
Russell Curry, M.D.
Morris Davidman, M.D.
Scott Davies, M.D.
Thomas Davin, M.D.
Alfred Doscherholmen, M.D., Ph.D.
John J. Drucker, M.D.
William C. Duane, M.D.
Sally M. Ehlers, M.D.
Mary Forcia, M.D.
Gary Francis, M.D.
Daniel Frenning, M.D.
Juan Fried, M.D.
Joyce L. Funke, M.D.
Roger L. Gebhard, M.D.
Stephen Gilberstadt, M.D.
Richard F. Gillum, M.D.
Michael Goodman, M.D.
Kathryn A. Hale, M.D.
Samuel W. Hall, M.D.
Dale Hammerschmidt, M.D.
Barry S. Handwerger, M.D.
David Hanley, M.D.
James Hatch, M.D.
Daniel E. Hathaway, M.D.
Robert Hebbel, M.D.
John R. Hoidal, M.D.
Neal Holtan, M.D.
William Hrushesky, M.D.
David Hurd, M.D.
Patrick W. Irvine, M.D.
Paul B. Johnson, M.D.
John A. Juers, M.D.
Lawrence R. Kaplan, M.D.
Neil E. Kay, M.D.
William F. Keane, M.D.
Douglas L. Kjellsen, M.D.
Edith Leyasmeyer, Ph.D.
Linda A. Long, M.D.
Russell V. Luepker, M.D.

King-Wai Ma, M.D.
Thomas MacKenzie, M.D.
James Madison, M.D.
Maren L. Mahowald, M.D.
Donald S. Masler, M.D.
John W. McBride, M.D.
Craig McClain, M.D.
Philip McGlave, M.D.
John Morley, M.D.
Martin M. Oken, M.D.
Robert C. Olson, M.D.
Thomas A. Ophoven, M.D.
Bruce A. Peterson, M.D.
Lance Peterson, M.D.
Phillip K. Peterson, M.D.
Robert A. Petzel, M.D.
James Pries, M.D.
Koppanadham V. Rao, M.D.
Fred Rasp, M.D.
Eugene P. Reese, Jr., M.D.
Frank Rhame, M.D.
Terry Rosborough, M.D.
Jeffrey S. Schwartz, M.D.
Bimlendra Sharma, M.D.
Geza Simon, M.D.
Charles Smith, M.D.
Ronald D. Soltis, M.D.
Michael T. Spilane, M.D.
Norman Steinberg, M.D.
M. Thomas Stillman, M.D.
David A. Stuart, M.D.
Padub Sukhum, M.D.
Harold C. Towle, M.D.
Gerald J. Vosika, M.D.
Paul Waytz, M.D.
David Zoschke, M.D.

Clinical Assistant Professor

Richard F. Adair, M.D.
Mohammed Ahmed, M.D.
Thomas W. Amsden, M.D.
Horace J. Andersen, M.D.
Michael Anderson, M.D.
Harold T. Arneson, M.D.
Frederick D. Arny, M.D.
John Baumgartner, M.D.
Jack G. Beaird, M.D.
Richard Beck, M.D.
Alphonso A. Belsito, M.D.
William J. Bergstrom, M.D.
Max A. Boller, M.D.
Stuart H. Borken, M.D.
Arnold M. Brier, M.D.
Robert Burmaster, M.D.
John M. Burns, M.D.
Conrad S. Butwinick, M.D.
Kenneth Caldwell, M.D.
John B. Cardle, M.D.
David J. Carlson, M.D.
Cecil H. Chally, M.D.
Thaddeus Chao, M.D.
Ephraim B. Cohen, M.D.
Robert F. Coniff, M.D.
Victor Corbet, M.D.
Charles Dash, M.D.
Curtis E. Davis, M.D.
Paul Dickinson, M.D.
Walter H. Dorman, M.D.
Ronald C. Eggert, M.D.
Hans Engman, M.D.
John G. Fee, M.D.
Jeffrey Felt, M.D.
William D. Flory, M.D.
Vincent L. Fromke, M.D.
Carl R. Guiton, M.D.
Paul R. Hamann, M.D.
A. Stuart Hanson, M.D.
William L. Hedrick, M.D.
Stanton A. Hirsh, M.D.
Neil R. Hoffman, M.D.
Frank J. Indihar, M.D.
Randall Johnson, M.D.
Lorraine Kretchman, M.D.
Catherine H. Lang, M.D.
Jerrold V. Larson, M.D.
Robert B. Lasser, M.D.
Elliot M. Latts, M.D.
Herbert Lauritzen, M.D.
James D. Lehmann, M.D.
Jeanette K. Lowry, M.D.
John C. Manion, M.D.
Raymond L. Maracek, M.D.
Aaron L. Mark, M.D.
C. Paul Martin, M.D.
Thomas Martin, M.D.
Donald S. Mattson, M.D.
William F. Mazzitello, M.D.
Charles N. McCloud, M.D.
Byron C. McGregor, M.D.
Ambrosio Meding, M.D.
Paul T. Moran, M.D.
John N. Mork, M.D.
Richard Morris, M.D.
Donn G. Mosser, M.D.
Beatrice Mulford, M.D.
Thomas F. Mulrooney, M.D.
Robert N. Needham, M.D.
Richard R. Nelson, M.D.
Leonard A. Nordstrom, M.D.
William F. Nuessle, M.D.
Bruce C. Nydahl, M.D.
William B. Ogden, M.D.
Eugene Ollila, M.D.
Ronald J. Pizinger, M.D.
James Reinertsen, M.D.
Rudolph J. Ripple, M.D.
James Rubin, M.D.
Kusum Saxena, M.D.
Robert H. Scott, M.D.
Terry C. Shackelford, M.D.
James R. Shanks, M.D.
Andrew W. Shea, M.D.
William Shimp, M.D.
John S. Shronts, M.D.
James C. Smith, M.D.
Louis H. Stahn, M.D.
Wayne Stern, M.D.
John E. Stevenson, M.D.
George Strauss, M.D.
Richard R. Sturgeon, M.D.
Richard W. Swenson, M.D.
Wayne H. Thalhuber, M.D.
Joseph M. Tombers, M.D.
David Vagneur, M.D.
Robert A. Van Tassel, M.D.
Donald G. Vellek, M.D.
Richard Wahlstrom, M.D.
Frederick E. Walker, M.D.
William E. Walsh, M.D.
Kyuhyun Wang, M.D.

John A. Wangsness, M.D.
Harold M. Wexler, M.D.
James Wiberg, M.D.
David N. Williams, M.D.
Donald W. Woodley, M.D.
Solomon J. Zak, M.D.
Stephen Zuckerman, M.D.

Instructor

Barbara Bowers, M.D.
Dennis Doorneweerd, M.D.
Paul Dorsher, M.D.
David Ernst, M.D.
Richard Farleigh, M.D.
David Griffin, M.D.
Daniel Hankins, M.D.
Linda Hedemark, M.D.
John Kleinman, M.D.
Mary Leida, M.D.
Jonathon Li, M.D.
Roger Luckmann, M.D.
David Martin, M.D.
Frank Mikell, M.D.
Wesley Miller, M.D.
Robert Nesheim, M.D.
Paul Pentel, M.D.
Greg Rutecki, M.D.
Bruce Schwartz, M.D.
Susan Schwartz, M.D.
Tryg Velde, M.D.

Clinical Instructor

Madeline M. Adcock, M.D.
Parin N. Ahamed, M.D.
Charles F. Alexander, M.D.
David C. Bartsch, M.D.
Lowell Becker, M.D.
David Bonham, M.D.
Robert Bonner, M.D.
Thomas Braxton, M.D.
Samuel E. Carlson, M.D.
Robert A. Coates, M.D.
James A. Daniel, M.D.
Thomas E. Davis, M.D.
K. James Ehlen, M.D.
William S. Eisenstadt, M.D.
Richard B. Guthrie, M.D.
Gary Hanovich, M.D.
Wayne Hass, M.D.
Mark I. Hewitt, M.D.
Bruce E. Jacobson, M.D.
Roger L. Johnson, M.D.
Victor Kelmensen, M.D.
John P. Kieley, M.D.
William Kimber, M.D.
Charles P. Kolars, M.D.
Stuart Lancer, M.D.
John W. Lawrow, M.D.
Wayne F. Leebaw, M.D.
Frank G. Lushine, M.D.
Gordon L. McKinlay, M.D.
Charles Meyer, M.D.
Michael I. Neren, M.D.
Jerrol Noller, M.D.
David B. Plimpton, M.D.
John Raines, M.D.
Jonathan Rogers, M.D.
Joseph M. Ryan, M.D.
Kamal K. Sahgal, M.D.
Mark J. Schmidt, M.D.
Lawrence Schuster, M.D.
David J. Scott, M.D.
Richard D. Shank, M.D.
Mark Sharon, M.D.
Michael Slag, M.D.
Cheryle D. Southern, M.D.
Jerrold M. Stempel, M.D.
Victor Tschida, M.D.
Ronald R. Vessey, M.D.
David E. Weinberg, M.D.
James J. Wheeler, M.D.
F. Douglas Whiting, M.D.
Paul E. Youngquist, M.D.

ELECTIVE COURSES

5501. MEDICAL ONCOLOGY INTERNSHIP IN MEDICINE. (9 cr per period, offered all periods) Kennedy
Training in internal medicine with emphasis on the total care of patients with cancer. Students, as interns, have direct patient responsibilities.

5502. MEDICINE EXTERNSHIP. (9 cr per period; offered all periods) Murray
The diagnosis, treatment, and management of patients on medical wards, allowing students as much individual patient care responsibility as possible.

5505. INFECTIOUS DISEASE RESEARCH. (18 cr; offered all periods) Sabath
Examination in depth of a clinical or laboratory problem related to infectious diseases.

5509. RESEARCH IN IMMUNOLOGY—RHEUMATOLOGY. (9 cr per period) Douglass
Research in rheumatology with emphasis on immune mechanisms of injury, inflammatory reactions, innovative therapeutic trials in induced disease. Broad latitude allowed student in designing individual research project. Multidisciplinary approach encouraged.

5510. RESEARCH IN INFECTIOUS DISEASE. (9 cr per period, offered all periods) Hall
Students carry out and complete a clinical or laboratory study of a current problem in the diagnosis, pathogenesis, or therapy of an infectious disease.

5511. RESEARCH IN GASTROENTEROLOGY. (9 cr per period, offered all periods) Levitt
Students carry on an active research program under the direction of a staff member in the Gastroenterology Section.

5512. RESEARCH IN HEMATOLOGY. (18 cr; offered all periods) Jacob
Research on a problem or problems currently under investigation in hematology.

5521. INFECTIOUS DISEASE, CLINICAL ASPECTS, AT THE UNIVERSITY HOSPITALS. (9 cr per period; offered all periods) Sabath
Students participate in clinical evaluation and management of inpatient problems, attend formal conferences, and observe the role of the clinical microbiology laboratory in investigation of infectious disease.

5522. MEDICAL GASTROENTEROLOGY. (9 cr per period; offered all periods) Martin
Students do workups and attend teaching rounds dealing with patients with gastrointestinal disease. Includes conferences and outpatient clinical experience.

5523. MEDICAL ENDOCRINOLOGY AND METABOLISM. (9 cr per period; offered all periods) Barbosa
Introductory experience in clinical endocrinology and metabolic disease. Emphasis on clinical diagnosis, efficient and incisive workups, and clinical management in both inpatient and outpatient settings.

5524. CLINICAL INFECTIOUS DISEASES. (9 cr per period; offered all periods) Hall
Emphasis on inpatients with clinical problems related to infections. Practical experience in examining and managing patients.

5525. CARDIOVASCULAR MEDICINE. (9 cr per period) Bache
Introduction to the diagnosis and management of cardiovascular disease occurring in adult patients.

5528. CLINICAL HEMATOLOGY. (9 cr per period; offered all periods) Howe
Clinical and research aspects of hematology. Course is structured to the student's specific goals, but generally the student is given initial responsibility for proposing diagnosis and treatment plans for patients with hematologic illnesses.

5531. CLINICAL RHEUMATOLOGY. (9 cr per period; offered all periods) Hathaway
Emphasis on clinical aspects of diseases of rheumatic and immunologic nature including the broad areas of collagen disease, autoimmune disease, and all types of arthritic and musculoskeletal disease.

5532. PULMONARY DISEASE. (9 cr per period; offered all periods) Drage
Emphasis on evaluation of clinical pulmonary problems and pathophysiology of pulmonary disease. Pulmonary physiology is taught in the pulmonary function laboratories and correlated with clinical data and chest X-rays.

5533. CLINICAL ALLERGY AT UNIVERSITY HOSPITALS. (4.5 or 9 cr; offered all periods; hrs ar) Blumenthal
Emphasis on the practical features of doing an allergic and immunologic workup and of treating patients in a safe and medically acceptable fashion.

5554. FLUID ELECTROLYTE AND ACID-BASE METABOLISM. (9 cr per period; offered all periods) Brown
Prevention, diagnosis, and treatment of acid-base (A/B) and fluid and electrolyte (F/E) disorders. Evaluation of acute and chronic renal failure. Students will be members of a consulting team that evaluates patients with A/B and F/E abnormalities associated with a variety of medical and surgical diseases.

5556. MEDICAL NEPHROLOGY AT UNIVERSITY HOSPITALS. (9 cr per period; offered all periods) Kjellstrand
Students gain proficiency in the diagnostic workup, treatment, and management of kidney patients.

5557. RESEARCH IN NEPHROLOGY. (18 cr; offered all periods) Kjellstrand
Research, particularly clinical research, in nephrology.

5562. MEDICAL NEPHROLOGY. (9 cr per period; offered all periods) Rao
Clinical problems in the diagnosis and management of patients with renal disease.

5572. AMBULATORY MEDICINE AT ST. PAUL-RAMSEY HOSPITAL. (9 cr per period; offered all periods) Spilane
Training in the ambulatory care of patients with health care problems in the areas of general internal medicine and subspecialty internal medicine.

5583. DIAGNOSIS, EVALUATION, AND CARE OF ADULTS AND CHILDREN WITH CANCER. (9 cr per period; offered all periods) Ramsay
Current concepts of management and the results of therapy for common malignancies. The cooperative role of various disciplines in the management of the cancer patient.

5590. PRECEPTORSHIP IN INTERNAL MEDICINE. (9 cr per period; offered all periods) Murray
Students examine and participate in medical practices in a setting different from the large institution, working with physicians by arrangement in either rural or city practices.

5594. PSYCHIATRY IN MEDICINE: CONSULTATION-LIAISON. (9 cr per period; offered all periods) Popkin
Psychiatric knowledge and skills integral to the holistic practice of medicine. Emphasis on the practical benefits and utility of psychiatric perspectives and interventions in the general medical setting.

5595. PSYCHOLOGICAL ASPECTS OF MEDICAL PRACTICE. (Cr ar; offered all periods) Wilder
Designed to provide a bridge linking medical diagnosis and treatment as well as psychological evaluation with the goals of teaching and improving comprehensive medical care.

Microbiology (MicB)

Dennis W. Watson, Ph.D., professor and head

Professor

Arthur Johnson, M.D., *head, UMD*[1]
Roy E. Ritts, Jr., M.D., *chairman, Mayo Graduate School of Medicine*[2]
Dwight L. Anderson, Ph.D.
K. Gerhard Brand, M.D.
Francis Busta, Ph.D.
Steven Douglas, M.D.
Martin Dworkin, Ph.D.
David P. Fan, Ph.D.
Anthony J. Faras, Ph.D.
V. W. Greene, Ph.D.
W. H. Hall, M.D., Ph.D.
Thomas Hamilton, M.D.
Alan B. Hooper, Ph.D.
Howard M. Jenkin, Ph.D.[3]
Russell C. Johnson, Ph.D.
Frederic C. McDuffie, M.D.[2]
Charles F. McKhann, M.D.
Gerald M. Needham, Ph.D.[2]
Peter G. W. Plagemann, Ph.D.
Paul Quie, M.D.
Palmer Rogers, Ph.D.
Charles Schachtele, Ph.D.
Edwin L. Schmidt, Ph.D.
Richard L. Simmons, M.D.
Henry M. Tsuchiya, Ph.D.
Lewis W. Wannamaker, M.D.
John A. Washington II, M.D.

Associate Professor

Peter Chapman, Ph.D.
P. Patrick Cleary, Ph.D.
Ronald Crawford, Ph.D.
Gregory Germaine, Ph.D.
Gerald Gleich, M.D.[2]
Beulah H. Gray, Ph.D.
Bruce Kline, Ph.D.[2]
Omelan Lukasewycz, Ph.D.
Harold Markowitz, M.D., Ph.D.[2]
Paul Meyers, Ph.D.[2]
Gary Pearson, Ph.D.[2]
James T. Prince
Bernard E. Reilly, Ph.D.
Richard J. Ziegler, Ph.D.[1]
James F. Zissler, Ph.D.

Assistant Professor

Russell F. Bey, Ph.D.
Robert Click, Ph.D.
Thomas Fitzgerald, Ph.D.
Bobby Jo Gormus, Ph.D.
Barry Handwerger, Ph.D.
Richard Krzyzek, Ph.D.
Richard Miller, Ph.D.
H. C. Tsien, Ph.D.
Robert Wonlheuter, Ph.D.

Lecturer

Donna J. Blazevic, M.P.H.
William Campbell, Ph.D.[2]
Grace Mary Ederer, M.P.H.
William Liljemark, D.D.S., Ph.D.
Larry McKay, Ph.D.
Charles Muscoplat, Ph.D.

Microbiology for freshman medical students covers the principles and techniques necessary to understand host-parasite relationships and the pathogenesis of infectious diseases. The application of microbiology to medical diagnosis guides the future physician in the treatment and prevention of infectious diseases and in the use of chemotherapeutic and antibiotic agents. In the lecture portion of the course, basic principles in medical immunology, parasitology, mycology, bacteriology, and virology are reviewed. Through laboratory experience the future clinician learns to interpret laboratory results as well as to appreciate the need for cooperation between the physician and the diagnostic laboratory.

Elective courses are offered to medical students during their second through fourth years of school. These courses present advanced studies and in-depth treatment of such topics as basic microbiology, immunobiology, immunochemistry, virology, microbial physiology, and mechanisms of pathogenicity.

REQUIRED COURSES

5205s.[4] **BASIC AND MEDICAL ASPECTS OF MICROBIOLOGY FOR MEDICAL STUDENTS.** (6 cr; prereq regis med tr or grad student) Brand and staff

Basic and medical aspects of immunology, parasitology, mycology, medical bacteriology, and virology with emphasis on pathogenesis. Principles and techniques for diagnosis, treatment (especially chemotherapy), and prevention of infectious disease.

[1]University of Minnesota, Duluth
[2]Mayo Graduate School of Medicine
[3]Hormel Institute
[4]Microscope required. Students may obtain use of microscope by purchasing a $3 microscope card from the bursar.

5206sul.[1] **BASIC AND MEDICAL ASPECTS OF MICROBIOLOGY FOR MEDICAL STUDENTS.** (4 cr)
(Continuation of 5205) Lecture and laboratory.

ELECTIVE COURSES

The following microbiology courses are available on a quarterly basis to medical students.

5105f.[1] **BIOLOGY OF MICROORGANISMS.** (4 cr, §3103, §Biol 3013; prereq 5 cr biological sciences. Biol 3021 or #) Dworkin
Lectures, demonstrations, and laboratory exercises in taxonomy, anatomy, physiology, biochemistry, and ecology of microbes. Molecular structure in relation to bacterial function.

5216f. IMMUNOLOGY. (4 cr, prereq Biol 3021) Gray
Nature of antigens and antibodies; chemical basis of serologic specificity; qualitative and quantitative aspects of antigen-antibody reactions; theories of antibody production; cellular antigens and blood grouping; nature of complement and its role in immunologic phenomena; mechanisms of hypersensitivity; hypersensitivity-like states and immunologic diseases; transplantation and tumor immunity; host-parasite interactions. Includes laboratory.

5218f. IMMUNOLOGY. (3 cr; prereq Biol 3021) Gray
Same as 5216 without laboratory.

5233f.[1] **MICROORGANISMS AND DISEASE.** (7 cr, not open to microbiology majors; prereq 10 cr chemistry and 5 cr biological sciences or #) Johnson
Nature of microorganisms, immunology, medical bacteriology, virology, mycology, parasitology, and principles of disease control.

5321w. PHYSIOLOGY OF BACTERIA. (3 cr; prereq 3103 or 5105 or Biol 3013...10 cr organic chemistry or biochemistry...3 cr genetics) Rogers
Chemical and physical organization of bacteria as related to function; growth; energy metabolism including oxidations and fermentations; nutritional requirements, antimicrobial agents; autotrophic mechanisms; microbial differentiation.

5322w. PHYSIOLOGY OF BACTERIA LABORATORY. (2 cr, prereq 5321 or *5321 and a lab course in basic bacteriology) Rogers
Techniques employed in the study of bacterial physiology and metabolism.

5424s. BIOLOGY OF VIRUSES. (4 cr; prereq 5321 or Biol 3021 and #) Plagemann
Structure, composition, and properties of bacterial, plant, and animal viruses; their interaction with cells and effects on host cell metabolism; biochemistry of viral replication; techniques used in study of viruses and viral infections; viral tumorigenesis. Includes laboratory.

5611f. MICROBIAL ECOLOGY. (4 cr; prereq general microbiology course. Biol 3021 or #) Crawford
Microbial adaptation and diversity; role of microorganisms in natural processes; methods in microbial ecology; other topics of interest to microbial ecologists.

ADVANCED CREDIT COURSES

(For a description and complete list of 8000-level courses, see the *Graduate School Bulletin* or *Graduate Programs in the Health Sciences Bulletin*)

8110f. BIOLOGY OF MICROORGANISMS

8112s. MICROBIAL GENETICS

8120f. MICROBIOLOGY LABORATORY

8121f. ADVANCED IMMUNOLOGY LABORATORY

8122. ADVANCED MICROBIOLOGY

8202w. ORAL MICROBIOLOGY

8218s. IMMUNOCHEMISTRY AND IMMUNOBIOLOGY

8234. ADVANCED MEDICAL MICROBIOLOGY

8242f,w,s. DIAGNOSTIC MICROBIOLOGY

8320w. IMMUNOGENETICS

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[1]Microscope required. Students may obtain use of microscope by purchasing a $3 microscope card from the bursar.

8323. REGULATION OF METABOLISM

8421f. MOLECULAR BIOLOGY OF CANCER

8425s. ADVANCED LABORATORY IN VIROLOGY AND ANIMAL CELL CULTURE

8910f,w,s. SEMINAR

8911f,w,s. COLLOQUIUM IN MICROBIOLOGY

8920f,w,s. ADVANCES IN IMMUNOLOGY

8990f,w,s,su. RESEARCH IN MICROBIOLOGY

Neurology (Neur)

Joseph A. Resch, M.D., professor and head

Professor

James Berry, Ph.D.
Milton G. Ettinger, M.D.
Robert J. Gumnit, M.D.
William R. Kennedy, M.D.
Arthur C. Klassen, M.D.
Joo Ho Sung, M.D.
Kenneth F. Swaiman, M.D.
Fernando Torres, M.D.
David Webster, M.D.
Jonathan D. Wirtschafter, M.D.
Francis S. Wright, M.D.

Clinical Professor

William Chalgren, M.D.
Paul M. Elwood, Jr., M.D.
Lawrence Farber, M.D.
Ernest M. Hammes, Jr., M.D.
Andrew Leemhuis, M.D.
Robert L. Meller, M.D., M.S.
Zondal R. Miller, M.D.
Harold Noran, M.D., Ph.D.
Sidney K. Shapiro, M.D.
Paul Silverstein, M.D.
Robert K. Stoltz, M.D.

Associate Professor

Khurshed A. Ansari, M.D.
Gary Birnbaum, M.D.
Harold P. Cohen, Ph.D.
Robert Kriel, M.D.
Myoung C. Lee, M.D.
Sping Lin, Ph.D.
Ruth Loewenson, Ph.D.
Angeline Mastri, M.D.
Manuel Ramirez-Lassepas, M.D.
Robert Roelofs, M.D.
Alan B. Rubens, M.D.
Bruce D. Snyder, M.D.

Clinical Associate Professor

James R. Allen, M.D.
Lowell Baker, M.D.
Charles S. Bland, M.D.
Michael Bromer, M.D.
Terrance Capistrant, M.D.
Richard Foreman, M.D.
Richard F. Galbraith, M.D.
Edward Jimenez-Pabon, M.D.
Richard V. Johnson, M.D.
Brian Krasnow, M.D.
Glenn Sawyer, M.D.
Randall T. Schapiro, M.D.
Lawrence Schut, M.D.
Irving Shapiro, M.D.
Gilbert Westreich, M.D.
V. Richard Zarling, M.D.

Assistant Professor

David C. Anderson, M.D.
Tsing Yun Chiang, M.D.
Ronald E. Cranford, M.D.
Anna Ellington, M.D.
Kathryn Green, M.D., Ph.D.
Elsa S. Greenberg, Ph.D.
Ilo Leppik, M.D.
Lawrence Lockman, M.D.
Mark W. Mahowald, M.D.
Gabe J. Maletta, M.D.
Assa Mayersdorf, M.D.
L. William McLain, Jr., M.D.
James A. Moriarty, M.D.
Gerald K. Morley, M.D.
James Mortimer, M.D.
Barbara Patrick, M.D.
Francis J. Pirozzolo, M.D.
Donald Quick, Ph.D.
Winfried Raabe, M.D.
S. Venkat Ramani, M.D.
Gerald Slater, M.D.
Stephen A. Smith, M.D.
Govin T. Vatassery, Ph.D.

Clinical Assistant Professor

C. Camak Baker, M.D.
Ivan Brodsky, M.D.
James G. Brueggemann, M.D.
Roger E. Farber, M.D.
Miguel E. Fiol, M.D.
Maland C. Hurr, M.D.
Thomas H. McPartlin, M.D.
Bruce A. Norback, M.D.
Paul M. Schanfield, M.D.
Crispin E. See, M.D.
Robert Soll, M.D.
Louise Town, M.D.
Thomas M. Wilson, M.D.

Instructor

Margaret Clipper
J. Thomas Hutton, M.D.
Kathleen Johnston

Clinical Instructor

Bruce I. Idelkope, M.D.
Hsien-Hwa Hsieh Lee, M.D.

The Department of Neurology provides in the second year training in clinical neurology as well as an interface with other departments in presenting an interdisciplinary approach to the neurosciences. These contributions include clinical correlations, lectures and demonstrations on techniques of the neurological examination, and a series of clinical demonstrations that provide a didactic approach to the field of clinical neurology. The department also offers the opportunity for externships in neurology that offer supervised clinical experience with inpatients and outpatients suffering from neurological disorders.

ELECTIVE COURSES

5120. SELECTED PROBLEMS IN NEUROLOGY. (Cr and hrs ar; prereq regis med) Staff

5510. EXTERNSHIP IN CLINICAL NEUROLOGY AT THE UNIVERSITY AND AFFILIATED HOSPITALS. (Cr and hrs ar; prereq regis med) Staff

5541. PEDIATRIC NEUROLOGY-NEUROCHEMISTRY. (Cr and hrs ar; prereq regis med) Swaiman

5542. PEDIATRIC NEUROLOGY. (Cr and hrs ar; prereq regis med) Swaiman

5544. CLINICAL ELECTROENCEPHALOGRAPHY. (Cr and hrs ar; prereq regis med) Torres

5545. ELECTROMYOGRAPHY. (Cr and hrs ar; prereq regis med) Kennedy

5570. IMMUNOLOGY—VETERANS ADMINISTRATION HOSPITAL. (Cr and hrs ar; prereq regis med) Ansari

ADVANCED CREDIT COURSES

(For a description of 8000-level courses, see the *Graduate Programs in the Health Sciences Bulletin*)

5121. DESCRIPTIVE NEUROLOGY. (2 cr, hrs ar; prereq regis occupational or physical therapy) Moriarty

8200. CLINICAL NEUROLOGY

8201. CLINICAL PEDIATRIC NEUROLOGY

8202. RESEARCH IN NEUROLOGY

8203. APPLIED ELECTROENCEPHALOGRAPHY

8204. APPLIED ELECTROMYOGRAPHY

8205. APPLIED NEUROPATHOLOGY

8220. NEUROPHARMACOLOGY

8221. NEUROCHEMICAL ASPECTS OF SELECTED CLINICAL DISORDERS

8222. APPLIED NEUROPHYSIOLOGY

8226. NEUROMUSCULAR DISEASE

8227. NEUROLOGICAL SPEECH DISORDERS

8229. CLINICAL CORRELATIVE NEUROANATOMY

8233. NEUROLOGICAL CLINICAL PATHOLOGICAL CONFERENCE

8234. NEUROPSYCHOLOGY CONFERENCE

8235. ADVANCED NEUROPSYCHOLOGY

8236. RESEARCH IN NEUROPATHOLOGY

8244. NEUROEPIDEMIOLOGY

8245. DEVELOPMENTAL NEUROSCIENCES

8701. NEUROOPHTHALMOLOGY

8702. NEURORADIOLOGY

8703. ADVANCED NEUROPATHOLOGY

8704. SURVEY OF NEUROPATHOLOGY

8705. NEUROLOGICAL-NEUROSURGICAL CONFERENCE

Neurosurgery (NSu)

Shelley N. Chou, M.D., Ph.D., professor and head

Professor

James R. Bloedel, M.D.
Lyle A. French, M.D., Ph.D.
Manfred J. Meier, Ph.D.
Edward L. Seljeskog, M.D., Ph.D.

Clinical Professor

Harold Buchstein, M.D., M.S.
Leonard Titrud, M.D., Ph.D.

Associate Professor

Donald L. Erickson, M.D.

Clinical Associate Professor

Paul S. Blake, M.D.
Robert L. Merrick, M.D., Ph.D.
Charles D. Ray, M.D.
Erich S. Wisiol, M.D.

Assistant Professor

Robert E. Maxwell, M.D., Ph.D.
Gaylan L. Rockswold, M.D.
Phudhiphorn Thienprosit, M.D., Ph.D.
Jesse C. Yap, M.D.

Clinical Assistant Professor

Heinrich Bantli, Ph.D.
David Danoff, M.D.
Stephen H. Martin, M.D.

Clinical Instructor

Walter Bailey, M.D.
Harry Rogers, M.D.
John L. Seymour, M.D.
Andrew J. K. Smith, M.D., Ph.D.
Max Zerling, M.D.

The courses in neurological surgery are designed to introduce medical students to the theory, philosophy, and treatment of the surgical diseases of the nervous system. The primary emphasis is on the recognition of neurological problems, with special emphasis on the broad scope of methodology used in diagnosis. Experience in methods of treatment is obtained through a close working relationship with the staff. The program is designed to provide a broad base of experience for the individual interested in general medicine but may, in certain instances, be adapted for the individual specifically interested in the neurological sciences.

ELECTIVE COURSES

5500. EXTERNSHIP AT THE UNIVERSITY HOSPITALS. (Cr ar; prereq regis med)

5510. EXTERNSHIP AT VETERANS HOSPITAL. (Cr ar; prereq regis med)

5511. EXTERNSHIP AT HENNEPIN COUNTY GENERAL HOSPITAL. (Cr ar; prereq regis med)

5512. EXTERNSHIP AT ST. PAUL-RAMSEY HOSPITAL. (Cr ar; prereq regis med)

5520. NEUROSURGICAL INVESTIGATION. (Cr ar; prereq regis med)

5530. NEUROPSYCHOLOGY. (Cr ar; prereq regis med)

5540. NEUROSURGICAL CONFERENCE. (Cr ar; prereq regis med)

ADVANCED CREDIT COURSES

8300. OUTPATIENT CLINIC IN NEUROSURGERY

8305. NEUROSURGICAL DIAGNOSIS

8308. NEUROSURGICAL SERVICE

8311. OPERATIVE NEUROLOGICAL SURGERY

8316. NEUROSURGICAL RESEARCH

8318. NEURORADIOLOGICAL CONFERENCE

8320. NEUROSURGICAL CONFERENCE

8322. SEMINAR: NEUROSURGERY-OPHTHALMOLOGY—PART I

8323. SEMINAR: NEUROSURGERY-OPHTHALMOLOGY—PART II

8324. READINGS IN NEUROBIOLOGY

8325. ADVANCED READINGS IN NEUROBIOLOGY

Obstetrics and Gynecology (Obst)

Konald A. Prem, M.D., professor and head

Professor

Harry Foreman, M.D., Ph.D.
Donald W. Freeman, M.D.
Robert J. Gorlin, D.D.S.
Erick Y. Hakanson, M.D.
Takashi Okagaki, M.D., Ph.D.
George E. Tagatz, M.D.

Clinical Professor

Alex Barno, M.D.
Irving C. Bernstein, M.D.

Associate Professor

Leon L. Adcock, M.D.
Richard P. Bendel, M.D.
Julius C. Butler, Jr., M.D.
Edward C. Hanisch, Jr., M.D.
Benjamin S. Leung, Ph.D.
Theodore C. Nagel, M.D.
Preston P. Williams, M.D.

Clinical Associate Professor

Melvin P. Baken, Jr., M.D.
Milton E. Baker, M.D.
Maxwell M. Barr, M.D.
James R. Bergquist, M.D.
Dorothy M. Bernstein, M.D.
Thomas C. Carrier, M.D.
Joseph A. Cella, M.D.
Charles E. Crutchfield, M.D.
Robert A. Diamond, M.D.
John D. Farr, M.D.
Peter E. Fehr, M.D.
Joseph I. Hamel, M.D.
Jane E. Hodgson, M.D.
George W. Janda, M.D.
G. Eric Knox, M.D.
Fred A. Lyon, M.D.
Peter M. Mark, M.D.
Edward C. Maeder, Jr., M.D.
F. J. McCaffrey, M.D.
Charles J. McCarthy, M.D.
Fred E. Mecklenburg, M.D.
Henry C. Meeker, M.D.
Gunard A. Nelson, M.D.
Edward H. Niera, M.D.
Bruce J. O'Brien, M.D.
Jay R. Olsen, M.D.
Hardin E. Olson, M.D.
Mitchell Pincus, M.D.
Jerome J. Scherek, M.D.
Clark A. Shattuck, M.D.
Gaius J. Slosser, M.D.
Anton F. Spraitz, Jr., M.D.
Samuel B. Solhaug, M.D.
Arthur R. Thelemann, M.D.
Robert N. Wagner, M.D.
John W. Warren, M.D.
P. Theodore Watson, M.D.
Martin G. Weisberg, M.D.
Earl V. Wetzel, M.D.

Assistant Professor

M. Ismail Barrada, M.D.
Doris C. Brooker, M.D.
Laura E. Edwards, M.D.
Marilyn S. Joseph, M.D.
Gary T. Lundborg, M.D.
Sharon S. Rising, C.N.M.
Leo B. Twiggs, M.D.

Clinical Assistant Professor

Andrew R. Agee, M.D.
M. M. Aksoy, M.D.
Neil I. Arnold, M.D.
Robert L. Barricks, M.D.
Arthur H. Bearon, M.D.
John A. Beeman, M.D.
Stephen J. Berestka, M.D.
James A. Brockberg, M.D.
John M. Brown, M.D.
John C. Ellis, Jr., M.D.
Harry F. Farb, M.D.
John D. Farr, M.D.
Howard W. Fisher, M.D.
Richard R. Fliehr, M.D.
Russell N. Frys, M.D.
Emanuel P. Gaziano, M.D.
Ernest Goodman, M.D.
John J. Graham, M.D.
Richard C. Graham, M.D.
Arlyn A. Hamann, M.D.
Edward M. Hanton, M.D.
David L. Hill, M.D.
Arthur J. Horowitz, M.D.
Richard L. Jackson, M.D.
Alec L. Janes, M.D.
David W. Johnson, M.D.
Donald A. Johnson, M.D.
M. F. Komsheh, M.D.
Beni Katz, M.D.
Frederick H. Kravitz, M.D.
Stephen L. Larson, M.D.
David C. Lees, M.D.
Jack R. Lees, M.D.
Howard M. Levine, M.D.
Anatol Lysyj, M.D.
Joseph S. Massee, M.D.
Miriam K. McCreary, M.D.
Stephen A. McCue, M.D.
Nicholas M. Mensheha, M.D.
Robert K. Nolan, M.D.
Robert A. Nordland, M.D.
Pamela A. Norford, M.D.
Gerald O'Brien, M.D.
William J. O'Hanlon, M.D.
Robert A. Olson, M.D.
Dwain J. Paal, M.D.
Oliver H. Peterson, M.D.
Peter Popadiuk, M.D.
Philip S. Randall, M.D.
John A. Reichert, M.D.
George E. Schaffhausen, M.D.
Richard C. Schissel, M.D.
Richard L. Schroeder, M.D.
Melvin B. Sinykin, M.D.
Loren A. Smeby, M.D.
Norman S. Solberg, M.D.
Dirk J. A. Van Oppen, M.D.
James O. Wall, M.D.
John D. Watson, M.D.
David I. Wigren, M.D.

Clinical Instructor

Robert A. Braun, M.D.
Lawrence C. Cairns, M.D.
Bruce F. Campbell, M.D.
Joseph G. Capecchi, M.D.
Eric J. Gilster, M.D.
Robert H. Kaplan, M.D.
James B. Lannon, M.D.
Joan E. Madden, M.D.
John W. Malo, M.D.
Philip Marcus, M.D.
Ronald J. Peterson, M.D.
Leslie A. Sharpe, M.D.
Michael W. Spence, M.D.
Charles A. Stegeman, M.D.
Mark L. Tanz, M.D.

The field of obstetrics and gynecology encompasses all aspects of human reproduction. The course of study in the Medical School provides the student with a basic understanding of the reproductive process and of the function of the female reproductive system, especially during pregnancy and childbirth. At University Hospitals, practical obstetrical experience is gained in the management of normal pregnancy, evaluation of the status of the fetus *in utero*, supervision of labor, and conduct of delivery. The clinical experience in obstetrics and gynecology is expanded at affiliated community hospitals. Experience in gynecology includes a systematic study of the diagnosis and therapy of diseases of the female reproductive system, gynecological endocrinology, and clinical gynecological cytology and pathology. In seminars and small group discussions, problems of current importance in human reproductive biology are discussed, ranging from the broad social problems of fertility regulation to the specific medical problems of the infertile couple.

The primary aim of the Department of Obstetrics and Gynecology is to provide a basic foundation that will enable the student to understand human reproductive process at a level consistent with his or her ultimate career goals. The department offers a series of clinical and investigative elective courses designed to fit the varied interests of students.

ELECTIVE COURSES

5500. EXTERNSHIP IN OBSTETRICS AND GYNECOLOGY. (Cr ar, prereq regis med) Foreman, staff
Six-week experience in clinical obstetrics and gynecology spent in one of seven hospitals: Hennepin County Medical Center, North Memorial, St. Joseph's, St. Mary's, St. Paul-Ramsey, University, or St. Luke's (Duluth). Students may express hospital preference, but final assignments will be made by course coordinator. This is the core clinical course in obstetrics and gynecology for Phase D students selecting tracts in medicine, surgery, pediatrics, family practice, or obstetrics. Graded responsibility assigned so that, by end of externship, student will be able to manage and deliver normal pregnancies, perform minor gynecological procedures, and be familiar with and have observed most common obstetrical and gynecological problems. All students meet at University Hospitals Tuesday, Wednesday, and Thursday of first week and each Wednesday afternoon thereafter for didactic presentations.

5520. OBSTETRICS AND GYNECOLOGY EXTERNSHIP IN CLINICAL PRACTICE. (Course and cr ar) Foreman, staff
Practical community experience in obstetrics and gynecology under preceptorship of one or more practicing members of clinical staff. Both office and hospital practice included. In order to devote full energy to association with a busy specialist, student will have no other assignments during this time. To be arranged individually with course coordinator.

5540. ADVANCED EXTERNSHIP IN OBSTETRICS AND GYNECOLOGY. (Cr ar, prereq 5500) Foreman, staff
Full-time clinical experience on obstetrical and gynecological service at one of three hospitals: Hennepin County Medical Center, St. Paul-Ramsey, or University. Students may express hospital preference, but final assignments will be made by course coordinator. Emphasis is on total care of obstetrical patients and on management of major gynecological conditions. Students who have been in Rural Physician Associate Program may take this course without having taken 5500.

5550. PSYCHIATRIC ASPECTS OF OBSTETRICS AND GYNECOLOGY. (Cr ar, prereq regis med) Foreman, i Bernstein, D Bernstein
Experience in diagnosis and treatment of patients who come to a psychiatrist either directly or on request for consultation from a medical colleague, particularly an obstetrician-gynecologist. Primarily directed to management of female patients, including adolescents.

5560. RESEARCH IN REPRODUCTION. (Cr and hrs ar) Foreman, staff
Topics selected for each student.

5575. GYNECOLOGICAL PATHOLOGY AND DIAGNOSTIC CYTOLOGY. (Cr ar; prereq 5500) Foreman, Okagaki, Brooker
Review of daily gynecological histopathology material of surgical and clinical cases from Ob-Gyn Service. Includes diagnostic cytology of Pap smears encountered in actual practice.

5590. PRECEPTORSHIP IN OBSTETRICS AND GYNECOLOGY. (Course and cr ar; prereq 5500) Foreman
Full-time preceptorship in clinical obstetrics and gynecology offered in outstate Minnesota by the Area Health Education Center (AHEC). Student receives per diem expenses. Similar to experience in 5520, but in smaller community.

ADVANCED CREDIT COURSES

8201. ADVANCED OBSTETRICS AND GYNECOLOGY
8202. ADVANCED OBSTETRICS AND GYNECOLOGY
8203. ADVANCED OBSTETRICS AND GYNECOLOGY
8204. ADVANCED OBSTETRICS AND GYNECOLOGY
8205. ADVANCED OBSTETRICS AND GYNECOLOGY
8206. ADVANCED OBSTETRICS AND GYNECOLOGY
8207. ADVANCED OBSTETRICS AND GYNECOLOGY
8208. ADVANCED OBSTETRICS AND GYNECOLOGY
8209. ADVANCED OBSTETRICS AND GYNECOLOGY
8210. ADVANCED OBSTETRICS AND GYNECOLOGY
8211. ADVANCED OBSTETRICS AND GYNECOLOGY
8212. ADVANCED OBSTETRICS AND GYNECOLOGY
8213. ADVANCED OBSTETRICS AND GYNECOLOGY
8214. ADVANCED OBSTETRICS AND GYNECOLOGY
8215. ADVANCED OBSTETRICS AND GYNECOLOGY
8216. ADVANCED OBSTETRICS AND GYNECOLOGY
8217. SEMINAR: OBSTETRICS AND GYNECOLOGY
8218. SEMINAR: OBSTETRICS AND GYNECOLOGY
8219. SEMINAR: OBSTETRICS AND GYNECOLOGY
8221. SEMINAR: OBSTETRICS AND GYNECOLOGY
8222. GYNECOLOGICAL ONCOLOGY
8223. GYNECOLOGICAL ONCOLOGY
8224. GYNECOLOGICAL ENDOCRINOLOGY—Part I
8225. GYNECOLOGICAL ENDOCRINOLOGY—Part II
8226. OBSTETRICAL PHYSIOLOGY AND ANESTHESIOLOGY
8227. PRECEPTORSHIP IN CLINICAL PRACTICE
8228. SELECTED ASPECTS OF RADIATION THERAPY
8229. SELECTED ASPECTS OF MEDICAL ONCOLOGY
8230. RESEARCH IN REPRODUCTION

Ophthalmology (Opth)

Donald J. Doughman, M.D., professor and head

Professor Emeritus
John E. Harris, M.D.

Professor
William H. Knobloch, M.D.
Jonathan D. Wirtschafter, M.D.

Clinical Professor
Harry Friedman, M.D.
Robert Monahan, M.D.
Howard Shaw, M.D.
George Tani, M.D.

Associate Professor

William L. Fowlks, Ph.D.
Robert D. Letson, M.D.
Robert C. Ramsay, M.D.
William R. Rathbun, Ph.D.

Clinical Associate Professor Emeritus

Douglas Johnson, M.D.
Karl Sandt, M.D.

Clinical Associate Professor

Bud Appleton, M.D.
Llewellyn Christensen, M.D.
W. Bruce Clark, M.D.
Robert Fink, M.D.
Charlotte Hill, M.D.
Richard Horns, M.D.
Leslie Jacobson, M.D.
Yale Kanter, M.D.
Richard Leavenworth, M.D.
Vernon Lindberg, M.D.
Winston Lindberg, M.D.
Malcolm McCannel, M.D.
Sidney Nerenberg, M.D.
Charles Ostrov, M.D.
Harry Plotke, M.D.
Brooks Poley, M.D.
John Riley, M.D.
Robert Rocknem, M.D.
Thomas Rucker, M.D.
Irving Shapiro, M.D.
James Standefer, M.D.
Donald Sterner, M.D.
Richard Student, M.D.
Frederic Wipperman, M.D.
Robert Wohlrabe, M.D.
Frederick Wuest, M.D.

Assistant Professor

Douglas Cameron, M.D.
Herbert Cantrill, M.D.
Jonathan Pederson, M.D.

Clinical Assistant Professor

Frank Adair, M.D.
James Allen, M.D.
James Brown, M.D.
Martin Bruhl, M.D.
Emmett Carpell, M.D.
Richard Carroll, M.D.
Robert Cooper, M.D.
Theodore Fritsche, M.D.
Howard Gilbert, M.D.
Nicholas Haddad, M.D.
Martin Kaplan, M.D.
Jerry Kobrin, M.D.
Allen Larsen, M.D.
Ernest Larson, M.D.
James Layer, M.D.
Murray Lufkin, M.D.
John McNeill, M.D.
Aaron Nathenson, M.D.
Lydia Neibergs, M.D.
Mark Norman, M.D.
Thomas O'Kane, M.D.
Richard Olson, M.D.
Rene Pelletier, M.D.
Jerome Poland, M.D.
Thomas Purcell, M.D.
Charles Roach, M.D.
Robert Sigelman, M.D.
Wesley Sondreal, M.D.
Alfred Steldt, M.D.
Joseph Terry, M.D.
Byron Teska, M.D.
James Thompson, M.D.
Jon Tierney, M.D.
Elliott Troup, M.D.
Paul Wicklund, M.D.

Clinical Instructor

Peter Arny, M.D.
Christopher Brown, M.D.
David Hendrickson, M.D.
Donald Herrick, M.D.
George Hilgerman, M.D.
Herbert Hobday, M.D.
Douglas Holmen, M.D.
James Householder, M.D.
Robert Ostrow, M.D.
Carroll Rund, M.D.
Paul Sanderson, M.D.
David Simundson, M.D.
Robert Warshawsky, M.D.

ELECTIVE COURSE

5100. INTRODUCTION TO OPHTHALMIC PATHOLOGY. (1 cr. prereq #) Cameron

ADVANCED CREDIT COURSES

8101f,w,s,su. CLINICAL OPHTHALMOLOGY. (8 cr) Doughman and staff

8110s. OPTICS, REFRACTION AND CONTACT LENSES. (3 cr) Tani

8111w. INTRAOCULAR INFLAMMATION, UVEITIS, AND OCULAR TUMORS. (3 cr) Cameron

8112f. RETINA AND VITREOUS. (3 cr) Ramsay

8113w. BASIC AND CLINICAL NEUROOPHTHALMOLOGY. (3 cr) Wirtschafter

8114f. BINOCULAR VISION AND MOTILITY. (3 cr) Letson

8115w. EXTERNAL DISEASE AND CORNEA. (3 cr) Doughman

8116s. GLAUCOMA, LENS, AND ANTERIOR SEGMENT TRAUMA. (3 cr) Standefer

8117f. ORBIT, PLASTICS, AND TRAUMA (EXCEPT INTRAOCULAR). (3 cr) Carroll

8118s. GENERAL MEDICAL CARE PROBLEMS. (3 cr) Ramsay

8119f,w,s. CLINICAL PATHOLOGICAL CORRELATIONS IN OPHTHALMOLOGY. (1 cr) Cameron

8120f,w,s. SCOPE OF OPHTHALMIC PATHOLOGY. (2 cr) Cameron

8131f,w,s,su. PRACTICAL OCULAR SURGERY. (3 cr) Doughman and staff

8142f,w,s,su. OPHTHALMIC PATHOLOGY LABORATORY. (2 cr) Cameron

8152. OPHTHALMOLOGY LABORATORY. (15 cr) Staff

8153. RESEARCH IN OPHTHALMOLOGY. (Cr ar) Staff

8154. SEMINAR: OPHTHALMOLOGY. (Cr ar) Staff

8155. SPECIAL TOPICS IN OPHTHALMOLOGY. (Cr ar) Staff

8218f. VISUAL SYSTEMS. (Cr ar) Purple

Orthopaedic Surgery (OrSu)

Roby C. Thompson, Jr., M.D., professor and head

Professor

David S. Bradford, M.D.
Robert B. Winter, M.D.

Clinical Professor

Frederick E. Drill, M.D.
Ramon B. Gustilo, M.D.
Harry B. Hall, M.D.
Sheldon M. Lagaard, M.D.

Associate Professor

Thomas H. Comfort, M.D.
James H. House, M.D., M.S.
Robert F. Premer, M.D.

Clinical Associate Professor

Richard J. Aadalen, M.D.
Robert M. Barnett, M.D.
Lester W. Carlander, M.D.
Arnold L. Hamel, M.D.
Richard H. Jones, M.D.
Lowell Kleven, M.D.
Lowell Lutter, M.D.
Edward C. McElfresh, M.D.
Harvey E. O'Phelan, M.D.
Wayne W. Thompson, M.D.

Assistant Professor

Alfred F. Behrens, M.D.
John E. Lonstein, M.D.
Jack K. Mayfield, M.D.
Theodore R. Oegema, Jr., Ph.D.
Harry J. Robinson, M.D.

Clinical Assistant Professor

Gordon Aamoth, M.D.
Frank S. Babb, M.D., M.S.
Roland Birkebak, M.D.
Vincent E. Eilers, M.D.
David W. Florence, M.D.
John A. Hartwig, M.D.
Edward H. Kelly, M.D.
Charles C. Lai, M.D.
Donald R. Lannin, M.D., M.S.
Lloyd Leider, M.D.
John E. McMahon, M.D.
Richard D. Schmidt, M.D.
Joseph M. Tambornino, M.D.
Francis J. Trost, M.D.

Instructor

Karl L. Pennau, M.D.

Clinical Instructor

John W. Benton, M.D.
Wesley H. Burnham, M.D.
F. Dixon Conlin, M.D.
Charles J. Cooley, M.D.
Michael W. Davis, M.D.
Leo J. DeSouza, M.D.
Richard B. Edwards, M.D.
David A. Fischer, M.D.
Lewis J. Gramer, M.D.
Patrick M. Healy, M.D.
Christopher V. Horn, M.D.
James E. Johanson, M.D.
Richard J. Johnson, M.D.
Stephen Kuslich, M.D.
Richard F. Kyle, M.D.
John Larkin, M.D.
Thomas Litman, M.D.
Donald Madsen, M.D.
David H. Palmer, M.D.
James D. Priest, M.D.
Thomas Raih, M.D.
Jerry Reese, M.D.
George E. Reisdorf, M.D.
Ivan Schloff, M.D.
Peter Strand, M.D.
Marlen S. Strefling, M.D.
John Wilson, M.D.
James T. Young, M.D.

The major goals of the courses in orthopedic surgery are to provide the medical student with the foundation necessary for performing a basic neuromusculoskeletal

examination of the patient, for correlating the clinical expressions of disease with a knowledge of basic science, and for recognizing those patient problems that require immediate appraisal and resolution. In a number of clinical electives, the student has the option of participating in the diagnostic and therapeutic management of patients with orthopedic and traumatic disabilities; this advanced experience provides an understanding of fundamental orthopedic principles, the scope of orthopedic surgery, and the opportunities for both clinical and basic investigation in orthopedic surgery.

ELECTIVE COURSES

5180. ORTHOPEDICS I. (Cr ar; prereq regis med)

5185. ORTHOPEDICS II—EXTERNSHIP IN ORTHOPEDIC SURGERY. (Cr ar, prereq regis med)

5186. RESEARCH PROBLEMS IN ORTHOPEDIC SURGERY. (Cr ar; prereq regis med)

5187. EXTERNSHIP IN ORTHOPEDIC SURGERY AND FRACTURES—St. Paul-Ramsey Hospital. (Cr ar; prereq regis med)

5188. EXTERNSHIP IN ORTHOPEDIC SURGERY AND FRACTURES—Gillette Children's Hospital, St. Paul. (Cr ar, prereq regis med)

5189. EXTERNSHIP IN ORTHOPEDIC SURGERY AND FRACTURES—St. Luke's Hospital, Duluth. (Cr ar; prereq regis med)

5190. EXTERNSHIP IN ORTHOPEDIC SURGERY AND FRACTURES—Veterans Hospital. (Cr ar; prereq regis med)

5191. ORTHOPEDIC EXTERNSHIP AT HENNEPIN COUNTY GENERAL HOSPITAL. (Cr ar; prereq regis med)

ADVANCED CREDIT COURSES

8401. ORTHOPEDIC CONFERENCE

8403. FRACTURES

8404. FRACTURES

8405. ORTHOPEDIC DIAGNOSIS

8407. PEDIATRIC ORTHOPEDICS

8408. ORTHOPEDIC PROBLEMS AND MANAGEMENT

8409. ORTHOPEDIC PROBLEMS AND MANAGEMENT

8410. ORTHOPEDIC PATHOLOGY

8411. ORTHOPEDIC OPERATIVE SURGERY

8412. ORTHOPEDIC ANATOMY

8416. ORTHOPEDIC RESEARCH

Otolaryngology (Otol)

Michael M. Paparella, M.D., professor and head

Professor

Arndt J. Duvall III, M.D.
Earl Harford, Ph.D.
S. K. John, M.D.
Frank Lassman, Ph.D.
W. Dixon Ward, Ph.D.

Clinical Professor

Ernest Anderson, M.D.
Robert Gorlin, M.D., D.D.S.
Jerome A. Hilger, M.D.
Albert Hohmann, M.D.
Melvin E. Sigel, M.D.

Associate Professor

George L. Adams, M.D.
Lawrence Boies, Jr., M.D.
Mary Jayne Capps, Ph.D.
William L. Meyerhoff, M.D.
David A. Nelson, Ph.D.
Kurt Pollak, M.D.
Donald W. Robertson, Ph.D.

Clinical Associate Professor

John D. Banovetz, M.D.
David Buran, M.D.
John S. Huff, M.D.

Severin Koop, M.D.
Joseph Leek, M.D.
Cheng-en Lu, M.D.
Hyman Paisner, M.D.
Robert Richardson, M.D.
George V. Tangen, M.D.

Assistant Professor

John H. Anderson, M.D., Ph.D.
Timothy Doyle, Ph.D.
Richard L. Hoel, M.A.
Stephen Liston, M.D.
Robert H. Maisel, M.D.
Tetsuo Morizono, M.D.
Mario Ruggero, Ph.D.
Leonard Rybak, M.D.
Peter Santi, Ph.D.

Clinical Assistant Professor

Dennis Brady, M.D.
Thomas G. Bunker, M.D.
Richard B. Carley, M.D.
Thomas A. Christiansen, M.D.
Barclay Cram, M.D.
James Dunn, M.D.
Gary Garvis, M.D.
Neill Goltz, M.D.
Ekrem Gozum, M.D.
Gerald Jurgens, M.D.
Morton Kane, M.D.
Robert Koller, M.D.
Bradley Kusske, M.D.
Douglas Kusske, M.D.
Richard M. Levinson, M.D.
Richard Lund, M.D.
C. Randall Nelms, M.D.
Evan Nelson, Jr., M.D.
Winston Odland, M.D.
Jerome O'Hearn, M.D.
Elizabeth Payne, M.D.
Robert Rosenberg, M.D.
Mark Satz, M.D.
Richard Schlorf, M.D.
Leighton Siegel, M.D.
Graham Smith, M.D.
Harold Ulvestad, M.D.
Kent Wilson, M.D.

Instructor

David W. Johnson, M.D.

Clinical Instructor

Richard Dobbs, M.D.
Thomas Englund, M.D.
Laurence Winter, M.D.
John Youngs, M.D.

The medical student is introduced to otolaryngology through a series of didactic lectures that emphasize broad aspects of the field and discussions of basic principles when applicable. The course work in the Department of Otolaryngology involves student participation in the clinical examination of patients with otolaryngological disorders. During this time, the student develops skills in examination (especially indirect laryngoscopy) and in interpretation of findings. The practical work is supplemented by discussions and seminars with the faculty. The student is encouraged to spend additional elective time in clinical, surgical, and research services in the department.

ELECTIVE COURSES

5500. GENERAL ENT ELECTIVE

5501. ACTING INTERNSHIP IN ENT

5502. NEUROLOGICAL SCIENCES ENT

5503. RESEARCH: BASIC SCIENCE ENT ELECTIVE

ADVANCED CREDIT COURSES

8220. RESEARCH IN OTOLARYNGOLOGY

8230. CLINICAL OTORHINOLARYNGOLOGY

8231. SURGERY OF EAR, NOSE, AND THROAT

8232. MAXILLOFACIAL SURGERY

8233. PLASTIC AND RECONSTRUCTIVE SURGERY: HEAD, NECK

8234. ANATOMY OF THE HEAD AND NECK AND TEMPORAL BONE DISSECTION

8235. ROENTGENOLOGY OF THE HEAD AND NECK

8236. PHARMACOLOGY IN ENT

8237. ENDOSCOPY

8238. PATHOLOGY OF THE EAR, NOSE, AND THROAT

8239. OTONEUROLOGY

8240. ALLERGY

8241. TUMOR CLINIC

8242. AUDIOLOGY AND SPEECH PATHOLOGY

8243. INTRODUCTION: RESEARCH METHODOLOGY

8244. SEMINAR: CURRENT LITERATURE

8245. M.S. THESIS RESEARCH

8246. PH.D. THESIS RESEARCH

Pediatrics (Ped)

James H. Moller, professor and interim head

Professor

Ray C. Anderson, M.D.
Henry Balfour, M.D.
Eldon Berglund, M.D.
David M. Brown, M.D.
C. Carlyle Clawson, M.D.
Patricia Ferrieri, M.D.
Robert Fisch, M.D.
Alfred Fish, M.D.
Edward Kaplan, M.D.
John Kersey, M.D.
William Krivit, M.D.
Russell Lucas, M.D.
S. Michael Mauer, M.D.
Alfred Michael, M.D.
Bernard Mirkin, M.D., Ph.D.
James Moller, M.D.
Mark Nesbit, M.D.
Arthur Page, M.D.
Paul Quie, M.D.
Richard Raile, M.D.
Harvey Sharp, M.D.
Kenneth Swaiman, M.D.
Robert ten Bensel, M.D.
Robert Ulstrom, M.D.
Homer Venters, M.D.
Robert Vernier, M.D.
Lewis Wannamaker, M.D.
Warren Warwick, M.D.
James White, M.D.
Francis Wright, M.D.

Clinical Professor Emeritus

Stuart L. Arey, M.D.

Clinical Professor

Donald Amren, M.D.
Arnold Anderson, M.D.
William Bevis, M.D.
Robert J. Desnick, M.D., Ph.D.
Paul Ellwood, M.D.
Donnell D. Etzwiler, M.D.
Stanley Leonard, M.D.

Associate Professor

Barbara Burke, M.D.
Peter Coccia, M.D.
Amos Deinard, M.D.
Rolf Engel, M.D.
Ernest Gray, Ph.D.
Robert Kriel, M.D.
George Noren, M.D.
Karen Olness, M.D.
Krishna Saxena, M.D.
Jon Scheinman, M.D.

Clinical Associate Professor

David Bloom, M.D.
Albert Schroeder, M.D.
Lawrence Singher, M.D.
Theodore Smith, M.D.
Edward Strem, M.D.

Assistant Professor

John Bass, M.D.
Robert Blum, M.D.
Stephen Boros, M.D.
Pi-Nian Chang, M.D.
Eunice Davis, M.D.
Stanley Einzig, M.D.
Ralph Faville, M.D.
Richard Gehrz, M.D.
Jon Gerrard, M.D.
Scott Giebink, M.D.
Bo Hedlund, M.D.
Youngki Kim, M.D.
David Klain, M.D.
Carolyn Levitt, M.D.
James Lock, M.D.
Lawrence Lockman, M.D.
Stephen Marker, M.D.
Carolyn McKay, M.D.
Elaine Mills, M.D.
Thomas Nevins, M.D.
Thomas Norris, M.D.
Robert O'Dea, M.D., Ph.D.
Norma Ramsay, M.D.
Thomas Rolewicz, M.D.
Leon Satran, M.D.
Alan Sinaiko, M.D.
Sharanjeet Singh, M.D.
Jean Smelker, M.D.
Stephen Smith, M.D.
Theodore Thompson, M.D.
John Tobin, M.D.
Rachel Trockman, M.D.
Norman Virnig, M.D.
William Woods, M.D.
James Zavoral, M.D.

Clinical Assistant Professor Emeritus

Robert Rosenthal, M.D.

Clinical Assistant Professor

Sol Austrian, M.D.
F. Blanton Bessinger, M.D.
John Balfanz, M.D.
Northrup Beach, M.D.
Edwin Burklund, M.D.
John A. Cich, M.D.
Robert Dooley, M.D.
Mitchell Einzig, M.D.
Laurence Erickson, M.D.
John Galligan, M.D.
Robert Gibbs, M.D.
Ronald Glasser, M.D.
John Harkness, M.D.
Albert Heimel, M.D.
Elizabeth Jerome, M.D.
Harold Katkov, M.D.
George Lund, M.D.
Raymond Lynch, M.D.
Jack Markovitz, M.D.
Lloyd Nelson, M.D.
Gerardo Neuwirth, M.D.
Mildred Norval, M.D.
John O'Brien, M.D.
Theodore Papermaster, M.D.
Charles Pitzele, M.D.
Richard Sand, M.D.
Paul Singh, M.D.
Norman Sterrie, M.D.
Frederic Stone, M.D.
Jack Strobel, M.D.
John Tobin, M.D.
Edward Walsh, M.D.
Paul Wernick, M.D.

Clinical Instructor

Theresa Baker, M.D.
Lowell Becker, M.D.
Paul Blum, M.D.
Robert Bugenstein, M.D.
Marilyn Campbell, M.D.
James Cardle, M.D.
Lawrence Condon, M.D.
Terrence Coyne, M.D.
Richard Cushing, M.D.
Gary Geller, M.D.
Mace Goldfarb, M.D.
Clayton Green, M.D.
Patricia Johnson, R.N.
Max Josan, M.D.
Russell LeBeau, M.D.
Jeffrey Liebo, M.D.
Arnold London, M.D.
Wallace Lueck, M.D.
Richard Matus, M.D.
William Mulholland, M.D.
Laura Saliterman, M.D.
Sylvester Sanfilippo, M.D.
Robert Schulenberg, M.D.
Lewis Sher, M.D.
Lawrence Sholler, M.D.
Amarjit Singh, M.D.
Donald Stemmle, M.D.
Ernest Swihart, M.D.
Richard B. Tudor, M.D.
James Vaccarella, M.D.
Loren Vorlicky, M.D.
Richard Waeschle, M.D.
Mark Warnken, M.D.
Walter Wilder, M.D.

Instructor

Pakshir Athinarayanan, M.D.
David Brasel, M.D.
W. Brooks Donald, M.D.
Gary Fifield, M.D.
Bradley Fuhrman, M.D.
Tom Green, M.D.
Arthur Jaffe, M.D.
Dana Johnson, M.D.
Daniel Kohen, M.D.
Steve Latimer, M.D.
James Nettleton, M.D.
Tom Nevins, M.D.
Thomas Newman, M.D.
Warren Regelmann, M.D.
Charles Sklar, M.D.
Clark Smith, M.D.
Linda Thompson, M.D.

Pediatrics is concerned with the basic aspects of human developmental biology, both in the prenatal period and in postnatal life. The application of the knowledge of growth and development is of paramount importance to the study of diseases in the interdisciplinary organ system courses offered during Phase B. The application of this knowledge to pediatric patients and the acquisition of skills in assessing and applying growth and developmental aspects are learned through the pediatric tutorials in the Student as Physician tutorials. The student examines, studies, and discusses, with the faculty tutor, children with the following pediatric conditions and problems: normal newborn, sick infant, respiratory disease, genetic disease, congenital malformation, fluid and electrolyte imbalance, failure to thrive, neurologic disorder, and adolescent.

In Phase D, students may choose several types of pediatric experience. They may participate in the care of children in the inpatient and outpatient services of the University Hospitals and affiliated community hospitals. In these experiences, emphasis is placed on the diagnosis and management of pediatric disorders and on the effect of illness on the child's growth and development. Students may choose to observe and participate in diagnostic and care programs concerned with specific aspects of the field pediatrics: the premature and newborn, development, endocrino-

logy, allergy, cardiology, psychiatry, nephrology, and communicable diseases. Finally, students may elect a research experience or other opportunity in an area of special interest in selected basic areas of pediatrics.

To reinforce fundamental concepts in the clinical programs, emphasis is placed on the application of basic knowledge in the prevention, diagnosis, and management of diseases of infants and children.

ELECTIVE COURSES

5501. PEDIATRIC EXTERNSHIP. (Cr ar)

5503. PEDIATRIC EXTERNSHIP WITH OUTSTATE CLINICIANS. (Cr ar)

5507. SEMINARS IN DIAGNOSTIC PEDIATRIC HEMATOLOGY. (Cr ar)

5508. BASIC AND CLINICAL NUTRITION OF CHILDREN. (Cr ar)

5512. PEDIATRIC ACTING INTERNSHIP. (Cr ar)

5514. CHILD CARE CLINIC PROGRAM. (Cr ar)

5515. CHILD DEVELOPMENT AT ST. PAUL-RAMSEY. (Cr ar)

5517. PRECEPTORSHIP IN CLINICAL PEDIATRICS. (Cr ar)

5520. PEDIATRIC OUTPATIENT—UNIVERSITY HOSPITALS. (Cr ar)

5521. AMBULATORY PEDIATRICS AT ST. PAUL CHILDREN'S. (Cr ar)

5522. AMBULATORY PEDIATRICS AT HENNEPIN COUNTY MEDICAL CENTER. (Cr ar)

5523. OUTPATIENT EXTERNSHIP AT COMMUNITY UNIVERSITY HEALTH CARE CENTER. (Cr ar)

5525. INTERNATIONAL HEALTH. (Cr ar)

5532. CLINICAL ALLERGY AND IMMUNOLOGY AT UNIVERSITY HOSPITALS. (Cr ar)

5534. PEDIATRIC CARDIOLOGY AT THE UNIVERSITY. (Cr ar)

5535. PEDIATRIC INFECTIOUS DISEASES. (Cr ar)

5536. PEDIATRIC HEMATOLOGY/ONCOLOGY AT UNIVERSITY HOSPITALS. (Cr ar)

5537. PEDIATRIC ENDOCRINOLOGY AND METABOLISM AT THE UNIVERSITY. (Cr ar)

5538. PEDIATRIC GASTROENTEROLOGY. (Cr ar)

5539. NEONATAL MEDICINE EXTERNSHIP. (Cr ar)

5540. PEDIATRIC NEUROLOGY. (Cr ar)

5541. CLINICAL PHARMACOLOGY: FACTORS INFLUENCING THE RATIONAL USE OF DRUGS IN MAN. (Cr ar)

5542. CLINICAL PHARMACOLOGY AT THE UNIVERSITY. (Cr ar)

5543. PEDIATRIC NEPHROLOGY AT THE UNIVERSITY. (Cr ar)

5544. PULMONARY DISEASE IN PEDIATRICS. (Cr ar)

5545. DIAGNOSIS, EVALUATION, AND CARE OF ADULTS AND CHILDREN WITH CANCER. (Cr ar)

5547. TOPICS IN MATERNAL AND CHILD HEALTH. (Cr ar)

5548. PEDIATRIC GENETICS AT THE UNIVERSITY. (Cr ar)

Pharmacology (Phcl)

Frederick E. Shideman, M.D., Ph.D., professor and head

Professor

Marion W. Anders, D.V.M., Ph.D.
Nelson D. Goldberg, Ph.D.
Norman O. Holte, D.D.S.
Gilbert J. Mannering, Ph.D.
Jack W. Miller, Ph.D.
Bernard L. Mirkin, M.D., Ph.D.
Norman E. Sladek, Ph.D.
Sheldon B. Sparber, Ph.D.
Akira E. Takemori, Ph.D.
Ben G. Zimmerman, Ph.D.

Associate Professor

James F. Cumming, M.D., Ph.D.
Earl W. Dunham, Ph.D.
Patrick E. Hanna, Ph.D.
Jordan L. Holtzman, M.D., Ph.D.

Donald B. Hunninghake, M.D.
Richard J. Meisch, M.D., Ph.D.
Mark R. Montgomery, Ph.D.
Aloysius J. Quebbemann, Ph.D.

Assistant Professor

Gustav Graff, Ph.D.
Elizabeth Jeffrey, Ph.D.
Robert F. O'Dea, M.D., Ph.D.
Alan R. Sinaiko, M.D.
George L. Wilcox, Ph.D.

Instructor

Thomas P. Green, M.D.

Lecturer

Faruk S. Abuzzabab, M.D., Ph.D.
Jonathan S. Bishop, M.D.

The courses in pharmacology are designed to provide students with an in-depth understanding of the fundamental principles upon which rational therapy is based. Emphasis is placed on the mechanisms of action, absorption, distribution, biotransformation, excretion, and clinical use of drugs, both in general and specific terms. Work in laboratories and therapeutic conferences supplements the lectures to illustrate the actions of drugs in health and disease. Clinical pharmacologists attempt to show, by means of ward rounds and clinical conferences, how principles of pharmacology are applied to treatment of disease. Through elective courses, opportunity is provided to explore various specialized areas of pharmacology.

REQUIRED COURSE

5110s. PHARMACOLOGY. (8 cr; prereq regis med or #)

ELECTIVE COURSES

5109. PROBLEMS IN PHARMACOLOGY. (Cr and hrs ar, prereq #)

5501. CLINICAL PHARMACOLOGY: FACTORS INFLUENCING THE RATIONAL USE OF DRUGS IN MAN. (4.5 cr)
The relationship between basic clinicopharmacological principles and rational drug therapy. Factors that influence prescribing habits and problems associated with establishing and maintaining therapeutically sound prescribing patterns for physicians. Sources that offer the physician the most reliable information about drugs, their use, and their effects. Students encouraged to develop a set of standards to guide selection and use of drugs. Includes seminars, independent reading, case studies, audiovisual materials, and clinical experiences.

5502. MECHANISMS OF HORMONE ACTION. (1 cr)
Lectures on the mechanisms by which hormones influence metabolic and functional cellular events. Steroid hormone actions and the role of cyclic AMP and cyclic GMP in the expression of polypeptide and neurohormone actions emphasized.

5503. BASIC PSYCHOPHARMACOLOGY. (1 cr)
Discussions of biochemical mechanisms and behavioral correlates of psychotropic compounds. Emphasis on experimental design and interpretation of data as they relate to normal and abnormal CNS function.

5504. NEUROPHARMACOLOGY. (1 cr)
Discussions of neurophysiological mechanisms by which drugs alter CNS function. Students help select course topics and papers to be discussed.

5507. DRUG INTERACTIONS. (1 cr)
Lectures on how drugs can interact to enhance or diminish their individual pharmacologic effects.

5508. SEDATIVES AND ANALGESICS IN THE PRACTICE OF MEDICINE. (1 cr)
The pharmacology and toxicology of sedatives and analgesics are considered as the basis for intelligent clinical use of these agents.

5509. CHEMOTHERAPY OF NEOPLASTIC DISEASES. (1 cr)
Lectures, discussions, and readings on principles of tumor chemotherapy and preclinical and clinical evaluation of newer agents.

5511. TOXICOLOGY. (1 cr)
Lectures on the toxicity and therapy of intoxications of drugs and environmental chemicals.

5512. RENAL PHARMACOLOGY REVIEW. (1 cr)
Drugs that affect kidney function and metabolism.

5513. CONCEPTS INVOLVED IN CARDIOVASCULAR PHARMACOLOGY. (1 cr)
Mechanisms of action of drugs employed to treat hypertension and to modify the renin-angiotensin system and other topics.

5515. CLINICAL PHARMACOLOGY AT THE UNIVERSITY HOSPITALS. (9 cr)
The clinical application of therapeutic agents in pathophysiologic states. Correlations between basic pharmacologic knowledge and its utilization at the bedside emphasized. Each student involved in the management of inpatients and outpatients experiencing therapeutic problems. Opportunity to participate in ongoing clinical research programs within the Division of Clinical Pharmacology. Regularly scheduled activities include:

Monday afternoon—Clinical pharmacology rounds, University Hospitals (inpatients)
Tuesday afternoon—Hypertension-renal clinic (outpatients); drug therapy studies
Thursday afternoon—Clinical pharmacology walking rounds; seminar or journal club
Friday—Tutorial with Dr. Mirkin or staff (seminar, inpatient/outpatient activity)

ADVANCED CREDIT COURSES

8203. RESEARCH IN PHARMACOLOGY

8204. SEMINAR: SELECTED TOPICS IN PHARMACOLOGY

8206. SEMINAR: MICROASSAY OF DRUGS

8207. SEMINAR: PSYCHOPHARMACOLOGY

8208. NEUROPSYCHOPHARMACOLOGY

8209. NEUROHORMONES AND NEUROPHARMACOLOGICAL AGENTS

8211. PHYSIOLOGICAL DISPOSITION OF DRUGS

8212. PHARMACODYNAMICS

8214. TOXICOLOGY

8215. CANCER CHEMOTHERAPY

8217. CARDIOVASCULAR-RENAL PHARMACOLOGY

8219. ADVANCED TOXICOLOGY

Physical Medicine and Rehabilitation (PMed)

Frederic J. Kottke, M.D., Ph.D., professor and head

Professor

Thomas P. Anderson, M.D.
Gary T. Athelstan, Ph.D.
Essam A. Awad, M.D., Ph.D.
Glenn Gullickson, Jr., M.D., Ph.D.
Daniel Halpern, M.D.
William G. Kubicek, Ph.D.
Frank M. Lassman, Ph.D.

Clinical Professor

Paul M. Ellwood, Jr., M.D.

Associate Professor

John Allison, M.S.
Nancy M. Crew, Ph.D.
Helen Dahlstrom, B.A.
Dortha L. Esch, B.S.
A. Joy Huss, M.S.
Marvin G. Lepley, B.S.
Martin O. Mundale, M.S.
Robert Patterson, Ph.D.
James F. Pohtilla, M.S.
Mary Price, M.D.
Pearl Rosenberg, Ph.D.
Helen Skowlund, M.S.

Assistant Professor

Louvain G. Arndts, B.A.
Rita Bistevins, M.D.
Robert Bollinger, B.S.
Geraldine Dickinson, M.D.
Marian Eliason, B.S.
Corinne Ellingham, M.S.
Steven Fisher, M.D., M.S.
Sarah Gault, M.D.
Michael Kosiak, M.D.
Jerry Martin, Ph.D.
Garland K. Meadows, M.Ed.
Kevin Murphy, Ph.D.
Donna Pauley, B.S.
Glenn Scudder, M.S.
Clarence Sicard, B.S.

Clinical Assistant Professor

Alan Bensman, M.D.
W. John Dawson, Jr., M.D.
Matthew Eckmann, M.D.
Roger P. Hallin, M.D.
Loren R. Leslie, M.D.
Richard R. Owen, M.D.
John E. Quast, M.D.
Arthur Quiggle, M.D.
Herbert A. Schoening, M.D.
John Sharpless, M.D.
Richard M. Steidl, M.D.

Instructor

Rondall Berkeland, M.P.H.
Joseph Bohlen, M.D.
Marguerite Gardner, M.S.
Judith Reisman, M.A.
James Thompson, M.D.

Clinical Instructor

Sunada Apte, M.D.
Joann Battaglia, B.S.
Nancy Belschner, B.S.
Beatrice Boody, B.S.
John Bower, M.D.
Mary Brambilla, B.S.
Susan Braun, B.S.
Marion Calph, B.S.
Eugene Connally, B.S.
Thomas H. Coplin, B.A., B.S.
Kathryn Dole, B.S.
Joseph P. Engel, M.D.
Anita Folch, B.S.
Jan Lynn Gauger, B.S.
James Gealow, B.S.
Donabelle Hansen, B.S.
Kathleen Janikula, B.S.
Merideth L. Jennings, B.S.
Joyce Jensen, B.S.
Karon O. Kendrick, B.S.
Karen Lane, B.S.
Barbara E. Linderman, B.S.
Ellamae McGarry, B.A.
Ruth Nevels, R.N.
Peter Polga, B.S.
Elizabeth Rivers, B.S.
Karen Rudeen, B.S.
Dale Schibonski, B.S.
John Sharpless, M.D.
Andrew Steiner, M.D.
Martha Talmadge, B.A., B.S.
Henry Tamminen, B.S.
Diane Twedt, B.S.
Robert Zimmerman, M.S.

Adjunct Instructor

Cornelia A. Burrill, B.S.

Care of patients with physical disabilities or chronic diseases has become an important part of medical practice. Comprehensive medical management of such patients requires that the physician evaluate those abilities of the patient that may be utilized to restore the individual to useful function. Rehabilitation may require the use of multiple types of therapy. The allied health professions participate with the physician in a coordinated rehabilitation program. In the Rehabilitation Center, this multidisciplinary approach is used in the treatment of patients. The student learns about the comprehensive care of disabled patients and participates in the program of rehabilitation. By active involvement in the management of patients, the student learns the methods of coordination of care, communication, leadership, and administration necessary for professional practice. There is also opportunity to participate in research related to neuromuscular and circulatory functions, techniques of therapy, programs for management of patients, and methods of education in the health professions.

ELECTIVE COURSES

5410. ADULT REHABILITATION MEDICINE. (Cr ar, prereq regis med)

5411. PEDIATRIC REHABILITATION MEDICINE. (Cr ar, prereq regis med)

5414. PHYSICAL MEDICINE AND REHABILITATION FOR THE FAMILY PHYSICIAN. (Cr ar, prereq regis med)

5420. HISTOPATHOLOGY, ELECTRODIAGNOSIS, AND KINESIOLOGY. (Cr ar, prereq regis med)

5430. RESEARCH IN PHYSICAL MEDICINE AND REHABILITATION. (Cr ar, prereq regis med)

5440. BEHAVIOR MODIFICATION IN HEALTH CARE. (2 cr, prereq 8 cr psychology or #)
Theoretical and practical applications of the principles of behavioral psychology to physiological, neurological, and behavioral dysfunctions of patients. Problem-oriented approach to patient management stressed.

ADVANCED CREDIT COURSES

8200. PHYSICAL MEDICINE AND REHABILITATION SERVICE

8205. PHYSICAL MEDICINE AND REHABILITATION LITERATURE

8206. PHYSICAL MEDICINE AND REHABILITATION CONFERENCE

8207. BASIC AND APPLIED PHYSIATRY

8210. RESEARCH IN PHYSICAL MEDICINE AND REHABILITATION

8211. ELECTRONICS IN PHYSICAL MEDICINE AND REHABILITATION

8212. ELECTRODIAGNOSIS AND ELECTROMYOGRAPHY

8220. SEMINAR: PHYSICAL MEDICINE AND REHABILITATION

8230. LEADERSHIP TRAINING FOR INTERDISCIPLINARY SETTINGS

Physiology (Phsl)

Eugene Grim, Ph.D., professor and head

Professor

Marvin Bacaner, M.D.
James Bloedel, M.D., Ph.D.
H. Mead Cavert, M.D., Ph.D.
Irwin J. Fox, M.D., Ph.D.
Rodney B. Harvey, M.D., Ph.D.
John A. Johnson, M.D., Ph.D.
David Levitt, M.D., Ph.D.
Nathan Lifson, M.D., Ph.D.
Jack H. Oppenheimer, M.D.
Richard Poppele, Ph.D.
Richard Purple, Ph.D.
Carlo Terzuolo, M.D.
Maurice B. Visscher, M.D., Ph.D.
Esmail D. Zanjani, Ph.D.

Associate Professor

Charles Knox, Ph.D.
Chiung P. Lee, Ph.D.
Jui S. Lee, Ph.D.
John Soechting, Ph.D.
O. Douglas Wangensteen, Ph.D.

Assistant Professor

John H. Anderson, M.D., Ph.D.
Jurgen F. Fohlmeister, Ph.D.
Gordon Kepner, Ph.D.
Richard Stish, B.E.E.

Instructor

Gertrude Blackshear, M.D., Ph.D.
George Bloom

Lecturer

Richard Kronenberg, M.D.
John K. Love, Ph.D.
Ida M. Martinson, Ph.D.
Maurice Meyer, D.D.S., Ph.D.
Lester Michels, Ph.D.
Fernando Vargas, D.D.S., Ph.D.
Clyde Wilkes, Ph.D.

REQUIRED COURSES

5110w. HUMAN PHYSIOLOGY. (5 cr; prereq anatomy, biochemistry)

5111s. HUMAN PHYSIOLOGY. (6 cr; prereq 5110)

ELECTIVE COURSES

5103f. GENERAL PHYSIOLOGY. (3 cr; prereq physical chemistry; #; offered 1980 and alt yrs)

5104w. NEUROPHYSIOLOGY. (4 cr; prereq neuroanatomy and #; offered 1981 and alt yrs)

5105s. CARDIOVASCULAR PHYSIOLOGY. (4 cr; prereq #; offered 1981 and alt yrs)

5106f. RESPIRATORY PHYSIOLOGY. (3-4 cr; prereq #; offered 1979 and alt yrs)

5107w. ALIMENTARY PHYSIOLOGY. (3 cr; prereq #; offered 1980 and alt yrs)

5108s. NEPHROLOGY. (4 cr; prereq #; offered 1980 and alt yrs)

5113f,w,s. PROBLEMS IN PHYSIOLOGY. (Cr and hrs ar; prereq 5111 or #)
Topics assigned for readings or lab study; conferences

5114f. BIOPHYSICS OF NERVE CELLS. (3 cr; prereq #; offered 1979 and alt yrs)

5116s. BIOPHYSICAL APPROACHES TO PHYSIOLOGY. (4 cr; prereq 3055 or #)

ADVANCED CREDIT COURSES

5115w. MATHEMATICAL NEUROPHYSIOLOGY. (4 cr; prereq calculus through ordinary differential equations, Stat 8501 or #; offered 1980 and alt yrs)

5551f,w,s. LITERATURE SEMINAR. (1-2 cr; hrs ar)

5552f,w,s. READINGS IN PHYSIOLOGY. (Cr and hrs ar)
Topics selected for each student; written reviews prepared and discussed.

5553f,w,s. RESEARCH IN PHYSIOLOGY. (Cr and hrs ar)

5554.[1] HISTORY OF PHYSIOLOGY. (Cr and hrs ar)

5560.[1] SELECTED TOPICS IN PERMEABILITY. (Cr and hrs ar; prereq 5103 or equiv; #)
Advanced seminar.

5561.[1] SELECTED TOPICS IN HEART AND CIRCULATION. (Cr and hrs ar; prereq 5105 or equiv; #)
One or more seminars in the advanced physiology of the heart and circulation.

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[1] Students should consult the department for offerings during any specific quarter.

5562.[1] **SELECTED TOPICS IN RESPIRATION.** (Cr and hrs ar; prereq 5106 or equiv; #)
Advanced seminar.

5563.[1] **SELECTED TOPICS IN ALIMENTARY PHYSIOLOGY.** (Cr and hrs ar; prereq 5107 or equiv; #)

5564.[1] **SELECTED TOPICS IN NEPHROLOGY.** (3 cr; prereq 5108 or equiv)

5566.[1] **SELECTED TOPICS IN NEUROPHYSIOLOGY.** (Cr and hrs ar; prereq 5104 or equiv; #)
Advanced seminar.

5567s. PROPERTIES OF RECEPTOR SYSTEMS. (3 cr; prereq #; offered 1980 and alt yrs)

5568f. PHYSIOLOGY OF VISUAL SYSTEMS. (3 cr; prereq #; offered 1980 and alt yrs)

5569s. SPINAL CORD PHYSIOLOGY AND MOTOR CONTROL. (3 cr; prereq #; offered 1981 and alt yrs)

5570.[1] **METHODS OF ANALYSIS.** (3 cr; prereq calculus through introduction to differential equations, physical chemistry or #)
Topics selected from the following: control theory, compartmental analysis, tracer analysis, thermodynamics of irreversible processes, construction and use of models. Applications in physiology.

5577s.[1] **METHODS IN PHYSIOLOGY.** (3 cr; prereq #)

5580, 5581.[1] **TRANSPORT PROCESS IN BIOLOGY.** (3 cr per qtr; prereq 5103 or equiv)
Relatively systematic coverage of biological transport processes.

5584.[1] **RESPIRATION, ACID-BASE CHEMISTRY, AND ELECTROLYTE METABOLISM.** (3 cr; prereq 5106 or equiv)

5585.[1] **BIOENERGETICS OF CARDIAC CONTRACTION.** (3 cr; prereq 5105 or equiv)

5588.[1] **NEURAL AND HUMORAL CONTROL OF CIRCULATION.** (3 cr; prereq 5105 or equiv)

5589.[1] **PHYSIOLOGY OF LYMPHATIC SYSTEM AND MICROCIRCULATION.** (Cr ar)

Psychiatry

William Hausman, M.D., professor and head

The program in psychiatry is designed to train the student to understand the emotional aspect of illness, both in the identified psychiatric patient and in those with other medical disorders, and the various treatment methods available for helping patients with emotional problems. The program emphasizes the recognition and understanding of the types of human behavior exhibited by patients suffering from a variety of emotional problems and the role of a physician.

The first-year course in human behavior introduces the student to fundamental determinants of human behavior as they relate to the physician-patient relationship and to the adaptive patterns available to patients in coping with illness. Normal development from infancy through adolescence as well as the biological bases of behavior are reviewed. Problem areas of special psychological importance, including chemical dependency, pain, aging, dying, and death, are included.

The Phase B course deals with a range of approaches, both developmental and descriptive, to the understanding of psychopathology and of the psychological, biological, and social bases for therapeutic approaches to the treatment of psychiatric disorders. It also deals with problems of the doctor-patient relationship and with psychological testing procedures. During the Phase B year, each medical student completes a tutorial in psychiatry, meeting with a psychiatrist and, under this tutelage, evaluating psychiatric patients. The student is expected to be able to describe the psychological components of a patient's problem based upon a holistic evaluation of the individual. Such an evaluation includes a general history, physical examination, mental status examination, and social history of the patient, and the formulation of a problem list, integration of the data, formulation of a diagnosis, and planning of a therapeutic program. During this time the student learns about the management

[1] Students should consult the department for offerings during any specific quarter.

of chemical dependency and reviews interview skills. The student also gains experience in working with people with emotional disorders and learns to work with professionals in allied health care fields in addition to physicians. Small group seminars are conducted for discussion of interviewing techniques, psychotherapy, psychopathology, and communication patterns. This tutorial experience is part of the Student as Physician course.

In Phase D, the student is offered supervised clinical experience, which may be selected from a variety of different settings, as an opportunity to learn to relate appropriately to emotionally disturbed individuals, to evaluate psychiatric problems of medical and other patients, and to carry out psychiatric treatment.

In addition to the formal Phase D electives, other elective and free-time programs are available during each of the phases to meet the interests of the individual student and to augment the medical education with the study of specific issues in the field.

Adult Psychiatry (AdPy)

Professor

John Brantner, Ph.D.
Floyd K. Garetz, M.D.
Lawrence Greenberg, M.D.
William Hausman, M.D.
Leonard L. Heston, M.D.
John T. Kelly, M.D.
Thomas Kiresuk, Ph.D.
Manfred Meier, Ph.D.
Roy Pickens, Ph.D.
William Schofield, Ph.D.
Lloyd Sines, Ph.D.
Vicente B. Tuason, M.D.
Joseph J. Westermeyer, M.D.

Clinical Professor

Irving C. Bernstein, M.D.
Donald Daggett, M.D.
Philip Feinberg, M.D.
James Garvey, M.D.
Frank Kiesler, M.D.
James J. Lawton, M.D.
Nathaniel J. London, M.D.
Robert L. Meller, M.D.
John J. Regan, M.D.
Clarence J. Rowe, M.D.
Werner Simon, M.D.
Daniel Wiener, Ph.D.

Associate Professor

David Cline, M.D.
Elke Eckert, M.D.
Harold Ireton, Ph.D.
William W. Jepson, M.D.
Jerome L. Kroll, M.D.
Richard Meisch, M.D.
Michael K. Popkin, M.D.
Pearl Rosenberg, Ph.D.
George Williams, M.D.
Ronald C. Young, M.D.

Clinical Associate Professor

Faruk S. Abuzzahab, M.D.
Marvin Ack, Ph.D.
Dorothy Bernstein, M.D.
Robert Bush, M.D.
Robert Clark, M.D.
Willem Dieperink, M.D.
Seymour Gross, Ph.D.
Charles Haberle, M.D.
James Janecek, M.D.
James Kincannon, Ph.D.
Glenn J. Lewis, M.D.
Timothy Magee, M.D.
Donald M. Mayberg, M.D.
Charles McCafferty, M.D.
W. Wyatt Moe, M.D.
Ilgvars Nagobads, M.D.
Myron Stocking, M.D.
Frederic Wilson, M.D.

Assistant Professor

Edward J. Bardon, M.D.
Steven Butzer, M.D.
Larry Dailey, M.D.
Charles E. Dean, M.D.
Susan Erbaugh, Ph.D.
William Erickson, M.D.
Daniel Ferguson, M.D.
Michael Garvey, M.D.
John Heefner, M.D.
Richard O. Heilman, M.D.
William B. Hosfield, M.D.
Suck Won Kim, M.D.
Steven Lari, M.D.
Daniel Larson, M.D.
Thomas B. Mackenzie, M.D.
Manuel Mejia, M.D.
Richard Miner, M.D.
James Mitchell, M.D.
Robert Murtaugh, M.D.
Joanne Pearson, M.D.
Francis J. Pirozzolo, Ph.D.
Anthony J. Pollock, M.D.
Edward W. Posey, M.D.
Richard Pyle, M.D.
John M. Scanlan, M.D.
Thomas Weier, M.D.
Marlin Wiemer, Ph.D.
Avi Yellin, Ph.D.

Clinical Assistant Professor

Burton Abramson, M.D.
David Auran, M.D.
Lee Beecher, M.D.
William Brauer, M.D.
William A. Callahan, Jr., M.D.
Curtis Carlson, M.D.

George Dorsey, M.D.
John Druker, M.D.
Howard Fisher, M.D.
Joseph Gendron, M.D.
William Goodchild, M.D.
Malka Goodman, M.D.
Hildegard Graber, M.D.
Stephen M. Greenwald, M.D.
Keith Horton, M.D.
Rodger C. Kollmorgen, M.D.
Murray Locke, M.D.
William T. Luckey, M.D.
Richard G. Lunzer, M.D.
Deane Manolis, M.D.
Kenneth Nimlos, M.D.
Clyde Olson, M.D.
Martin Orbuch, M.D.
Henry Osekowsky, M.D.
Jennings Peteler, M.D.
Loran Pilling, M.D.
James Pullen, M.D.
Nancy Rains, Ph.D.
John Rauenhorst, M.D.
Gerald Ronning, M.D.
David Schalker, M.D.
Alan Serposs, M.D.
Thomas Stapleton, M.D.
Patrick Stokes, M.D.
James Swenson, M.D.
Lowell C. Wigdahl, M.D.
Thomas Wittkopp, M.D.

Instructor

Jonathan Jensen, M.D.
Michael Moore, M.D.
George Realmuto, M.D.

Clinical Instructor

Floyd O. Anderson, M.D.
Frederick Engstrom, M.D.
Steven Keller, M.D.
Lenore A. Nimlos, M.D.
David Paulson, M.D.
Lawrence Peterson, M.D.
Linda Peterson, M.D.
Fatma Reda, M.D.

REQUIRED COURSE

5107, 5108. HUMAN BEHAVIOR

ELECTIVE COURSES

5109. EXTERNSHIP IN CLINICAL PSYCHIATRY—Duluth Hospital. (9 cr; prereq regis med) Olson

5110. CONTEMPORARY HOSPITAL PSYCHIATRY—St. Luke's Hospital, Duluth. (9 cr; prereq regis med) Cowan

5120. CLINICAL EXPERIENCE IN INTERVIEWING AND DIAGNOSTIC SKILLS—Veterans Administration Hospital. (9 cr; prereq regis med) Posey

5222. PRECEPTORSHIPS IN PSYCHIATRY (location by arrangement). (Cr ar) Hausman, Tuason

5500. COMBINED INPATIENT AND CRISIS INTERVENTION CENTER—Hennepin County Medical Center. (9 cr; prereq regis med) Dean

5501. CLINICAL PSYCHIATRY—St. Paul-Ramsey Hospital. (9 cr; prereq regis med) Tuason

5507. CLINICAL RESEARCH IN PSYCHIATRY—University Hospitals, Station 61. (9 cr; prereq regis med) Heston

5508. ADULT GENERAL PSYCHIATRY—University Hospitals, Station 60. (9 cr; prereq regis med) Kroll

5511. PSYCHIATRY IN MEDICINE: CONSULTATION-LIAISON—University Hospitals. (9 cr; prereq regis med) Popkin, Mackenzie

5512. PSYCHOLOGIC ASPECTS OF MEDICAL PRACTICE—Veterans Administration Hospital. (9 cr; prereq regis med) Heefner, Nesheim

5513. ST. MARY'S EXTENDED CARE CENTER: CHEMICAL DEPENDENCY CENTER—St. Mary's ECC. (4.5 or 9 cr; prereq regis med) Mann

5515. NEUROPSYCHOLOGY—University Hospitals. (9 cr; prereq regis med) Meier

5516. ST. MARY'S EXTENDED CARE CENTER: ALCOHOLIC TREATMENT UNIT—St. Mary's ECC. (4.5 or 9 cr; prereq regis med) Mann

5518. COMMUNITY PSYCHIATRY—Five-County Human Development Program, Braham, Minnesota. (9 cr; prereq regis med) Kollmorgen

5519. CLINICAL PSYCHIATRY—Abbott Division of Abbott-Northwestern Hospital. (9 cr; prereq regis med) Mayberg

5521. COMMUNITY PSYCHIATRY—Dakota County Mental Health Center. (9 cr; prereq regis med) Nagobads

5530. INDEPENDENT STUDY. (Cr ar; prereq regis med) Heston

5602. CLINICAL PSYCHOPHARMACOLOGY SEMINAR—University Hospitals. (Cr ar; prereq regis med) Abuzzahab

5604w,s. BIOLOGICAL BASES OF BEHAVIOR—University Hospitals. (3 cr; prereq regis med) Heston

5608w. PSYCHOPHARMACOLOGY FOR OFFICE PRACTICE—University Hospitals. (1 cr; prereq regis med) Abuzzahab

ADVANCED CREDIT COURSES

5800. CASE CONFERENCE: PSYCHIATRY IN MEDICINE

5801. CONSULTATION-LIAISON PSYCHIATRY

8201. CLINICAL PSYCHIATRY

8203. ADVANCED CLINICAL PSYCHIATRY

8205. SPECIAL ASSIGNMENTS

8206. RESEARCH

8208. SURVEY OF PHYSIOLOGICAL TREATMENTS IN PSYCHIATRY

8209. DESCRIPTIVE PSYCHOPATHOLOGY

8216. INTRODUCTION TO FAMILY THERAPY TECHNIQUES

8221. SEMINAR: CURRENT LITERATURE

8224. INTRODUCTION TO GROUP THERAPY

8226. BIOLOGICAL PSYCHIATRY

8238. CASE CONFERENCE: PSYCHOLOGICAL MEDICINE

8239. CONTINUOUS CASE SEMINAR: PSYCHOANALYTICALLY ORIENTED PSYCHOTHERAPY

8240. PSYCHOLOGICAL PROBLEMS OF THE AGED

8243. SEMINAR: INTRODUCTION TO CLINICAL THEORY OF PSYCHOANALYSIS

8244. COMPARATIVE THEORIES OF PSYCHOTHERAPY

8265. READINGS: PSYCHOSOMATIC MEDICINE CONSULTATION-LIAISON PSYCHIATRY

8970. DIRECTED STUDIES

Child and Adolescent Psychiatry (CAPy)

Lawrence M. Greenberg, M.D., professor and director

Clinical Professor

Marvin Ack, Ph.D.
James J. Lawton, Jr., M.D.

Associate Professor

David W. Cline, M.D.

Clinical Associate Professor

Dorothy Bernstein, M.D.
K. Michael Hong, M.D.
Myron Stocking, M.D.
Jack Wallinga, M.D.

Assistant Professor

Larry Dailey, M.D.
Susan Erbaugh, Ph.D.
William Erickson, M.D.
W. Baillie Hosfield, M.D.
Michael Koch, M.D.
Richard Miner, M.D.
Joanne Pearson, M.D.
Absalom Yellin, Ph.D.

Clinical Assistant Professor

Nancy Rains, Ph.D.
Constantine Rigas, M.D.
A. Lee Sandler, Ph.D.

Instructor

Donna Gedo, M.A.
Brian Guidera, M.A.
Jonathan Jensen, M.D.
Michael Moore, M.D.
George Realmuto, M.D.

ELECTIVE COURSES

5204. DIAGNOSTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq med student, #) Greenberg and staff

Multidisciplinary evaluations of children, adolescents, and their families are presented for discussion, dynamic and diagnostic formulations, and disposition planning in a conference setting.

5206f,w,s,su. THERAPEUTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq med student, #; Wednesdays 10-11 am) Lawton, Greenberg
Therapeutic techniques utilized in child, adolescent, and family psychiatry are reviewed through presentation and discussion of ongoing cases.

5500. PEDIATRIC AND PEDIATRIC NEUROLOGY-PSYCHIATRIC LIAISON. (Cr and hrs ar; prereq med student, #; not offered period 5) Pearson, Jensen
Supervised consultation, diagnostic and short-term therapy experience in pediatrics and pediatric neurology.

5520f,w,s. OUTPATIENT CLINICAL CHILD AND ADOLESCENT PSYCHIATRY. (Cr and hrs ar; prereq med student, #, not offered period 5) Greenberg, Erbaugh
Supervised diagnostic and therapeutic experiences in an outpatient setting.

5221f,w,s. INPATIENT CLINICAL ADOLESCENT PSYCHIATRY. (Cr and hrs ar; prereq med student, #) Erickson and staff
Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary adolescent psychiatric unit with an emphasis on group and milieu therapies.

5602f,w,su. INTRODUCTORY READING IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; hrs ar; prereq med student, #) Erickson and staff
Assigned readings and discussions with faculty members. Topics include child development, diagnostic and therapeutic techniques, and psychopathology.

5603f,w,s. INPATIENT CLINICAL CHILD PSYCHIATRY. (Cr and hrs ar; prereq med student, #) Miner and staff
Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary child psychiatric unit with an emphasis on group and milieu therapies.

5608. INTRODUCTION TO FAMILY THERAPY: THEORY AND PRACTICE. (1 cr, 1 hr ar; prereq MD, course in basic psychopathology or equiv, current supervision of treatment cases, and #) Miner and staff
Introduction to the ideas and treatment approaches of some major figures in the current clinical practice of psychotherapy with families: Carl Whitaker, Salvador Minuchin, Lyman Wynne, Jay Haley, Murray Bowen, Virginia Satire, and others. Exposure to the problems of and techniques used by beginning family therapists through review and discussion of videotapes of current treatment cases of course participants.

5609. CHILD DEVELOPMENT PRACTICUM. (Cr ar, 2½ hrs ar; prereq MD and or #) Hosfield
Observation at the University Child Care Center consisting of three sessions with infants, three sessions with toddlers, and four sessions with preschoolers. Each session consists of one hour of observation of unstructured activities under the guidance of faculty members, one hour of group discussion with child psychiatry and child development faculty members, and one hour of demonstration illustrating the characteristic behaviors of each age group.

5610. BIOMEDICAL RESEARCH: PRINCIPLES AND DESIGN. (2 cr, prereq introductory statistics, #) Yellin
Basic knowledge and skills necessary to plan and carry out biomedical research and to critically read research reports and articles. Topics will include theoretical models, generation of research hypotheses, selection of appropriate research strategies, determination of appropriate statistical analyses, interpretation of results, issues related to research with human subjects, the relationship between research and clinical work, the computer as a research tool, and resources available for literature searches.

ADVANCED CREDIT COURSES

8100f,w,s,su. READINGS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq #; Thursdays 4-5 pm) Greenberg and staff
Comprehensive review of the classical and contemporary literature in the field, including the topics growth and development, diagnostic and therapeutic techniques, and psychopathology. Supplemental course work in other departments and schools.

8110f,w,s,su. DIAGNOSTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq #; Thursdays 12-1 pm) Greenberg and Erbaugh
For a description, see 5204.

8120f,w,s,su. THERAPEUTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq #; hrs ar) Greenberg and staff
For a description, see 5206.

8200f,w,s,su. OUTPATIENT CLINICAL CHILD AND ADOLESCENT PSYCHIATRY. (3 cr; prereq #; 15-30 hrs per wk) Greenberg, Erbaugh
For a description, see 5520.

8212f,w,s,su. INPATIENT CLINICAL CHILD PSYCHIATRY. (3 cr, prereq #; 15-30 hrs per wk) Miner and staff
For a description, see 5603.

8214f,w,s,su. INPATIENT CLINICAL ADOLESCENT PSYCHIATRY. (3 cr, prereq #; hrs ar) Erickson and staff
For a description, see 5222.

8216. PEDIATRIC AND PEDIATRIC NEUROLOGY AND PSYCHIATRIC LIAISON. (3 cr; hrs ar; prereq MD, #) Pearson and staff
Supervised consultation, diagnostic, and short-term therapy experience in pediatrics and pediatric neurology.

8218. GROUP THERAPY. (1 cr; hrs ar; prereq MD, #) Greenberg
Readings and group therapy examples are reviewed to complement the clinical experiences being taken concurrently.

8223. FAMILY THERAPY. (1 cr; hrs ar; prereq MD, #) Miner
Readings and family therapy examples are reviewed to complement the clinical experiences being taken concurrently.

8228. RESEARCH IN CHILD AND ADOLESCENT PSYCHIATRY. (1 cr; prereq MD, #) Greenberg, Yellin
Research design and methodology as well as current research projects are reviewed with faculty members and invited guests.

8243. SCHOOL CONSULTATION. (2 cr; 10 hrs per wk; prereq MD, #) Gedo and staff
Supervised clinical and consultative experiences in a school setting with literature and clinical seminars.

8301f,w,s,su. SEMINAR IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; Wednesdays 8:30-10am; C-608 Mayo) Greenberg and staff
Through clinical and didactic presentations and discussions by students, faculty members, and invited guests, current diagnostic, therapeutic, and theoretical issues in child, adolescent, and family psychiatry are reviewed.

8302. BIOMEDICAL RESEARCH: PRINCIPLES AND DESIGN. (2 cr; prereq introductory statistics, #) Yellin
For a description, see 5610.

Health Care Psychology

Robert D. Wirt, professor and director

Courses in health care psychology are offered by the School of Public Health. These courses are listed under the public health heading that follows in this section of the bulletin.

Public Health, School of

Lee D. Stauffer, M.P.H., professor and dean

Professor

Robert K. Anderson, D.V.M.
Donald Barber, Ph.D.
Henry Blackburn, M.D.
James Boen, Ph.D.
Richard G. Bone, M.P.H., M.S.
Bright Dornblaser, M.H.A.
Velvl Greene, Ph.D.
A. Jack Hafner, Ph.D.
Eugene A. Johnson, Ph.D.
Marcus Kjelsberg, Ph.D.
Arthur S. Leon, M.D.
Theodore Litman, Ph.D.
Richard B. McHugh, Ph.D.
Harold Paulus, Ph.D.
Ronald Prineas, M.D., Ph.D.
Wentworth Quast, Ph.D.
William Schofield, Ph.D.
Leonard Schuman, M.D.
Lloyd K. Sines, Ph.D.
Conard Straub, Ph.D.
Henry Taylor, Ph.D.
Robert W. ten Bensel, Ph.D.
Donald Vesley, Ph.D.
Vernon Weckwerth, Ph.D.
Robert D. Wirt, Ph.D.

Associate Professor

Lester Black, D.D.S.
Mario F. Bognanno, Ph.D.
Norman Craig, M.P.H.
Richard Crow, M.D.
Judith Garrard, Ph.D.
George K. Gordon, Ed.D.
Robert Schwanke, M.P.H.
Rexford D. Singer, M.D.
Robert Veninga, Ph.D.

Assistant Professor

James L. Ayres, Ph.D.
Judith Brown, Ph.D.
Raymond Carlaw, Dr.P.H.
Richard Culbertson, M.H.A.
Phyllis Fleming, Ph.D.
Richard Gillum, M.D.
Robert Jeffery, Ph.D.
Russell Luepker, M.D.
Daniel J. McInerney, M.P.H.
Charles E. McJilton, Ph.D.
Maurice Mittlemark, Ph.D.
Sue V. Petzel, Ph.D.
E. Charlotte Pflug, M.P.H.
Barbara Reynolds, M.P.H.
Elaine Richard, M.S.

Orlando R. Ruschmeyer, Ph.D.
Ralph O. Wollan, M.P.H.

Instructor

Patricia Cretilli, M.S.
Robert Dickler, M.H.A.
Janet Kempf, M.S.
Barbara Leonard, M.S.
Jack Mandel, M.P.H.
Steven R. Orr, M.H.A.
Patricia Splett, M.P.H.

For descriptions of the following courses, see the *School of Public Health Bulletin*.

Biometry

ELECTIVE COURSES

5400. INTRODUCTION TO QUANTITATIVE METHODS IN THE LIFE SCIENCES. (3 cr; prereq Biol 1002, Chem 1005, Math 1142, #)

5409-5410. BIOMETRY IN CLINICAL STUDIES I, II. (3 cr per qtr; prereq DDS, MD or DVM or #)

5430. BIOMEDICAL COMPUTING. (3 cr; prereq Math 1110)

5436. ANALYTICAL TECHNIQUES FOR HEALTH DELIVERY SYSTEMS. (3 cr; prereq calculus, 5450, 5451 or #)

5450. BIOMETRY I. (3 cr; prereq ‡5451, familiarity with basic concepts of calculus)

5451. BIOMETRY LABORATORY I. (2 cr; prereq ‡5450)

Environmental Health

ELECTIVE COURSES

5152. ENVIRONMENTAL HEALTH. (2 cr; prereq #)

5171. ENVIRONMENTAL MICROBIOLOGY. (3 cr; prereq 5151, MicB 3103 or #)

5177. PUBLIC HEALTH BIOLOGY. (3 cr; prereq #)

5181. INTRODUCTION TO THE AIR POLLUTION PROBLEM. (3 cr; prereq #)

5201. MEASUREMENT AND APPLICATION OF IONIZING RADIATION. (3 cr lect and lab, 2 cr lect only; prereq #)

5207. RADIATION PROTECTION CRITERIA FOR HOSPITALS. (2 cr; prereq #)

5211. INDUSTRIAL HYGIENE ENGINEERING. (4 cr; prereq #)

5212. VENTILATION CONTROL OF ENVIRONMENTAL HAZARDS. (3 cr; prereq 5211, #)

5213. PUBLIC HEALTH ASPECTS OF TOXIC PRODUCTS. (2 cr; prereq 5215)

5241. ENVIRONMENTAL HEALTH ASPECTS OF WATER SUPPLY. (3 cr; prereq #)

8201. RADIATION DOSIMETRY. (3 cr; prereq #)

8202. RADIATION DOSIMETRY LABORATORY. (1 cr; prereq ‡8201)

8218. FIELD PROBLEMS IN OCCUPATIONAL HEALTH. (3 cr; prereq 5211, 5212 or ‡5213, #)

Epidemiology

ELECTIVE COURSES

5330. EPIDEMIOLOGY I. (5 cr; prereq course in microbiology and 5405-5406 or 5407 or 5450-5451 or #)

5332. FUNDAMENTALS OF EPIDEMIOLOGY. (3 cr)

5335. EPIDEMIOLOGY II. (3 cr; prereq 5330)

5336. INFECTIOUS DISEASE EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics)

5338. HOSPITAL EPIDEMIOLOGY AND INFECTION CONTROL. (2 cr; prereq basic epidemiology)

5339. EPIDEMIOLOGY OF DISEASES DUE TO DRUGS AND OTHER THERAPIES. (2 cr; prereq basic epidemiology and biostatistics)

5340. EPIDEMIOLOGIC SURVEY METHODS. (3 cr; prereq 5330, 5407 or equiv, and #)

5344. CLINICAL TRIALS. (2 cr; prereq basic epidemiology and biostatistics)

5345. EPIDEMIOLOGY OF CANCER. (3 cr, prereq basic epidemiology and biostatistics and 5357 or ‡5357)

5346. EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE. (3 cr, prereq basic epidemiology and biostatistics and 5357 or ‡5357)

5350. EPIDEMIOLOGIC BASIS FOR HEALTH SERVICES PLANNING AND EVALUATION. (2 cr; prereq basic epidemiology and biostatistics)

5355. GENETICS AND EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics)

5360. EPIDEMIOLOGY OF TRAUMA. (2 cr; prereq basic epidemiology and biostatistics)

5378. DEVELOPMENT OF AND PERSPECTIVES IN EPIDEMIOLOGY. (2 cr, prereq basic epidemiology and basic biostatistics)

8340. EPIDEMIOLOGIC ASPECTS OF CANCER. (3 cr; prereq 5330)

8342. ADVANCED STATISTICAL METHODS IN EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics)

Health Care Psychology

ELECTIVE COURSES

5800f,w,s,su. RESEARCH PROJECT IN HEALTH CARE PSYCHOLOGY. (Cr ar [max 6 per qtr])

5801f,w,s,su. DIRECTED STUDY IN HEALTH CARE PSYCHOLOGY. (Cr ar [max 4 per qtr])

5802f,w,s,su. SPECIAL TOPICS IN HEALTH CARE PSYCHOLOGY. (Cr ar; prereq #)

5803. READINGS IN THE HISTORY OF PSYCHIATRY. (2 cr; 2 sequential qtrs required) Schofield

5804s. SEMINAR ON PROFESSIONAL ETHICS. (2 cr) Schofield

5805f. INTRODUCTION TO PSYCHOPHARMACOLOGY. (1 cr, §AdPy 8248, prereq #) Sines

5850s. HEALTH SCIENCES EDUCATION IN THE 20TH CENTURY. (3 cr, §HSU 5022) Garrard, Eyler, Harris, Loupe

5851f,w,s. HUMAN INTERACTION LABORATORY FOR PROFESSIONALS. (4 cr) Ayers

Health Education

ELECTIVE COURSES

5080. INTRODUCTION TO COMMUNITY HEALTH EDUCATION. (2 cr; prereq #)

5083. PATIENT EDUCATION IN REPRESENTATIVE HEALTH CARE SETTINGS. (3 cr, prereq #)

Hospital and Health Care Administration

ELECTIVE COURSES

5750. PRINCIPLES OF HEALTH ADMINISTRATION. (4 cr; prereq #)

5751. PRINCIPLES OF ORGANIZATION AND MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS. (3 cr; prereq #)

5768. LONG-TERM CARE. (3 cr; prereq #)

5769. CORPORATE PLANNING IN HEALTH CARE ORGANIZATIONS. (3 cr, prereq #)

5785. QUANTITATIVE METHODS APPLIED TO HEALTH ADMINISTRATIVE PROBLEMS. (4 cr; prereq #)

5790. SOCIAL, ECONOMIC, AND POLITICAL ASPECTS OF MEDICAL CARE. (3 cr; prereq #)

8750-8751. ALTERNATIVE PATTERNS OF HEALTH CARE. (3 cr per qtr [grade assigned upon completion of both qtrs], prereq #)

8752. SEMINAR: COMPARATIVE HEALTH CARE SYSTEMS. (3 cr; prereq #)

8762. CONTEMPORARY PROBLEMS OF HOSPITAL AND RELATED HEALTH SERVICES. (Cr ar; prereq #)

8770. HEALTH AND HUMAN BEHAVIOR. (3 cr, prereq #)

8781. SEMINAR: RESEARCH STUDIES IN HEALTH CARE. (3 cr; prereq #)

8790. POLITICAL ASPECTS OF HEALTH SERVICES. (3 cr; prereq #)

8795. ECONOMIC ASPECTS OF HEALTH. (3 cr, prereq #)

Interdisciplinary Studies

ELECTIVE COURSES

5004. FIELD INSTRUCTION IN PUBLIC HEALTH. (Cr ar; prereq #)

5005. TOPICS IN PUBLIC HEALTH. (Cr ar, prereq #)

5006. INTRODUCTION TO COMMUNITY HEALTH. (5 cr, prereq #)

5007. HEALTH LEADERSHIP AND EFFECTING CHANGE. (4 cr)

5009. HONORS COURSE: ISSUES AND CONTROVERSIES IN CONTEMPORARY COMMUNITY HEALTH. (3 cr; prereq 3001, 3004, 5006 or equiv, advance application, #)

5010. INTERPERSONAL BEHAVIOR IN HEALTH ORGANIZATIONS. (4 cr)

5011. HUMAN RESOURCES MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS. (4 cr)

5012. FINANCIAL MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS. (4 cr, prereq #)

5013. INTERDISCIPLINARY TEAM TRAINING IN HEALTH SERVICE DELIVERY. (3 cr, §HSU 5001, §HSU 5300; prereq #)

5015. TOPICS IN INTERDISCIPLINARY STUDIES. (Cr ar)

5024. HEALTH ASPECTS OF AGING. (3 cr)

5033. FUNDAMENTALS OF ALCOHOL AND DRUG ABUSE. (3 cr)

5035. INTERDISCIPLINARY STUDY IN DRUG PROBLEMS: CAUSAL CONTRIBUTORS. (3 cr)

5036. GROUP COUNSELING IN CHEMICAL DEPENDENCY. (3 cr; prereq 3032, #)

5037. INTERDISCIPLINARY STUDIES IN DRUG PROBLEMS: PREVENTION. (3 cr; prereq 5035 or #)

5039. INTERDISCIPLINARY STUDIES IN DRUG PROBLEMS: RESPONSE. (3 cr, prereq 5035 or #)

5040. DEATH EDUCATION IN CONTEMPORARY SOCIETY. (3 cr, §Hlth 5402, §Mort 5040; prereq education sr, licensed teacher, school nurse or mortuary science major or #)

8003. RESEARCH. (Cr ar)

Maternal and Child Health

ELECTIVE COURSES

5610. PRINCIPLES, PROBLEMS, AND ISSUES IN MATERNAL AND CHILD HEALTH. (3 cr)

5611. PROBLEMS AND PROGRAMS IN MATERNAL AND CHILD HEALTH. (3 cr; prereq 5610 or #)

5612. HUMAN GENETICS AND PUBLIC HEALTH. (3 cr, prereq #)

5613. CHRONIC AND HANDICAPPING CONDITIONS OF CHILDREN. (3 cr, prereq 5610 or #)

5614. FIELD EXPERIENCE IN MATERNAL AND CHILD HEALTH. (Cr ar, prereq 5610, 5611 or #)

5615. HEALTH OF THE SCHOOL-AGE CHILD. (3 cr; prereq 5610 or #)

5616. THE RIGHTS OF CHILDREN: NEGLECT AND ABUSE. (3 cr)

5618. YOUTH AND HEALTH: AN INTRODUCTION. (3 cr, §YoSt 5133)

5619. SOCIAL WORK ASPECTS OF MATERNAL AND CHILD HEALTH PROGRAMS. (2 cr; prereq 5611 or #)

5620. FAMILY STRESS, COPING AND ADAPTATION. (3 cr)

5621. MATERNAL AND CHILD HEALTH STUDENT SEMINAR. (1 cr. prereq MCH grad student)

5622. WOMEN'S HEALTH: ISSUES AND CONTROVERSIES. (4 cr. prereq #)

5623. MEDICAL ETHICS. (3 cr; prereq #)

5624. INTERNATIONAL HEALTH. (Cr ar. §Ped 5525)

5639. PREVENTION: THEORY, PRACTICE, AND APPLICATION IN PUBLIC HEALTH SERVICES. (4 cr)

5649. TOPICS: MATERNAL AND CHILD HEALTH. (Cr ar; prereq #)

8611. MATERNAL AND CHILD HEALTH PROBLEMS. (3 cr. prereq 5610, 5611 or #)

Physiological Hygiene

ELECTIVE COURSES

5380. APPLIED HUMAN NUTRITION. (3 cr. prereq #)

5386. PUBLIC HEALTH ASPECTS OF CARDIOVASCULAR DISEASE. (3 cr. prereq #)

Public Health Administration

ELECTIVE COURSES

5700. PUBLIC HEALTH ADMINISTRATION. (Cr ar; prereq #)

5701. PUBLIC HEALTH ADMINISTRATION PROBLEMS. (Cr ar. prereq #)

5702. PUBLIC HEALTH ADMINISTRATION CLERKSHIP. (Cr ar. prereq 5701)

5704. FIELD EXPERIENCE IN PUBLIC HEALTH ADMINISTRATION. (Cr ar; prereq #)

5705. BASIC SOCIAL SCIENCE RESEARCH SKILLS FOR PUBLIC HEALTH ADMINISTRATION. (Cr ar. prereq #)

5711. PUBLIC HEALTH LAW. (4 cr; prereq public health student or #)

Public Health Nursing

ELECTIVE COURSES

5500. NORMAL GROWTH AND DEVELOPMENT. (4 cr. prereq #)

5502. PREVENTIVE ASPECTS: COMMUNITY HEALTH ASSESSMENT. (4 cr. prereq #)

5576. ISSUES, TRENDS, AND PUBLIC HEALTH NURSING LEADERSHIP. (4 cr. prereq #)

Public Health Nutrition

ELECTIVE COURSES

3600. HUMAN NUTRITION. (3 cr. prereq courses in chemistry and biology or #)

5602. MATERNAL AND CHILD NUTRITION. (2 cr; prereq #)

5603. NUTRITION ASSESSMENT. (2 cr. prereq #)

5604. FACTORS AFFECTING NUTRITION BEHAVIOR. (2 cr. prereq #)

5605. PRINCIPLES OF PUBLIC HEALTH RESEARCH. (3 cr)

5608. CURRENT NUTRITION ISSUES IN PUBLIC HEALTH. (3 cr)

5609. TOPICS: PUBLIC HEALTH NUTRITION. (Cr ar)

Veterinary Public Health

ELECTIVE COURSES

5300. COMPARATIVE MEDICINE AND PUBLIC HEALTH. (2 cr. prereq #)

5303. PERSPECTIVES: ANIMAL-HUMAN RELATIONS AND COMMUNITY HEALTH. (3 cr)

5310. DISEASES TRANSMITTED BETWEEN ANIMALS AND MAN. (4 cr. prereq #)

Radiology (Rad)

Eugene Gedgaudas, M.D., professor and head

Division of Roentgen Diagnosis

Eugene Gedgaudas, M.D., professor and director

Professor Emeritus

Harold O. Peterson, M.D.

Professor

Kurt Amplatz, M.D.
Samuel B. Feinberg, M.D.

Associate Professor

Augustin Formanek, M.D.
Lawrence Harvey A. Gold, M.D.
Marvin E. Goldberg, M.D.
Richard Latchaw, M.D.
Philippe R. L. Heureux, M.D.
Richard Moore, Ph.D.
Donovan B. Reinke, M.D.
Shih Hao Tsai, M.D.

Clinical Associate Professor

Daniel L. Fink, M.D.
Sewell Gordon, M.D.
Leonard O. Langer, M.D.
Donald H. Peterson, M.D.
Hugh Jones Williams, M.D.

Assistant Professor

Howard Ansel, M.D.
Wilfrido Castaneda, M.D.
Adolfo Chuy, M.D.
Helmut Diefenthal, M.D.
Mathis Frick, M.D.
Walter Hildebrandt, M.D.
Alan Hill, M.D.
J. Paul Leonard, M.D.
Robert McGeachie, M.D.
Roger Miller, M.D.
Paul Neibergs, M.D.
Frederick Olson, M.D.
Mario Pliego, M.D.
Robert Stenlund, M.D.
Saul Taylor, M.D.
Joaquim Vieira, M.D.
H. Charles Walker, M.D.
Neil Wasserman, M.D.

Clinical Assistant Professor

Eugene Ahern, M.D.
Heino Alari, M.D.
Monouchehr Azad, M.D.
O. J. Baggenstoss, M.D.
Stanford Calin, M.D.
John B. Coleman, M.D.
Glen G. Cramer, M.D.
Charles W. Frye, M.D.
Milton R. Gilchrist, M.D.
Gerald A. Gretsch, M.D.
Barnard Hall, M.D.
Donald Charles Hauser, M.D.
Harlan Hawkinson, M.D.
Carroll N. Hess, M.D.
Erling Kloppedahl, M.D.
Dominic Korbuly, M.D.
Donald Gene Marsh, M.D.
Thomas B. Merner, M.D.
Harry W. Mixer, M.D.
David L. Moody, M.D.
S. Murthy Tadavarthy, M.D.
John A. Tobin, M.D.

Instructor

A. Samuel Baumel, M.D.
Sultan Bhimani, M.D.
Eul-Suk Kang, M.D.
Paul Kollitz, M.D.
Morteza Jahangir, M.D.
Kurt Scheurer, M.D.
Suzanne Smith, M.D.

Clinical Instructor

Quentin N. Anderson, M.D.
Robert D. Bugby, M.D.
Sheldon W. Damberg, M.D.
Joseph F. Eckert, M.D.
Herman H. Eelkema, M.D.
Erik Philip Eselius, M.D.
Robert J. Foley, M.D.
Jule Jerome Hopperstad, M.D.
Richard S. Johnson, M.D.
Thomas E. Johnson, M.D.
Warren L. Kump, M.D.
Leonard H. Levitan, M.D.
Frank E. Mork, Jr., M.D.
Paul C. Olfelt, M.D.
Robert L. Pedersen, M.D.
James L. Purdie, M.D.
Arnold O. Rholl, M.D.
Norman F. Stone, M.D.
Richard C. Tucker, M.D.
Peter Helmuth Ullrich, M.D.
Stanley C. Von Drashek, M.D.
Gilbert S. Wheeler, M.D.
James Philip Zachman, M.D.

Division of Nuclear Medicine

Merle K. Loken, M.D., Ph.D., professor and director

Associate Professor

Rex B. Shafer, M.D.
Lawrence E. Williams, Ph.D.

Assistant Professor

LeRoy Arthur Forstrom, M.D., Ph.D.
Dennis R. Hoogland, Ph.D.
John M. Wolff, M.D.

Clinical Assistant Professor

William A. Wilcox, M.D.

Clinical Instructor

John B. Marta, M.D.

Medical Fellow

Anthony Cook, M.D.

ELECTIVE COURSES

5100. EXTERNSHIP: NUCLEAR MEDICINE. (Cr ar; prereq regis med)

5101. EXTERNSHIP: DIAGNOSTIC RADIOLOGY—University Hospitals. (Cr ar; prereq regis med)

5102. EXTERNSHIP: DIAGNOSTIC RADIOLOGY—Veterans Administration Hospital. (Cr ar; prereq regis med)

5103. EXTERNSHIP: DIAGNOSTIC RADIOLOGY—Hennepin County General Hospital. (Cr ar; prereq regis med)

5104. EXTERNSHIP: DIAGNOSTIC RADIOLOGY—St. Paul-Ramsey Hospital. (Cr ar; prereq regis med)

5140. SPECIAL PROBLEMS: ROENTGENOLOGY. (Cr ar; prereq regis med)

5240. SPECIAL PROBLEMS: NUCLEAR MEDICINE. (Cr ar; prereq regis med)

ADVANCED CREDIT COURSES

5440. SPECIAL PROBLEMS: RADIATION BIOLOGY. (Cr ar; prereq regis med)

5511. ROENTGEN TECHNIQUE. (1 cr)

5512. DOSIMETRY OF INTERNAL-EXTERNAL RADIATION EMITTERS. (1 cr)

5540. SPECIAL PROBLEMS: RADIOLOGICAL PHYSICS. (Cr ar; prereq regis med)

5570, 5571, 5572. RADIATION PHYSICS. (3 cr per qtr; prereq #)

8100. GASTROINTESTINAL ROENTGENOLOGY

8101. UROLOGIC ROENTGENOLOGY

8102. NEUROLOGIC ROENTGENOLOGY

8103. CARDIOVASCULAR ROENTGENOLOGY

8104. PEDIATRIC ROENTGENOLOGY

8105. PULMONARY ROENTGENOLOGY

8110. NEURORADIOLOGY

8150. RESEARCH: ROENTGENOLOGY

8200. NUCLEAR MEDICINE

8210. FUNDAMENTALS OF NUCLEAR MEDICINE

8410. SEMINAR: RADIATION BIOLOGY

8450. RESEARCH: RADIATION BIOLOGY

8550. RESEARCH: RADIOLOGICAL PHYSICS

Surgery (Surg)

John S. Najarian, M.D., professor and head

Regents' Professor

Richard L. Varco, M.D.

Professor

Robert W. Anderson, M.D.
Fritz H. Bach, M.D.
Henry Buchwald, M.D.
M. Michael Eisenberg, M.D.
John J. Haglin, M.D.
Claude R. Hitchcock, M.D.
Edward W. Humphrey, M.D.
Carl M. Kjellstrand, M.D.
Arnold S. Leonard, M.D.
Richard C. Lillehei, M.D.
Charles F. McKhann, M.D.
Donald G. McQuarrie, M.D.
John F. Perry, M.D.
Yoshio Sako, M.D.
Richard L. Simmons, M.D.

Clinical Professor

John F. Alden, M.D.
Tague C. Chisholm, M.D.
John A. Culligan, M.D.
Ronald H. Dietzman, M.D.
Harrison H. Farley, M.D.
Davitt A. Felder, M.D.
William G. Gamble, M.D.
Paul G. Gannon, M.D.
David Gaviser, M.D.
Bernard Goott, M.D.
Lyle J. Hay, M.D.
Frank E. Johnson, M.D.
William D. Kelly, M.D.
Arnold J. Kremen, M.D.
James W. LaFave, M.D.
John G. Linner, M.D.
Stanley R. Maxeiner, Jr., M.D.
Felix A. McParland, M.D.
Fletcher A. Miller, M.D.
Frederick M. Owens, M.D.
William R. Scott, M.D.
Bernard J. Spencer, M.D.
Lyle Tongen, M.D.
Robert W. Utendorfer, M.D.
Earl G. Yonehiro, M.D.

Associate Professor

Robert C. Anderson, M.D.
John P. Delaney, M.D.
John E. Foker, M.D.
Robert L. Goodale, M.D.
Theodor B. Grage, M.D.
Hovald Helseth, M.D.
John Long, Ph.D.
J. Ernesto Molina, M.D.
Richard Moore, M.D.
Frank Quattlebaum, M.D.
Alan R. Shons, M.D.
W. Albert Sullivan, M.D.

Clinical Associate Professor

Stuart W. Arhelger, M.D.
Gary Baab, M.D.
Robert B. Benjamin, M.D.
Dorothy M. Bernstein, M.D.
Manuel R. Binder, M.D.
Raymond C. Bonnabeau, M.D.
John B. Brainard, M.D.
John J. Breen, M.D.
Bart S. Cuderman, M.D.
David E. Culligan, M.D.
Cassius M. C. Ellis, M.D.
Robert S. Flom, M.D.
Charles W. Hauser, M.D.
Herman Heupel, M.D.
David F. Hickok, M.D.
Samuel W. Hunter, M.D.
Thomas L. Huseby, M.D.
Lyle V. Kragh, M.D.
Bernard G. Lannin, M.D.
Richard E. Larson, M.D.
Louis C. Lick, M.D.
John B. Lunseth, M.D.
Charles H. Manlove, M.D.
Harvey M. Moral, M.D.
Glen D. Nelson, M.D.
Neil M. Palm, M.D.
Theodore A. Peterson, M.D.
David E. Raab, M.D.
Walter R. Schmidt, M.D.
Lee A. Simso, M.D.
Joseph L. Sprafka, M.D.
Donald E. Stewart, M.D.
Neil A. Trotman, M.D.
John F. Waldron, M.D.
Darrell E. Westover, M.D.
Richard E. YaDeau, M.D.

Assistant Professor

Martin Finch, M.D.
David Fryd, Ph.D.
Ciril J. Godec, M.D.
Albert Mowlem, M.D.
Robert Nelson, Ph.D.
Ernest Ruiz, M.D.
Richard Strate, M.D.
David E. R. Sutherland, M.D.
Tingchung Wang, Ph.D.

Clinical Assistant Professor

Gordon Addington, M.D.
Dale L. Anderson, M.D.
Daniel R. Baker, M.D.
Aydin M. Bilgutay, M.D.
Norman B. Bloom, M.D.
William S. Brennon, M.D.
Brooks A. Butler, M.D.
Coleman J. Connelly, M.D.
Orest N. Filipovich, M.D.
Donald L. Foss, M.D.
Joseph J. Garamella, M.D.
Max E. Harris, M.D.
Alan C. Hymes, M.D.
Joseph Kiser, M.D.
Clarence V. Kusz, M.D.
Evan F. Lindberg, M.D.
Elmer J. Martinson, M.D.
Michael A. Messenger, M.D.
Clifford M. Phibbs, M.D.
Stacy A. Roback, M.D.
Philemon Roy, M.D.
Abbott Skinner, M.D.

William E. Stephens, M.D.
Farrell S. Stiegler, M.D.
Robert A. VanTyn, M.D.
George Werner, M.D.
William C. Woyda, M.D.

Instructor

Richard Condie
Ronald M. Ferguson, M.D.
Peter J. Gingrass, M.D.
Elmer H. Kasperson, M.D.
John Matts, M.D.
John B. McMullen, M.D.
Bjorn K. Monson, M.D.
William F. Northrup, M.D.
Timothy O'Brien, M.D.
William Payne, M.D.
Michael L. Schwartz, M.D.
Lynn D. Solem, M.D.
Per H. Wickstrom, M.D.
Stanley Williams, Ph.D.

Clinical Instructor

Orn Arnar, M.D.
David C. Anderson, M.D.
Robert D. Christensen, M.D.
Rosalie Dodd, M.D.
James Gaviser, M.D.
Harold W. Hanson, M.D.
Carter W. Howell, M.D.
Bryan Hubble, M.D.
David Joesting, M.D.
Harvey Knaack, M.D.
Robert L. MacCornack, M.D.
David W. Nelson, M.D.
John Parrott, M.D.
Michael Pliam, M.D.
John H. Rosenow, M.D.
Martin Rosenstein, M.D.
Abe M. Sborov, M.D.
Leonard S. Schultz, M.D.
David S. Schwartz, M.D.
Sheridan S. H. Stevens, M.D.
Peter Vogt, M.D.
Richard J. Webber, M.D.

Special Lecturer

Victor A. Gilbertsen, M.D.
Darwin E. Zaske, Pharm.D.

Elective courses are offered in general surgery and in all surgical subspecialties, primarily to increase the scope of clinical exposure and to give the student an opportunity to participate in a wide variety of surgical problems including surgical research.

5500x. EXTERNSHIP IN GENERAL SURGERY—University Hospitals and affiliated hospitals. (Cr ar; prereq regis med) Najarian and staff

An opportunity to acquire competence in initial history and physical examination of the surgical patient; systematic approach to diagnosis and treatment; preoperative preparation of the surgical patient; the function of the O.R. and the surgeon's role; operative procedures used in treatment of surgical diseases; management of the postoperative patient; techniques of follow-ups and long-term postoperative care; published literature on surgical diseases; oral presentation of surgical problems with which the student has dealt. Students attend conferences, animal laboratory sessions, team discussions, and group seminars, and familiarize themselves with pertinent surgical literature in preparation for the didactic aspects of the rotation.

5501. EMERGENCY ROOM EXTERNSHIP. (9 cr) Najarian and staff

Colon and Rectal Surgery

Stanley M. Goldberg, M.D., clinical professor and director

Clinical Professor

Robert J. Tenner, M.D.

Clinical Associate Professor

Emmanuel G. Balcos, M.D.
Loren E. Nelson, M.D.
William T. Smith, M.D.

Assistant Professor

Santhat Nivatvongs, M.D.

Clinical Assistant Professor

Carl E. Christenson, M.D.
Emerson E. Hoppes, M.D.
George C. Hottinger, M.D.
Jerry L. Schottler, M.D.

Clinical Instructor

Frederic D. Nemer, M.D.
David A. Rothenberger, M.D.
Paul E. Schultz, M.D.

5523x. EXTERNSHIP IN COLON AND RECTAL SURGERY—Veterans Administration Hospital. (Cr ar; prereq regis med) Goldberg and staff

Practical experience in the management of common anorectal problems. The student acts as an intern on a surgical service with a busy clinic, "first assists" with surgical procedures, and attends the colon and rectal seminars and presents cases. The student becomes adept in the use of the sigmoidoscope and is exposed to colonoscopy.

Therapeutic Radiology (TRad)

Seymour H. Levitt, M.D., professor and head

Professor

Faiz M. Kahn, Ph.D.
John H. Kersey, M.D.
Seymour H. Levitt, M.D.
Mark E. Nesbit, M.D.
Chang W. Song, Ph.D.
Joo Ho Sung, M.D.

Clinical Professor

Donn G. Mosser, M.D., M.S.

Associate Professor

Thomas K. Jones, Jr., M.D.

Assistant Professor

Donald J. Buchsbaum, Ph.D.
Edmund P. Cytacki, Ph.D.
Robert E. Haselow, M.D.
Taw H. Kim, M.D.
Chung Kyu Kim Lee, M.D.
Eitan Medini, M.D.
Roger A. Potish, M.D.
Yashoda T. Rao, M.D.
Daniel S. Rapport, Ph.D.
Subash C. Sharma, Ph.D.
Barry L. Werner, Ph.D.

Clinical Assistant Professor

Manouchehr Azad, M.D.
David G. Smith, M.D.

Instructor

F. Christopher Deibel, Jr., Ph.D.
John W. Karrow, M.D.

Clinical Instructor

Virgil T. Fallon, M.D.
Duane O. Ytredal, M.D.

ELECTIVE COURSES

5505f,w,s,su. EXTERNSHIP IN RADIATION THERAPY. (Cr ar, prereq regis med)

5506f,w,s,su. CANCER DIAGNOSIS AND TREATMENT. (Cr ar, prereq regis med)

5507f,w,s,su. ADVANCED EXTERNSHIP IN RADIATION THERAPY. (Cr ar, prereq regis med)

5508f,w,s,su. SPECIAL PROBLEMS IN RADIATION BIOLOGY. (Cr ar)

5583. DIAGNOSIS, EVALUATION, AND CARE OF ADULTS AND CHILDREN WITH CANCER. (9 cr)

ADVANCED CREDIT COURSES

5170f. RADIOLOGICAL PHYSICS. (3 cr)

5171w. MEDICAL NUCLEAR PHYSICS. (3 cr)

5172s. RADIATION BIOLOGY. (3 cr)

5173w. PHYSICS OF RADIATION THERAPY. (3 cr)

5174s. PHYSICS OF DIAGNOSTIC RADIOLOGY. (3 cr)

5340f,w,s,su. SPECIAL PROBLEMS IN RADIATION THERAPY. (Cr ar)

5512f,w,s,su. DOSIMETRY OF INTERNAL AND EXTERNAL RADIATION. (1 cr)

5540f,w,s,su. SPECIAL PROBLEMS IN RADIOLOGICAL PHYSICS. (Cr ar)

5800. RADIATION ONCOLOGY PATHOLOGY. (Cr ar)

8300f,w,s,su. RADIATION THERAPY. (Cr ar)

8310f,w,s,su. FUNDAMENTALS OF RADIATION THERAPY. (1 cr)

8315f,w,s,su. RADIATION THERAPY PATHOLOGY. (1 cr)

8320f,w,s,su. RADIATION THERAPY TREATMENT PLANNING PROBLEMS. (1 cr)

8325f,w,s,su. RADIATION THERAPY PEDIATRICS ONCOLOGY. (1 cr)

8350f,w,s,su. RESEARCH IN RADIATION THERAPY. (Cr ar)

8410f,w,s,su. SEMINAR: RADIATION BIOLOGY. (1 cr)

8450f,w,s,su. RESEARCH IN RADIATION BIOLOGY. (Cr ar)

8550f,w,s,su. RESEARCH IN RADIOLOGICAL PHYSICS. (Cr ar)

Urology (Urol)

Elwin E. Fraley, M.D., professor and head

Clinical Professor

Clyde Blackard, M.D.
Baxter A. Smith, M.D., M.S.

Associate Professor

Alexander Cass, M.D.
Ricardo Gonzalez, M.D.
Paul Lange, M.D.

Clinical Associate Professor

George L. Garske, M.D.
Milton P. Reiser, M.D., M.S.

Assistant Professor

David Bronson, Ph.D.
Arthur Smith, M.D.
Robert Vessella, Jr., Ph.D.

Clinical Assistant Professor

David M. Anderson, M.D.
Robert Geist, M.D.
Paul Hartig, M.D.
Ranjit Jain, M.D.
Gerald Koos, M.D.
Bruce E. Linderholm, M.D.
William E. Price, M.D.
Edward J. Richardson, M.D.

Clinical Instructor

Stanley Antolak, M.D.
William H. Card, M.D.
John P. Cooper, M.D.
Everette Duthoy, M.D.
Dextor Jeffords, M.D.
Rodger R. Lundblad, M.D.
Gerald D. McEllistrem, M.D.
C. Richard McKinley, M.D.
Alaeddin Moghaddam, M.D.
Michael Pergament, M.D.
Harold A. Reif, M.D., M.S.
John A. Soucheray, M.D.
Gordon Strom, M.D.
Theodore H. Sweetser, M.D.
Shin Tanaka, M.D.
Joseph Twidwell, M.D.
Albert L. Walonick, M.D.

ELECTIVE COURSE

5180. EXTERNSHIP IN UROLOGY. (Cr ar, prereq regis med)

ADVANCED CREDIT COURSES

8250. UROLOGICAL SURGERY

8251. CYSTOSCOPY AND UROLOGY DIAGNOSIS

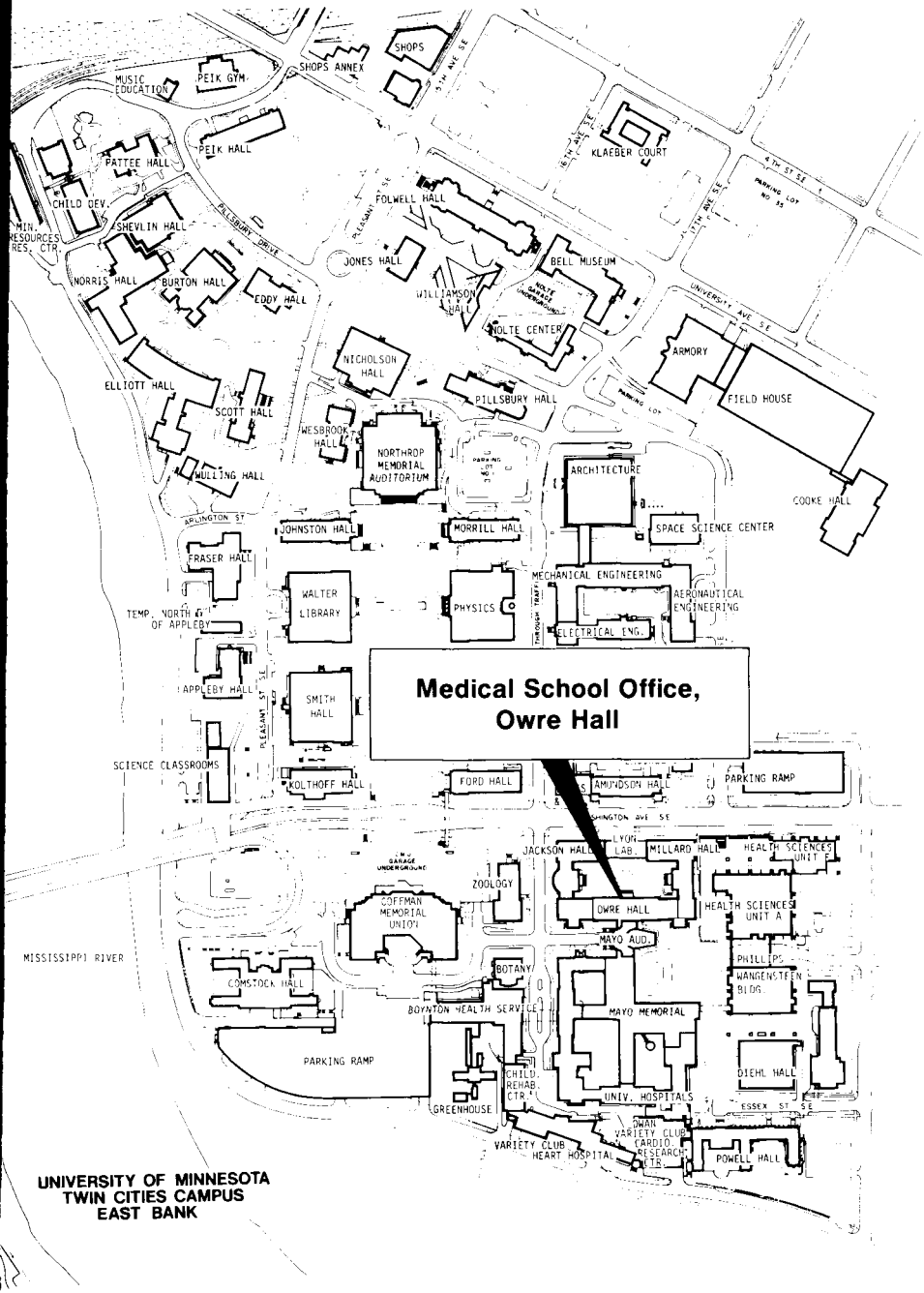
8252. UROLOGICAL CONFERENCE

8253. RESEARCH: UROLOGY

8254. UROLOGICAL SEMINAR

8255. UROLOGICAL-RADIOLOGICAL CONFERENCE

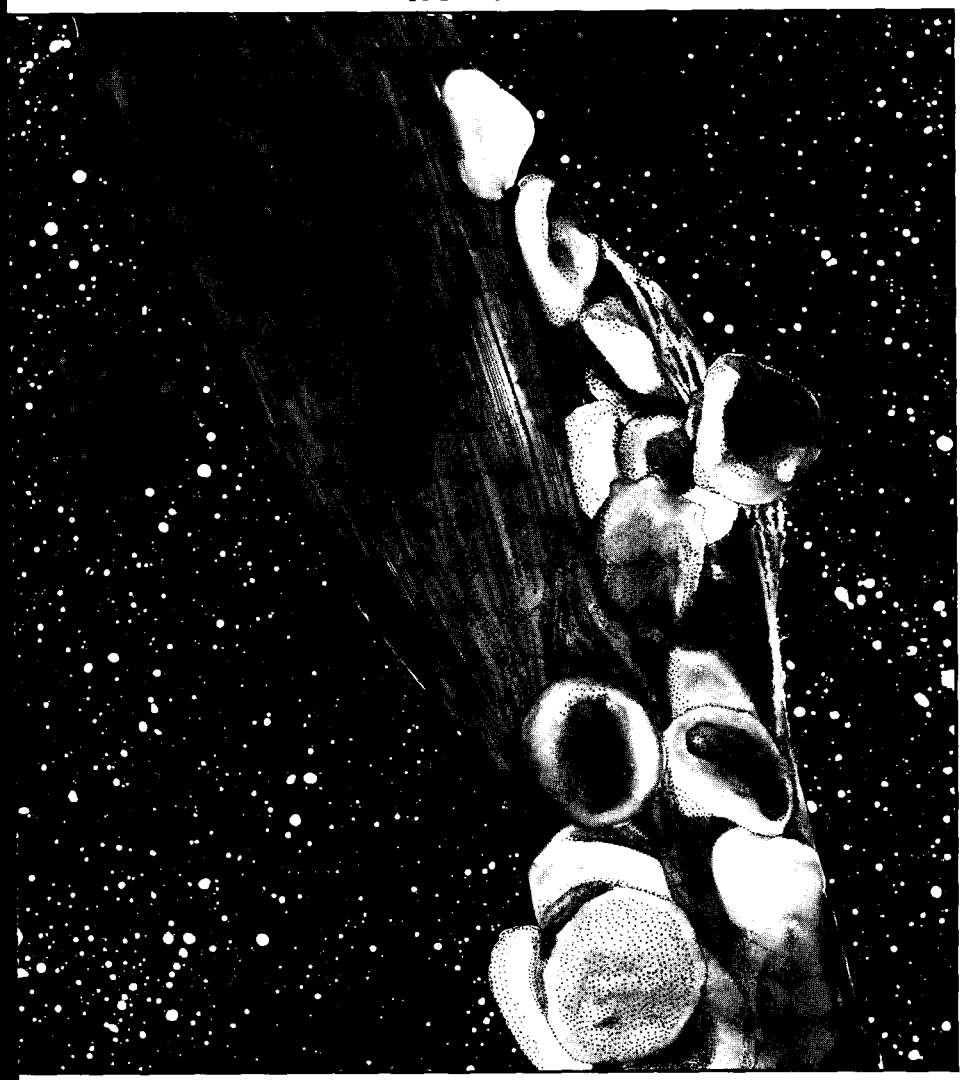
8256. UROLOGICAL-PATHOLOGICAL CONFERENCE



UNIVERSITY OF MINNESOTA
TWIN CITIES CAMPUS
EAST BANK

1979-81 UNIVERSITY OF MINNESOTA BULLETIN

GRADUATE PROGRAMS IN THE HEALTH SCIENCES



UNIVERSITY OF MINNESOTA

Cover: Fibrin formation in the human blood system. Design by Gadbois Art Works.

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Graduate Programs in the Health Sciences

UNIVERSITY OF MINNESOTA

How to Use This Bulletin

The General Information section of this bulletin is your official source of information about the policies of the Graduate School and about procedures for earning graduate degrees.

The Fields of Instruction section of this bulletin contains statements of the policies and requirements of the various departments offering graduate degrees and listings of the graduate-level course offerings of these departments.

The rules and regulations detailed in this bulletin are subject to change without notification.

The offices of the Graduate School are located in Johnston Hall.

Graduate students are responsible for all information contained in this bulletin that is pertinent to graduate study and to their specific field of study.

Services for the Handicapped

The University is flexible and open to adaptations to aid students with handicaps. A variety of services are available for handicapped students. A student handbook (*The Enabler*), maps showing accessibility of facilities, and a guide to library services are available on request. The Rehabilitation Services Office (which is part of the Student Counseling Bureau), N106 Elliott Hall, Minneapolis campus, can assist with information, referrals, problem solving, and individual counseling. Call 376-3143 for more information.

Graduate Programs in the Health Sciences

GENERAL INFORMATION

Purpose and Organization—The central purposes of the Graduate School are the advanced training of men and women in a wide variety of fields and the promotion of research in an atmosphere of freedom of inquiry.

The Graduate School administrative structure includes six policy and review councils, consisting of faculty and students, in the areas of education and psychology; health sciences; language, literature, and arts; physical sciences; plant and animal sciences; and social sciences. These councils, together with an executive committee, are responsible for making general policy for the Graduate School. The executive committee is composed of the chairpersons of the policy and review councils and the Duluth Graduate Faculty Committee; representatives from the Graduate School Research Advisory Committee, the Fellowship Committee, and the Mayo Graduate School; the Graduate School deans; and student representatives from the Council of Graduate Students.

PHYSICAL FACILITIES

The University, through the University of Minnesota Hospitals, owns and operates a broad range of clinical facilities that are used extensively for the entire spectrum of medical educational programs, especially for graduate training and investigation in the various primary care and clinical specialty fields. These facilities, located at the University of Minnesota health sciences center, include the Health Sciences Unit A, Phillips-Wangensteen Building, Mayo Memorial complex, Variety Club Heart Hospital, Masonic Memorial Hospital, Dwan Variety Club Cardiovascular Research Center, Veterans of Foreign Wars Cancer Research Center, and Children's Rehabilitation Center.

Also available for clinical graduate work, and closely affiliated with the University health sciences center in training programs, are the Hennepin County Medical Center in Minneapolis, St. Paul-Ramsey Hospital in St. Paul, Veterans Administration Hospital in Minneapolis, and Gillette State Hospital for Children in St. Paul, as well as several private community hospitals in the Minneapolis-St. Paul metropolitan area.

In Rochester, facilities, materials, and records at the Mayo Clinic, St. Mary's Hospital, Methodist Hospital, and Rochester State Hospital are available for use by Mayo Graduate School degree candidates.

Some graduate students in medicine may divide their time spent in study between the Mayo Graduate School of Medicine and the Graduate School in Minneapolis. Learning experiences for School of Nursing graduate students may be arranged in a variety of community agencies.

LIBRARIES

The biomedical collections are housed in Diehl Hall, located adjacent to the University Hospitals. Also at the disposal of the student are the main University library, the departmental libraries, and the collections of other city and hospital libraries. The medical library of the Mayo Graduate School of Medicine at Rochester

consists of over 150,000 bound volumes and receives some 2,500 medical journals; a general reading room, reading tables in the stacks, and special rooms for study are also available. Current issues and complete files of the most important health science periodicals are available in both Minneapolis and Rochester.

ADMISSION

Any student with a bachelor's degree or its foreign equivalent from a recognized college or university may apply to the dean of the Graduate School for admission. Applicants with the necessary background for their chosen major field, an excellent scholastic record from an approved college or university, and appropriate professional qualifications may be admitted for graduate work on recommendation of the graduate faculty in the proposed major field and approval of the dean of the Graduate School. University of Minnesota undergraduates who have no more than 9 quarter credits or two courses to complete for their bachelor's degree (including both distribution and total credit requirements), if they meet admission requirements, may register in the Graduate School to begin a graduate program while simultaneously completing their baccalaureate work.

Clinical Medical Majors—Entrance to work for advanced degrees in the clinical departments of medicine is limited to those who have the M.D. degree from an acceptable institution.

Dentistry Majors—Applicants must have a D.D.S. degree from a recognized school of dentistry.

Credentials Examination Fee

A credentials examination fee is required of each applicant. Detailed information about the fee is included in the instructions that accompany the Graduate School Application for Admission form.

Test Data

Miller Analogies Test—A graduate-level form of the Miller Analogies Test is required of applicants for the majors in hospital and health care administration, and public health (when emphasis is public health nursing).

Those on or near a college or university campus should contact the student counseling center, testing service, or similar office on that campus to arrange for testing. Those not near a college or university campus should write to the Psychological Corporation, 304 East 45th Street, New York, New York 10017, for a list of testing centers.

Graduate Record Examination (GRE)—Students who submit undergraduate narrative transcripts or transcripts containing "pass-no credit (P-N)," "credit," or other ungraded notations for a substantial number of courses taken during the junior and senior years must submit the results of the GRE aptitude test and, if available, an advanced test that is appropriate for the proposed major in the Graduate School.

The GRE is also often requested by individual major fields. It would be wise, therefore, for applicants to complete this test either in the senior year of undergraduate work or before filing an application for admission.

For information about the test, applicants should write to the Educational Test-

ing Service, Box 955, Princeton, New Jersey 08540. Official scores must be sent to the Graduate School office from the testing service.

Test of English as a Foreign Language (TOEFL)—This test is required of all foreign applicants whose native language is not English except those who will have completed an academic year in residence as a full-time student at a recognized institution of higher learning in the United States prior to entering the University of Minnesota. The University of Minnesota reserves the right to require additional testing upon arrival.

Applications will be considered prior to the time that TOEFL results are available, but the Certificate of Eligibility necessary to obtain the visa will not be issued until the University has evidence of satisfactory performance on the test.

Educational Council for Foreign Medical Graduates (ECFMG) Examination—Applicants seeking admission to graduate study in clinical medical fields whose medical degrees or qualifications were conferred by medical schools outside the United States, Puerto Rico, or Canada must submit certification by the Educational Council for Foreign Medical Graduates or evidence of a full and unrestricted license to practice medicine issued by a state or other territory under United States jurisdiction that is authorized to license physicians. For information concerning the examination for certification, applicants should write directly to the Educational Council for Foreign Medical Graduates, 3930 Chestnut Street, Philadelphia, Pennsylvania 19104, U.S.A.

Licensure

Mayo Graduate School students who will be working in any field of clinical medicine for more than 1 year are required to obtain a Minnesota medical license as soon as they are eligible.

Additional Information

The Graduate School reserves the right to request additional information in any case in which it is believed necessary.

Application Procedure

Requests for application materials must be sent to the Graduate School, 307 Johnston Hall, 101 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455, and should specify the applicant's proposed major field, degree objective, and date of entry.

Applicants are encouraged to apply for admission well in advance of the term in which they wish to enter the Graduate School (but no more than 1 year in advance of the proposed entry date). The Graduate School application, complete with all required materials, must be submitted by the following deadlines:

Fall quarter—August 15
Winter quarter—November 25
Spring quarter—February 25
Summer session, first term—May 15
Summer session, second term—June 15

Deadlines that fall on a holiday or weekend will be extended through the next regular

workday. Many major fields have established deadlines earlier than those listed above and also require additional application and supporting materials. It is the applicant's responsibility to obtain information about those deadlines and requirements from the program description in this bulletin and from the director of graduate study for the proposed major.

Applicants seeking admission to clinical medical fields should contact their department directly for instructions about application procedures.

Foreign Applicants

All foreign applicants who have attended universities that issue official, original transcripts of records upon request must submit such credentials. Attested true copies of such records are not accepted. Those foreign applicants who have attended universities that issue original transcripts or mark sheets only once to the student must submit attested or certified true copies of academic records. If the grading system employed by the university is not shown in the credentials, a separate official statement from the university detailing this information is required. If an applicant is uncertain about what documents are required, early inquiry is recommended.

Experience at the University of Minnesota has been that often during the course of the program of study a student has need of a complete set of official credentials covering previous college and university training. Applicants are urged to request two sets of official credentials when preparing their application for admission—one to be submitted for permanent filing in the Graduate School and the other for personal use.

Transient Graduate Students

Students who have registered within the last year in a graduate degree program at another recognized graduate school in the United States and wish to enroll for a summer session or single quarter in the Graduate School of the University of Minnesota to earn credits to apply toward their degree program may be admitted as a transient graduate student. They will not be required to submit a transcript of credits but may ask the dean of their graduate school to complete the Transient Application form (G.S. Form 57) and return it to the Graduate School, 322 Johnston Hall, 101 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455. Deadlines for applying are included in the form.

Under no circumstances will students be permitted to register for more than 1 quarter or summer session as a transient student. Persons originally registering under this status who wish to apply for regular admission must follow the application procedures outlined above.

Readmission, Change of Major or Degree Objective, or Change of Campus

Requests for readmission, change of major or degree objective, or change of campus should be made on the Change of Status form (G.S. Form 72). This form may be obtained from the Graduate School office, 322 Johnston Hall. Processing of these requests requires a minimum of 1 month.

Readmission—Persons who have not registered in the Graduate School of the University of Minnesota for 2 consecutive years will be considered to have with-

drawn. Students who subsequently wish to resume graduate work must request readmission on the Change of Status form.

Change of Major or Degree Objective—Students currently enrolled in the Graduate School who intend to change either their major or their degree objective from that originally approved by the Graduate School should request this change on the Change of Status form.

Change of Campus—Students currently enrolled in the Graduate School on one campus who wish to continue their studies on another campus should initiate this request through the Change of Status form. Graduate study is currently available on the Minneapolis-St. Paul campus, on the Duluth campus, and at the Mayo Graduate School of Medicine, Rochester.

ORIENTATION TO THE TWIN CITIES CAMPUS

Incoming graduate students pay a single fee of $5 to support information and orientation programs on University policies and procedures, facilities and services, the Twin Cities community, and financing a dissertation; career workshops (résumé writing and job interview skills); and social events. Students may obtain a brochure about orientation events in the Graduate School office after registration opens for fall quarter. Fall quarter programs will begin the week prior to the start of classes; some programs continue during the quarter. Winter and spring quarter programs will be held on the Saturday following the first week of classes.

ACADEMIC RANK AND PURSUIT OF A GRADUATE DEGREE

Members of the University of Minnesota staff holding academic appointments above the rank of instructor or research fellow are normally not permitted to complete a graduate degree at the University. If admitted to the Graduate School, they may register for graduate work, and the credits they earn may be presented for transfer to a graduate program at another college or university.

TRANSFER OF CREDITS

For the Master's Degrees

Unless otherwise specified in the departmental section, the following rules apply to transfer of credits.

Master's degree students are required by the Graduate School to complete at least 60 percent of the course work for their official degree programs (see section on the Master's Degree, page 13) as registered Graduate School students. With the approval of the adviser and director of graduate study of the major (and the director of graduate study in the minor if the courses are for a designated minor), the transfer of up to 40 percent of the degree course work from adult special, summer special, and Continuing Education and Extension status at the University of Minnesota, or from other recognized graduate schools, in any desired combination, is permitted. Individual graduate programs may, at their option, specify a lower percentage of course work for transfer.

The work to be transferred must be graduate level, must have been taken for

graduate credit, and must have been taught by faculty members authorized to teach graduate courses. Continuing Education and Extension courses must bear the special CEE transcript entry verifying that they were completed for graduate credit. Credits transferred from other institutions must appear on official graduate school transcripts of the institutions. Credit for courses completed through independent (correspondence) study, and credit for courses completed through extension or special categories at other institutions, may not be transferred.

The transfer of credits is accomplished by the inclusion of the courses on the proposed degree program.

For the Doctor's Degrees

From Adult Special or Summer Special Status—Students admitted to and registered in the Graduate School may transfer to their graduate program the graduate-level credits earned in their first academic quarter as an adult special student, or in their first summer session (both terms in the same calendar year) as a summer special student. Such work must be graduate level and must be offered by a member of the faculty approved to teach graduate courses, and students must complete the work required of graduate students in the courses. The transfer is accomplished by inclusion of the courses on the proposed degree program; an official transcript of the work must be attached.

From Continuing Education and Extension—A maximum of 12 credits of graduate-level work completed in Continuing Education and Extension (CEE) may be transferred to the graduate program. This applies only to credits earned in CEE at the University of Minnesota; graduate-level extension credits earned at other institutions may not be transferred. University extension courses must bear the special CEE transcript entry showing they were completed for graduate credit. Transfer is accomplished by including the courses of the proposed degree program.

From Independent (Correspondence) Study—Graduate credit is *not* allowed for courses completed through independent (correspondence) study.

From Other Graduate Institutions—Graduate credit earned at other recognized graduate institutions may be applied to University of Minnesota graduate degrees. The credits must appear on an official graduate school transcript. The transfer is accomplished by inclusion of the course on the proposed degree program.

COMMITTEE ON THE USE OF HUMAN SUBJECTS IN RESEARCH

All research that involves the use of human subjects must be reviewed and approved by the University Committee on the Use of Human Subjects in Research. This policy, approved by the University Senate and Board of Regents, applies to funded and nonfunded faculty and student research. Any individual student research project (e.g., Plan B project, thesis, dissertation) that involves human subjects must be approved by this committee prior to initiation of the research. Visit or contact the committee office at 2642 University Avenue, St. Paul, Minnesota 55114, telephone 373-9895, for additional information.

QUARTERLY PROGRESS REPORT

Each quarter of the academic year and once at the close of the summer session the Graduate School issues a computerized Quarterly Progress Report for each student registered in that term. One copy of the report is retained in the student's Graduate School file and three copies (for the department, the adviser, and the student) are forwarded to the departmental office of the student's major field.

The Quarterly Progress Report contains course and grade information drawn from the student records maintained by the Office of Registration and Student Records as well as a record of other progress toward the degree objective that does not become a part of the official University record. This report is intended for internal uses only to assist the graduate faculty and the Graduate School in the evaluation of student progress and standing. *It is not to be considered an official record, nor is it, in itself, to be interpreted as defining a student's good standing or status in the Graduate School or in the major field.*

The Quarterly Progress Report computer file is used as a basis for the Graduate School's registration system. Reminders to students to file official programs and thesis proposals at appropriate times are generated as a part of this system, as are warnings and registration holds when students fail to meet Graduate School and major field standards with respect to grades and the timely completion of course work. However, in generating such reminders, warnings, and holds, the system is dependent upon the student's continuous and timely registration each quarter; the fact that such a notice is not generated because a student registered late, or not at all, for one or more quarters, does not absolve the student from the responsibility to comply with degree requirements.

REGISTRATION

The Graduate School operates on a quarter system, and registration ordinarily begins about 6 weeks before the opening of the term and closes at the end of the first week of classes. Work is also offered in a variety of fields during two summer terms of 5 weeks each. For the University calendar and tuition and fee rates, see the University's current *General Information Bulletin*.

Students must receive notification of admission to the Graduate School before registration is permitted.

Registration Requirements—Registration required for the award of a graduate degree is specified below in the sections on degree requirements (for registration requirements for the master's degree, see page 13; for the doctor's degree, page 16). In addition, the following requirements apply as appropriate.

1. The Graduate School requires that graduate students holding appointments as teaching, research or project assistants, teaching associates, and administrative fellows register each term that an appointment is held. This does not apply to summer terms.
2. All persons appointed under trainee programs must register as full-time students during the tenure of their appointments. Each individual enrolled in a clinical residency or post-M.D. graduate training program sponsored by the University of Minnesota and directed by a clinical department of the Medical School is required to register either as a medical fellow in the Graduate School or as a medical fellow specialist in the Medical School.
3. Students receiving other types of financial aid from the University or other agencies, foreign students with certain types of visas, and students wishing to use various University services and facilities may have to meet specific

registration requirements of other agencies or University units; they are responsible for securing information about such requirements from the appropriate offices.

Graduate students need not register for the *sole* purpose of taking final written or oral examinations for the master's degree, or for taking the preliminary written or oral examinations for the doctorate.

Varieties of Registration—The four kinds of registration currently in effect are listed below. *Note*: The thesis-only, examination-only, and doctoral candidate registration categories (items 2, 3, and 4 below) may be replaced as early as fall 1980 by a new system of thesis credit registration. *This will not raise tuition charges for students who entered the Graduate School by fall 1980, but may raise it for some who enroll at that time and thereafter.*

1. *Registration for Course Work*—The maximum number of credits for which a graduate student may register in a single quarter during the academic year is 16; in a single term during the summer session, 10. Exceptions are granted by the Graduate School office only in unusual circumstances.
2. *"Thesis-Only" Registration*—This type of registration is designed for the convenience of students as a means of registering when they are not taking course work but are required to register for institutional or personal reasons. Eligibility is not confined to students actually working on a thesis (see item 4 below for doctoral candidate registration). Students typically using thesis-only registration include those working on Plan A master's theses, teaching or research assistants who are not taking courses but must register as graduate students, and students in the process of changing majors who wish to maintain their registration. Eligible students will need their adviser's signature.
3. *"Examination-Only" Registration*—This type of registration is open only to doctoral students who have completed language requirements and all course work on their *officially approved* doctoral program but who have not yet passed their preliminary oral examination. Examination-only registration must be approved by the Graduate School office and may be utilized only twice. Eligible students may use this registration as a matter of convenience, but are not required to do so since it is acceptable not to register while studying for the preliminary oral examination. This registration bears a special tuition rate. *Late registration in this category is not allowed.*
4. *Doctoral Candidate Registration*—This option is restricted to doctoral students who have passed their preliminary oral examination. *It is required* and bears a special tuition rate. Students must begin this registration in the quarter following the successful completion of their preliminary oral examination. (Eligibility must be established prior to the official opening of the quarter or term in which the student proposes to register in this category.) Doctoral students in their final quarter of registration are required to register for thesis-only to take the final oral examination. If the student does not graduate in the quarter or term in which the final oral examination is passed, he or she must resume doctoral candidate registration at the special tuition rate.

Changes in Registration—The addition, deletion, or change of a course registration up to midterm requires only the approval of the adviser. Any change between midterm and the last day of classes of a term requires approval of the adviser and the instructor. Students are not permitted to register or to change their registration after the last day of classes of a term.

TUITION AND FEES

For current tuition and fees for the academic year, see the *General Information Bulletin.*

For summer session tuition and fees, see the *Summer Session Bulletin.*

GRADING SYSTEM

The Graduate School uses two grading systems, A-B-C-D-N and S-N. Except in courses in which grading has been restricted to one system or the other with approval of the Graduate School, students have the option of choosing the system under which they will be graded. Arrangements for the grading system to be used must be made with the instructor *within the first 2 weeks of the term.* For information about courses in which grading is restricted, students should consult the department offering the course (see also Minimum Grade Requirements below).

Incomplete Grades—Course instructors may, at their discretion, place a time limit for the removal of incomplete grades. The maximum number of credits of incompletes allowable at any given time is established by each department for its majors.

Retaking Courses—The Graduate School discourages the retaking of courses to improve grades. Permission of the course instructor and the major adviser is required. If a course is retaken, all registrations for the course will remain on the student's record.

GRIEVANCE PROCEDURES: ACADEMIC FREEDOM AND RESPONSIBILITY

Grievance procedures relating to academic freedom and responsibility are governed by the University Senate statement on Academic Freedom and Responsibility of December 17, 1970, and the Revised Report of the University Appeals Committee on Academic Freedom and Responsibility of April 18, 1974. As a consequence of these policies, each department or program has available a set of operating procedures to deal with both the formal and informal aspects of possible grievance matters; often these procedures are spelled out in a department's or program's handbook for graduate students or are available upon request in the department or program office. Also as a consequence of the two senate policies, each department or program has established a standing committee on grievances to conduct hearings and make recommendations in those cases that reach the formal grievance stage. In general, it is best for graduate students with a potential grievance to seek the advice and assistance of their adviser or director of graduate study and the department or program chairperson. In the event that the nature of the potential grievance precludes such inquiry and discussion, graduate students may wish to seek advice from the Graduate School grievance officer by contacting the Graduate School dean's office. There is a Graduate School Grievance Committee, but its function is essentially limited to hearing appeals from department or program grievance committees.

STUDENT RECORDS

The Office of Registration and Student Records of the University maintains and releases the official student transcripts.

For a 5-year period from fall 1972 through summer 1977, the official transcript included only positive academic achievements. Courses in which the student received a grade of N (no credit) or a registration symbol of I (incomplete) or W (withdrawal) were recorded on an operational record, which was used only within the University. Beginning in fall 1977, a single record system was again instituted. This record contains grades and registration symbols for all courses for which a student registered beyond the second week of a quarter.

Both transcripts and operational records (for those students who were registered during the period from fall 1972 through summer 1977) may be obtained from the Certification Service, Office of Registration and Student Records, 150 Williamson Hall.

Access to Student Educational Records

In accordance with regents' policy on access to student records, information about a student generally may not be released to a third party without the student's permission. The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information—name, address, telephone number, dates of attendance, college and class, major, adviser, and degrees earned—is considered public or directory information. To prevent release of such information outside the University while in attendance at the University, a student must notify the records office on his or her campus.

Students are notified annually of their right to review their educational records. The regents' policy, including a directory of student records, is available for review at the information booth in Williamson Hall, Minneapolis campus, and at the records offices on other campuses of the University. Questions may be directed to the Office of the Coordinator of Student Support Services, 260E Williamson Hall, telephone (612) 373-2106.

TERMINATION OF GRADUATE STUDENT STATUS

When performance is unsatisfactory in terms of grades or normal progress, as established and promulgated by the graduate faculty in the major field, graduate student status may be terminated. All guidelines stated in this bulletin are minimal requirements, and a program is free to set more specific terms by which progress will be measured for purposes of continuation. Notice of termination will be in writing.

ATTENDANCE AT COMMENCEMENT

Attendance at commencement is voluntary. However, all degree candidates are individually recognized at the ceremony and must inform the Graduate School as to whether or not they will attend.

COUNCIL OF GRADUATE STUDENTS

The Council of Graduate Students (COGS) is the official body that represents all students within the Graduate School. In each department the graduate students elect one representative to serve on the council. Through COGS these representatives assimilate, coordinate, and disseminate pertinent information; provide student

members for Graduate School and University committees; and deal with problems and issues that affect graduate students. The *COGS Newsletter,* distributed to all graduate students through their departments, attempts to keep graduate students informed of Graduate School affairs.

The council office is located in 409 Johnston Hall (373-7909). Students with questions, problems, or suggestions should contact the council.

MASTER'S DEGREE

Two Plans for the Master's Degree—The Graduate School offers the master's degree under two plans: Plan A, involving a thesis, and Plan B, which substitutes additional course work and special projects for the thesis. Plan B is not employed in the clinical medical fields (except in family practice and community health). For plans offered in each major, consult the departmental sections of this bulletin.

Registration Requirement for the Nonclinical Health Science Fields—A master's program ordinarily takes from 4 to 6 quarters in residence to complete. At least 60 percent of the course work for the master's degree must be completed in the Graduate School; individual programs may require a higher percentage.

Registration Requirement for the Clinical Medical Fields—For the *master's degree (M.S.) in clinical subjects,* 2 or 3 calendar years are required. For the *master's degree with field designated in clinical fields* (e.g., M.S. in medicine), 3 calendar years are required to insure proficiency in the special field. For the *master's degree without special designation,* the length of residence may be reduced to 2 calendar years.

Time Requirement for the Master's Degree—All requirements for the master's degree must be completed within 7 years. The 7-year period begins with the earliest work included on the official degree program, including any transfer work applied. The graduate faculty in a specific program may set more stringent time requirements.

Official Program for the Degree in Nonclinical Health Fields—After completing 15 credits, and ordinarily not later than the third quarter of registration (the second year for the longer programs), students must file with the Graduate School an official proposed program for the degree. The program form is available in the Graduate School office. On it students list all course work, completed and proposed, that will be offered in fulfillment of degree requirements; this includes transfer work (see section on Transfer of Credits). If a foreign language is required, the one to be offered is specified. If the degree is being completed under Plan A, students also include their thesis proposal. *On the basis of this program, the members of students' final examining committees, and the thesis readers for Plan A, are appointed.*

The minimum credit requirements for the program are specified below under the two plans for the degree.

Official Program for the Degree in the Clinical Medical Fields—Students are encouraged to submit their program and thesis title before the end of the second year of registration. Approval by the program faculty and the Graduate School indicates the student's admission to candidacy for the degree. Students should include on the official program form only the minimum number of credits actually required for the award of the degree, rather than the full complement of credits taken during the course of the residency program.

Changes in the Approved Program—Once approved, the program must be fulfilled in every detail to meet graduation requirements. Alterations in the program that are found necessary or desirable should be requested by General Petition form.

Minimum Grade Point Average—The minimum grade point average required by the Graduate School for courses included on the official program for any master's degree is 2.80 (on a 4.00 scale). Grades of A, B, C, and S are acceptable, but grades of S are not calculated in the grade point average. *At least two-thirds of the credits taken in this Graduate School and included on any degree program must be taken under the A-N system.*

Individual major fields may set higher grade requirements, and students should be familiar with special requirements in their major field.

Language Requirement for the Master's Degree—See the appropriate major field section to determine the language requirement, if any, for a specific field. The Graduate School monitors the fulfillment of language study when a department requires a language. Information about how to demonstrate proficiency and the conditions under which proficiency will be recorded on the official transcript is available from the Graduate School office.

Plan A: Master's Degree With Thesis

Minimum Credit Requirements—Students must complete a minimum of 20 quarter credits in the major field and a minimum of 8 quarter credits in one or more related fields outside the major to constitute the minimum of 28 quarter credits required for the degree.

Students who wish to complete a designated minor (which will be certified on the transcript—unlike the related fields option, which will not be) must complete 9 or more quarter credits in a single field (making the minimum requirement for a Plan A degree with a designated minor 29 credits). A designated minor must be approved by the director of graduate study in the field.

For majors in clinical branches the minor or related fields must be in nonclinical fields that will serve as a basis for the proposed clinical specialization. This fundamental work should be concentrated in the first part of the program. Familiarity with those phases of the nonclinical disciplines essential to proficiency in the major specialty is required.

At the Mayo Graduate School of Medicine candidates must complete a minimum of 6 months of work (or its equivalent) in a related laboratory field for the minor.

Note: In addition to course credits, thesis credits will be required if a proposed new thesis credit system is instituted (see Varieties of Registration, page 10).

Master's Thesis—The thesis title is submitted for approval as a part of the student's official degree program. Instructions for preparation of the thesis should be obtained from the Graduate School office.

Registration of the Thesis With the Graduate School—A complete, clean, typed draft of the thesis, with title page, table of contents, and bibliography, must be presented for registration in the Graduate School office at least 9 weeks before the commencement at which a candidate expects to receive the degree. The copy will be returned to the candidate immediately, together with the readers' report form and other forms necessary for graduation. When the signed thesis report form is returned, a final examination report form will be issued to the student. The members of the student's examining committee may, at their discretion, require a 30-day interval between the registration of the thesis and the date of the final examination.

Thesis Readers—The thesis will be read by a committee of not less than three members, as appointed by the dean of the Graduate School on recommendation of the program faculty at the time of approval of the student's official degree program. The examining committee will ordinarily include at least two representatives from the

major field and one from the minor or a related field. *This committee must be unanimous* in certifying that the thesis is ready for defense.

Thesis Binding—Two copies of the thesis must be bound and submitted to the Graduate School office. For the deadline for a particular commencement, consult the Graduate School office.

Final Examinations—Candidates for the master's degree, Plan A, must pass a final oral examination; a final written examination may also be required at the discretion of the graduate faculty in the major field.

The final examination covers the major and minor or related fields and may include any work fundamental thereto. This examination is coordinated by the chairperson of the committee. *A majority vote* of the committee, all members present and voting, is required for a pass. Results are reported to the Graduate School on a Final Examination Report form, which is issued to the student when the form certifying that the thesis is ready for defense is submitted. In case of failure, unanimous consent of the examining committee is required to retake the examination.

Clearing for Graduation—To qualify for graduation in a particular quarter, students must complete the examination and all other requirements (including the submission of required forms and fees) by a specified date approximately 5 weeks before the commencement day. Information about the deadlines are available from the Graduate School office.

Plan B: Master's Degree Without Thesis

Minimum Credit Requirements—Students must complete a minimum of 20 quarter credits in the major field and a minimum of 8 quarter credits in one or more related fields outside the major to constitute the minimum of 28 quarter credits required for the degree.

Students who wish to complete a designated minor (which will be certified on the transcript—unlike the related fields option, which will not be), must complete 9 or more quarter credits in a single field. A designated minor must be approved by the director of graduate study in the field.

Plan B Project(s)—Students must demonstrate familiarity with the tools of research or scholarship in their field, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one "Plan B project." The graduate faculty in each major field may require as many as three such projects.

The Plan B project(s) should involve approximately 3 weeks or 120 hours of work. The graduate faculty in each major field specifies both the nature and extent of the options available to satisfy this requirement and whether the requirement is to be satisfied in conjunction with or independent of the courses in the student's program.

Final Examinations—The Graduate School requires a final examination that may be written, oral, or both, at the discretion of the graduate faculty in the major field. A committee of at least three examiners is appointed by the dean of the Graduate School on recommendation of the program faculty at the time of the approval of the official degree program. The committee will include one member from outside the major field. Students will make the Plan B project(s) available to the examining committee for its review. *A majority vote* of the committee, all members present and voting, is required to pass . The vote is reported to the Graduate School on a form the student must obtain from the Graduate School office before taking the examination. In case of failure, unanimous consent of the examining committee is required to retake the examination.

DOCTOR OF PHILOSOPHY DEGREE

The doctor of philosophy degree is granted chiefly in recognition of high attainment and ability in a special subject field as demonstrated, first, by passing the required examinations covering both a candidate's general and special subject fields and, second, by the preparation of a thesis.

Registration Requirement for the Doctor's Degree—Candidates for the doctor's degree must register in the Graduate School for at least 9 quarters or, if students transfer work from other graduate schools for the degree, they must spend the first 2 years or the last year in residence at the University of Minnesota. There is also a continuous registration requirement (see below).

Official Program for the Degree—Students are expected to file their official program for the degree in the second year of their program; the specific quarter depends upon individual major field requirements. The program form is available in the Graduate School office. It should contain course work, completed and proposed, that will be offered in fulfillment of degree requirements in the major field and in the minor or supporting program fields; this includes transfer work (see section on Transfer of Credits). Students should also specify the foreign languages, if any, that will be offered in fulfillment of the departmental requirement. *On the basis of the program, the members of the students' preliminary oral examinining committee will be appointed.*

Minimum Grade Requirements—Grades of A, B, C, and S are acceptable. *At least two-thirds of the credits taken in this Graduate School and included on any degree program must be taken under the A-N system.*

Major Work—There is no minimum number of credits specified for the major by the Graduate School, and frequently, depending upon previous preparation, the length of programs for individual students, even within the same field, may vary considerably. In the clinical fields, the Ph.D. is always a degree with designation. In pathology (offered only at Mayo), the Ph.D. may be earned either with or without designation.

In addition to course credits, thesis credits will be required if a proposed new thesis credit system is instituted (see Varieties of Registration, page 10).

Minor or Supporting Program Work—At least 18 quarter credits must be offered in the minor or supporting program. With a traditional minor, this work will be in a single field related to the major. If students are offering a supporting program, it must be composed of a coherent pattern of courses possibly embracing several disciplines. Students electing the supporting program option may be required to take written preliminary examinations in the fields included, but will not be expected to have competency in each of the fields comparable to that of a person with a traditional minor.

For majors in clinical branches the minor or supporting programs must be in nonclinical fields that will serve as a basis for the proposed clinical specialization. This fundamental work should be concentrated in the first part of the program. Familiarity with those phases of the nonclinical disciplines essential to proficiency in the major specialty is required.

Changes in the Approved Program or Students' Preliminary Oral Examining Committee—Once approved, the program must be fulfilled in every detail to meet graduation requirements. Changes that are found necessary or desirable should be requested by General Petition form.

Substitutions on the examining committee, which may be necessitated, for example, by the departure or absence on leave of a faculty member, must be re-

quested by the adviser or the director of graduate study through the Graduate School office *well in advance* of the examination.

Official Candidacy—Candidacy is established when students have passed the preliminary oral examination. The Graduate School issues a Candidate in Philosophy certificate to all students passing the preliminary oral examination without reservation.

Time Limit for Earning the Doctor's Degree and Continuous Registration Requirement—To maintain candidacy for the degree, effective with the quarter immediately following the passing of the preliminary oral examination for the doctorate, students must:

1. Complete all requirements and receive the degree within a maximum of 5 calendar years. This time period begins the quarter following the passing of the preliminary oral examination. Petitions for extension of the time limit must be submitted before the expiration of the 5 years. Failure to receive the Ph.D. within the 5-year period may necessitate retaking the preliminary oral examination. The graduate faculty in the degree programs may establish more stringent time limitations.
2. Register continuously and pay candidacy fees during the academic year (fall, winter, spring quarters) until the doctorate is awarded. Registration for the first or second summer term (or both) may be made in lieu of registration for the academic quarter or quarters immediately following. (See Doctoral Candidate Registration, page 10.)
3. In the term in which the final oral examination is taken, register for "thesis-only" and pay the appropriate tuition.

Thesis Proposal—At the time of submission of the doctoral program, or not later than the first quarter after passing the preliminary oral examination, students must file the thesis title form and statement in the Graduate School office. The thesis title form is available from that office. The statement, approximately 250 words in length, must describe the research to be undertaken and the methods to be employed in carrying it out.

On the basis of the thesis proposal, the thesis readers and other members of the final oral examining committee will be appointed by the dean of the Graduate School upon recommendation of the program faculty.

Changes in the Thesis Title—Changes in the wording of the thesis title may be made without special approval, but changes should not be made after the thesis is registered (see Registration of the Thesis With the Graduate School below). If the substance of the proposal should change markedly in the course of the research, a revised proposal should be submitted immediately.

Substitutions on the Final Oral Examining Committee—See Changes in the Approved Program or Student's Preliminary Oral Examining Committee above.

Language Requirement—See the major field section to determine the language requirement, if any, for a specific program. The Graduate School monitors the fulfillment of language study when a department requires a language. Information about how to demonstrate proficiency and the conditions under which proficiency will be recorded on the official transcript is available from the Graduate School office.

Written and Preliminary Oral Examinations

Written Examination—A written examination in the major subject will be given by the graduate faculty in the major field, generally before the preliminary oral examination is given. This examination covers all work completed in the major field and may include any work fundamental thereto. It is the student's responsibility to ensure that the results of the written examination are reported immediately to the Graduate School office. A form for this purpose, available in the Graduate School office, requires the signature of the adviser and the director of graduate study in the major field.

Preliminary Oral Examination—After completing a substantial part of the course work and passing the preliminary written examination (except in those instances where the written follows the oral), and prior to writing the dissertation, the student will take the preliminary oral examination. The examination will be administered by the committee appointed by the dean, on recommendation of the program faculty, on the basis of the official doctoral program.

Preliminary Examining Committee—The examining committee will include a minimum of five members, three from the field of the major and two from the field of the minor or supporting program.

Scheduling the Preliminary Oral Examination—It is the responsibility of the student to schedule the preliminary oral with the examiners *and with the Graduate School office* at least 1 week in advance. *In certain of the health science areas, however, 1 month's notice must be given.* The Graduate School must have on file a report that the student passed the preliminary written examination before the oral examination can be scheduled.

The Graduate School issues the report form for the preliminary oral examination to the student's adviser, and informs both the student and the adviser if the language requirement or course work on the official program has not yet been completed. The preliminary oral will be authorized in spite of such deficiencies, but deficiencies must be completed before the final oral may be scheduled.

Preliminary oral examinations will not be scheduled from the beginning of the second term of summer session to the opening of the fall quarter, when many faculty members are away from the campus.

Preliminary Oral Examination Content and Outcome—The preliminary oral examination covers both the major and minor fields or supporting program and any work fundamental thereto, including possible plans for thesis research.

The outcome of the examination, with all committee members present and voting, will be recorded in one of three possible ways: passed, passed with reservations, or failed. The voting proportions necessary for these decisions are as follows: if the committee consists of five members, a favorable verdict for passing will consist of either a unanimous vote or a vote of 4-1; if the committee consists of six members, a favorable vote for passing will consist of a unanimous vote or 5-1 or 4-2; and if the committee consists of seven members, a favorable vote for passing will consist of a unanimous vote or a vote of 6-1 or 5-2. Candidates who do not earn committee votes in these proportions will fail. If, in order to achieve the *minimum* number of votes to reach a verdict of pass, any vote of pass with reservations is included, then the outcome is recorded as a pass with reservations.

Reporting the Results—The examining committee will report the results of the preliminary oral to the Graduate School office, stating clearly, in the case of a pass with reservations, what additional requirements must be met by a candidate to remove the reservations. The removal of the reservations must be reported in writing

to the Graduate School with signatures of those members of the examining committee who voted to pass the candidate with reservations.

Failure of the Examination—Students failing the preliminary oral (a) may be allowed, on unanimous recommendation of the examining committee, to retake the examination or (b) may be excluded from candidacy for the degree. In no case may the reexamination take place until at least 1 full academic quarter has passed. No more than two preliminary examinations are allowed.

Ph.D. Thesis

The thesis must demonstrate originality and ability for independent investigation, and the results of the research must constitute a contribution to knowledge. The thesis must exhibit mastery of the literature of the subject and familiarity with the sources. The subject matter must be presented with a satisfactory degree of literary skill.

Language of the Thesis—Theses must normally be written in English, the language of instruction. However, in some fields of study, a language other than English may be used provided there is a scholarly reason for its use. When the thesis statement is submitted, a justification for the use of a foreign language, signed by the adviser and director of graduate study, should be attached. The statement should attest that the recommended thesis readers (including the outside reader) are qualified to read, comprehend, and criticize a thesis in the foreign language.

Preparation of the Thesis—Instructions for the preparation of the thesis should be obtained from the Graduate School office.

Registration of the Thesis With the Graduate School—A complete, clean, typed draft of the thesis, with title page, table of contents, and bibliography, must be registered in the Graduate School office and copies distributed to the thesis committee at least 9 weeks before the commencement at which a candidate expects to receive the degree. This copy will be returned to the student immediately, together with the report form on which readers certify that the thesis is ready for defense. Other forms required for graduation are issued at the same time.

To allow readers ample time to evaluate the thesis, 30 days should be allowed between the registration of the thesis and the planned date of the final oral examination. However, the final oral examination may be scheduled anytime (allowing at least 1 week before the examination) after the signed readers' report form has been submitted to the Graduate School office.

Thesis Readers—The thesis must be read by a committee of not less than three members (see Thesis Proposal above). As a rule, the student's major adviser will be the chairperson of the committee, and the field of the minor or the supporting program will be represented by at least one committee member. The committee *must be unanimous* in certifying that the thesis is ready for defense before the final oral examination will be authorized by the Graduate School (see Registration of the Thesis above).

Final Oral Examination

To be eligible for the final oral examination, the student must have completed all work on the official doctoral program including the language requirement (if any); both the written and oral preliminary examinations must have been passed; and the

thesis must have been certified by the readers as ready for defense. The examination will ordinarily be conducted by a committee appointed at the time of approval of the thesis proposal and consisting minimally of the adviser, two additional readers, and two other members of the graduate faculty. The examination covers the candidate's thesis and special field of study. It will not exceed 3 hours.

Scheduling the Final Oral With the Graduate School–*The examination must be scheduled by the student 1 week in advance* (see Deadlines for Graduation below) *with the committee and with the Graduate School. In certain of the health science fields the faculty requires 30 days' notice of the date of the final oral.*

When the examination is scheduled the file will be checked to determine that the student is clear to take the examination as stipulated above, and, if so, the report form for the final oral examination will be forwarded to the adviser.

If time permits, the date of the examination will be publicly announced, and any member of the graduate faculty may attend.

The final oral cannot be scheduled during the same quarter in which the student takes the preliminary oral.

Reporting the Results of the Final Oral—Upon completion of the examination, a formal vote of the committee is taken. *To be recommended for the award of the doctoral degree candidates must receive a vote with no more than one dissenting member of the total examining committee.* The results must be reported to the Graduate School on the Final Oral Examination Report form.

Deadlines for Graduation—In addition to the forms mentioned above, students must complete all other requirements including the filing of forms issued when the thesis was registered. *If students wish to graduate at a particular commencement, the forms, including the report of the results of the final oral, must be submitted and fees paid by the deadline date for that commencement.* For the deadline for a particular commencement, students should consult the Memorandum for Candidates issued at the time the thesis was registered or the Graduate School office.

COMMITTEE ON INSTITUTIONAL COOPERATION TRAVELING SCHOLAR PROGRAM

The University of Minnesota is a participant in the Traveling Scholar Program for graduate students enrolled in CIC (Committee on Institutional Cooperation) institutions. The 11 participating universities are the members of the "Big Ten" and the University of Chicago.

The program enables doctoral students at any CIC university to take advantage, for 3 quarters or 2 semesters, of educational opportunities—specialized courses, unique library collections, unusual laboratories—at any other CIC university without change in registration or increase in fees.

Graduate students interested in graduate course offerings not available at the University of Minnesota should confer first with their major department and major adviser concerning which of the cooperating institutions to select for program enrichment and diversification. Information regarding the procedure to be followed in seeking admission to another CIC institution is available at the Graduate School Fellowship Office.

FELLOWSHIPS AND ASSISTANTSHIPS

The following policies govern all awards administered by the Graduate School:

Duplicate Awards—Recipients of a Graduate School award may not hold concurrently a second Graduate School fellowship, scholarship, or similar award (with the exception of a Tuition Scholarship, which may be held with a non-tuition-granting fellowship); nor may they hold concurrently a similar award from a non-Graduate School source (e.g., a Danforth Foundation Fellowship) that duplicates the benefits of the Graduate School award.

Supplementation—Recipients of any Graduate School administered award of $3,500 or more plus tuition may hold concurrently a graduate assistantship of up to 25 percent time during any quarter. Likewise, recipients may hold concurrently a non-Graduate School administered fellowship, scholarship, or similar award, provided it does not exceed the equivalent of a 25 percent time assistantship during any quarter (if the supplementation exceeds that amount, the Graduate School administered award will be reduced accordingly).

Terms of Award—Graduate School awards may not be renewed, used for summer study, or deferred for use in another academic year.

Graduate Fellowships

Graduate fellowships, awards based on academic merit, are available to new and currently enrolled graduate students at the University of Minnesota. The Graduate School Fellowship Office, 422 Johnston Hall, administers several fellowship programs; a number of individual academic departments also administer field-specific fellowships. Entering students must file their fellowship application with their prospective graduate program. Currently enrolled students should consult with staff at the Graduate School Fellowship Office and at their graduate program office for current information about fellowship opportunities.

Medical Fellowships

Medical fellowships at Minneapolis are full-time appointments with stipends determined annually by the Council of Clinical Sciences of the Medical School, in most cases including payment of tuition and fees. Students interested in medical fellowships should contact their major departments for additional information.

Graduate Assistantships

Graduate assistantships are academic appointments that are reserved for graduate students. Appointments to teaching assistantships or associateships, research or project assistantships, or administrative fellow positions are offered through various departments. A teaching assistant or associate helps in teaching students in a specified course or courses under the general supervision of the academic staff. A research or project assistant carries out activities connected with research studies that are assigned by the supporting department or principal research investigator. An administrative fellow performs duties of a specialized nature connected with administration.

To be eligible to hold one of these appointments, a student must have been admitted to and registered in the Graduate School each quarter the appointment is

held during the academic year. Registration during the summer session is not required. A student may be appointed for 75 percent time or less per academic quarter (students may work up to 100 percent time during the summer).

Students registered in the Graduate School and holding appointments as teaching assistants, research assistants, project assistants, teaching associates, and administrative fellows at 25 percent time or more pay resident tuition rates. This same privilege applies to members of their immediate families. These same privileges have been extended beyond the term of qualifying appointment, subject to the following rules:

1. The qualifying appointee must have held one of the above appointments for a minimum of 3 academic quarters, at 25 percent time or more, in one of the specific positions listed above. Two summer terms will count as 1 academic-year quarter.
2. After completion of the qualifying 3 quarters of appointment, on a quarter-for-quarter basis up to a maximum of 6 quarters of use, the use of the privileges is extended.
3. The entitlement of the qualifying appointee and members of her or his immediate family to this privilege will not extend beyond 3 years from the termination of the last or most recent qualifying appointment.

Each department sets its own application deadline. Unless otherwise noted, applications must be received by February 15 for appointments for the ensuing academic year; applications received at other times will be considered for any available vacancies. All applications for staff appointments should be returned to the head of the appropriate department — *not to the Graduate School.*

Application forms and further information may be obtained from either the head of the department offering the appointment or from the Graduate Assistants Information and Assistance Office, 411 Johnston Hall, 101 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

General College Assistantships

Graduate students are eligible to apply for teaching assistantships and associateships in the General College. The General College program consists of general education courses in such areas as natural science, social science, communications, and the humanities, as well as specialized courses in such career areas as business, recreation, health, and law. Graduate students may also be interested in the college teaching/counseling internship program for graduate assistants. Graduate assistants in the General College may participate in the internship program and earn credit (but not degree credit) by registering for GC 5001: General College Teaching Internship or GC 5002: General College Counseling Internship the first year, and GC 5005: General College Supervised Teaching Projects or GC 5006: General College Supervised Counseling Projects the second year. Inquiries about assistantships and the teaching internship program should be directed to the Office of the Dean, General College, 106 Nicholson Hall, 216 Pillsbury Drive S.E., University of Minnesota, Minneapolis, Minnesota 55455.

GRADUATE ASSISTANTS OFFICE

The Graduate Assistants Information and Assistance Office was established to provide ombudsman services for graduate assistants. The office handles the range of problems and information requests of individuals serving the dual role of student and

University employee. The office, located in the Graduate School, is administered by the Office of the Vice President for Academic Affairs.

COUNCIL OF GRADUATE SCHOOLS IN THE UNITED STATES

Resolution Regarding Graduate Scholars, Fellows, Trainees, and Assistants

Acceptance of an offer of financial aid (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year by an enrolled or prospective graduate student completes an agreement that both student and graduate school expect to honor. When a student accepts an offer before April 15 and subsequently desires to withdraw, the student may submit a written resignation for the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student not to accept another offer without first obtaining a written release from the institution to which a commitment was made. Similarly, an offer made by an institution after April 15 is conditional on presentation by the student of a written release from any previously accepted offer. It is further agreed by the institutions and organizations subscribing to this resolution that a copy of the resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer.

MISCELLANEOUS ASSISTANCE

Honorary Fellowships

Professors or other eminent scholars who are not candidates for degrees and who desire temporarily the privileges of using library or research facilities or attending seminars of the University may, upon recommendation of the dean of the Graduate School and approval of the president of the University, be appointed honorary fellows without stipend.

Honorary fellows are not required to pay any fees but are responsible for the cost of unusually expensive supplies or equipment.

Postdoctoral Associates

Postdoctoral fellows who are not already entitled to normal faculty privileges can be appointed by the Graduate School as postdoctoral associates. These positions carry no stipend from the Graduate School but do entitle associates to use University facilities, to purchase athletic tickets at the staff rate, and, if they have private health insurance, to join the Health Service plan for outpatient care.

Nomination forms for this appointment are available from the Office of the Dean, Graduate School, 321 Johnston Hall.

Visiting Scholar Program

Regular faculty members of Minnesota public and private colleges who are not studying for advanced degrees and who desire temporarily the privileges of using library facilities or attending day school courses (as auditors) can be appointed by the Graduate School as visiting scholars without stipend. Interested individuals will be granted appointments on receipt of a letter to the dean of the Graduate School from their academic dean or vice president verifying their faculty status and field of specialization.

Possibilities for Employment

The Student Employment Service of the University, 6 Morrill Hall, 100 Church Street S.E., University of Minnesota, Minneapolis, Minnesota 55455, maintains a file of available jobs on the Minneapolis and St. Paul campuses and in the Twin Cities for students and their spouses. Further information about this service may be found in the *General Information Bulletin*.

Students in the Graduate School may also find it advantageous to explore through other channels the possibility of part-time employment in the Twin Cities area in business, professional, or other fields.

Services of the Office of Student Financial Aid

Financial assistance available to graduate students from the Office of Student Financial Aid includes University Trust fund loans, National Direct Student Loans, federally insured loans, and the work-study program.

The United States Steel Foundation Loan Fund also offers loans to graduate students. Contact the Graduate Fellowship Office, 422 Johnston Hall, for details.

Awards from these loan programs are made on the basis of financial need to students who maintain at least a half-time or equivalent enrollment status. Applications may be obtained from the Office of Student Financial Aid, 107 Armory, 15 Church Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Financial aid counselors are available to assist students in planning their finances and to advise them on financial problems. Students are encouraged to contact the Office of Financial Aid, either in person or by mail, if they need financial assistance.

Services for Students From Abroad

Counseling and advising services are provided for students from other countries by the Office of the International Student Adviser. Assistance is given to those seeking information about English language requirements; visa requirements; federal, state, and local regulations governing foreign nationals; and educational, social, and financial matters. This office also sponsors orientation programs and, when necessary, directs students to the Program in English as a Second Language for English language instruction. All foreign students are invited to address inquiries to the Office of the International Student Adviser, 717 East River Road, University of Minnesota, Minneapolis, Minnesota 55455.

Placement of Graduate Students

Graduate students seeking placement in college, university, or other positions may obtain aid and counsel from advisers and departments, from the deans of various colleges of the University, and through the placement section of the Education Career Development Office. This last office receives reports of vacancies for college teaching positions in all fields as well as for positions in counseling, administration, and research. The address of the Education Career Development Office is 1425 University Avenue S.E., University of Minnesota, Minneapolis, Minnesota 55414; telephone (612) 373-2266.

Housing Facilities

Most out-of-town students live either in University-maintained residence halls, in private housing, or in fraternities or sororities. University-owned residences are inspected regularly to assure safe and healthful quarters as well as good study conditions. Refer to the *General Information Bulletin* for details.

Information concerning residence halls may be obtained from the Director of Housing, Comstock Hall, 210 Delaware Street S.E., University of Minnesota, Minneapolis, Minnesota 55455. Information about private housing and fraternities or sororities may be obtained from the Off-Campus Housing Office, Comstock Hall, 210 Delaware Street S.E., University of Minnesota, Minneapolis, Minnesota 55455; or 190 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, Minnesota 55108.

Army and Air Force ROTC Programs

Students in the Graduate School may pursue a 2-year Army or Air Force ROTC program. To be eligible, applicants must have 6 quarters of academic work remaining after successful completion of a required 6-week summer encampment. Transportation, meals, lodging, and a salary are furnished during the summer encampment. All ROTC textbooks and uniforms are loaned to the student without cost, and all cadets receive a tax-free stipend of $100 per month during the school year. Students successfully completing the program are commissioned as second lieutenants in the Army or Air Force. Further information is available in the University's *Army, Navy, Air Force ROTC Bulletin.*

GRADUATE MAJOR FIELDS AND DEGREES OFFERED IN THE HEALTH SCIENCES

Twin Cities Campus

MAJOR	DEGREES OFFERED
Anatomy	M.S., Ph.D.
Anesthesiology	M.S., M.S.Anes.
Biochemistry	M.S., Ph.D.
Biomedical Engineering	Ph.D.
Biometry and Health Information Systems	M.S., Ph.D.
Biophysics	M.S., Ph.D.
Dentistry	M.S.
Dermatology	M.S., M.S.Derm., Ph.D.Derm.
Environmental Health	M.S., Ph.D.
Epidemiology	M.S., Ph.D.
Experimental Surgery	M.S.Exp.Surg.
Family Planning Administration	M.S.
Family Practice and Community Health	M.S.
History of Medicine and Biological Sciences	Ph.D.
Hospital and Health Care Administration	Ph.D.
Hospital Pharmacy	M.S.
Laboratory Medicine	M.S.
Medical Microbiology	M.S.
Medical Technology	M.S.
Medicinal Chemistry	M.S., Ph.D.
Medicine	M.S., M.S.Med., Ph.D.Med.
Microbiology	M.S., Ph.D.
Neurology	M.S., M.S.Neur., Ph.D.Neur.
Neurosurgery	M.S., M.S.Nsurg., Ph.D.Nsurg.
Nursing	M.S.
Nutrition	M.S., Ph.D.
Obstetrics and Gynecology	M.S., M.S.Obs.&Gyn., Ph.D.Obs.&Gyn.
Ophthalmology	M.S., M.S.Ophthal.
Oral Biology	M.S., Ph.D.
Orthopedic Surgery	M.S., M.S.Orth.Surg, Ph.D.Orth.Surg.
Otolaryngology	M.S., M.S.Otol., Ph.D.Otol.
Pathobiology	Ph.D.
Pediatrics	M.S., M.S.Ped., Ph.D.Ped.
Pharmaceutics	M.S., Ph.D.
Pharmacognosy	M.S., Ph.D.
Pharmacology	M.S., Ph.D.
Physical Medicine and Rehabilitation	M.S., M.S.P.M.&Rehab., Ph.D.P.M.&Rehab.
Physical Therapy	M.S.
Physiological Hygiene	M.S., Ph.D.
Physiology	M.S., Ph.D.
Psychiatry	M.S.Psychiat., Ph.D.Psychiat.
Public Health	M.S.
Radiology	M.S., M.S.Rad., Ph.D.Rad.
Social and Administrative Pharmacy	M.S., Ph.D.
Surgery	M.S.Surg., Ph.D.Surg.
Therapeutic Radiology	M.S.Ther.Rad.
Urology	M.S., M.S.Urol., Ph.D.Urol.

Mayo Graduate School of Medicine, Rochester

MAJOR	DEGREES OFFERED
Anesthesiology	M.S., M.S.Anes.
Biophysics	M.S.
Dentistry	M.S.D.
Dermatology	M.S., M.S.Derm., Ph.D.Derm.
Medical Microbiology	M.S.
Medicine	M.S., M.S.Med., Ph.D.Med.
Neurology	M.S., M.S.Neur., Ph.D.Neur.
Neurosurgery	M.S., M.S.Nsurg., Ph.D.Nsurg.
Obstetrics and Gynecology	M.S., M.S.Obs.&Gyn., Ph.D.Obs.&Gyn.
Ophthalmology	M.S., M.S.Ophthal., Ph.D.Ophthal.
Orthopedic Surgery	M.S., M.S.Orth.Surg., Ph.D.Orth.Surg.
Otolaryngology	M.S., M.S.Otol., Ph.D.Otol.
Pathology	M.S., M.S.Path., Ph.D., Ph.D.Path.
Pediatrics	M.S., M.S.Ped., Ph.D.Ped.
Physical Medicine and Rehabilitation	M.S., M.S.P.M.&Rehab., Ph.D.P.M.&Rehab.
Physiology	M.S., Ph.D.
Plastic Surgery	M.S., M.S.Plas.Surg.
Proctology	M.S., M.S.Proct.
Psychiatry	M.S., M.S.Psychiat., Ph.S.Psychiat.
Radiology	M.S., M.S.Rad., Ph.D.Rad.
Surgery	M.S., M.S.Surg., Ph.D.Surg.
Urology	M.S., M.S.Urol., Ph.D.Urol.

FIELDS OF INSTRUCTION

For information about course listings and course symbols, see the inside back cover of this bulletin.

ANATOMY (Anat)

OFFERED AT MINNEAPOLIS

Professor

David W. Hamilton, Ph.D., *head, director of graduate study*
G. Eric Bauer, Ph.D.
Anna-Mary Carpenter, M.D., Ph.D.
Padmakar K. Dixit, Ph.D.
Stanley L. Erlandsen, Ph.D.
Carl B. Heggestad, M.D., Ph.D.
Morris Smithberg, Ph.D.
R. Dorothy Sundberg, M.D., Ph.D.

Associate Professor

Orion D. Hegre, Ph.D.
Jonathan A. Parsons, Ph.D.
Donald W. Robertson, Ph.D.
Robert L. Sorenson, Ph.D.

Assistant Professor

H. David Coulter, Ph.D.
Robert P. Elde, Ph.D.
Hue Lee Kaung, Ph.D.

Degrees offered include the Ph.D.; a few candidates for the M.S. degree are accepted only under special circumstances and under Plan A. Consult the director of graduate study before applying.

Prerequisites—Prerequisite work for a major or minor in the field of anatomy includes 9 credits of general biology.

Departmental applications for admission must be filed in addition to those required by the Graduate School; they can be obtained at any time from the director of graduate study. The departmental application must be returned to the Department of Anatomy, 262 Jackson Hall, 321 Church Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Major and Minor, for the Ph.D.—All majors in anatomy must have had or must take the basic 8000-level courses in anatomy (embryology, gross anatomy, histology, and human neuroanatomy). Majors in clinical subjects who desire a minor in anatomy must have had, as prerequisites, the courses in anatomy usually required of medical students, including Anat 5100, 5103, 5106, and 5111.

Language Requirement—For the master's degree, none. For the Ph.D. degree, reading knowledge of one language—French, German, Italian, Spanish, or Russian. Other requirements may be specified at the discretion of the adviser.

5105. DENTAL MICROSCOPIC ANATOMY. (6 cr; prereq #) Bauer and staff
Structure of cells, tissues, and organs of the human body.

5108. GROSS ANATOMY FOR DENTAL STUDENTS. (6 cr; prereq #) Bauer and staff
Lectures and dissection; thorax, extremities; abdomen and pelvis.

5109. GROSS ANATOMY FOR DENTAL STUDENTS. (6 cr; prereq #) Sorenson and staff
Lectures and dissection; head and neck.

5110. NEUROSCIENCE FOR DENTAL STUDENTS. (2 cr; prereq Phsl 5100, regis dentistry fr or #) Elde
Introduction to structure and function of central nervous system. Correlation between morphology and physiology emphasized.

5190. ADVANCED ANATOMY. (2 cr; prereq regis med, 5103) Staff
Teaching methods, supervision of student's original research, or combination of both.

5765-5766. HEMATOLOGY. (4 cr per qtr; prereq 5103 or Zool 5066 or #) Sundberg
Blood and blood-forming organs; blood and bone marrow from standpoint of diagnosis and prognosis.

5767. SEMINAR: HEMATOLOGY. (1 cr; prereq 5766) Sundberg

8100. GROSS HUMAN ANATOMY. (8-16 cr, prereq #) Robertson, Hamilton, Parsons, and staff
Dissection of human body and discussion in small groups to understand anatomical relationships in preparation for teaching.

8103. HUMAN HISTOLOGY. (4-8 cr; prereq #) Erlandsen, Carpenter, Hamilton, and staff
Microscopic structure, cytochemical and functional aspects of cells, tissues, and organs. Current literature with emphasis on methodology applicable to morphological research.

8106. HUMAN EMBRYOLOGY. (4-6 cr; prereq #) Hegre, Hamilton, Heggestad, Smithberg
Development of the human body. Microscope slides, series of embryo type specimens, and specimens demonstrating anomalies are available for individualized study.

8111. HUMAN NEUROANATOMY. (4 cr; prereq 8103, #) Smithberg, Elde, Coulter
Structure and function of nervous system including organs of special sense.

8114. ORAL ANATOMY AND EMBRYOLOGY. (1 cr; prereq #) Bevis
Lectures reviewing anatomy and embryology of the oral cavity as well as adjacent head and neck structures. Emphasis on growth, development, and cephalometric landmarks.

8115. ADVANCED DENTAL MICROSCOPIC ANATOMY. (3 cr; prereq #) Bevis
Microscopic structure of cells, tissue, and organs related to dentistry. Demonstrations and laboratory exercises with electron microscope and associated technics.

8116. ADVANCED DENTAL HISTOLOGY. (1 cr; prereq 8115 and #) Bevis
Complete review of the literature on collagen breakdown and renewal, bone healing, and related dental topics. Lecture only.

8135. BIOLOGICAL ELECTRON MICROSCOPY: TECHNICS. (1-5 cr; prereq #; offered 1979-80 and alt yrs) Erlandsen
Introduction to principles and technics of electron microscopy. Laboratory emphasis on acquisition of skills in tissue preparation, photography, use of electron microscope, and ancillary equipment.

8136. BIOLOGICAL ELECTRON MICROSCOPY: TECHNICS. (1-5 cr; prereq #; offered 1979-80 and alt yrs) Erlandsen
Specialized ultrastructural technics and their application to biologic problems. Laboratory emphasis on high resolution microscopy and use of scanning electron microscope.

8137. BIOLOGICAL ELECTRON MICROSCOPY: INTERPRETATION. (1-5 cr; prereq *5103, *8135-8136, and #; offered 1979-80 and alt yrs) Erlandsen
Structure and function of cell organelles. Individual projects using advanced technics for both transmission and scanning electron microscopy.

8141. NEUROANATOMICAL METHODS. (2 cr; prereq #) Elde
Introduction to contemporary morphological technics applicable to investigation of the nervous system. Theoretical basis of these technics as well as practical aspects related to their use. Laboratory experience with selected technics.

8153, 8154, 8155, 8156. ADVANCED ANATOMY. (2-6 cr; prereq #) Bauer, Carpenter, Coulter, Dixit, Elde, Erlandsen, Hamilton, Heggestad, Hegre, Kaung, Parsons, Robertson, Smithberg, Sorenson, Sundberg
Cytochemistry, embryology, gross anatomy, hematology, histology, neurology, or experimental morphology.

8160. INTRODUCTION TO HISTOLOGICAL AND MORPHOLOGICAL-HISTOCHEMICAL TECHNICS. (2 cr; prereq 5103, #; offered 1980-81 and alt yrs) Carpenter
Fixation, embedding, and staining of cytological components and enzymes.

8161-8162-8163. METHODS IN ANATOMICAL RESEARCH. (2 cr per qtr; primarily for 1st-yr grad students; prereq 5100 or #; offered 1980-81 and alt yrs) Bauer and staff
Introduction to instrumentation, technics, and experimental approaches in fields of cell physiology, microchemistry, radioautography, quantitative histochemistry, tissue culture, etc.

8166. SEMINAR: CYTOLOGICAL ASPECTS OF PROTEIN SYNTHESIS AND SECRETION. (3 cr; prereq 5100 or #; offered winter 1980 and alt yrs) Bauer
Protein synthesis, storage, and secretion in mammalian tissues, with emphasis on hormone production. Correlation of structure and function of subcellular organelles and current ideas on regulation of synthesis and secretion.

8201, 8202, 8203, 8204. RESEARCH IN ANATOMY. (2-10 cr; prereq #) Bauer, Carpenter, Coulter, Dixit, Elde, Erlandsen, Hamilton, Heggestad, Hegre, Kaung, Parsons, Robertson, Smithberg, Sorenson, Sundberg
Cytochemistry, embryology, gross anatomy, histology, hematology, or neurology. Special facilities offered to graduate students in clinical departments for work on problems in applied anatomy.

8205, 8206, 8207. SEMINAR: ANATOMY. (1 cr per qtr; prereq #) Bauer, Carpenter, Coulter, Dixit, Elde, Erlandsen, Hamilton, Heggestad, Hegre, Kaung, Parsons, Robertson, Smithberg, Sorenson, Sundberg
Reviews of current literature and discussion of research work being carried on in the department.

8211. NEUROCYTOLOGY. (1 cr; prereq #) Coulter
Ultrastructure, cytochemistry, and physiology.

ANATOMY

OFFERED AT ROCHESTER[1]

Professor

Frederick W. L. Kerr, M.D.
Richard K. Winkelmann, M.D., Ph.D.

Associate Professor

Duane K. Rorie, M.D.

Assistant Professor

Bruce W. Pearson, M.D.

In cooperation with other departments at the Mayo Graduate School of Medicine, there is opportunity for study and research leading to a minor in anatomy.

M 5801. GROSS HUMAN ANATOMY. (3 cr; prereq #) Rorie
Dissection of human body and discussion in small groups to understand relationships and the clinical importance of selected areas.

M 8851f,s. ANATOMY FOR GENERAL SURGEONS. (3 cr) Staff
Fundamental anatomical facts and relations, especially of the neck and trunk; details of special surgical interest, not generally acquired in undergraduate anatomy, studied in lectures, discussions, and by dissection.

M8852f,s. SURGICAL ANATOMY OF HEAD AND NECK. (3 cr; prereq grad student in surgical field) Pearson
Cadaver dissection and lecture demonstration. Only those taking laboratory will receive credit.

M 8854. APPLIED NEUROANATOMY AND NEUROPHYSIOLOGY. (4 cr) Kerr
Ultrastructure of the nervous system.

M 8855s. ORTHOPEDIC ANATOMY. (1 cr) Staff
Lectures and laboratory work on the limbs and back.

ANESTHESIOLOGY (Anes)

OFFERED AT MINNEAPOLIS

Professor

Joseph J. Buckley, M.D., M.S., *head*
John R. Gordon, M.D., M.S.

Associate Professor

James F. Cumming, M.D., Ph.D.
Edward C. Hanisch, Jr., M.D.
Ji-Chia Liao, M.D.

Graduate work in anesthesiology offers a number of fellows superior training with opportunity for large clinical experience and investigative work in all types of general and regional anesthesia.

In addition, work in cooperation with other departments is available. The standards of the certifying specialty boards must be fully met.

Master's Degree—The M.S. degree is offered in anesthesiology under Plan A, with major in anesthesiology and minor in one of the laboratory sciences.

8265f,w,s,su. GENERAL ANESTHESIA. (12 cr)
Instruction and experience in general anesthesia.

8266f,w,s,su. REGIONAL ANESTHESIA. (4 cr)
Observation, instruction, and administration of all types of local, regional, and spinal anesthesia.

8267f,w,s,su. PRE- AND POSTANESTHETIC EVALUATION. (2 cr)
Selection of proper anesthetic agent and technique, premedication, and observation of recovery from anesthesia.

8268f,w,s,su. SEMINAR: ANESTHESIOLOGY. (2 cr)
Review of literature, report of case problems, and discussion of research work in progress within the department.

[1]Enrollment in these courses is limited.

8269f,w,s,su. RESEARCH IN ANESTHESIA. (Cr ar)
Anesthesia problems in experimental laboratory or in hospital.

It is recommended that fellows in anesthesiology also register for courses in other departments selected from the following offerings:

MdBc 5053. PROBLEMS IN BIOCHEMISTRY

MdBc 5100-5101. BIOCHEMISTRY

MdBc 8150. SEMINAR: BIOCHEMISTRY

Med 8202. DISEASES OF THE CARDIOVASCULAR APPARATUS

Phcl 5109. PHARMACOLOGICAL PROBLEMS

Phcl 8203. RESEARCH IN PHARMACOLOGY

PubH 5450. BIOMETRY I

PubH 5451. BIOMETRY LABORATORY I

ANESTHESIOLOGY

OFFERED AT ROCHESTER

Professor

Alan D. Sessler, M.D., *chairman*
John D. Michenfelder, M.D.
Kai Rehder, M.D.
Russell A. Van Dyke, Ph.D.

Associate Professor

Edward P. Didier, M.D.
Allan B. Gould, Jr., M.D., M.S.
Gerald A. Gronert, M.D.
Paul F. Leonard, M.D.
Joseph M. Messick, Jr., M.D., M.S.
Duane K. Rorie, M.D., Ph.D.
Sait Tarhan, M.D.
John H. Tinker, M.D.
Roger D. White, M.D.

Assistant Professor

Roy F. Cucchiara, M.D.
Robert A. Devloo, M.D.
Virginia B. Hartridge, M.D.
Harold M. Marsh, M.B.B.S.
Lawrence B. Perry, M.D.
Norbert Schnelle, M.D., M.S.
Josef K. Wang, M.D.

Instructor

Thomas J. Knopp, B.A.

Graduate training in anesthesiology at the Mayo Graduate School of Medicine combines practical training with opportunity for an advanced degree. The educational program fulfills all training requirements of both Plan 1 and Plan 2 of the American Board of Anesthesiology. Residents have the opportunity to earn the M.S. degree in anesthesiology (or a related science) with a minor in physiology, biophysics, biochemistry, or pharmacology.

The didactic program includes a weekly departmental conference, a series of core lectures by consultants, and daily respiratory and intensive care conferences. Morbidity and mortality conferences and presentations of scientific data from ongoing departmental research are held biweekly.

Residents who are particularly interested in study of certain specialized fields of anesthesiology may arrange to concentrate on those areas. Excellent opportunities are available to qualified individuals for advanced training in cardiovascular anesthesiology, neuroanesthesiology, respiratory intensive care, and research related to anesthesia.

M 5850. BASIC PRINCIPLES FOR ANESTHETIC PRACTICE. (3 cr) Cucchiara, Gould, Marsh, Rorie, Sessler, Tinker, Van Dyke
Basic physical, physiological, pharmacological, and medical principles relevant to the clinical practice of anesthesiology.

M 8851f,w,s,su. INTRODUCTION TO GENERAL ANESTHESIA. (6 cr) Gould, Hartridge, Leonard, Perry, Schnelle, Sessler, Tarhan
Observation and instruction in all types of general anesthesia and simple regional anesthesia, administration under supervision, and responsible administration.

M 8852f,w,s,su. ADVANCED TECHNIQUES IN ANESTHESIA. (6 cr) Devloo, Didier, Gould, Gronert, Marsh, Messick, Michenfelder, Perry, Sessler, Tarhan, Tinker, White
Anesthesia for pediatric surgery, cardiovascular surgery, neurosurgery, ENT and ophthalmological surgery, and obstetrics including general and advanced regional techniques, respiratory intensive care.

M 8853f,w,s,su. ANESTHESIA AS APPLIED TO ALL TYPES OF ORAL SURGERY. (6 cr) Gould, Perry, and staff

M 8854f,w,s,su. NEUROSURGICAL ANESTHESIA. (6 cr, prereq 2 yrs basic clinical anesthesia training) Cucchiara, Gronert, Messick, Michenfelder, and staff
Twelve months of experience with increasing responsibility. Intensive clinical experience. Several months available for work in related fields: neuroanatomy, neuropathology, neurophysiology, electroencephalography, electromyography, and intensive care.

M 8855f,w,s,su. CARDIOVASCULAR ANESTHESIA. (6 cr; prereq 2 yrs basic clinical anesthesia background) Devloo, Tarhan, Tinker, White
Twelve months devoted to anesthesia for patients undergoing surgery for cardiovascular disease. Increasing responsibility for patient care as experience warrants. Several months devoted to studies in related fields: cardiac catheterization, pulmonary and cardiovascular physiology, association with clinical research problems in cardiovascular surgical field. Extensive experience in management of cardiopulmonary bypass patients.

M 8856f,w,s,su. RESPIRATORY INTENSIVE CARE. (6 cr; prereq 2 yrs approved residency in allied clinical field) Didier, Marsh
Twelve or 24 months of training in all phases of management of patients with respiratory problems, including mechanical ventilation, respiratory physiology, pulmonary function evaluation, and general intensive care. Experience in the function of hospital respiratory therapy service; participation in directing a respiratory intensive care unit, and instruction and direction of respiratory paramedical personnel.

M 8990. RESEARCH IN ANESTHESIOLOGY. (6 cr) Gronert, Knopp, Michenfelder, Rehder, Rorie, Tinker, Van Dyke

BIOCHEMISTRY

OFFERED AT MINNEAPOLIS AND ST. PAUL

Graduate training leading to the M.S. and Ph.D. degrees in biochemistry is offered in each of two biochemistry departments, one in the College of Biological Sciences and the other in the Medical School. The two departmental programs, however, are closely coordinated through an interdepartmental committee, and, except for minor differences in detail, the graduate program in biochemistry can be considered to be a single entity.

Prerequisites—Applicants are screened by a single, interdepartmental admissions committee. For major work, candidates must have completed courses in analytical, organic, and physical chemistry equivalent to those contained in an American Chemical Society approved curriculum. In addition, students are required to have at least 1 year of college physics, mathematics through integral calculus, and 1 year of biology (general, botany, zoology, microbiology, and genetics). Students may be permitted to make up deficiencies in these requirements in the course of completing their graduate program. Candidates for the master's degree in biochemistry and those seeking a Ph.D. degree with a minor in biochemistry may be admitted with less rigorous requirements. While most admissions will be for fall quarter, applications are also invited for admission at the beginning of other terms. Applications must include GRE scores (verbal, quantitative, analytical, and, preferably, advanced test in chemistry or biology).

Master's Degree—Offered only under Plan A. The student must satisfactorily complete 1 year of general biochemistry courses (5751-5752 and laboratory courses) plus two advanced biochemistry courses, participate in seminars, and take 9 credits of graduate-level courses in a minor field of study. A final oral examination covering the student's research and other topics in biochemistry will be given.

Ph.D. Degree—In addition to the examination and thesis requirements of the Graduate School, completion of the core biochemistry courses (5751-5752) or their equivalent is required, accompanied by an appropriate laboratory program. Addi-

tional advanced courses in chemistry, biochemistry, and biology are also required. With the approval of the adviser, courses in various fields of mathematics, physics, agricultural sciences, and medical sciences may be included as part of the major course of study. Students must participate in the graduate seminar programs of their respective departments.

The Ph.D. degree also requires a minor field of study that may be chosen from biophysics, botany, cell biology, chemistry, genetics, microbiology, physiology, plant physiology, zoology, or other suitable fields, or a supporting program generally composed of more than one discipline. Approximately 20 credits of course work are required for a supporting program. The number of credits in the minor program is established by the minor department or program.

Language Requirement—There is no language requirement for either the M.S. or Ph.D. degree; however, competency obtained at the high school or undergraduate level in a language is highly desirable.

Minor in Biochemistry—The requirements for a minor in biochemistry include a basic biochemistry sequence (5751-5752 is recommended; MdBc 5100-5101[1] or BioC 5001-5002 are also accepted) with laboratory, and advanced courses in biochemistry to total approximately 20 credits. A minimum of 2 quarters of physical chemistry (5534-5535, 5533-5534, 5520-5521, or their equivalent) are also required, but will not be counted as part of the 20 credits.

Note—Graduate study in biochemistry is also offered at the Mayo Graduate School of Medicine of the University of Minnesota in Rochester, Minnesota. The requirements outlined above also apply to this program. Students usually spend 3 quarters in residence on the Twin Cities campus.

Biochemistry (BioC)

(College of Biological Sciences)

Professor

Victor A. Bloomfield, Ph.D., *head*
Huber R. Warner, Ph.D., *director of graduate study*
Peter J. Chapman, Ph.D.
Stanley Dagley, D.Sc.
John E. Gander, Ph.D.
Robert L. Glass, Ph.D.
LaVell M. Henderson, Ph.D.
Robert Jenness, Ph.D.
Samuel Kirkwood, Ph.D.
Irvin E. Liener, Ph.D.
Rex E. Lovrien, Ph.D.
Kenneth G. Mann[2]
Eckard Muenck[3]
Palmer Rogers, Ph.D.[4]
Hermann Schlenk, Ph.D.[5]
Ulysses S. Seal, Ph.D.[6]
Finn Wold, Ph.D.
John M. Wood, Ph.D.[3]

Associate Professor

John S. Anderson, Ph.D.
James A. Fuchs, Ph.D.
Gary R. Gray, Ph.D.[7]
Gary L. Nelsestuen, Ph.D.
Clare K. Woodward, Ph.D.

Assistant Professor

Joseph R. Lakowicz, Ph.D.[3]

[1]Offered on the Medical School calendar, which is different from the regular University calendar. Fall classes may start as much as one month ahead of other courses.

[2]Member of Mayo Clinic, Rochester

[3]Member of Gray Freshwater Biological Institute

[4]Primary appointment in Department of Microbiology

[5]Member of the Hormel Institute staff

[6]Member of Veterans Administration Hospital staff

[7]Primary appointment in Department of Chemistry

Biol 5001f,w,s,su. BIOCHEMISTRY. (4 cr; prereq Biol 1011, 12 cr organic chemistry)
Biochemistry and biophysics of cells: enzyme catalysis, cellular constituents, and cellular regulatory mechanisms.

5002w,s. BIOCHEMISTRY TOPICS. (3 cr; prereq Biol 3021 or 5001)
Topics not covered in Biol 5001. Biol 5001, BioC 5002 constitute a 2-quarter sequence for undergraduate and graduate students lacking physical chemistry and serve as a prerequisite for certain advanced courses.

5025f,w,s. LABORATORY IN BIOCHEMISTRY. (2 cr; prereq Biol 3021 or 5001 or ¶Biol 5001)
Techniques and problem-solving approaches illustrated with laboratory experiments and demonstrations.

5522f. PHYSICAL BIOCHEMISTRY OF SOLUTIONS. (4 cr, §Chem 5522; prereq 2 qtrs physical chemistry...Biol 3021 or 5001 desirable)
Physical chemistry of equilibrium and transport of phenomena in solution, with application to biochemical systems. Macromolecular solutions and phase transitions, protein polymerization, micelle formation, sedimentation equilibrium and velocity, translational and rotational diffusion, viscosity.

5523w. PHYSICAL BIOCHEMISTRY: STRUCTURE AND INTERMOLECULAR FORCES. (4 cr, §Chem 5523; prereq 2 qtrs physical chemistry...Biol 5001 desirable)
Methods of structure determination of biological macromolecules. Scattering and diffraction, optical and magnetic resonance spectroscopy. Application to proteins, nucleic acids, and synthetic analogs.

5524s. PHYSICAL BIOCHEMISTRY: DYNAMICS. (4 cr, §Chem 5524; prereq 2 qtrs physical chemistry...Biol 5001 desirable)
Application of thermodynamics, statistical mechanics, and chemical kinetics; solvent effect, structure-function relation.

5744w. BIOCHEMICAL ANALYSIS. (2 cr; prereq ¶5745 or #, cr in analytical chemistry and 5002 or equiv)
Numerical problems in biochemistry and analytical biochemistry. Lectures and problem sets.

5745w. BIOCHEMICAL ANALYSIS LABORATORY. (2 cr; prereq ¶5744, lab work in analytical and organic chemistry, #)
Isolation and characterization of proteins, carbohydrates, and lipids. Experimental methods in ligand binding and bioenergetics.

5751f-5752w†. GENERAL BIOCHEMISTRY. (4 cr per qtr, §MdBc 5751-5752; prereq Biol 5001 or equiv, 2 qtrs physical chemistry, or parallel second qtr physical chemistry; offered jointly by Departments of Biochemistry [College of Biological Sciences] and Biochemistry [Medical School])
Structure, function, metabolism, and metabolic regulation of components in biological systems.

5950f,w,s. SPECIAL TOPICS. (1-5 cr; prereq #, △)

5970. DIRECTED STUDIES. (1-3 cr; prereq #, △) Staff
Offered to enable students to make up certain deficiencies in background course work.

8094. RESEARCH AND LITERATURE REPORTS. (1 cr) Staff
Consideration of current developments in biochemistry.

8194. GRADUATE SEMINAR. (1 cr; prereq △) Staff
Reports on recent developments in biochemistry and on research projects in department.

8211s. CARBOHYDRATES. (2 cr; prereq 5752 or #; offered 1981-82 and alt yrs)
Lectures and assigned readings on composition, structure, chemical and physical properties, and biochemical functions of carbohydrates.

8221s. ENZYMES. (3 cr; prereq 5752 or #; offered 1981-82 and alt yrs)
Lectures and assigned readings on nature and function of enzymes.

8225f. TRACER TECHNIQUES. (1 or 3 cr; prereq 5752 or MdBc 5750, #)
Laboratory work on application of radioisotopes to study of metabolic processes.

8231. LIPIDS. (3 cr; prereq 5752 or #; offered 1979-80 and alt yrs)
Lectures and assigned readings on composition, structure, chemical and physical properties, and biochemical functions of fats and fat-like compounds.

8250. SPECIAL TOPICS IN BIOCHEMISTRY. (1-3 cr; prereq 5002) Staff
Lectures and discussions varying from quarter to quarter according to staff availability and needs of department.

8260. ADVANCED PHYSICAL BIOCHEMISTRY. (2 cr per qtr [may be repeated for cr 1 or more qtrs in different topic areas]; prereq 5523 and #) Bloomfield, Lakowicz
Theory, methodology, and applications of biophysical chemistry techniques: fluorescence spectroscopy.

8261w. PROTEINS. (3 cr; prereq 5752 or #; offered 1980-81 and alt yrs)
Lectures and assigned readings on composition, structure, chemical and physical properties, and biochemical functions of proteins and amino acids.

8271f. VITAMINS. (3 cr; prereq 5752 or #; offered 1979-80 and alt yrs)
Lectures and assigned readings on biochemistry of vitamins and their physiological action.

8290f,w,s,su. CURRENT RESEARCH TECHNIQUES. (1-3 cr per qtr, prereq graduate major in biochemistry, #)
Research projects in biochemistry, each one to be carried out in the research laboratory of an individual staff member. Satisfies all or part of the laboratory requirements for Ph.D. degree.

8501s. BIOCHEMICAL EVOLUTION. (3 cr; prereq 5002 or 5752 or #; offered 1980-81 and alt yrs) Jenness, Kirkwood
Lectures and assigned readings on prebiotic chemical evolution and Darwinian evolution of important biochemical molecules and processes.

8746s. BIOCHEMISTRY LABORATORY PROJECTS AND ADVANCED TECHNIQUES. (1-3 cr; prereq 5745, 5752)
Special projects and techniques in isolation and characterization of biomolecules, ligand binding, enzyme kinetics, hydrodynamics, spectrophotometry, chromatography, and electrophoresis. Each project or exercise corresponds to 1 credit.

8764f. METALLOPROTEINS: STRUCTURE AND FUNCTION. (3 cr; prereq 5751-5752 or 5002, Biol 5001 or equiv . . . 5523 recommended; offered 1980-81 and alt yrs) Muenck, Wood
Magnetic resonance techniques. Transition metals in enzyme-catalyzed reactions.

8990. GRADUATE RESEARCH. (2-5 cr; prereq #) Staff
Research problems in various fields in biochemistry represented by staff interests.

Biochemistry (MdBc)

(Medical School)

Professor

Henricus P.C. Hogenkamp, Ph.D., *head*
Charles W. Carr, Ph.D., *director of graduate study*
M. Zouhair Atassi, Ph.D.[1]
James W. Bodley, Ph.D.
Mary E. Dempsey, Ph.D.
Ivan D. Frantz, M.D.
Helmut R. Gutmann, Ph.D.[2]
Ralph T. Holman, Ph.D.[3]
James F. Koerner, Ph.D.
Andreas Rosenberg, Ph.D.[4]
Leon Singer, Ph.D.
Frank Ungar, Ph.D.
John F. Van Pilsum, Ph.D.

Adjunct Professor

Quenton T. Smith, Ph.D.[5]

Assistant Professor

John D. Lipscomb, Ph.D.
Dennis M. Livingston, Ph.D.

Associate Professor

Ronald D. Edstrom, Ph.D.
Ernest D. Gray, Ph.D.
James B. Howard, Ph.D.
Robert J. Roon, Ph.D.

5053f,w,s,su. PROBLEMS IN BIOCHEMISTRY. (Cr ar [may be repeated 1 or more qtrs for cr]; prereq 5752 or 5101) Staff

5100. BIOCHEMISTRY. (6 cr; primarily for medical students; prereq physics and organic chemistry) Staff

5101. BIOCHEMISTRY. (4 cr; primarily for medical students; prereq 5100) Staff

5750s. BIOCHEMISTRY LABORATORY. (4 cr; biochemistry majors given priority; prereq 5752) Staff
General experimental techniques, instrument analyses, special individual projects with oral reports and examinations.

5751f-5752w†. GENERAL BIOCHEMISTRY. (4 cr per qtr, §BioC 5751-5752; prereq BioC 3021 or equiv, 2 qtrs physical chemistry, or parallel second qtr physical chemistry)
See BioC 5751.

8150f,w,s. SEMINAR: BIOCHEMISTRY. (1 cr) Staff

8206f. ADVANCED ENDOCRINOLOGY AND STEROID CHEMISTRY. (3 cr; prereq 5752 or 5101; offered 1979-80 and alt yrs) Ungar
Control mechanisms for hormone production; hormone-regulated molecular events; comparison of mode of action of peptide and steroid hormones.

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[1]Primary appointment at Mayo Clinic, Rochester

[2]Located at Minneapolis Veterans Hospital

[3]Member of the Hormel Institute staff

[4]Primary appointment in Department of Laboratory Medicine and Pathology

[5]Primary appointment in School of Dentistry

8211s. NUCLEIC ACID STRUCTURE AND FUNCTION. (3 cr, §BioC 8241; prereq 5752 or 5101; offered 1979-80 and alt yrs) Bodley, Gray, Livingston, Warner
Lectures and readings on current topics in DNA and RNA structure, synthesis, and function.

8215s. LIPIDS. (3 cr, §8231; prereq 5752 or #; offered 1979-80 and alt yrs) Frantz, Schlenk
Lectures and assigned readings on composition, structure, chemical and physical properties, and biochemical functions of fats and fat-like compounds.

8217w. PROTEIN BIOCHEMISTRY. (3 cr; prereq 5752 or 5101, Chem 5504, or #; offered 1980-81 and alt yrs)
Structure of proteins as revealed by chemical and physical investigations; selected examples of correlation between protein structure and function.

8218s. STRUCTURE AND MECHANISM IN ENZYME CATALYSIS. (3 cr; prereq 5742 or 5101 or #; offered 1979-80 and alt yrs) Howard
Lectures and readings on enzyme catalysis as elucidated through enzyme structure studies, kinetics, and protein modification.

8219f,s. BOCHEMISTRY OF SPECIALIZED TISSUES. (3 cr; prereq 5752 or 5101; offered 1980-81 and alt yrs) Van Pilsum
Biochemical and physiological functions and metabolism of adipose, nervous, muscle, liver, kidney, and other tissues in mammals.

8220w. CARBOHYDRATE METABOLISM. (3 cr; prereq 5752 or 5101; offered 1979-80 and alt yrs) Edstrom
Lectures and readings on carbohydrate metabolism in mammalian systems. Emphasis on biosynthesis and degradation of polysaccharides, glycoproteins, and glycolipids. Metabolic diseases of carbohydrate metabolism involving storage of polymeric products.

8290f,w,s,su. CURRENT RESEARCH TECHNIQUES. (1-3 cr per qtr; prereq grad major in biochemistry, #)

8300. RESEARCH. (Cr ar)

BIOCHEMISTRY

OFFERED AT ROCHESTER

Professor

Vernon R. Mattox, Ph.D., *director of graduate study*
M. Zouhair Atassi, Ph.D.
James D. Jones, Ph.D.
Kenneth G. Mann, Ph.D.
John T. McCall, Ph.D.
John T. Penniston, Ph.D.
Thomas C. Spelsberg, Ph.D.
Russell A. Van Dyke, Ph.D.
Carlo M. Veneziale, M.D., Ph.D.

Associate Professor

Ralph D. Ellefson, Ph.D.
Nai-Siang Jiang, Ph.D.
David O. Toft, Ph.D.

Graduate training in biochemistry leading to the M.S. and Ph.D. degrees may be arranged through a didactic program offered jointly by the biochemistry department at Rochester and by the two biochemistry departments in the Twin Cities. Thesis work for graduate degrees may be undertaken at Rochester.

M 5852-5853f,w. BIOCHEMISTRY LECTURE. (6 cr) Mattox
Structure, function, metabolism, and regulation of major cellular constituents, including carbohydrates, amino acids, lipids, nucleic acids, proteins, enzymes, hormones, etc.

M 5854f,w,s. BIOCHEMISTRY SEMINAR. (1 cr) Staff
Student discussion of current topics in biochemistry.

M 5855w. ENDOCRINOLOGY AND METABOLISM. (3 cr) Staff
Structure, function, regulation, and mode of action of hormones.

M 5856. REGULATION OF CARBOHYDRATE AND FAT METABOLISM. (2 cr; prereq 5852 or 5853 or equiv) Veneziale
Metabolism in brain, liver, kidney, and muscle are primary topics; mechanisms of various control processes emphasized.

M 5857w. CONCEPTS OF PROTEIN CHEMISTRY. (3 cr; prereq 2 qtrs organic chemistry, 2 qtrs physical chemistry, or #; offered even yrs) Mann
Lectures and assigned readings in the area of protein chemistry. Concepts in protein structure and function introduced at the experimental level and developed with respect to theoretical basis. Primarily intended for students with a limited amount of specific background in biochemistry; i.e., medical students and residents.

M 5858. LABORATORY TECHNIQUES IN BIOCHEMISTRY. (6 cr) Mattox and staff
Tutorial course involving methods of isolation, characterization, and assay of subcellular particles, proteins, nucleic acids, lipids, steroids, and carbohydrates. General techniques, instrumental analyses, and special procedures emphasized.

M 8859. BIOCHEMISTRY OF LIPIDS. (2 cr; prereq 5852, 5853 or equiv) Ellefson, Mattox
Interrelated, topical lectures to include occurrence, analysis, normal and abnormal metabolism, and biological functions of lipids.

M 8860. METHODS OF BIOCHEMICAL ANALYSIS. (1 cr; prereq 5852, 5853 or equiv) Spelsberg
Lectures on various chemical, physical, optical, and instrumental methods of analysis; demonstrations of various biochemical techniques and interpretation of laboratory data.

M 8890. RESEARCH IN BIOCHEMISTRY. (6 cr)
Graduate thesis research under supervision of staff.

BIOMEDICAL ENGINEERING

OFFERED AT MINNEAPOLIS

Professor

Darrell A. Frohrib (mechanical engineering), *director of graduate study*
Eugene Ackerman (biometry and health information systems)
Perry L. Blackshear, Jr. (mechanical engineering)
Victor A. Bloomfield (biochemistry)
William E. Bradley (neurology)
Henry Buchwald (surgery)
Thomas F. Fletcher (veterinary anatomy)
Arnold G. Fredrickson (chemical engineering and materials science)
Russell K. Hobbie (physics)
John A. Johnson (physiology)
Kenneth H. Keller (chemical engineering and materials science)
Rex E. Lovrien (biochemistry)
Rufus W. Lumry (chemistry)
Wilmer G. Miller (chemistry)
Stephen Prager (chemistry)
Otto H. Schmitt (biophysics)
Henry M. Tsuchiya (chemical engineering and materials science)
Richard L. Varco (surgery)
Theodore A. Wilson (aerospace engineering and mechanics)

Associate Professor

George W. Beeler (physiology, Mayo)
Robert G. Bryant (chemistry)
Richard Moore (radiology)
Frederick M. Waltz (electrical engineering)

Assistant Professor

Ronald L. Wathen (medicine)

Degrees—The program in biomedical engineering leads to the Ph.D. degree only. However, work in biomedical engineering can be taken as a minor for either a master's or Ph.D. program.

Emphases Available Within the Major—Biomedical engineering is an interdisciplinary program designed to provide the student with a broad familiarity with the interactions among the engineering sciences, the biological sciences, and the medical sciences, and in-depth training in at least one of these disciplines. Thesis research topics, which provide the focus for a student's training, may be chosen from among the many areas of biomedical engineering research being conducted at the University. For example, research is currently under way in: blood fluid mechanics and its application to cardiovascular problems and to the design of artificial internal organs; organ preservation; chemotaxis; modeling of lung dynamics and the study of pathological pulmonary conditions; microbial population dynamics; intestinal mass transfer; the development of instrumentation and control devices to correct neurological defects; the application of computer science to a wide variety of problems in physiological simulation, diagnosis, and medical data recording.

Prerequisites—Candidates for the Ph.D. degree should have completed undergraduate work in an engineering, physical science, or biological science field. They must have sufficient breadth of training to allow them to undertake graduate-level courses in the several fields that constitute the Ph.D. program. Usually, this is interpreted to mean *at least* the following: 2 years of college-level mathematics; 1 year of physics; 1 year of chemistry; 1 year of biological science. Where specific deficiencies exist, candidates may be accepted into the program contingent upon the successful completion of certain preliminary courses designed to correct those deficiencies. In most cases, such preliminary courses would not be part of the Ph.D. program.

Three letters of recommendation should be submitted in conjunction with the candidate's application. In evaluating applications and supporting materials, consideration is given to the likelihood that an appropriate focus exists within the program to match the candidate's interest.

Approval of Program—The candidate's tentative program will be planned with the aid of an adviser and a three-member subcommittee selected jointly by the candidate and the director of graduate study from the above list of departmental faculty members, or otherwise approved by the Biomedical Engineering Graduate Program Review Committee. The committee will consider the suitability of the program and thesis topic and will take appropriate action, and will also be responsible for the appointment of examination committees.

Major Program—The purpose of the major program is to provide students with comprehensive training in both the engineering and biomedical aspects of at least one area of biomedical engineering. To accomplish this, students will normally take a broad but cohesive program consisting of at least 9 credits in each of three departments. Two of these departments should be in a college other than that of the minor. In addition, students will normally register in one of the ongoing biomedical engineering seminar series for at least 6 quarters.

Minor Program—The minor program is intended to insure that the emphasis on breadth in the major is complemented by the development of specialized proficiency in at least one subdiscipline of this inherently interdisciplinary field. To accomplish this, the student will be required to complete at least 18 credits in the department designated as the minor, with at least 9 of these credits in 8000-level courses. The minor department will normally be the one most closely related to undergraduate training or the one in which the student's adviser holds an appointment.

Language Requirement—Students will be required to demonstrate proficiency in French, German, or Russian or to complete an alternative program.

Minor Requirements for Students Majoring in Other Fields—For an M.S. degree, students are required to take 12 credits in two departments other than that of their major. The particular courses are approved by the director of graduate study based upon discussions with the student. Students must also register for 3 quarters of an approved 1-year biomedical engineering seminar series.

For a Ph.D. minor program, 18 credits outside the major are required. The particular program is approved on an individual basis by the director of graduate study in consultation with the student. Three quarters of registration in an approved biomedical seminar series are also required.

BIOMETRY AND HEALTH INFORMATION SYSTEMS (PubH)

OFFERED AT MINNEAPOLIS

Professor

Marcus O. Kjelsberg, Ph.D., *head*
Eugene A. Johnson, Ph.D., *director of graduate study*
Eugene Ackerman, Ph.D.
James R. Boen, Ph.D.
Lila R. Elveback, Ph.D.
Richard B. McHugh, Ph.D.
Donald G. McQuarrie, M.D., Ph.D.
William F. Taylor, Ph.D.
Vernon E. Weckwerth, Ph.D

Associate Professor

Glenn E. Bartsch, Sc.D.
Stanley M. Finkelstein, Ph.D.
Laèl C. Gatewood, Ph.D.
Anne I. Goldman, Ph.D.
Kathleen M. Keenan, Ph.D.
Ruth B. Loewenson, Ph.D.
William M. O'Fallon, Ph.D.

Assistant Professor

Lynda B. Ellis, Ph.D.
Chap T. Le, Ph.D.
Peter C. O'Brien, Ph.D.

Program of Study—Biometry and health information systems is the study of analytical and quantitative aspects of biology, medicine, public health, and health care systems. Possible areas of emphasis include measurement problems, model building, evaluation of health programs, experimental design and analysis, systems monitoring and control, health computer sciences, demography, and health statistics. To complement biometry course offerings, students may elect courses from such fields as computer science; hospital and health care administration; epidemiology; mathematics; and statistics. Advanced work in the social, biological, or medical sciences is usually taken as part of a minor or supporting program, but with special justification may be taken as part of the major.

Prerequisites—Two years of college mathematics with an undergraduate major in one of the social, biological, mathematical, or physical sciences.

Admission Date—Entry into the program in the fall quarter is strongly recommended.

Master's Degree—Plan A and Plan B programs leading to the M.S. degree are available. Most students would be expected to enroll in the Plan B program. The Plan A program is usually restricted to those with an undergraduate major in biometry or those with a D.D.S., D.V.M., or M.D. degree, or a Ph.D. degree in a bioscience. Candidates must pass a final oral examination.

Doctor's Degree—Work for the Ph.D. degree is offered.

Language Requirement—None.

Note—A master of public health degree with special emphasis on biometry is offered by the School of Public Health. Consult the *School of Public Health Bulletin*.

The courses below are described in the Public Health section of this bulletin.

5400. INTRODUCTION TO QUANTITATIVE METHODS IN THE HEALTH AND LIFE SCIENCES. (4 cr: for students majoring in biological and health sciences; prereq Biol 1011, Chem 1004-1005, Math 1231 or equiv, #) McHugh

5403. COMPUTER APPLICATIONS IN HEALTH SERVICES ADMINISTRATION. (4 cr: prereq non-biometry major, health science regis or #) Gatewood

5404. INTRODUCTION TO BIOSTATISTICS AND STATISTICAL DECISION. (4 cr: prereq #) Weckwerth

5406. BIOMETRIC METHODS IN ENVIRONMENTAL HEALTH. (3 cr: prereq environmental health student and 5414 with grade B or equiv or #) Johnson

5407. VITAL AND HEALTH STATISTICS I. (3 cr) Kjelsberg

5408. BIOMETRIC METHODS II. (3 cr; prereq 5414 with grade B or #) Goldman

5409. BIOMETRY IN CLINICAL STUDIES I. (3 cr; prereq DDS, MD, DVM, PharmD, or clinical nursing student or #)

5410. BIOMETRY IN CLINICAL STUDIES II. (3 cr; prereq DDS, MD, PharmD, or clinical nursing student or #)

5412. SURVEY SAMPLING IN SOCIAL AND HEALTH SCIENCE RESEARCH. (3 cr, §Soc 5970; prereq #) Staff

5413. VITAL AND HEALTH STATISTICS. (1 cr) Kjelsberg

5414. BIOMETRIC METHODS I. (3 cr; prereq public health regis or #) Staff

5415-5416-5417. MATHEMATICAL BIOLOGY I, II, III. (3 cr per qtr; prereq 5432, knowledge of differential equations and biological science or #) Ackerman and staff

5430. BIOMEDICAL COMPUTING I. (4 cr, prereq Math 1111) Ellis

5431. BIOMEDICAL COMPUTING II. (4 cr; prereq 5430 or #) Ellis

5432. BIOMEDICAL COMPUTING III. (4 cr; prereq 5431 or #) Ellis

5433-5434-5435. COMPUTER METHODOLOGY ON THE DELIVERY OF HEALTH CARE I, II, III. (3 cr per qtr; prereq 5432 or #) Gatewood and staff

5436. ANALYTICAL TECHNIQUES FOR HEALTH DELIVERY SYSTEMS. (3 cr; prereq calculus, 5450, 5451, knowledge of FORTRAN, or #) Johnson

5440-5441. QUANTITATIVE PHYSIOLOGY I, II. (3 cr per qtr, §Phsl 3052-3053; prereq 1-yr sequences in mathematics, physics, chemistry, and biology or #)

5446. BIOCOMPUTING CONSULTING SEMINAR. (3 cr; prereq biometry major, 5432, 5452, or #) Gatewood

5450. BIOMETRY I. (3 cr; prereq ¶5451...familiarity with basic concepts of calculus desirable) Jeffries

5451. BIOMETRY LABORATORY I. (2 cr; prereq ¶5450) Jeffries

5452. BIOMETRY II. (3 cr; prereq 5450, ¶5453) Jeffries

5453. BIOMETRY LABORATORY II. (2 cr; prereq ¶5452) Jeffries

5454. BIOMETRY III. (3 cr; prereq 5452, ¶5455) Jeffries

5455. BIOMETRY LABORATORY III. (2 cr; prereq ¶5454) Jeffries

5456. BIOMETRY CONSULTING SEMINAR. (Cr ar; prereq biometry major) Boen and staff

5457. STOCHASTIC MODELS IN BIOLOGY AND MEDICINE. (3 cr; prereq 5451, theoretical statistics, biometry major . . . others #) Boen

5459. INTRODUCTION TO MATHEMATICAL THEORY IN BIOMETRY. (1 cr per qtr [may be repeated for cr]; prereq ¶5450, 2 qtrs calculus or #) Jeffries

5460. DEMOGRAPHY AND HEALTH. (3 cr, §Soc 5561; prereq biometry major . . . others #) Kjelsberg

5461. BIOMETRIC TOPICS IN EPIDEMIOLOGY. (3 cr; prereq biometry major . . . others #) Kjelsberg

5462. CLINICAL TRIALS AND LIFE TABLE TECHNIQUES. (3 cr; prereq biometry major . . . others #) Staff

5470. TOPICS IN BIOMETRY. (Cr ar; prereq #)

8400. SEMINAR IN BIOMETRY. (Cr ar) Staff

8405-8406-8407. ADVANCED TOPICS IN HEALTH COMPUTER SCIENCE I, II, III. (3 cr per qtr; prereq 5432-5435, 5452 and #) Staff

8420. ADVANCED BIOMETRIC METHODS I. (3 cr; prereq 5455, 5459 or equiv, knowledge of FORTRAN) Johnson

8421. ADVANCED BIOMETRIC METHODS II. (3 cr; prereq 8420 or #) Johnson

8422. ADVANCED BIOMETRIC METHODS III. (3 cr; prereq 5455, 5459 or equiv, knowledge of FORTRAN) Staff

8430-8431-8432. ADVANCED BIOMETRIC ANALYSIS I, II, III. (3 cr per qtr; prereq 8422, advanced calculus, theoretical statistics) McHugh

8449. TOPICS IN BIOMETRY. (Cr ar; prereq 5450 and #) Staff

8450. RESEARCH IN BIOMETRY. (Cr ar) Staff

BIOMETRY AND HEALTH INFORMATION SYSTEMS

OFFERED AT ROCHESTER

Professor

Lila R. Elveback, Ph.D.
William F. Taylor, Ph.D.

Associate Professor

William M. O Fallon, Ph.D.

Assistant Professor

Peter C. O'Brien, M.S., Ph.D.

Graduate work in this field at the Mayo Graduate School of Medicine is offered in the Departments of Medical Statistics and Epidemiology at the Mayo Clinic.

M 5823f. INTRODUCTORY STATISTICS I. (3 cr) Staff
Role of statistics in evaluation of evidence. Estimation and comparisons in clinical and experimental research. Basic considerations in experimental design: populations and samples. Statistical methodology: binomial, normal, and skewed distributions, t, x^2, and introduction to correlation and regression in the two-variable case.

M 5824w. INTRODUCTORY STATISTICS II. (3 cr) Staff
Further considerations of experimental design. Additional applications of x^2. Analysis of variance. Multivariate regression. Survivorship in chronic disease.

M 5825s. INTRODUCTORY STATISTICS III. (3 cr) Staff
Poisson distribution, normal values in clinical medicine, nonparametric methods, clinical trials, introduction to sequential methods, bioassay, and analysis of covariance.

M 8826. PROBABILITY THEORY. (3 cr)
Introduction to concepts and facts in both discrete and continuous cases. Probability distributions, random variables, expectation, the law of large numbers.

BIOPHYSICS (BPhy)

OFFERED AT MINNEAPOLIS

Committee

Professor

Otto H. Schmitt, Ph.D., *chairman*
Eugene Ackerman, Ph.D.
Merle K. Loken, M.D., Ph.D.
A. Glenn Richards, Ph.D.

Staff

Professor

Otto H. Schmitt, Ph.D., *director of graduate study*
Eugene Ackerman, Ph.D.
Merle K. Loken, M.D., Ph.D.
Rufus W. Lumry, Ph.D.
A. Glenn Richards, Ph.D.
Murray D. Rosenberg, M.D., Ph.D.
Carlo A. Terzuolo, M.D.

Associate Professor

Dean E. Abrahamson, Ph.D.
Faiz M. Kahn, Ph.D.
Richard Moore, Ph.D.
Alan L. Orvis, Ph.D. (Mayo Graduate School, Rochester)
Andreas Rosenberg, Ph.D.
Chang W. Song, Ph.D.

Assistant Professor

George W. Beeler, Jr., Ph.D. (Mayo Graduate School, Rochester)

Degrees Offered—M.S. (Plan A and Plan B); Ph.D.

Additional course work in biophysical science areas, needed to strengthen individual student programs in biophysics, and coadvisory staff may be drawn from related departments such as cell biology, physiology, physical chemistry, zoology, electrical engineering, mechanical engineering, chemical engineering, health computer sciences, or control science. There is opportunity for thesis research in a wide variety of topical areas such as biocomputer development, simulation, modeling,

programming and displays, biological systems theory and pattern recognition, neural and sensory physiology, electrocardiography, automated diagnosis and health care systems, chronobiology, membrane structure and function, computer-aided therapeutic and tracer radiology, hemodynamics, and physical chemistry of proteins. There are additional opportunities for research in diversified biophysical areas at the Mayo Graduate School of Medicine in Rochester, Minnesota. Courses leading to the biophysics master's degree are available in the program at Rochester as well as at Minneapolis, but biophysics candidates for the Ph.D. degree usually complete a major portion of their course work on the Minneapolis campus.

Prerequisites—Students are ordinarily admitted to the graduate biophysics degree programs only if they have had good basic training in a biological, medical, or appropriate physical science area at a level equivalent to an undergraduate major and have had at least introductory courses in biology, physics, chemistry, mathematics, and computing. Some remedial study to fill undergraduate-level gaps is often combined with regular graduate work.

Language Requirement—For the master's degree, a reading knowledge of one language, preferably German or Russian, is required, although another language or additional course work can be substituted with approval of the adviser. For the Ph.D., a reading knowledge of Russian or German is required. A second language—German, Russian, or French—is required, unless another language or collateral field of study is accepted as a substitute.

Since biophysical science is a broad field including diverse biological and physical disciplines, credit in biophysics is regularly granted for courses drawn from many different departments. A wide diversity of appropriate courses is available in addition to those described below. The student's program should include courses from the following list supplemented by other courses listed under their respective departmental headings. In consultation with the adviser, the student should plan a balanced program tailored to individual needs. Because biophysics is highly interdisciplinary, a minor field need not be identified as such on the student's program.

5138. SEMINAR: BIOPHYSICAL SCIENCES. (Cr ar) Staff

5155, 5156, 5157.* BIOPHYSICS. (3 cr per qtr; prereq basic preparation in biological sciences, physical sciences, mathematics, #) Schmitt
Selected topics in theoretical, experimental, and technical areas of biophysical science where quantitative methods of the physical sciences are especially applicable. 5155: Basic principles of biophysical analysis and experimentation. Biostatics; structure of biological systems, especially as revealed by electronic, optical, and ionizing radiation imaging techniques; hypermicroscopy, birefringence, colloidal and micellar systems. 5156: Biophysical function; dynamics of biophysical systems, excitatory state in nerve and muscle, contractility, secretion, synthesis, sensory and motor transducers. 5157: Organization of biological systems for communication and control; stability of feedback and feed-ahead systems; biocommunication theory, computer aspects of living systems, biomimetics.

5170. BASIC RADIOLOGICAL PHYSICS. (3 cr; prereq #) Staff
Theoretical and experimental aspects of radiological physics. Physical properties of various ionizing radiations; interactions of ionizing radiations with matter; methods of radiation dose measurement.

5171. PHYSICS OF NUCLEAR MEDICINE. (3 cr; prereq 5170 or #) Staff
Theoretical and experimental applications of radionuclides in medicine and biology. Imaging devices and techniques; dynamic tracer analysis; internal emitter dosimetry. Radioimmunoassay and statistics of counting.

5172. RADIATION BIOLOGY. (3 cr; prereq 5170 or #) Staff
Effects of ionizing radiation on cells, tissues, and organisms; biochemical and physiological bases of radiation effects; biological rationale for radiation therapy practices.

5173. PHYSICS OF RADIATION THERAPY. (3 cr; prereq 5107 or #)
High energy and teletherapy machines. Measurements of radiation quality, output, and depth dose distributions for clinical use. Calculation of treatment parameters. Beam modification and shaping. Treatment planning for fixed field and rotational therapy. Physics of intracavitary and interstitial therapy. Computer applications in treatment planning. Principles and criteria for radiation protection.

5174. PHYSICS OF DIAGNOSTIC RADIOLOGY. (3 cr; prereq 5170 or #)
Physics of diagnostic X-ray imaging, X-ray production, image receptors, radiation exposure and protection. Special imaging modes including computerized tomographic scanning, ultrasound, and electron radiography.

8204x.* RESEARCH IN BIOPHYSICS AND RADIATION BIOLOGY. (Cr ar) Loken

8218x. SEMINAR: RADIOBIOLOGY. (1 cr; prereq #)
Biological effects of ionizing radiations. Discussion of research problems and current literature.

8221, 8222, 8223x.* RESEARCH IN BIOPHYSICS. (Cr ar) Staff

8296, 8297, 8298.* SEMINAR: BIOPHYSICS. (Cr ar) Schmitt

Rad 8236. SEMINAR: RADIOISOTOPE. (1 cr; prereq #) Loken

BIOPHYSICS

OFFERED AT ROCHESTER

Professor
Joseph H. Szurszewski, Ph.D.

Associate Professor
George W. Beeler, Ph.D.
James F. Greenleaf, Ph.D.
Alan L. Orvis, Ph.D.

Within the Mayo Graduate School of Medicine, biophysics is a program staffed by members of the Department of Physiology and Biophysics. The biophysics program is, therefore, very highly interrelated with the physiology program, and listings under physiology may be found to be pertinent to the interests of biophysics students. The major opportunities in biophysics available in Rochester are in research for the Ph.D. dissertation. Much of the course work necessary for completing the requirements for the Ph.D. degree is taken on the Minneapolis campus.

Prerequisites—A bachelor's degree and a superior undergraduate record are required. Undergraduate college courses should include basic training in biological, medical, or appropriate physical science areas at a level equivalent to undergraduate major, and the candidate should have had at least introductory courses in biology, physics, chemistry, mathematics, and computer science. Some prerequisite course work may be completed with the regular graduate work under certain circumstances.

Opportunities for research leading to a dissertation in biophysics are available in areas including development of high-speed computers for biomedical image processing and computed tomography, biological imaging, advanced applications of computer-assisted tomography, multidimensional image analysis, automated computer pattern recognition for disease detection and diagnosis, advanced ultrasonic imaging techniques, measurement of biophysical properties of smooth muscle synctium and of noradrenergic neurons, and cellular and molecular basis of muscle cell function.

M 8851. BIOPHYSICAL SCIENCES SEMINARS. (1 cr; prereq M 8853 or for other listed courses ar with staff)

M 8852f,w,s,su. SEMINARS IN BIOPHYSICAL SPECIALTIES. (1 cr) Staff
Specialized area of biophysical sciences reviewed in depth. Research papers presented by students and staff with active discussion.

M 8853f,w,s,su. READINGS IN BIOPHYSICAL SCIENCES. (Cr ar) Staff

M 8857, 8858, 8859. RADIOLOGIC PHYSICS. (3 cr per qtr [1st qtr not available for biophysics cr]; prereq #) Staff
Physical basis of radiology, radiologic equipment, dosimetry, radiation safety.

M 8871. BIOLOGICAL SYSTEMS ANALYSIS AND MODELING I. (3 cr; prereq #) Beeler, Greenleaf, Gilbert, and staff
Introduction to methods used to describe systems and signals, including differential equations, time domain response, Fourier and Laplace transforms; supporting numerical methods are integrated with subject matter.

M 8872. BIOLOGICAL SYSTEMS ANALYSIS AND MODELING II. (3 cr; prereq M 8871 or #) Beeler, Greenleaf, Gilbert, and staff
Methods of system description and analysis; equations of state, matrix methods of system reduction and solution; filter theory, auto- and cross-correlation analysis; supporting numerical methods.

M 8873. BIOLOGICAL SYSTEMS ANALYSIS AND MODELING III. (3 cr; prereq M 8872 or #) Beeler, Greenleaf, Gilbert, and staff
Large array methods, image synthesis and processing; multidimensional filtering; feature extraction.

M 8890. RESEARCH IN BIOPHYSICAL SCIENCES. (6 cr; prereq △)
Opportunities in research to be arranged with individual staff members, subject to departmental approval.

M 8896. RADIOISOTOPE RESEARCH TECHNIQUES. (3 cr) Orvis
Basic principles of effective, safe handling of radioisotopes in research and clinical situations. Theory of atomic decay, qualitative and quantitative measurements of radioactivity, basic radiation safety considerations. Techniques of liquid scintillation counting and sample preparation, gamma counting, autoradiography, radioimmune assay, radio-labeling.

DENTISTRY

OFFERED AT MINNEAPOLIS

Professor

Richard C. Oliver, D.D.S., *dean*
Mellor R. Holland, D.D.S., M.S.D., *associate dean*
James R. Jensen, D.D.S., M.S.D., *associate dean*
Erwin M. Schaffer, D.D.S., M.S.D., *associate dean*
Dwight L. Anderson, Ph.D.
Carl L. Bandt, D.D.S., M.S.D.
Jaroslav Cervenka, M.D.
Richard J. Goodkind, D.M.D., M.S.
Robert J. Gorlin, D.D.S., M.S.
Norman O. Holte, D.D.S., M.S.D.
Robert J. Isaacson, D.D.S., M.S.D., Ph.D.
Lawrence Meskin, D.D.S., Ph.D.
Andrew T. Morstad, D.D.S., M.S.
Heddie O. Sedano, D.D.S., Dr.O.
Burton L. Shapiro, D.D.S., M.S.D., Ph.D.
Leon Singer, Ph.D.
Quenton T. Smith, Ph.D.
Michael J. Till, D.D.S., M.S.D., Ph.D.
Robert A. Vickers, D.D.S., M.S.D.
Daniel E. Waite, D.D.S., M.S.
Carl J. Witkop, D.D.S., M.S.
Frank W. Worms, D.D.S., M.S.D.
Douglas H. Yock, D.D.S., M.S.

Clinical Professor

William O. Branstad, D.D.S.

Associate Professor

James L. Baker, D.D.S., M.S.D.
Richard R. Bevis, D.D.S., Ph.D.
Ramesh K. Kuba, B.D.S., M.S.D.
William F. Liljemark, D.D.S., Ph.D.
Michael J. Loupe, Ph.D.
Thomas M. Speidel, D.D.S., M.S.D.
Paul O. Walker, D.D.S., M.S.D.

Clinical Associate Professor

Ronald E. LaBelle, D.D.S., M.S.D.

Assistant Professor

William H. Douglas, Ph.D.
Sharon F. Garber, Ph.D.
Mark C. Herzberg, D.D.S., Ph.D.
Kenneth T. Meyer, D.D.S., M.S.D.
Bruce L. Pihlstrom, D.D.S., M.S.
Abbas Tabibi, D.D.S., M.S.

Graduate work in dentistry is offered to meet needs in two areas—the training of well-qualified teachers and investigators in the various branches of dentistry and the preparation of fully trained specialists for the various fields of dentistry. The course of study leads to the degree of master of science, a combination of the normal work for the master's degree plus achievement of proficiency in some phase of clinical dentistry. Hence, a minimum of 2 academic years in residence is required, though most students probably will need 3 years.

Graduate study related to dentistry and leading to the M.S. and Ph.D. degrees may also be pursued through majors in such allied sciences as anatomy, biochemistry, microbiology, oral biology, pathobiology, pharmacology, and physiology. A program leading to the Ph.D degree with a major in one of the above-mentioned basic sciences and a minor in dentistry is offered to qualified dental graduates. A postgraduate program is now available through a major in cariology. The program combines work in a basic science laboratory with applied clinical problems.

Graduate courses in dentistry are offered in the fields of oral pathology, oral surgery, orthodontics, restorative dentistry, oral radiology, and periodontics.

Prerequisites—A degree from an accredited school of dentistry with an average of B or better or an academic standing in the top fourth of the applicant's graduating class.

Major or Minor Work—The aim of the program of study is mastery of the major subject, in which a minimum of 18 credits must be earned with a grade of B or better. The minimum acceptable grade in the minor field is C.

Language Requirement—Although reading knowledge of German is highly desirable, candidates for the master's degree in dentistry are exempted from the language requirement. Oral pathology, however, requires German.

Master of Science Degree—Offered only under Plan A.

Dentistry (Dent)

5991. RESEARCH IN DENTISTRY: THE CLINICAL TRIAL. (2 cr) Katz
Topics include the formulation of research questions, the null hypothesis, basic research design, use of a packaged computer program (SPSS), proper interpretation of research findings, quality assurance of data, and the ethical and legal issues related to human experimentation. Topics reinforced by an SPSS computer project developed by student.

5995. ADVANCED CLINICAL RESTORATIVE DENTISTRY. (Cr ar)
Application of advanced technical and clinical procedures with emphasis on the more complex problems in operative dentistry; diagnosis and treatment planning, management of patients, and dental auxiliary utilization.

8126. TEACHING AND EVALUATION IN DENTISTRY I. (3 cr; prereq #) Lange, Loupe
Application of educational and psychological principles to professional dental education. Theoretical principles of behavioral and cognitive psychology applied to topics appropriate to dental education. Students apply these principles to concrete instructional situations in their own areas of interest and become familiar with instructional practice in both traditional and new instructional settings.

8127. TEACHING AND EVALUATION IN DENTISTRY II. (3 cr; prereq 8126) Lange
Application of evaluation and measurement theory to higher education, specifically dental education. Objectives for teaching and evaluation, construction of tests and measurement instruments, analysis of tests, interpretation of test results, principles of marking.

8128. DENTAL EDUCATION AND ADMINISTRATION. (3 cr; prereq #) Loupe, Lange
Lectures, seminars, and individualized learning experiences in topics of educational administration in a dental school setting; organizational principles, critical path management, personnel administration and budgetary concepts at the administrative level.

8129. TOPICS AND PROBLEMS IN DENTAL EDUCATION. (Cr ar; prereq #) Loupe, Lange
Independent study arranged for individual student to pursue advanced work in student learning, instructional development, curriculum planning, student testing and evaluation, and academic administration, where these areas and their interfaces are applied directly to professional dental education. Provides opportunity for applying and extending concepts learned in 8126, 8127, 8128.

8140. TOPICS IN RESTORATIVE DENTISTRY. (Cr ar)
Literature review and discussion of past and current philosophies and research.

8150. RESEARCH IN RESTORATIVE DENTISTRY. (Cr ar)
Organized literature review in area of specific interest of student, selection of thesis project, and completion of research and thesis.

8400. OCCLUSION. (1 cr)

8401. OCCLUSION. (1 cr)

8402. LITERATURE REVIEW IN OCCLUSION. (1 cr)
Related to topics covered in 8400 and 8401.

8500. SEMINAR: RESEARCH DESIGN. (3 cr; prereq introductory course in statistics and #) Garber
Critical appraisal of current dental literature, fundamentals of research design and analysis, individualized projects (designing a study).

Endodontics (Endo)

5300f, 5301w, 5302s, 5303su, 5304f, 5305w, 5306s. ADVANCED CLINICAL ENDODONTICS. (Cr ar) Jensen
Diagnosis and treatment of clinical cases. Students are assigned complex cases and explore new and unique techniques.

5310f, 5311w, 5312s, 5313su, 5314f, 5315w, 5316s. ENDODONTIC EMERGENCY PROBLEMS. (1 cr) Jensen
Each student is assigned a 1-week period (8 hours per day) and is responsible for all emergencies in the Endodontic Clinic during this time.

5320f, 5321w, 5322s, 5323su, 5324f, 5325w. TREATMENT PLANNING. (1 cr) Jensen
Students share in decisions of treatment planning of clinical cases as they are processed in the School of Dentistry and observe how other disciplines function in this capacity.

5330f, 5331w, 5332s, 5333su, 5334f, 5335w, 5336s. REVIEW OF CASES. (1 cr) Jensen
Students present cases for review by endodontic faculty and other graduate students.

8001f, 8002w, 8003s, 8004su, 8005f, 8006w. RESEARCH IN ENDODONTICS. (Cr ar) Jensen
Organized literature review in area of specific interest of student, selection of thesis project, and completion of research and thesis.

8310f, 8311w, 8312s, 8313su, 8314f, 8315w, 8316s. SEMINAR: ENDODONTICS. (2 cr per qtr; 1st 4 qtrs for 1st-yr grad students, last 2 qtrs for 2nd-yr grad students) Jensen
Review of current literature, research, and clinical cases. Sessions assigned to student.

8320f, 8321w, 8322s, 8323su, 8324f, 8325w, 8326s. ADVANCED ENDODONTIC LECTURES. (1 cr per qtr) Jensen
Pulpal and periapical pathology, diagnosis, and treatment planning in endodontics.

8330f,w,s. ENDODONTIC DIAGNOSIS AND TREATMENT PLANNING. (Cr ar) Jensen
Etiology, treatment, and prognosis of clinical endodontic patients.

8331f, 8332w, 8333s. TOPICS IN ENDODONTICS. (Cr ar) Jensen
Special topics for advanced students.

8335. ENDODONTIC-PERIODONTIC SEMINAR. (1 cr) Jensen
Discussions of endodontic-periodontic problems for all graduate dental students.

Oral Biology (OBio)

Course listings may be found in the separate Oral Biology section of this bulletin.

Oral Pathology (OPat)

8001. RESEARCH IN ORAL PATHOLOGY. (Cr ar) Gorlin, Vickers, Witkop

8002, 8003. ORAL PATHOLOGY. (Cr ar; prereq 5251, 5252, or equiv) Gorlin, Vickers, Witkop
Lectures, laboratory, and clinical demonstrations. Histology of teeth and related oral tissues, including embryologic considerations. Special pathology of the oral regions as well as relation of local pathologic findings to systemic conditions and to general pathology. Graduate students gain experience in educational methods; lecture, seminar, laboratory preparation, development of programmed learning materials, and evaluation of examinations.

8004. HISTOPATHOLOGY. (1 cr) Vickers
Weekly presentation of currently encountered diagnostic material. Evaluation and interpretation by trainees of individual and representative material. Additional diagnostic information, such as clinical and radiologic information, is collated as an introduction to the individual problem of diagnosis when possible. Cases chosen in advance and made available for individual study.

8005. ADVANCED ORAL PATHOLOGY. (3 cr; limited to 8 students) Gorlin, Vickers, Witkop
Offered semiannually. Principal offering deals with the nature of diseases encountered in head and neck regions including laboratory sessions on histopathologic interpretations. Pathology of salivary glands, odontogenesis (with odontogenic tumors), diseases of facial bones, soft tissue diseases, lymph nodes, mucosal disorder, and other topics.

8006. CURRENT LITERATURE REVIEW. (1 cr)
Seminars include discussion of a variety of research problems, topics, and areas of special interest between graduate students and oral pathology faculty. Graduate students expected to determine both the subjects for discussion and the level or manner of discussions.

8007. SPECIAL ORAL PATHOLOGY. (2 cr)
Review of the clinical, radiographic, and treatment aspects of oral disease and oral manifestations of systemic disease. For residents and graduate students in disciplines other than oral pathology.

8008. CLINICAL ORAL PATHOLOGY CONFERENCE. (1 cr) Vickers
Weekly "rounds" of patient presentation by division staff of dental school and health sciences center. Symptomatology, diagnosis, prognosis, and treatment.

8009. EMBRYOLOGY OF THE HEAD AND NECK. (1 cr)

8010. CURRENT LITERATURE REVIEW. (1 cr)
See 8006.

8011. SURGICAL ORAL PATHOLOGY. (Cr ar) Vickers
Residents and graduate students participate as staff assistants in diagnosis of oral diseases. Histopathologic, frozen section, clinical, cytologic, cytogenetic, microbiologic, hematologic, radiologic, and other diagnostic means are utilized.

8012. MEDICAL CYTOGENETICS. (2 cr) Cervenka
Methodology of tissue culture, identification of chromosomes, chromosomal structure, phylogenetic evolution of chromosomes, sex chromatin analysis, use of cell hybridization, chromosomes in human cancer, action of mutagenic agents, and genetic counseling in autosomal and sex chromosome syndromes. Mechanism of chromosomal aberrations. Procedures of genetic counseling and prenatal cytogenetics.

8013. PHYSICAL DIAGNOSIS AND THE MEDICAL EVALUATION OF THE PATIENT. (1 cr) King
Lectures and patient demonstrations to elucidate importance of medical history, physical examination, and diagnostic, clinical, and laboratory procedures, etc., used in treating the whole patient.

8014. EXFOLIATIVE CYTOLOGY OF THE ORAL MUCOSA. (2 cr) Witkop
Comparative histology of skin and normal mucosa; cytology maturation of oral mucosa compared to vaginal mucosa; sex differences in mucosa, techniques, stains and smears, menstrual cycle; benign lesions of oral mucosa, toothbrushing effects; introduction to grading system for malignant lesions; X-ray and drug effects on oral mucosa; oral squamous cell carcinoma; in situ and basal cell carcinoma.

8015. METHODS OF GENETIC COUNSELING AND TREATMENT. (1 cr) Cervenka
Preventive genetics, counseling in mental retardation, counseling in chromosomal aberrations, counseling in congenital malformations, consanguineous marriage and incest, genetic considerations in human malignancy, counseling and genetic treatment of inborn errors of metabolism, ethical and social aspects of eugenics and genetic counseling, prenatal diagnosis.

8016f,w,s,su. HISTOPATHOLOGY. (2 cr) Sedano
Designed exclusively for graduate students and residents not specializing in oral pathology but wishing additional information concerning causes, diagnosis, or cellular basis of oral diseases. Histologic aspects of various oral and paraoral diseases demonstrated and clinical and radiologic information utilized.

8300f. HUMAN DEVELOPMENT GENETICS I. (2 cr; prereq GCB 3022, BioC 5970, Path 5101 or #) Witkop
Genetic and genetic-environmental interactions in development of normal and abnormal human traits. Genetic control of pre- and postnatal differentiation at the cellular tissue level. Morphological and functional (behavioral) human traits, especially those affecting the face and oral structures.

8301w. HUMAN DEVELOPMENT GENETICS II. (2 cr; prereq 8300) Witkop
Continuation of 8300.

8302s. SEMINAR: HUMAN DEVELOPMENTAL GENETICS. (Cr ar) Witkop
Selected topics by series of guest speakers on gene action from conception through the neonatal period.

Oral Radiology (ORad)

8100. ORAL RADIOLOGY SEMINAR. (1 cr; prereq #) Kuba

8200. ADVANCED ORAL ROENTGENOGRAPHIC TECHNIQUE. (2 cr; prereq #) Kuba
Theory and principles involved in intraoral and dentally significant extraoral roentgenographic techniques, including temporomandibular joint roentgenography, sialography, panoramic roentgenography, laminography, cineroentgenography, and cephalometric roentgenography, according to needs and interests of students.

8300. ADVANCED ORAL ROENTGENOGRAPHIC INTERPRETATION. (2 cr; prereq #) Kuba
Theory, principles, and practice of roentgenographic interpretation of intraoral and extraoral roentgenograms. Normal roentgenographic anatomy and roentgenographic evidence of the presence of pathology and anomalies integrated with relevant anatomical, pathological, clinical, and statistical data in establishing differential, provisional and final diagnoses, prognoses, treatment plans, and treatment.

8400. ADVANCED STUDIES IN THEORY AND PRINCIPLES OF ORAL RADIOLOGY. (3 cr; prereq #) Kuba
Theory and principles involved in atomic structure, atomic radiations, X-ray production and control, roentgenographic films, mathematics of exposure and chemistry of processing.

8500. FUNDAMENTALS OF RADIATION BIOLOGY. (3 cr; prereq 8400) Kuba
Effects of ionizing radiations on biological systems. Theories on the mechanisms of action and effects at the molecular, cellular, organ, and total body levels considered and related to radiation biological problems in dentistry.

8600. RADIOLOGICAL HEALTH, HYGIENE, AND PROTECTION. (1-3 cr; prereq 8400) Kuba
Theoretical, practical, philosophical, and legal aspects of patient, operator, and general population exposure to and protection from diagnostic, therapeutic, industrial, experimental, and environmental ionizing radiations. Emphasis on significance and role of radiology in dentistry.

8700. RADIOLOGY LITERATURE EVALUATION. (1-2 cr; prereq 8400) Kuba
Principles of sound research and scientific writing; detailed evaluation of scientific literature in general emphasizing radiology literature relevant to dentistry. Critical consideration of papers dealing with radiology that have been published in dental literature.

8800. TEACHING ORAL RADIOLOGY. (4 cr; prereq 8400) Kuba
Challenge and problems of teaching oral radiology to dental auxiliaries, dental students, and graduate and postgraduate students. Development and evaluation of oral radiology curricula, development and construction of course objectives, teaching methods, and testing and evaluation. University of Minnesota School of Dentistry oral radiology program and traditional undergraduate programs critically analyzed.

8900. ORAL RADIOLOGY RESEARCH. (Cr ar; prereq #) Kuba

Oral Surgery (OSur)

5257. AMBULATORY GENERAL ANESTHESIA. (1 cr) Gatto and staff
A clinical rotation involving experience in outpatient management and utilizing intravenous sedation and general anesthesia.

8250. ADVANCED ORAL SURGERY. (Cr ar) Waite
Assigned clinics in University and Veterans Administration Hospitals, Hennepin County Medical Center, and School of Dentistry.

8251. SEMINAR: ORAL SURGERY. (1 cr) Lehnert
Oral surgical subjects.

8252. RESEARCH IN ORAL SURGERY. (Cr ar) Leonard
Research in fields related to oral surgery.

8253. PROBLEMS IN ORAL SURGERY. (Cr ar) Waite
Current literature review; experience in surgical techniques.

8254. TOPICS. (1 cr) Bevis, Lehnert
Surgical orthodontic techniques seminar.

8255. GENERAL SURGERY. (Cr ar) Najarian and staff
Clinical rotation on the general surgical service at University Hospitals, Minneapolis. Includes seminars, clinics, and operating room experience.

8256. ANESTHESIA AND PAIN CONTROL. (Cr ar) Holte, Gatto, and staff
Anatomical aspects, instrumentation, and types of local and general anesthesia and analgesia.

8258. ANESTHESIA II SEMINAR. (1 cr) Gatto and staff
Outpatient general anesthesia topics and related subjects covered on seminar basis.

Orthodontics (Otho)

5001, 5002, 5003, 5004. CLINICAL ORTHODONTICS. (Cr ar) Worms and staff
Students assigned patients for complete management of orthodontic and orthodontically related occlusal problems under direct staff supervision.

8001. RESEARCH IN ORTHODONTICS. (Cr ar) Bevis, Speidel, Worms

8200, 8201, 8202, 8203. GROWTH AND DEVELOPMENT. (Cr ar) Bevis, Isaacson, Speidel, Worms
Head growth, development, osteology, and myology. Includes both normal and abnormal morphology and function with emphasis on cephalometric methods.

8204, 8205, 8206, 8207. ORTHODONTIC DIAGNOSIS AND TREATMENT PLANNING. (Cr ar) Bevis, Cavanaugh, Speidel, Worms
Etiology, treatment, and prognosis of clinical orthodontic patients.

8208, 8209, 8210, 8211. ORTHODONTIC SEMINAR. (Cr ar) Bevis, Speidel, Worms
Review of current literature and discussion of current research and its implications.

8216f, 8217w, 8218s, 8219su. TOPICS IN ORTHODONTICS. (Cr ar) Worms and staff

Pediatric Dentistry (Pedo)

5414. ADVANCED CLINICAL PEDODONTICS. (Cr ar; prereq #) Staff
Assignment of patients for treatment of difficult or unusual pedodontic problems under direct faculty supervision.

8001. RESEARCH IN PEDIATRIC DENTISTRY. (Cr ar; prereq #) Staff

8290. HOSPITAL PEDODONTICS I. (Cr ar; prereq #) Staff
Diagnosis and treatment under direct faculty supervision of difficult and unusual problems in children with various handicaps at the Children's Physical Medicine and Rehabilitation Center. Includes pre- and postoperative discussion of general anesthetic cases and seminar discussion of operating room techniques and procedures, pharmaceutical adjuncts for dental procedures.

8291. HOSPITAL PEDODONTICS II. (Cr ar; prereq #) Staff
Diagnosis and treatment of pedodontic problems under direct faculty supervision at Hennepin County Medical Center. Includes participation on a rotation basis in seminars in pediatrics and anesthesia conducted by staff faculty. Pre- and postoperative seminar discussion and evaluation of treatment plans.

8292. PEDODONTIC LITERATURE. (Cr ar; prereq #) Staff
In-depth literature review and seminar discussion of specific pedodontic topics.

8293. ADVANCED PEDODONTIC TECHNIQUES. (Cr ar; prereq #) Staff
Description and exercises in advanced pedodontic skills and techniques.

8294. PEDODONTIC DIAGNOSIS AND TREATMENT PLANNING. (Cr ar; prereq #) Staff
Systematic approach to diagnosis and treatment planning of various pedodontic problems.

8295. INDEPENDENT PEDODONTIC STUDY. (Cr ar; prereq #) Staff
Preparation of a position paper on assigned topic, including review of pertinent literature.

Periodontology (Pero)

8000f,w,s,su. ADVANCED CLINICAL PERIODONTOLOGY. (Cr ar) Bandt, Pihlstrom
Clinical training in examination, diagnosis, treatment planning, and various phases of prevention and treatment of patients with periodontal disease.

8100f,w,s,su. RESEARCH IN PERIODONTOLOGY. (Cr ar) Bandt and staff
Opportunity to take part in various phases of periodontal research being conducted in laboratories and clinic.

8200f,w,s,su. CLINICAL SEMINARS IN PERIODONTOLOGY. (Cr ar) Bandt, Pihlstrom, Schaffer
Clinical cases are discussed from a diagnostic, treatment planning, and therapeutic viewpoint.

8250w,s. SUPPORTING STRUCTURES OF THE TEETH. (Cr ar) Pihlstrom, Schaffer
Gingival tissues, cementum, periodontal ligament, and alveolar bone discussed from a histological, physiological, and pathological point of view.

8300f,w,s,su. SEMINAR: PERIODONTOLOGY. (Cr ar) Pihlstrom, Schaffer
Discussion of assigned weekly literature reviews. Preparation of assigned formal literature reviews.

8305. PERIODONTIC-PROSTHODONTIC SEMINAR. (1 cr) Goodkind, Pihlstrom
Discussions of periodontal-prosthodontic problems for all graduate dental students.

8400. ANATOMY OF THE NORMAL AND OBSERVED PERIODONTIUM. (2 cr) Bandt and staff

8450. BACTERIOLOGY AND IMMUNOLOGY OF PERIODONTAL DISEASES. (1 cr) Bandt, Herzberg, Liljemark

Prosthodontics (Pros)

8001. RESEARCH IN PROSTHODONTICS. (Cr ar [may be repeated for cr]) Goodkind
Arranged with individual students upon application after a critical review of current and historical literature pertaining to the problem.

8003. ADVANCED TECHNICAL RESTORATIVE DENTISTRY. (Cr ar [may be repeated for cr]) Goodkind
Clinical and technological theories and practices interrelated in an effort to solve more complex problems in restorative therapy.

8005. ADVANCED CLINICAL PROSTHODONTICS I. (Cr ar [may be repeated for cr]) Goodkind
Practical clinical experience in examination, diagnosis, treatment planning, and various phases of treatment of patients with restorative dental problems. New and/or unfamiliar concepts and techniques stressed.

8006. ADVANCED CLINICAL PROSTHODONTICS II. (Cr ar [may be repeated for cr]; prereq #) Goodkind
Experience in prosthodontic treatment of patients having systemic complications. Patient therapy coordinated in a hospital environment as well as in graduate clinic of dental school.

8010. SEMINAR: ADVANCED RESTORATIVE DENTISTRY. (Cr ar [may be repeated for cr]) Goodkind
Review of current and selected historical literature with discussion of current research and its implication for restorative dental therapy.

8012. TOPICS IN PROSTHODONTICS. (Cr ar [may be repeated for cr]; prereq #) Goodkind
Special topics for advanced students.

8015. SEMINAR: PROSTHODONTICS I. (Cr ar [may be repeated for cr]; prereq #) Goodkind
Current concepts and practices related to treatment of the partially edentulous patient by means of fixed and removable partial prosthetic restorations. Based upon application of related sciences with emphasis on prevention.

8016. SEMINAR: PROSTHODONTICS II. (Cr ar [may be repeated for cr]; prereq #) Goodkind
Tissues involved and treatment of the completely edentulous patient.

8017. SEMINAR: ADVANCED PROSTHODONTICS. (Cr ar [may be repeated for cr]; prereq #) Goodkind
Treatment planning for the partially edentulous patient.

8018. SEMINAR: ADVANCED PROSTHODONTICS. (Cr ar [may be repeated for cr]; prereq #) Goodkind
Treatment planning for the completely edentulous patient.

8020. APPLIED GNATHOLOGY. (Cr ar [may be repeated for cr]; prereq #) Branstad
Seminar and clinical experience involving concepts and philosophies of jaw function. Emphasis on application of kinematics in the development of a dental occlusion.

8025. SEMINAR: APPLIED BIOMATERIALS I. (Cr ar; prereq #) Goodkind
Principles that govern manipulation of materials used in restorative dental practice. Physical properties and dimensional changes stressed.

8030. INTRODUCTION TO COMPREHENSIVE MAXILLOFACIAL CARE. (Cr ar; prereq #)
Milestones in development of maxillofacial prosthetics and interdisciplinary relationships in treatment of maxillofacial patient.

8032. PRINCIPLES OF MAXILLOFACIAL CARE. (Cr ar [may be repeated for cr]; prereq #)
Treatment biomechanics and technical procedures associated with fabrication, fitting, and servicing of various types of oral and facial restorations.

8034. ADVANCED CLINICAL MAXILLOFACIAL PROSTHETICS. (Cr ar [may be repeated for cr]; prereq 8030, 8032, #)
Factors involved in diagnosis and organization of a treatment plan for maxillofacial patient and practical experience in associated clinical and laboratory procedures.

DENTISTRY

OFFERED AT ROCHESTER

Professor

William R. Laney, D.M.D., M.S., *chairman*
Joseph A. Gibilisco, D.D.S., M.S.D.

Associate Professor

Juan B. Gonzalez, D.D.S., M.S.
Bruce A. Lund, D.D.S., M.S.D.
Charles M. Reeve, D.D.S., M.S.D.
A. Howard Sather, D.D.S., M.S.D.
Dan E. Tolman, D.D.S., M.S.D.

Assistant Professor

Ronald P. Desjardins, D.M.D., M.S.
Eugene E. Keller, D.D.S., M.S.D.
Phillip J. Sheridan, D.D.S., M.S.
Eastwood G. Turlington, D.D.S., M.S.D.

The Department of Dentistry is composed of four closely integrated dental disciplines: oral surgery-oral diagnosis, orthodontics, periodontics, and prosthodontics. Advanced education programs in these areas are interrelated with those of all medical and surgical departments associated with the Mayo Graduate School of Medicine. The completion of 36-month postdoctoral programs in the dental specialties is recognized by a certificate of achievement or M.S. degree. Entrance into the master of science in dentistry program must have the approval of the respective faculties, and a minimum of 3 calendar years in residence is required. While the clinical field of interest constitutes the major in the thesis program, the minor requirement must be completed in one of the basic sciences.

To supplement extensive clinical training in the specialty area, regular conferences, lectures, and seminars are scheduled within each section. Joint educational activities are arranged and conducted with other sections of the Graduate School. All educational programs are accredited by the American Dental Association Council on Dental Education, Commission on Accreditation, and the related experiences are directed toward the fulfillment of requirements for certification by the American boards in the various special areas of dental practice.

Oral and Maxillofacial Surgery (OrSu)

The purpose of the oral and maxillofacial surgery program is to train students to handle the full scope of this specialty practice. Although clinical aspects of the program constitute the major area of emphasis, there are also didactic studies necessary to provide an adequate base for clinical practice. Research can be incorporated in the program leading to the master's degree. Clinical quarters are devoted to oral and maxillofacial surgery, plastic surgery, emergency room surgery, oral diagnosis, oral roentgenology, and anesthesiology. Facilities for teaching oral and maxillofacial surgery are located at the Mayo Clinic, Rochester State Hospital, Rochester Methodist Hospital, and St. Mary's Hospital.

M 8850. ORAL AND MAXILLOFACIAL SURGERY. (6 cr per qtr; 4 qtrs) Staff
Includes service on all oral and maxillofacial surgery problems in outpatient clinic and hospitals.

M 8851. ORAL AND MAXILLOFACIAL DENTAL ROENTGENOLOGY. (1 cr) Staff
Includes X-ray diagnosis and techniques.

M 8852. ORAL DIAGNOSIS. (6 cr) Staff
Clinical diagnosis relating to oral and maxillofacial surgery problems.

M 8853. ORAL AND MAXILLOFACIAL SURGERY SEMINAR: CURRENT LITERATURE. (1 cr) Turlington and staff
Literature review from current journals.

M 8854. SEMINAR: ORAL AND MAXILLOFACIAL SURGERY. (1 cr) Lund and staff
Weekly review of case histories, academic presentation, discussion of oral and maxillofacial surgery subjects.

M 8855. ORAL REHABILITATION CLINIC. (2 cr per yr) Lund, Sather
Case presentations, illustrations, and treatment procedures emphasizing corrections of orofacial deformities.

M 8856. ADVANCED ORAL SURGERY. (6 cr per qtr; 4 qtrs) Staff
Includes senior resident, assignment to Rochester State Hospital, and first assistant status.

M 8857. RESEARCH ON SELECTED PROBLEMS. (2 cr) Laney and staff

M 8859. PRINCIPLES OF ORAL SURGERY. (1 cr) Staff
Lecture presentation of the principles involved in surgical problems.

M 8860. MEDICAL SEMINAR FOR ORAL AND MAXILLOFACIAL SURGERY. (1 cr) Staff
Medical problems related to oral and maxillofacial surgery.

Orthodontics (Otho)

The residency in orthodontics is a 36-month program. One appointment is made each year to a qualified graduate of an approved dental school.

The clinical training is primarily in the edgewise technique, with a review of other major techniques, and is integrated with services providing experiences in oral roentgenology, oral diagnosis, oral surgery, and speech pathology.

Coordinated treatment care with other dental areas (oral diagnosis, oral surgery, prosthodontics, periodontics) as well as with medical specialties is stressed.

Work in the clinical facilities at the Mayo Clinic may be supplemented by selected patient care experience at St. Mary's, Methodist, and Rochester State hospitals.

The usual program combines a minor in anatomy or biostatistics with the major in orthodontics. However, the minor may be arranged in other basic sciences to meet special interests.

M 8800. ADVANCED ORTHODONTIC TECHNIQUES. (3 cr) Staff
Initial technical procedures in preparation for clinical patient care. Technical procedures on the typodont, model preparation, photography, metallurgy, and cephalometrics.

M 8802. ORTHODONTIC CASE ANALYSIS. (6 cr) Staff
First phase involves complete review of previously treated cases. Second phase is application of basic analytic principles to clinical patients.

M 8803. ORTHODONTIC TREATMENT PLANNING. (6 cr) Staff
Mechanical principles coordinated with case analyses to provide the treatment plan. Force analysis and biomechanics of tooth movement.

M 8804. CLINICAL ORTHODONTICS. (6 cr per qtr; 5 qtrs) Staff
Individual treatment care and clinical observation. Treatment care coordinated with other services in selected instances in the hospital.

M 8805. ADVANCED CLINICAL ORTHODONTICS. (6 cr per qtr; 4 qtrs) Staff
Final treatment care of individual patients.

M 8806. ORTHODONTIC SEMINAR: TECHNIQUE. (1 cr) Staff
Seminar on technical orthodontic procedures.

M 8807. ORTHODONTIC SEMINAR: LITERATURE REVIEW. (1 cr) Staff
Classical orthodontic literature as well as current literature review.

M 8808. ORTHODONTIC SEMINAR: CASE PRESENTATION. (1 cr)
Cases with complete records reviewed and new patient treatment plans discussed.

M 8809. SURGICAL ORTHODONTIC SEMINAR. (1½ cr) Lund, Sather
Case presentation, illustration, diagnostic and treatment procedures that encompass the various dental specialties.

M 8851. DENTAL ROENTGENOLOGY. (1 cr) Gibilisco, Tolman
Includes X-ray diagnosis and techniques.

M 8852. ORAL DIAGNOSIS. (5 cr) Gibilisco, Tolman
Clinical course in diagnosis related to dental problems.

M 8857. RESEARCH IN SELECTED PROBLEMS. (2 cr) Laney and staff
Arrangements for research in selected areas related to minor.

M 8861. SPEECH PATHOLOGY. (2 cr) Aronson, Darley, and staff

Prosthodontics (Pros)

Residency appointments to qualified graduates of approved dental schools are made approximately once a year. Matriculation usually begins in the summer or fall quarter. Service experiences include clinical and laboratory prosthodontics (fixed, removable, and maxillofacial), oral diagnosis and roentgenographic interpretation, surgical pathology, therapeutic radiology, otolaryngology, anatomy and physiology, speech pathology, hospital procedure and practice, and related dental specialties. Under staff supervision, residents care for patients at Methodist, St. Mary's, and Rochester State hospitals. Elective assignments can be made to accommodate individual interests and may include practice teaching in the undergraduate program at the University of Minnesota School of Dentistry. Seminars and conferences in prosthodontics are held regularly and residents are expected to attend all seminars related to quarterly assignments in other fields.

M 8840. CLINICAL PROSTHODONTICS: COMPLETE DENTURES. (6 cr per qtr; 2 qtrs) Laney, Gonzalez, Desjardins
Orientation and introduction to clinical and laboratory phases of prosthodontics in the medical center with emphasis on principles, concepts, and practices related to complete denture prosthesis.

M 8841. PROSTHODONTIC SEMINAR. (1 cr per qtr; 3 qtrs) Laney, Gonzalez, Desjardins
Literature review and discussion of past and current concepts and practices of complete denture prosthesis.

M 8842. CLINICAL PROSTHODONTICS: PARTIAL DENTURES. (6 cr per qtr [3 qtrs required]) Laney, Gonzalez, Desjardins
Orientation and introduction to clinical and laboratory phases of prosthodontics in the medical center with emphasis on principles, concepts, and practices related to removable and fixed partial denture prosthesis.

M 8843. PROSTHODONTIC SEMINAR. (1 cr per qtr; 2 qtrs) Laney, Gonzalez, Desjardins
Literature review and discussion of past and current concepts and practices of partial denture prosthesis.

M 8844. MAXILLOFACIAL PROSTHETICS (INTRAORAL)—ADVANCED PROSTHODONTICS. (6 cr per qtr; 3 qtrs) Laney, Gonzalez, Desjardins
Clinical and laboratory procedures involved in management of patients with acquired, congenital, and developmental intraoral defects.

M 8845. PROSTHODONTIC SEMINAR. (2 cr) Laney, Gonzalez, Desjardins
Clinical and laboratory phases of prosthodontics; principles, practices, and concepts related to fixed prosthodontics and occlusion.

M 8846. MAXILLOFACIAL PROSTHETICS (EXTRAORAL)—ADVANCED PROSTHODONTICS. (6 cr per qtr) Gonzalez, Desjardins
Clinical and laboratory procedures involved in management of patients with acquired and congenital extraoral defects.

M 8847. SEMINAR: MAXILLOFACIAL PROSTHETICS (INTRAORAL)—ADVANCED PROSTHODONTICS. (1 cr per qtr; 2 qtrs) Laney, Gonzalez, Desjardins
Literature review and discussion of past and present concepts and practices related to maxillofacial prosthetics.

M 8848. SEMINAR: CURRENT LITERATURE. (1 cr per qtr [9 qtrs required]) Laney, Gonzalez, Desjardins
Review and discussion of practical, clinical, or laboratory applications.

M 8849. SEMINAR: MAXILLOFACIAL PROSTHETICS (EXTRAORAL) AND ADVANCED PROSTHODONTICS. (1 cr) Gonzalez, Desjardins
Lectures and discussions on clinical and laboratory procedures involved in fabrication of extraoral prostheses.

M 8851. DENTAL ROENTGENOLOGY. (1 cr) Gibilisco, Tolman
X-ray diagnosis and technique.

M 8852. ORAL DIAGNOSIS. (5 cr) Gibilisco, Tolman
Clinical diagnosis related to dental problems.

M 8857. RESEARCH IN SELECTED PROBLEMS. (2 cr) Laney and staff

M 8861. SPEECH PATHOLOGY. (2 cr) Aronson, Darley

M 8862. DENTAL MATERIALS. (1 cr) Desjardins, Gonzalez, Laney
Discussion of physical properties, mechanical properties, and technical procedures related to dental materials most commonly used in prosthodontics.

Periodontics (Pero)

The Mayo Graduate School of Medicine residency in periodontics is a 36-month program. All phases of clinical periodontics are included, and facilities are available for research.

The program is designed to permit close liaison with various medical and dental specialties. Hospital service experience is available at St. Mary's and Rochester Methodist hospitals. Seminars and lectures are held in various nonclinical fields; viz., pathology, microbiology, and immunology.

M 8851. DENTAL ROENTGENOLOGY. (1 cr) Gibilisco, Tolman
X-ray diagnosis and technique.

M 8852. ORAL DIAGNOSIS. (5 cr) Gibilisco, Tolman
Clinical diagnosis related to dental problems.

M 8857. RESEARCH ON SELECTED PROBLEMS. (2 cr) Laney and staff

M 8880. CLINICAL PERIODONTICS. (6 cr per qtr; 2 qtrs) Reeve, Sheridan
Etiology, diagnosis, and treatment of periodontal disease.

M 8881. ADVANCED CLINICAL PERIODONTICS. (6 cr per qtr; 2 qtrs) Reeve, Sheridan
Case presentation and treatment of difficult periodontal problems.

M 8883. PERIODONTIC SEMINAR. (1 cr) Reeve, Sheridan
Literature review and discussion.

M 8884. PATHOLOGY OF PERIODONTAL DISEASE. (1 cr per qtr; 3 qtrs) Reeve, Sheridan
Histopathology of periodontal disease. Oral mucous membrane; calcified tissues.

DERMATOLOGY (Derm)

OFFERED AT MINNEAPOLIS

Professor

Robert W. Goltz, *chairman*
Kenneth P. Manick, M.D.

Clinical Professor

Bruce J. Bant, M.D.
H. Irving Katz, M.D.
Milton Orkin, M.D.
Franklin Pass, M.D.
Willard C. Peterson, Jr., M.D.
Harold G. Ravits, M.D.
Alvin S. Zelickson, M.D.

Associate Professor

Mark V. Dahl, M.D.
William C. Gentry, Jr., M.D.

Master's and Doctor's Degrees—Instruction in dermatology leading to the M.S. or Ph.D. degree is offered at University Hospitals, Hennepin County Medical Center, and Veterans Hospital in Minneapolis, and at St. Paul-Ramsey Hospital in St. Paul, combined with attendance at the clinics at the four hospitals. A limited number of graduate students are appointed as fellows in dermatology, rotating in these hospitals. Students devote full time to graduate study and may not carry on outside practice. All graduate students majoring in dermatology and working toward an advanced degree are required to carry on independent research under the direction of the dermatology staff and the head of the basic science department or division in which they wish to do special research.

A 3-year program emphasizes clinical training in dermatology with the minor subject in a basic science field. A 5-year program aims additionally at greater competence in the major field and at increased knowledge, experience, and research in the minor field. The Ph.D. degree can be earned in this 5-year program.

Language Requirement—For the Ph.D. degree, this requirement may be fulfilled by either (a) two languages or (b) one language and the option of a collateral field of knowledge. French and German are routinely acceptable.

8225f,w,s,su. CLINICAL DERMATOLOGY. (Cr ar) Goltz and staff
Wards and outpatient departments of University Hospitals, Veterans Hospital, Hennepin County Medical Center, and St. Paul-Ramsey Hospital.

8226f,w,s,su. CLINICAL SEMINAR: DERMATOLOGY. (Cr ar) Goltz and staff
Conference twice weekly on diagnosis and treatment of skin conditions.

8227f,w,s,su. HISTOLOGY OF THE SKIN. (Cr ar) Orkin and staff
Includes histopathology, histochemistry, and fluorescence microscopy.

8228f,w,s,su. RESEARCH IN DERMATOLOGY. (Cr ar) Goltz and staff

8229f,w,s,su. ELECTRON MICROSCOPY IN DERMATOLOGY. (Cr ar) Zelickson and staff

8230f,w,s,su. FUNCTIONAL BIOLOGY OF THE SKIN. (Cr ar) Goltz and staff

DERMATOLOGY

OFFERED AT ROCHESTER

Professor
Harold O. Perry, M.D., M.S., *chairman*
Sigfrid A. Muller, M.D., M.S.
Richard K. Winkelmann, M.D., Ph.D.

Associate Professor
Roy S. Rogers III, M.D., M.S.
Arnold L. Schroeter, M.D.

Assistant Professor
Daniel W. Su, M.D.

The Department of Dermatology at the Mayo Graduate School of Medicine affords opportunity for instruction in dermatology leading to the M.S. or Ph.D. degree. Graduate students pursuing an advanced degree are appointed on approval of their program by the Department of Dermatology Research and Education Committees. These students may not carry on outside practice.

All candidates for advanced degrees are required to conduct independent research under direction of the staff of the Department of Dermatology and the staff of the basic science discipline when pertinent.

The 3-year M.S. program emphasizes training toward clinical excellence in dermatology with a minor area of interest from a field of basic science. The master's degree is awarded only under Plan A. Additional study time may be required for completion of the research project, and it is anticipated that this time will be supported by the Department of Dermatology. The 5-year Ph.D. program strives for continued excellence and growth in clinical dermatology and the development of knowledge, experience, and expertise commensurate with the awarding of the Ph.D. degree.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 8841f,w,s,su. DIAGNOSTIC DERMATOLOGY. (2 cr) Perry and staff
Diagnostic dermatology and dermatologic manifestations of systemic diseases.

M 8842f,w,s,su. HOSPITAL RESIDENCE. (6 cr) Perry and staff
Care of hospitalized patients.

M 8843f,w,s,su. ADVANCED DIAGNOSTIC DERMATOLOGY. (2 cr) Perry and staff
Responsibility for outpatient diagnosis and treatment of dermatologic disease.

M 8844. SYPHILOLOGY AND VENEREAL DISEASE. (1 cr [2 qtrs required]) Schroeter and staff

M 8845f,w,s,su. DERMATOPATHOLOGY. (6 cr) Muller, Perry, Schroeter, Su, Winkelmann
Microscopic anatomy, pathology, histopathology; introduction to cutaneous immunopathology and electronmicroscopy.

M 8846f,w,s,su. ADVANCED DERMATOLOGIC DIAGNOSIS AND THERAPEUTICS. (2 cr) Perry and staff
Outpatient diagnostic and therapeutic management of dermatologic diseases as a senior resident associate.

M 8847. CUTANEOUS PHOTOBIOLOGY. (1 cr) Su and staff
Lectures on the science of photobiology as related to the skin.

M 8848f,w,s,su. PHOTOBIOLOGIC THERAPEUTICS. (1 cr) Muller
Fundamentals of the science of photochemotherapy.

M 8849. THERAPEUTICS AND PHARMACOLOGY. (1 cr [2 qtrs required]) Rogers and staff
Lectures on the pharmacology of drugs used in dermatology.

M 8853. ANATOMY AND PHYSIOLOGY OF THE SKIN. (1 cr) Perry and staff
Lectures on the anatomy, physiology, and biochemistry of the skin as related to pathology.

M 8855. EXPERIMENTAL PATHOLOGIC ANATOMY OF THE SKIN. (1 cr) Perry and staff

M 8890. GRADUATE RESEARCH. (6 cr) Perry and staff

ENVIRONMENTAL HEALTH (PubH)

OFFERED AT MINNEAPOLIS

Professor

Conrad P. Straub, Ph.D., *head*
Donald E. Barber, Ph.D., *director of graduate study*
Richard G. Bond, M.S., M.P.H.
Velvl W. Greene, Ph.D.
Harold J. Paulus, Ph.D.
Irving Pflug, Ph.D.
W. Dixon Ward, Ph.D., Sc.D.

Associate Professor

James E. Long, Sc.D.
Rexford Singer, M.S.
Lee D. Stauffer, M.P.H.
Donald Vesley, Ph.D.

Assistant Professor

Roger L. De Roos, Ph.D.
Walter H. Jopke, M.P.H.
Charles E. McJilton, Ph.D.
Orlando R. Ruschmeyer, Ph.D.

Degrees Offered—M.S. (offered under both Plan A and Plan B), and Ph.D.

Emphases Available Within the Major—Air pollution, environmental biology, hospital engineering, institutional environmental health, occupational health and safety, radiological health, water hygiene.

Prerequisites—A bachelor's degree from a recognized college or university, preferably with a major in engineering or in one of the biological or physical sciences, although students from other backgrounds may be considered. If preparation appears to be inadequate, certain additional courses may be required.

Master's Degree Program Requirements—The program requires a minimum of 11 months of study. Candidates are expected to complete required core courses as a part of the major and are expected to include courses in administration, biometry, epidemiology, and toxicology either in their major or as one of their related fields.

Final Examination for the Master's Degree—Candidates are examined orally unless otherwise specified by the examining committee and the director of graduate study.

Ph.D. Degree Program Requirements—Candidacy for the Ph.D. program implies the prior completion of a master's degree or equivalent in environmental health.

Language Requirement—For the master's degree, none. For the doctorate, at the discretion of the adviser, the requirement may be met by reading knowledge of two languages, one language and additional course work, or no language and additional defined course work.

Note—For descriptions of the following courses, see the Public Health section of this bulletin.

5150. TOPICS IN ENVIRONMENTAL HEALTH. (Cr ar; prereq #) Staff

5152. ENVIRONMENTAL HEALTH. (2 cr; prereq #) Staff

5156. ENVIRONMENTAL HEALTH I. (2 cr; prereq #) Straub and staff

5157. ENVIRONMENTAL HEALTH II. (2 cr; prereq #) Straub and staff

5159. SEMINAR: ENVIRONMENTAL HEALTH. (Cr ar; prereq #) Staff

5161. ADMINISTRATION OF ENVIRONMENTAL HEALTH PROGRAMS. (3 cr; prereq #) Bond

5169. SEMINAR: ENVIRONMENTAL HEALTH ADMINISTRATION. (Cr ar; prereq #) Bond

5170. TOPICS IN ENVIRONMENTAL BIOLOGY. (Cr ar; prereq #) Staff

5171. ENVIRONMENTAL MICROBIOLOGY. (3 cr; prereq MicB 3103 or #) Greene

5172. ENVIRONMENTAL MICROBIOLOGY LABORATORY. (2 cr; prereq 5171, #) Greene, Vesley

5177. PUBLIC HEALTH BIOLOGY. (3 cr; prereq #) Ruschmeyer

5180. TOPICS IN AIR POLLUTION. (Cr ar; prereq #) Staff

5181. INTRODUCTION TO THE AIR POLLUTION PROBLEM. (3 cr; prereq #) Paulus

5182. AIR POLLUTION CONTROLS AND SURVEYS. (3 cr; prereq 5181 or #) Paulus

5183. PROBLEMS OF AIR POLLUTION CONTROL. (Cr ar; prereq 5181, #) Paulus

5184. AIR ANALYSIS I. (3 cr; prereq 5181, 5183 or 5211, #) Paulus

5185. AIR ANALYSIS II. (3 cr; prereq 5184, #) Paulus and McJilton

5190. TOPICS: INJURY CONTROL. (Cr ar; prereq #) Staff

5193. CHEMICAL LABORATORY SAFETY. (1 cr; prereq #) Herron

5194. OCCUPATIONAL SAFETY. (2 cr; prereq #) Herron

5200. TOPICS IN RADIOLOGICAL HEALTH. (Cr ar; prereq #) Staff

5201. MEASUREMENT AND APPLICATION OF IONIZING RADIATION. (3 cr [lect and lab], 2 cr [lect only]; prereq #)

5202. ENVIRONMENTAL RADIOACTIVITY. (2-3 cr; prereq 5201 or #)

5207. RADIATION PROTECTION CRITERIA FOR HOSPITALS. (2 cr; prereq #) Wollan

5209. SEMINAR: HEALTH PHYSICS. (1 cr; prereq #)

5210. TOPICS IN OCCUPATIONAL HEALTH. (Cr ar; prereq #) Staff

5211. INDUSTRIAL HYGIENE ENGINEERING. (3 cr; prereq #) McJilton

5212. VENTILATION CONTROL OF ENVIRONMENTAL HAZARDS. (3 cr; prereq 5211, #) McJilton

5213. PUBLIC HEALTH ASPECTS OF TOXIC PRODUCTS. (2 cr, prereq 5215) Long

5215. APPLIED OCCUPATIONAL TOXICOLOGY. (3 cr; prereq 5181 or 5211, #) Long

5219. SEMINAR: OCCUPATIONAL HEALTH. (1 cr; prereq occupational health student, #) Johnson, McJilton, Richard

5220. TOPICS IN FOOD SANITATION. (Cr ar; prereq #) Staff

5221. INSTITUTIONAL FOOD PROTECTION PROGRAMS. (3 cr; prereq #) Jopke

5222. FOOD SANITATION. (3 cr; prereq #) Jopke, Pflug

5230. TOPICS IN INSTITUTIONAL ENVIRONMENTAL HEALTH. (Cr ar; prereq #) Staff

5231. ENVIRONMENTAL HEALTH AND SAFETY IN HEALTH CARE FACILITIES I. (4 cr; prereq #) Vesley

5232. ENVIRONMENTAL HEALTH AND SAFETY IN HEALTH CARE FACILITIES II. (4 cr; prereq #) DeRoos

5233. BIOHAZARD CONTROL IN BIOMEDICAL LABORATORIES. (2 cr; prereq 5171, 5231, #) Vesley

5240. TOPICS IN WATER HYGIENE. (Cr ar; prereq #) Staff

5241. ENVIRONMENTAL HEALTH ASPECTS OF WATER SUPPLY. (3 cr; prereq #) Singer, Straub

5242. ENVIRONMENTAL HEALTH ASPECTS OF GROUNDWATER SYSTEMS. (2 cr; prereq #) Singer

5244. ENVIRONMENTAL HEALTH ASPECTS OF WASTEWATER SYSTEMS. (3 cr; prereq #) Singer, Straub

5246. MICROBIOLOGY OF WATER AND WASTEWATER. (3 cr; prereq #) Straub and staff

5247. ENVIRONMENTAL ANALYSIS. (3 cr; prereq #) Goppers, Straub

5261. ENVIRONMENTAL TOXICOLOGY. (3 cr; prereq #) Long

8002. FIELD OBSERVATION OF SELECTED PUBLIC HEALTH PRACTICES. (Cr ar; prereq #) Staff

8150. RESEARCH: ENVIRONMENTAL HEALTH. (Cr ar) Staff

8170. RESEARCH: ENVIRONMENTAL BIOLOGY. (Cr ar; prereq #) Ruschmeyer

8180. RESEARCH: AIR POLLUTION. (Cr ar; prereq #) Paulus

8190. RESEARCH: INJURY CONTROL. (Cr ar; prereq #) McJilton

8200. RESEARCH: RADIOLOGICAL HEALTH. (Cr ar; prereq #)

8201. RADIATION DOSIMETRY. (3 cr; prereq #)

8202. RADIATION DOSIMETRY LABORATORY. (1 cr; prereq ‹8201)

8208. FIELD PRACTICE IN RADIOLOGICAL HEALTH. (Cr ar; prereq #)

8210. RESEARCH: OCCUPATIONAL HEALTH. (Cr ar; prereq #) McJilton

8211. HEALTH SURVEY OF MANUFACTURING PROCESSES. (2 cr; prereq 5211, #) McJilton

8218. FIELD PROBLEMS IN OCCUPATIONAL HEALTH. (3 cr; prereq 5211, 5212 or ‹5213, #) McJilton

8220. RESEARCH: FOOD SANITATION. (Cr ar; prereq #) Pflug

8230. RESEARCH: INSTITUTIONAL ENVIRONMENTAL HEALTH. (Cr ar; prereq #) Vesley

8240. RESEARCH: WATER HYGIENE. (Cr ar; prereq #) Straub

8260. RESEARCH: ENVIRONMENTAL TOXICOLOGY. (Cr ar; prereq #) Straub

EPIDEMIOLOGY (PubH)

OFFERED AT MINNEAPOLIS

Professor
Leonard M. Schuman, M.D., M.S., *chairman, director of graduate study*
R.K. Anderson, D.V.M., M.P.H.
Lawrence H. Meskin, D.D.S., M.S.D., M.P.H., Ph.D.

Clinical Professor Emeritus
Henry K. Bauer, Ph.D.

Associate Professor
Stanley L. Diesch, D.V.M., M.P.H.

Degrees Offered—M.S., under Plan A and Plan B, and Ph.D.

Emphases Available Within the Major—Acute infectious or chronic disease epidemiology and epidemiologic applications of evaluative methods.

Prerequisites—Specialized training in epidemiology is offered to qualified graduates in medicine, dentistry, and veterinary medicine. Other students with adequate background in biological or physical sciences or with demonstrated competence in investigative work may be admitted. Since positions in the program are relatively limited, selection of candidates is competitive with respect to background of instruction and experience presented.

Application Deadline—It is advisable that applicants for both the M.S. and Ph.D. degree programs plan to begin their studies in the fall quarter of the academic year. Under special circumstances this requirement may be waived and entry permitted in other quarters, particularly for the Ph.D. applicant with graduate background in epidemiology or closely related fields. Accordingly, applications must generally be *completed by April 15.*

Special Major Field Requirements—All applicants for the M.S. and Ph.D. degree programs must submit to the director of graduate study of the department a résumé of their educational and work experiences, particularly those that are health-related; submit a one- to two-page statement of their purpose or goal objectives in obtaining instruction and experience in epidemiology; and arrange to have a minimum of three letters of recommendation submitted from individuals familiar with their scholastic achievements and/or professional experience.

Master's Degree—Candidates will usually elect a curriculum under Plan B (master's degree without thesis) and will be required to present a minimum of 44 quarter credits. A Plan A program may be authorized, depending upon the availability of research material and the feasibility of completing such research and in the time available. Candidates other than physicians, veterinarians, dentists, and others with professional experience may qualify for the M.S. degree in epidemiology upon completion of a 2-year (6-quarter) program of study that includes selected advanced courses in basic medical sciences and participation in field investigations.

Final Examination for the Master's Degree—Candidates will take an oral examination.

Doctor's Degree—Applicants will usually present a degree in medicine, dentistry, or veterinary medicine; others with adequate background in the biological or physical sciences or with demonstrated competence in investigative work may be accepted. Students majoring in epidemiology will offer a minor in a related field.

The doctoral program in epidemiology is designed to help students develop proficiency in epidemiologic investigation requisite for careers in service, research, or teaching in health agencies and institutions. It includes instruction in scheduled courses, with latitude in electives suitable to the student's background, interests, and needs. This is supplemented with participation in ongoing field research designed to provide increasingly complex experiences commensurate with the student's development. For successful completion of the thesis requirements, the candidate will design and execute an original field investigation of acceptable complexity and sophistication.

Language Requirement—Reading knowledge of languages is advised but not required for either the master's or the Ph.D. degree. However, a reading knowledge of languages must be acquired as part of a major program for the Ph.D. degree when such skill is needed to support the student's research objectives.

Minor Requirements for Students Majoring in Other Fields—Master's degree: 9 credits selected by the minor adviser on the basis of the candidate's major field of study. Doctor's degree: 24 credits selected by the minor adviser on the basis of the candidate's major field of study.

For descriptions of the following courses, see the Public Health section of this bulletin.

5300. COMPARATIVE MEDICINE AND PUBLIC HEALTH. (2 cr; prereq #) Anderson, Diesch

5330.* EPIDEMIOLOGY I. (5 cr; prereq course in microbiology or # and 3-cr course in biostatistics or #) Schuman, Anderson, Mandel

5331. FUNDAMENTALS OF BIOSTATISTICS. (3 cr) Visiting lecturers

5332. FUNDAMENTALS OF EPIDEMIOLOGY. (3 cr) Visiting lecturers

5333. BIOLOGICAL BASES AND EPIDEMIOLOGY OF HEALTH AND DISEASE. (4 cr; prereq course in microbiology, 3-cr course in biostatistics or #) Anderson, Mandel

5335.* EPIDEMIOLOGY II. (3 cr; prereq 5330) Schuman

5336. INFECTIOUS DISEASE EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics) Evans

5337. SEROLOGIC EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5338. HOSPITAL EPIDEMIOLOGY AND INFECTION CONTROL. (2 cr; prereq basic epidemiology) Hierholzer

5339. EPIDEMIOLOGY OF DISEASES DUE TO DRUGS AND OTHER THERAPIES. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5340. EPIDEMIOLOGY: STRATEGIES AND METHODS. (3 cr; prereq 5330, 5413 and 5414 or equiv, #) Mandel

5341. HEALTH SURVEY METHODS. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5342. PUBLIC HEALTH BACTERIOLOGY. (Cr ar; prereq MicB 5216, 5232, 5234, #) Stickles

5344. CLINICAL TRIALS—DESIGN ANALYSIS. (2 cr; prereq basic epidemiology and biostatistics) Kjelsberg

5345. EPIDEMIOLOGY OF CANCER. (3 cr; prereq basic epidemiology and biostatistics, 5357 or *5357) Cole

5346. EPIDEMIOLOGY OF CARDIOVASCULAR DISEASES. (3 cr; prereq basic epidemiology and biostatistics, 5357 or *5357) Kuller, Tyroler

5347. EPIDEMIOLOGY OF MENTAL DISORDERS. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5348. EPIDEMIOLOGY OF NEUROLOGIC DISEASES. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5349.* EPIDEMIOLOGY OF CHRONIC RESPIRATORY DISEASE. (Cr ar; prereq #) Visiting lecturers

5350. EPIDEMIOLOGIC BASIS FOR HEALTH SERVICES PLANNING AND EVALUATION. (2 cr; prereq 5330, 5332 or equiv, 5407, 5331 or equiv) Ibrahim

5353. EPIDEMIOLOGY OF NUTRITIONAL DISEASES AND ABNORMALITIES. (3 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5355. GENETICS AND EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics) Li

5356. POPULATION DYNAMICS. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5357. SELECTED STATISTICAL TOPICS IN EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5358. RADIATION EPIDEMIOLOGY. (2 cr; prereq basic epidemiology, biostatistics, advanced statistics)

5359. EPIDEMIOLOGY OF OCCUPATIONAL HAZARDS. (3 cr; prereq basic epidemiology and biostatistics) Decouflé

5360. EPIDEMIOLOGY OF TRAUMA. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

5361. EPIDEMIOLOGIC METHODS IN ORAL DISEASE RESEARCH. (3 cr; prereq regis dental public health) Katz

5365. EXPERIMENTAL EPIDEMIOLOGY. (Cr ar; prereq 5335 and 5407 or 5450 or equiv and #) Anderson, Diesch

5370. APPLIED EPIDEMIOLOGY. (Cr ar; prereq 5330, 5407, or 5450 or equiv and #) Anderson, Diesch

5375. BIOLOGICAL BASES OF HEALTH AND DISEASE. (3 cr; prereq course in microbiology or #) Schuman

5378. DEVELOPMENT OF AND PERSPECTIVES IN EPIDEMIOLOGY. (2 cr; prereq basic epidemiology and biostatistics) Lilenfeld

5379.* TOPICS IN EPIDEMIOLOGY. (Cr ar; prereq #) Staff

5380. APPLIED HUMAN NUTRITION. (3 cr; prereq Biol 3021 or equiv) Leon

5385. PSYCHOLOGY OF EXERCISE. (Cr ar; prereq Phsl 5101 or equiv and #) Leon, Taylor

5386. PUBLIC HEALTH ASPECTS OF CARDIOVASCULAR DISEASE. (3 cr; prereq basic epidemiology and biostatistics) Blackburn, Gillum, and staff

5407. VITAL AND HEALTH STATISTICS I. (3 cr) Bearman, Kjelsberg

5450. BIOMETRY I. (3 cr; prereq *5451...familiarity with basic concepts of calculus desirable) Jeffries

5451. BIOMETRY LABORATORY I. (2 cr; prereq *5450) Jeffries

5452. BIOMETRY II. (3 cr; prereq 5450, *5453) Jeffries

5453. BIOMETRY LABORATORY II. (2 cr; prereq *5452) Jeffries

5454. BIOMETRY III. (3 cr; prereq 5452, *5455) Jeffries

5455. BIOMETRY LABORATORY III. (2 cr; prereq *5454) Jeffries

5612. HUMAN GENETICS AND PUBLIC HEALTH. (3 cr; prereq #) Schacht

5651. PHILOSOPHY AND CONCEPTS OF PREVENTIVE DENTISTRY. (Cr ar; prereq #) Block and staff

8330. RESEARCH EPIDEMIOLOGY. (Cr ar) Staff

8331. FIELD PRACTICE IN EPIDEMIOLOGIC INVESTIGATIONS. (Cr ar; prereq epidemiology major, #) Schuman, Mandel

8340. EPIDEMIOLOGIC ASPECTS OF CANCER. (3 cr; prereq 5330) Schuman, Mandel

8341. EPIDEMIOLOGY OF SELECTED CHRONIC DISEASES. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

8342. ADVANCED STATISTICAL METHODS IN EPIDEMIOLOGY. (3 cr; prereq 5331, 5332 or #) White

8345. EPIDEMIOLOGIC BASIS FOR CANCER CONTROL. (2 cr; prereq basic epidemiology and biostatistics, 5357 or *5357) Visiting lecturers

8346. EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE AND CANCER. (3 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

8356. EPIDEMIOLOGIC ASPECTS OF POPULATION CHANGE. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers

8379. SEMINAR: EPIDEMIOLOGY. (Cr ar; prereq #) Schuman, Mandel

EPIDEMIOLOGY

OFFERED AT ROCHESTER

Professor

Leonard T. Kurland, M.D., *chairman*

Graduate work in epidemiology at the Mayo Graduate School of Medicine is offered in the Department of Medical Statistics and Epidemiology of the Mayo Clinic. Investigations of an epidemiologic nature, and particularly population studies in chronic diseases, are offered in conjunction with staff of clinical and laboratory sections of the Mayo Clinic.

M 5801. PRINCIPLES OF EPIDEMIOLOGY. (3 cr; prereq #)
General principles of epidemiologic method in studies of chronic and infectious disease covered by lectures and problem exercises with student participation. Problems of etiology and of prevention and control of disease considered in terms of the contributing role of descriptive, analytic (retrospective and prospective), and experimental studies with examples from chronic and infectious disease. Design of epidemiologic investigations, in terms of single factor and multifactor studies, illustrated in terms of current national cooperative studies in diabetes, cancer, and heart disease.

M 8801. EPIDEMIOLOGY SEMINAR. (1 cr)
Presentation, analysis, and discussion of proposed investigative work, research developments, and results by members of the department and guest lecturers. Research methods and statistical evaluation of data

M 8802. EPIDEMIOLOGY JOURNAL CLUB
Students and faculty report on articles from current journals in epidemiology and statistics. Emphasis on methodologic papers. Both infectious and chronic disease subjects covered. Presentation and group discussions.

M 8890f,w,s. RESEARCH PROBLEMS IN EPIDEMIOLOGY. (6 cr)

EXPERIMENTAL SURGERY

See Surgery.

FAMILY PLANNING ADMINISTRATION (FPAd)

OFFERED AT MINNEAPOLIS

Professor

Harry Foreman, M.D., Ph.D., *director of graduate study*
Ira L. Reiss, Ph.D.

Associate Professor

James R. Boen, Ph.D.
Robert E. Kennedy, Jr., Ph.D.

Prerequisites—An undergraduate degree in either the social or biological sciences is required. Special consideration will be given to individuals who after graduation will be working in programs for their own ethnic and cultural groups.

Language Requirement—No language is required.

Master's Degree—The M.S. is offered under both Plan A and Plan B. Knowledge and skills necessary for family planning administration are drawn from diverse disciplines: medicine, public health, sociology, etc. All candidates for the degree must take PubH 5407, Vital and Health Statistics I; Soc 5900, Population Problems; PubH 5460, Demography and Health; and FPAd 5241, Family Planning Administration. Depending upon background and objectives, each student, with the counsel of the adviser, has a wide choice of optional courses that are offered in a number of departments at the University.

5241. FAMILY PLANNING ADMINISTRATION. (3 cr; prereq #) Foreman
Planning, operations, and administration of publicly funded family planning programs.

5243. TOPICS IN FAMILY PLANNING. (3-12 cr; prereq #) Foreman, others
Flexible course to meet individual needs and interests; includes thesis preparation, research projects, field training.

5245. HISTORY AND DEVELOPMENT OF FAMILY PLANNING. (3 cr; prereq #) Foreman
Family planning programs over the world (including U.S.) instituted to meet health needs as well as to alleviate population pressures.

5247. FAMILY PLANNING PROBLEMS COUNSELING. (3 cr; prereq #)
Counseling on family health: maternal and child health, nutrition, contraception, birth control, etc.

5248. DEVELOPMENTS IN CONTRACEPTIVE TECHNOLOGY. (3 cr; prereq #) Foreman
Review of principles, efficiency, and side effects of currently used contraceptives and consideration of contraceptives in investigative stages.

FAMILY PRACTICE AND COMMUNITY HEALTH (FPCH)

OFFERED AT MINNEAPOLIS

Professor

Edward W. Ciriacy, M.D., *head*
Eldon B. Berglund, M.D.
John T. Kelly, M.D.
John B. O'Leary, M.D.
John E. Verby, M.D.
Vernon E. Weckwerth, Ph.D.

Clinical Professor

Faruk Abuzzahab, M.D., Ph.D.

Associate Professor

Carole J. Bland, Ph.D.
Vincent R. Hunt, M.D.
Harold R. Ireton, Ph.D.
James W. Maddock, Ph.D.
David L. Spencer, M.D.

Assistant Professor

Ray M. Conroe, Ph.D.
Leon J. Nesvacil, M.D.

The master of science degree program in family practice and community health is an academic program, distinct from the residency training program in family practice and community health. Broadly stated, the objectives of the master's program are the following.

1. To teach physicians approaches to investigating areas that relate to the discipline of family practice. These approaches may not be directly related to the immediate needs of clinical problem solving.

2. To enable physicians to acquire skills appropriate to academic responsibilities.

Studies focus on the discipline of family medicine and on academic skills, rather than on the body of clinical skills necessary for family practice.

Prerequisites—Before applying to the master of science degree program in family practice, the medical fellow must (1) have completed an M.D. or D.O. degree (foreign graduates are required to pass the Educational Council for Foreign Medical Graduates [ECFMG] examination also); (2) meet with an adviser in the department to obtain a letter of endorsement, which must be submitted with the formal application; and (3) meet Graduate School requirements for admission.

Master's Program—The master's degree is offered under Plan B. Each student selects a major and minor or a related field option. The major is family practice; the minor in a supporting field of study varies with the interests of each student. The official master's program submitted to the Graduate School by the graduate student must include a minimum of 44 graduate credit hours and must meet the requirements specified below.

A minimum grade point average of 2.80 (on a 4.00 scale) is required on completed courses submitted on the program. Of the credits included in the completed program, at least two thirds must be taken on the A-N grading system.

Major—Medical fellows pursuing a master's degree while in the family practice training program select a minimum of 20 credits from the major field for their official program. Courses designated nonclinical in the following listing must make up at least 50 percent of the credits in the major. However, if the total number of credits presented in the major is 30 or fewer, a minimum of 16 credits in nonclinical courses from the following list is required. Courses may be taken from outside the Department of Family Practice and Community Health, but these courses must be in a coherent sequence related to the major.

Minor—A minimum of 12 credit hours are required. Courses may be taken from more than one department, but they must be relevant to the major and must be a coherent sequence related to the stated minor. All courses included in the minor must be nonclinical, and they *all must be taken on the A-N grading system.*

Related Fields—In lieu of choosing a minor, students may elect to present a minimum of 8 credits in a number of related fields outside the major. This option requires approval of the student's adviser and the director of graduate study.

Remaining Credits—Arranged according to the needs of the student and the requirements of cohesion and relevance as stated above.

Language Requirement—None.

The courses listed below are described in the broadest outline to convey the character of the work. Course work in fields related to family practice and community health is also available in other departments of the University. In addition, students should consult the *Graduate School Bulletin.*

0555f-0556w-5557s†.[1] **SPECIAL TOPICS IN PSYCHOLOGICAL MEDICINE.** (1 cr per yr; prereq #) Ciriacy and staff
New applications of behavioral science to clinical practice. Lectures, workshops, and conferences.

5504.[1] **MEDICAL ETHICS.** (2 cr) Ciriacy and staff
Reading and discussion of major ethical issues relevant to the practice of medicine. Critical review of case studies to gain experience in solving medical ethics problems.

5563.[1] **CLINICAL NEUROPSYCHOPHARMACOLOGY.** (2 cr; prereq FPCH residency) Abuzzahab
Identification, diagnosis, treatment, and follow-up of major psychiatric disorders. Emphasis on the neuropsychopharmacological approach, identification of psychoactive drugs, contraindications, side effects, and long-term management of patients.

[1]Nonclinical course.

5567. COMMUNICATIONS. (1 cr; prereq #) Conroe
Videotaping to record and feed back to medical fellows their communicative behavior and skills in patient interaction and examination. Communication specialist and M.D. faculty review and discuss tapes made when medical fellows see patients on hospital rounds and in office or clinic examinations and consultations.

5570. PRACTICUM IN COUNSELING. (1 cr; prereq completion of 1st-yr residency) Conroe, Kelly
Basic techniques of short-term counseling. Lectures, classroom exercises, and actual counseling contact.

5581.[1] PRACTICE MANAGEMENT. (2 cr; prereq completion of 1st-yr residency or #) Ciriacy and staff
Business aspects of medical practice. Includes site selection for practice, office layout, personnel management, legal entities, financing mechanisms for ambulatory health care, financial and medical record systems required in medical practice, and physician's responsibilities as the owner, shareholder, employee, or partner in medical practice. Students work together on a final project to analyze a system or process in their model clinic or examine a practice management topic.

5583.[1] PERSONAL AND FINANCIAL PLANNING. (2 cr) Ciriacy and staff
Personal and financial planning. Includes an overview of life insurance, equity investments, and real estate. Pros and cons of these methods of personal investments, sources of information about them, and their history.

5598. INTRODUCTION TO PHYSICIAN'S ROLE IN NURSING HOMES. (2 cr) Ciriacy and staff
Roles of nursing home staff. Helps medical fellows become comfortable in nursing homes.

5903. COMMUNITY HEALTH. (Cr ar; prereq #) Ciriacy and staff
Practical experience in delivery of health care in urban or rural communities.

5904.[1] COMMUNITY HEALTH. (2 cr; prereq 2nd-yr residency or #) O Leary
Introduction to concepts of community health. In-depth look at community health activities in Minnesota. Tools and techniques for the study of contemporary health problems in the state. Strategies to meet community health needs.

5950.[1] SEXUAL HEALTH SEMINAR. (2-3 cr; prereq MD or #) Maddock, Staff
Methods of intervention into sex-related problems of individuals, couples, and families.

5951.[1] RESEARCH IN HUMAN SEXUALITY. (Cr ar; prereq #) Staff
Clinical and/or laboratory research related to human sexualty. Flexible according to specific interests of the student and availability of faculty. Contact director of the Program in Human Sexuality to discuss possible topics and to make course arrangements.

5952-5953-5954.[1] PRACTICUM IN SEXUAL COUNSELING. (3-6 cr per qtr; prereq #) Maddock, Staff
Supervised experience in sex-related counseling of individuals, couples, and groups. Work with problems of sexual adjustment, dysfunction, and couple conflict.

5955.[1] DIRECTED STUDY. (1-15 cr; prereq #. . . qualified students may register with # for work on a tutorial basis) Staff

5956.[1] HUMAN SEXUALITY IN THE LIFE CYCLE. (2-3 cr; prereq MD or #) Maddock
Psychosocial aspects of sex throughout the life cycle, with emphasis on the development of role-related behaviors and patterns of erotic attachment.

5957.[1] FEMALE SEXUALITY. (2-3 cr) Staff
Lectures and discussions on basic aspects of the female experience of sexuality.

5958.[1] SMALL GROUP PROCESS. (3 cr; prereq #) Staff
Group dynamics; various schools of group process and therapy active today. Experiential and cognitive methods used.

8201. CLINICAL FAMILY MEDICINE. (9 cr) Ciriacy and staff
Supervised care for patients of all ages on a continuous, primary, preventive, and general diagnostic basis. Diagnosis, methods of treatment, and problem-solving devices for the benefit of the patient and family are emphasized with particular stress on health hazard appraisal. New and refined methods of recording, documentation, and retrieval of clinical data.

8202.[1] DYNAMICS OF MARRIAGE AND FAMILY. (2 cr; prereq #) Ciriacy and staff
Marital and family health understood in a broader context than provided by episodic medicine and disease orientation. Promotes awareness that patients' life-styles and interactions, when impaired, contribute to organic, social, and spiritual breakdown.

8204.[1] SEMINAR: QUANTITATIVE STRATEGIES IN HEALTH CARE PRACTICE AND RESEARCH. (2 cr; prereq #) Weckwerth
Review of elementary statistical methods for both description and inference. Use of workbooks to identify and sharpen skills. Application of elementary decision making with emphasis on sensitivity/specificity and decision errors. Elementary literature critiques. Students make presentation and write paper showing an application to patient care of a strategy based on one or more journal articles.

[1]Nonclinical course.

8205.[1] MEDICAL RECORDS SYSTEMS. (2 cr) Ciriacy and staff
Introduction to the problem-oriented medical record. Emphasis on forms analysis, tabulation systems, and the use of a structured medical record in health services research.

8207. SEMINAR: COMMON DISEASES SEEN IN FAMILY PRACTICE. (1 cr) Ciriacy and staff

8208. FAMILY MEDICINE CONFERENCES. (1 cr) Ciriacy and staff
Problem cases from the Family Practice Service. Diagnosis, treatment, and consideration of relevant current literature.

8209. FAMILY MEDICINE X-RAY CONFERENCE. (1 cr) Ciriacy and staff

8210. FAMILY MEDICINE GRAND ROUNDS. (1 cr) Ciriacy and staff
Monthly conference with each institution presenting topics.

8212. CLINICAL PSYCHIATRY ROUNDS. (1 cr; prereq 1st-yr FPCH resident) Kelly
Medical fellows meet with a teaching psychiatrist to review cases, preferably from among patients. Topics of high clinical relevance presented and discussed.

8215.[1] SEMINAR: PSYCHOSOMATIC MEDICINE. (2 cr; prereq completion of 1st-yr residency or #) Kelly
Concept of multicausality of disease including biologic, psychologic, and social factors that may predispose, precipitate, or aggravate disease. Theoretical models of psychosomatic disease and concept of "symptom choice" by patients. Methods of recognition, quantification, and treatment including pharmacal therapy and psychotherapy.

8216.[1] SEMINAR: PSYCHOLOGICAL PROBLEMS OF CHILDREN. (2 cr; prereq 2nd-yr residency or #) Ireton
Diagnosis and management of psychological disorders in children. Evaluation in context of normal development, family dynamics, and the impact of illness. Stresses coping through interdisciplinary cooperation of physicians, nurses, psychologists, social workers, and other allied professionals.

8217.[1] SEMINAR IN COUNSELING. (2 cr; prereq 5567, 8215 or #) Conroe
Skills and strategies for performing short-term supportive counseling in family practice setting. Patient selection. Skills applicable to beginning, middle, and end of counseling. Strategies for working with patients presenting different types of problems seen by the family physician.

8223.[1] INTRODUCTION TO GERONTOLOGY AND GERIATRIC MEDICINE. (2 cr; prereq completion of 1st-yr residency or #) Ciriacy and staff
Introduction to human aging; social, biological, and psychological aspects. Programs and policies dealing with aging. Developmental and holistic approaches to the aging process and health care emphasized.

8224.[1] COMMUNITY MENTAL HEALTH SEMINAR. (1 cr; required for 3rd-yr residents; prereq completion of 2nd-yr residency) Kelly
Background material in a given area of community mental health followed by a community experience in that particular area and sharing of experiences with other residents at the training center. Split-time experience for the resident during which experience in medical sociology is made available.

8225.[1] MEDICAL SOCIOLOGY. (3 cr; prereq #) Ciriacy and staff
Critical review of sociological research in medical areas. Topics include illness behavior, the sick role, sociological aspects of the doctor-patient relationship, the problem of delay in seeking treatment, and differential reactions to pain.

8226.[1] MEDICAL SOCIOLOGY SEMINAR. (2 cr; prereq #) Ciriacy and staff
Problems in comprehensive health care delivery.

8228.[1] INTERDISCIPLINARY HEALTH SEMINAR. (2 cr; prereq #) Kelly

8240.[1] COMMUNITY RESOURCES. (2 cr) Kelly
Discussions with representatives of selected community agencies.

8243. FAMILY MEDICINE IN THE RURAL AREA. (Cr ar; prereq #) Ciriacy and staff
Problems specific to rural areas such as physician distribution, use of allied health personnel, initial emergency treatment, referral patterns.

8245.[1] ANALYSIS OF INSTRUCTION AND EDUCATIONAL EVALUATION. (Cr ar; prereq #) Bland, Houge
Psychology of learning, preparation of instructional objectives, educational evaluation, uses of instructional media, and educational methodology.

8250.[1] QUANTITATIVE STRATEGIES IN HEALTH CARE PRACTICE AND RESEARCH II. (2 cr [1 addtl cr available]; prereq 8204) Weckwerth
Presumptive review of elementary descriptive and inferential quantitative methods; models for decision making; evaluation; logic trees; critique of literature. Students design an inpractice study of a test, treatment, service, or method of choice to show outcome effect on patients.

8253.[1] RESEARCH PROBLEMS. (Cr ar; prereq #) Ciriacy and staff
Under supervision of faculty member.

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[1]Nonclinical course.

8582.[1] **ADVANCED PRACTICE MANAGEMENT.** (2 cr; prereq 5581 and 3rd-yr residency) Ciriacy and staff
Case studies in health care delivery; films developed by Peter Drucker, international business consultant; and topics suggested by medical fellows. Topics include motivation, leadership, time management, evolving cultural position of individuals and their interface with organizations, the medical economy, consumerism in health care, decision-making process, effective decisions, and staffing requirements in organizations.

HISTORY OF MEDICINE AND BIOLOGICAL SCIENCES (HMed)

OFFERED AT MINNEAPOLIS

Professor
Leonard G. Wilson, Ph.D., *director of graduate study*

Assistant Professor
John M. Eyler, Ph.D.

The program is designed to allow students to proceed to the Ph.D. degree with specialization in either the history of medicine or the history of the biological sciences. The doctorate in these areas is designed to prepare students for a career of academic scholarship and teaching in the history of biology and medicine.

Prerequisites—Students intending to specialize in the history of medicine should preferably have received the M.D. degree, or have extensive training in the biological sciences or in public health. Students intending to specialize in the history of the biological sciences should have an undergraduate major in biology or biochemistry and preferably some graduate training in these subjects.

Special Requirements—Applicants to the program should ask three of their teachers to send letters of recommendation. The Graduate Record Examination, both aptitude and advanced sections, is requested but not required.

Language Requirement—Students will be required to demonstrate competence in two languages, preferably French and German. They must pass the examination in one language before the end of their first academic year and in both languages before the end of their second year of graduate study. For students interested in a historical period before 1800, Latin will be a third required language.

During their first 2 years, students will take approximately 54 credits of courses in the history of medicine, history of science, history, and science. At the beginning or during the first quarter of their third year, they will take a comprehensive oral examination in their fields of interest. Students who pass the comprehensive examination successfully may begin work on a thesis.

5024. MEDICINE IN ANTIQUITY TO THE RENAISSANCE. (4 cr; primarily for CLA students)
Ritual, magical, and religious healing in the ancient world; Greek natural philosophy and rational medicine; medical practice in Greece and Rome; Galen and the classical medical legacy; the church and the sick person in the middle ages; universities and medical education; regulation of medical profession; great epidemics (leprosy, plague, syphilis); overturning of classical authority (Renaissance natural magic, Vesalius, Harvey).

5025. MEDICINE IN EARLY MODERN EUROPE: 17TH THROUGH EARLY 19TH CENTURIES, EMPHASIS ON GREAT BRITAIN AND FRANCE. (4 cr; primarily for CLA students)
Life-styles and the Old World disease pattern; the new science and its impact on medicine; medical education and regulation of practice; evolution of the hospital and medical charities; medicine and health under the absolute state (medical police and confinement of the insane); smallpox prevalence and control; medicine and the French Revolution; origins of modern psychology; clinical medicine at Paris.

[1]Nonclinical course.

5026. MEDICINE IN THE 19TH AND 20TH CENTURIES: EMPHASIS ON MEDICINE IN AMERICA. (4 cr; primarily for CLA students)
Medical education and practice in the new nation; homeopathy and sectarian medicine; professional conflicts and the American Medical Association; cholera and the public health movement; development of biological laboratory in Europe; advent of modern surgery; acceptance of germ theory of disease and conquest of old scourges; rebuilding the profession in the 20th century; formation of health policy; establishment of socialized medicine in Europe; health insurance in America.

5035. THE GERM THEORY AND THE MEDICAL PROFESSION. (4 cr)
Analysis of the formulation of the germ theory of disease and of its consequences for medical procedures (therapeutics, surgery, management of hospitals), public health programs, and the structure and prestige of the medical profession.

5045. MEDICAL PROFESSION IN AMERICA. (4 cr)
Historical analysis of the American medical profession in the 19th and 20th centuries; the role of institutions, influence of social and moral values, and consequences of specialization and scientific innovation.

5102. MEDICINE AND SOCIETY IN THE ENLIGHTENMENT. (3 cr; prereq #)
Readings and research seminar dealing with the interrelations of medicine and society from the late 17th to the early 19th centuries. Emphasis on methods and materials used by medical historians.

5120-5130. HISTORICAL TOPICS: MEDICINE AND THE MODERN STATE. (4 cr per qtr [may be repeated for max 16 cr]; prereq #) Eyler
Topics vary from year to year. Emphasis on mid-18th century to the present.

5400, 5401, 5402. HISTORY OF MEDICINE. (4 cr per qtr)

5410, 5411, 5412. SEMINAR: EMERGENCE OF MODERN MEDICINE, 1750-1900. (3 cr per qtr; prereq #)

8220, 8221, 8222. HISTORY OF THE BIOLOGICAL SCIENCES. (3 cr per qtr) Wilson
Survey of the history of biology tracing development of biological concepts from ancient Greece to early 20th century.

8230, 8231, 8232. READINGS: HISTORY OF SCIENCE. (3 cr per qtr) Wilson
Introduction to serious scholarly literature in history of science, focusing on a limited number of key historical problems and persons, e.g., Ptolemaic astronomy, Aristotle's physics and biology, Galenic physiology, the Copernican revolution, Kepler, Galileo, Newton, Harvey, Lavoisier, Lyell, Darwin.

8240f, 8241w, 8242s. SEMINAR: HISTORY OF EVOLUTIONARY BIOLOGY. (3 cr per qtr) Wilson
History of scientific thought and discovery leading up to 1859 publication of Darwin's *On the Origin of Species*, which students will read. 8241, 8242: Historical impact of evolutionary theory on biological sciences, including medicine, and on religious and social thought.

8260f. SEMINAR: PROBLEM OF MAN IN BRITISH NATURAL HISTORY, 1800-1863. (3 cr; prereq ♃)
History of British thought from 1800 to 1863. Place of humans in the order of nature—contributions of scientists, theologians, philologists, archaeologists, and historians.

8630, 8631, 8632f,w,s. DIRECTED STUDY. (3 cr per qtr [max 5 qtrs, 15 cr]; grad students may register on a tutorial basis; prereq #)

HOSPITAL AND HEALTH CARE ADMINISTRATION (PubH)[1]

OFFERED AT MINNEAPOLIS

Professor

Bright M. Dornblaser, M.H.A., *director*
Theodor J. Litman, Ph.D., *coordinator of doctoral study*
Vernon E. Weckwerth, Ph.D.

Associate Professor

Mario F. Bognanno, Ph.D.
N. Tor Dahl, M.B.A.
Willy DeGeyndt, Ph.D.

[1]Inquiries concerning courses of study leading to the Ph.D. degree in hospital and health care administration should be addressed to: Coordinator of Doctoral Studies Program in Hospital and Health Care Administration, School of Public Health, Box 97, 1260 Mayo Memorial Building, 420 Delaware Street S.E., University of Minnesota, Minneapolis, Minnesota 55455. Inquiries concerning the master of hospital administration (M.H.A.) degree program, offered through the School of Public Health, should be sent to the Director, Program in Hospital and Health Care Administration, same address.

Degree Offered—Ph.D.

Prerequisites—Applicants are expected to have demonstrated high scholastic ability as well as potential for independent study and research in the course of their previous academic training. While attainment of a master's degree in either hospital or health care administration is normally considered to be the first step in the acquisition of the doctoral degree, students with advanced degrees in such allied fields as business administration, industrial relations, medical sociology, public administration, comprehensive planning, public health, medical care, nursing, and medicine are encouraged to apply as well. Graduate work satisfactorily completed prior to admission may be applied for credit where appropriate and in accordance with the regulations of the Graduate School. An acceptable score on the Miller Analogies Test (graduate level) is required for admission. Additionally, three letters of reference attesting to the applicant's academic ability and capacity for independent research must be submitted.

Doctor's Degree—In contrast with the professional master's degree program offered in the School of Public Health, the doctoral program is designed for those interested in a career in teaching, research, or planning in the field of health care. Emphasis in the curriculum is more upon depth and breadth of learning than upon the acquisition of technical and management skills. Although completion of the academic program normally requires 3 years, a somewhat longer period of study may be required, depending on the individual's background and the type of program pursued. Each student's course of study will be developed with the guidance of an adviser according to the individual's background and interests. The candidate will be expected to demonstrate proficiency in the following core areas:

1. Organization and administration of health care services,
2. Social, political, and economic aspects of health care, and
3. Research and methodology in health care.

In addition to the work in the major field, the student must complete a supporting program of 24 credits involving two or more related areas, such as business administration, economics, sociology, industrial relations, public administration, or political science. The program must be approved by the major adviser.

Language and Collateral Field Requirement—A reading knowledge of one language or working knowledge of one computer language plus at least 9 credits of advanced statistics [courses at the 5000 level or higher].

Thesis—The dissertation must deal with a significant problem in the area of health care.

Minor—A minor in this field is also available subject to approval of the minor adviser.

For a more complete statement of admission requirements and related information, see the *Program in Hospital and Health Care Administration Bulletin* of the School of Public Health.

Note—Courses are described in the Public Health section of this bulletin.

5404. INTRODUCTION TO BIOSTATISTICS AND STATISTICAL DECISION. (4 cr; prereq #) Weckwerth

5750. PRINCIPLES OF HEALTH ADMINISTRATION. (4 cr; prereq #) Westerman, Dornblaser, Sweetland, and staff

5751. PRINCIPLES OF ORGANIZATION MANAGEMENT IN HEALTH SERVICES ORGANIZATION. (4 cr, §HSU 5016; prereq #) Culbertson

5785. QUANTITATIVE METHODS APPLIED TO HEALTH ADMINISTRATION PROBLEMS. (4 cr; prereq hospital administration student or #) Weckwerth

5795. THE SOCIOLOGY OF MEDICINE AND HEALTH CARE: AN INTRODUCTION TO THE FIELD OF MEDICAL SOCIOLOGY. (4 cr, §Soc 5855) Litman

8750-8751†. SEMINAR: ALTERNATIVE PATTERNS OF HEALTH CARE. (3 cr per qtr; prereq #; offered 1980-81 and alt yrs) Litman

8752. SEMINAR: COMPARATIVE HEALTH CARE SYSTEMS. (3 cr; prereq #; offered fall 1979 and alt yrs) Litman

8760. TOPICS IN HOSPITAL AND HEALTH CARE ADMINISTRATION. (3 cr; prereq #) Weckwerth

8761. READINGS IN THEORY AND PRINCIPLES OF HOSPITAL AND HEALTH CARE ADMINISTRATION. (3 cr; prereq #) Weckwerth

8762. CONTEMPORARY PROBLEMS OF HOSPITAL AND RELATED HEALTH SERVICES. (3 cr; prereq #) Weckwerth

8770. SEMINAR: HEALTH AND HUMAN BEHAVIOR. (3 cr; prereq 5795, Soc 5855; offered spring 1980 and alt yrs) Litman

8780. ADVANCED STATISTICAL METHODS IN HEALTH CARE RESEARCH. (3 cr; prereq 5450 or #) Weckwerth

8781. SEMINAR: RESEARCH STUDIES IN HEALTH CARE. (3 cr; prereq #; offered spring 1981 and alt yrs) Litman

8782. RESEARCH PRACTICUM. (6 cr; prereq #) Litman, Weckwerth, and staff

8790. SEMINAR: POLITICAL ASPECTS OF HEALTH CARE. (3 cr; prereq #; offered winter 1981 and alt yrs) Litman

8795. ECONOMIC ASPECTS OF HEALTH CARE. (3 cr; prereq #) Bognanno

8796. TOPICS IN HEALTH ECONOMICS. (3 cr; prereq at least one economics course and #) Dahl

HOSPITAL PHARMACY

See Social and Administrative Pharmacy.

LABORATORY MEDICINE (LMed)

OFFERED AT MINNEAPOLIS

Professor

Ellis S. Benson, M.D., *head*
Miguel Azar, M.D., Ph.D., *director of graduate study*
Eugene Ackerman, Ph.D.
Khalil Ahmed, Ph.D.
Henry Balfour, Jr., M.D.
Donna Blazevic, M.P.H.
David M. Brown, M.D.
Richard Brunning, M.D.
Agustin P. Dalmasso, M.D.
Mary E. Dempsey, Ph.D.
Grace M. Ederer, M.S.
J. Roger Edson, M.D.
Jesse Edwards, M.D.
Richard D. Estensen, M.D.
Esther F. Freier, M.S.
John H. Kersey, M.D.
J. Jeffrey McCullough, M.D.
Herbert F. Polesky, M.D.
Paul G. Quie, M.D.
Andreas Rosenberg, Ph.D
R. Dorothy Sundberg, M.D., Ph.D
Jorge J. Yunis, M.D.

Associate Professor

G. Mary Bradley, M.D.
Robert A. Bridges, M.D.
John T. Crosson, M.D.
Laël Gatewood, Ph.D.
Ben Hallaway, M.S.
Robert W. McKenna, M.D.
Michael W. Steffes, M.D.
Lorraine G. Stewart, M.S.
William R. Swaim, M.D.
Walid Yasmineh, Ph.D.

Assistant Professor

Larry D. Bowers, Ph.D.
Connie Clark, Ph.D.
Seymour Handler, M.D.
Lucille J. Hoilund, M.D.
Jane L. Swanson, M.D.
Michael J. Wilson, Ph.D.

Graduate work in laboratory medicine offers opportunities to physicians, medical technologists, and other qualified students to prepare for careers in teaching and research. Only the M.S. degree under Plan A (master's degree with thesis) is available to students in this program.

Academic Requirements—The program requires a minimum of 20 credits with emphasis in one area of laboratory medicine (chemistry, genetics, hematology, immunology, or microbiology). The minor subject (9 credits) may be chosen from among the basic fields of science such as anatomy, biochemistry, or pathology. The student is expected to maintain a B average in courses for both the major and minor. There is no language requirement. Original investigative work in one major area is essential.

Admission Requirements—Admission requirements include either an M.D. degree or a bachelor's degree from an accredited institution of higher learning, with adequate background in the biological sciences to justify graduate work in this specialty. Previous experience in laboratory medicine is desirable.

Special Major Field Requirements—The following information must be sent to the Department of Laboratory Medicine and Pathology before an application will be evaluated: three letters of recommendation; the Test of English as a Foreign Language (for foreign students); a brief autobiographical sketch including such information as reasons for seeking a degree in laboratory medicine, career objectives, and areas of special interest.

Student Progress and Examination—Students are encouraged to file their program by the end of their first quarter of graduate work in order to be reviewed by the departmental graduate committee. Student progress is reviewed at regular intervals by the graduate committee in laboratory medicine. Failure to maintain satisfactory progress may be cause for discontinuance in this program.

In addition to the usual course examinations, candidates must pass a preliminary written examination at the end of the first year of course work and a final oral examination that will cover the conceptual aspects of the thesis subject and the graduate courses taken. The latter examination will be conducted by a committee appointed by the Graduate School to examine the thesis.

5101f. PRINCIPLES OF LABORATORY MEDICINE. (4 cr) Yasmineh, Azar, Dalmasso, Swaim
Advanced treatment of the fundamental areas of laboratory medicine, such as clinical chemistry, hematology, immunology, bacteriological diagnosis; correlations of established methodology, quality control, research and development, to establish the conceptual basis of laboratory medicine.

5102w. PRINCIPLES OF LABORATORY MEDICINE. (4 cr) Yasmineh, Azar, Dalmasso, Swaim
See 8101.

5103w. PRINCIPLES OF DIAGNOSTIC MICROBIOLOGY. (3 cr; prereq MdBc 3103, 5232 or #) Ederer

5110f. HOSPITAL INFECTIONS CONTROL. (2 cr; prereq #; offered fall 1979 and alt yrs)
Nosocomial infections, transmission of hospital infections, surveillance and general methods of infection control.

5133s. MEDICAL MYCOLOGY. (3 cr; prereq medical microbiology, diagnostic microbiology or #; offered spring 1981 and alt yrs) Ederer
Laboratory diagnosis of infections caused by yeasts, dermatophytes, and systemic fungi.

5136s. ANAEROBIC BACTERIOLOGY. (4 cr; prereq biochemistry, medical microbiology, diagnostic microbiology or #; offered spring 1980 and alt yrs) Blazevic
Anaerobic respiration in bacteria. Methods of anaerobic culture. Taxonomy and classification of anaerobes. Biochemical and gas chromatographic differentiation of anaerobes. Role of anaerobes in disease.

5138f,w,s. CLINICAL MICROBIOLOGY SEMINAR. (1 cr; prereq #)

5139f,w,s,su. ADVANCED MICROBIOLOGY. (Cr ar; prereq #) Balfour, Blazevic, Ederer

5160s. HUMAN CYTOGENETICS. (3 cr; prereq #; offered 1981 and alt yrs) Yunis
Chromosome structure and function; genetic and clinical problems associated with study of human chromosomes.

5161s. HUMAN CYTOGENETICS LABORATORY. (2 cr; prereq #; offered 1981 and alt yrs) Lindquist, Yunis
Techniques for study of mammalian and human chromosomes; cell culture, autoradiography, new techniques for chromosome identification, and chromosome isolation techniques.

5162s. HUMAN BIOCHEMICAL GENETICS. (3 cr; prereq #; offered 1980 and alt yrs) Yunis
Molecular and genetic basis of human genetic traits.

5163s. HUMAN BIOCHEMICAL GENETICS LABORATORY. (2 cr; prereq #; offered 1980 and alt yrs) Yunis
Biochemical techniques used in study of human genetic traits.

5168f,w,s. GENETICS SEMINAR. (1 cr; prereq #) Yunis and staff

5169. RESEARCH IN HUMAN GENETICS. (Cr ar; prereq #) Yunis

5170. ADVANCED PROBLEMS IN MEDICAL GENETICS. (Cr ar; prereq #) Yunis and staff

5172f. HUMAN GENETIC TRAITS INCLUDING BLOOD GROUPS AND SERUM PROTEIN POLYMORPHISM. (3 cr, §Anth 5641; prereq #) Polesky

5178s. INTRODUCTION TO CLINICAL CHEMISTRY. (10 cr; prereq MdBc 5300-5301, Chem 3100-3101) Bowers
Lecture and laboratory in basic techniques and methods in clinical chemistry. Topics include spectrophotometry, electrolytes, proteins, enzymes, toxicology, and quality control. Both manual and instrumental methods in clinical chemistry.

5179f,w,s,su. CHEMISTRY SEMINAR. (1 cr; prereq #) Steffes

5180f,w,s,su. ADVANCED CHEMISTRY. (Cr ar; prereq #) Benson, Bridges, Brown, Dempsey, Freier, Hallaway, Rosenberg, Stewart

5194f,w,s. COMPUTER APPLICATIONS IN MEDICINE. (4 cr; prereq #) Ellis
Readings, discussions, seminars, and programming assignments to introduce students to current and anticipated uses of computers as part of health care delivery systems.

5195f,w,s. COMPUTER APPLICATIONS IN MEDICAL RESEARCH. (Cr ar; prereq #) Ellis
Readings, discussions, seminars, and programming assignments to introduce students to current and anticipated uses of computers as part of health care delivery systems.

5270f. IMMUNOHEMATOLOGY. (3 cr; prereq #; offered 1980 and alt yrs) Azar
Immune response. Blood cells as antigens. Antibodies in blood groups. Mechanisms of their reactions. White cells as antigens and antibodies. Autoimmune hemolysis. Humoral and cellular factors in immunohematology.

5271f. IMMUNOHEMATOLOGY LABORATORY. (2 cr; prereq 5270; offered 1980 and alt yrs) Azar

5272f,s,su. IMMUNOLOGY SEMINAR. (1 cr; prereq #) Azar, McCullough

5273f,s. ADVANCED IMMUNOLOGY. (Cr ar; prereq #; offered 1981 and alt yrs) Azar, McCullough

5274s. MOLECULAR ASPECTS OF IMMUNOLOGY. (3 cr; prereq #; offered 1981 and alt yrs) Dalmasso
Chemistry and pathobiology of immunoglobulins, complement, cell membrane, and mediators of anaphylaxis and cellular immunity.

5346w. COMPUTER APPLICATIONS FOR HEALTH CARE PROVIDERS. (3 cr; prereq health science regis or #) Gatewood
Survey of current roles of digital computers and associated technical staff in health care areas, both in the hospital and in the community.

5765f, 5766w. HEMATOLOGY. (4 cr per qtr, §Anat 5765, 5766; prereq #) Sundberg and staff
Blood and blood-forming organs; blood and bone marrow from the standpoint of diagnosis and prognosis.

5767s. SEMINAR: HEMATOLOGY. (1 cr, §Anat 5767; prereq #) Brunning, Edson, Sundberg

5768f,w,s,su. ADVANCED HEMATOLOGY. (Cr ar; prereq #) Brunning, Edson, Sundberg

5864f,w,s. RESEARCH SEMINAR. (1 cr; prereq #) Benson and staff

5865f,w,s. DEPARTMENTAL SEMINAR. (1 cr; prereq #) Benson and staff

8105f. PRINCIPLES OF DIAGNOSTIC ENZYMOLOGY. (3 cr; prereq 8101, 8102 or #; offered 1979-80 and alt yrs) Yasmineh
Enzymes of diagnostic interest, their biological and biochemical aspects, and their usefulness in understanding the etiology of disease and its diagnosis, treatment, and prevention.

8235f,w,s,su. ADVANCED CLINICAL LABORATORY MEDICINE. (Cr ar) Benson and staff

8236f,w,s,su. RESEARCH ON CLINICAL LABORATORY PROBLEMS. (Cr ar) Benson and staff

8920f,w,s. ADVANCES IN IMMUNOLOGY. (1 cr; prereq #) Kersey and staff
Presentation of research or literature seminar required for credit.

LABORATORY MEDICINE

OFFERED AT ROCHESTER

Professor

Edward J. W. Bowie, M.B.Ch.B., M.S.
Paul Didisheim, M.D.
Virgil F. Fairbanks, M.D.
James D. Jones, Ph.D.
W. Eugene Mayberry, M.D.
Robert V. Pierre, M.D.
James S. Robertson, M.D., Ph.D.
Howard F. Taswell, M.D., M.S.
John H. Thompson, Jr., Ph.D.
Heinz W. Wahner, M.D., M.S.
John A. Washington II, M.D.

Associate Professor

Michael B. O'Sullivan, M.D., *chairman*
Mrinal K. Dewanjee, Ph.D.
Ralph D. Ellefson, Ph.D.
Harold Markowitz, M.D.
Jon E. Rosenblatt, M.D.

Assistant Professor

John P. Anhalt, M.D., Ph.D.
Alvaro A. Pineda, M.D.
Glenn D. Roberts, Ph.D.
Thomas F. Smith, Ph.D.

Three programs in laboratory medicine are offered: (a) a 2-year program as part of a 4-year course in pathology leading to eligibility for examination and certification by the American Board of Pathology in the combined fields of anatomic and clinical pathology; (b) a 3-year program in laboratory medicine alone leading to eligibility for examination and certification by the American Board of Pathology in the field of clinical pathology; and (c) courses in specific fields of laboratory medicine available to residents in any specialty of medicine and other postdoctoral students.

These programs consist of lectures, seminars, demonstrations, and actual performance of tests in the laboratories of blood bank and transfusion services; and in clinical chemistry, clinical microbiology, diagnostic nuclear medicine, laboratory hematology, laboratory nephrology, and regional laboratory services.

Graduate students may be assigned to one or all of these laboratories to learn the methods used as aids in clinical diagnoses. Original projects in research may be conducted in most of the laboratories.

M 5800f,w,s,su. PARASITOLOGY. (2 cr) Thompson

M 5801w. LECTURES IN CLINICAL MICROBIOLOGY. (1 cr) Roberts, Smith, Washington

M 5802w. CLINICAL MICROBIOLOGY. (6 cr) Roberts, Smith, Washington
Experience in routine and special diagnostic laboratories in bacteriology, mycology, and virology.

M 5803-5804f,w,s,su. LABORATORY HEMATOLOGY. (6 cr per qtr) Bowie, Didisheim, Fairbanks, O'Sullivan, Pierre
Experience, lectures, and seminars in routine and special diagnostic laboratories in blood and marrow morphology, instrumentation, coagulation, hematologic enzymology and genetics, and routine analytical techniques. Two quarters required.

M 5805-5806f,w,s,su. IMMUNOHEMATOLOGY AND BLOOD BANKING. (8 cr per qtr) Taswell

M 5807f,w,s,su. NUCLEAR MEDICINE. (4 cr) Fairbanks, Jiang, Wahner

M 5808f,w,s,su. CLINICAL PHYSIOLOGY. (2 cr) Pierre, Wahner
Experience and lectures in special patient procedures involving studies of function of kidney, liver, and endocrine organs and in analysis of gastric contents, urine, and cerebrospinal fluid.

M 5809f. CLINICAL CHEMISTRY. (6 cr) Ellefson, Jiang, Jones, Markowitz, Mayberry, McCall
Lectures, seminars, and experience in general clinical chemistry, analysis of amino acids, enzymology, lipid chemistry, analysis of metals, toxicology, hormonal analysis, immunochemistry, protein chemistry, and serology.

M 8890f,w,s,su. RESEARCH PROBLEMS. (6 cr) O'Sullivan and staff

MEDICAL TECHNOLOGY (MedT)

OFFERED AT MINNEAPOLIS

Professor

Ellis S. Benson, M.D., *head*
Ruth F. Hovde, M.S., *director of graduate study*
Miguel M. Azar, M.D., Ph.D.
Donna Blazevic, M.P.H.
Richard D. Brunning, M.D.
Agustin P. Dalmasso, M.D.
Mary E. Dempsey, Ph.D.
Grace M. Ederer, M.P.H.
J. Roger Edson, M.D.
Esther F. Freier, M.S.
J. Jeffrey McCullough, M.D.
Herbert F. Polesky, M.D.
Verna L. Rausch, M.S.
Andreas Rosenberg, Ph.D.
R. Dorothy Sundberg, M.D., Ph.D.
Jorge J. Yunis, M.D.

Associate Professor

Henry H. Balfour, Jr., M.D.
Gloria M. Bradley, M.D.
Robert A. Bridges, M.D.
Leo T. Furcht, M.D.
Ben Hallaway, M.S.
Robert W. McKenna, M.D.
Jon R. Schmidtke, Ph.D.
Michael W. Steffes, M.D., Ph.D.
Lorraine G. Stewart, M.S.
Walid Yasmineh, Ph.D.

Assistant Professor

Larry D. Bowers, Ph.D.
Helen M. Hallgren, M.S.
Stephen C. Marker, M.D.

Graduate work in the field of medical technology leading to the M.S. degree is available for qualified candidates who wish to prepare themselves for a career of teaching and investigation in the clinical laboratory area. Regardless of career goal, all students spend a period of time in the clinical and teaching laboratories to familiarize themselves with the aspects of methodology, teaching, and research.

Prerequisites—For a major in medical technology, certification as a medical technologist or eligibility for such certification is required in addition to a bachelor's degree from an accredited institution with sufficient prerequisite work and scholarly attainment in chemistry and biological sciences to justify graduate work in these areas. Previous experience in a clinical laboratory is required. Three letters of reference from employers or teachers are also required; these should be sent to the Director of Graduate Study, Division of Medical Technology, 5307 Powell Hall, 500 Essex Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Minor—It is suggested that students who major in medical technology present a minor in one of the following fields: hematology, biochemistry, microbiology, immunohematology, or immunology.

Master's Degree—Offered only under Plan A. The work leading to a master's degree includes (a) 3 quarter credits in MedT 5120 in addition to a minimum of 20 quarter credits in graduate-level courses in the major department with grades not lower than B; (b) a minimum of 9 quarter credits in graduate-level courses in the minor department relating to the thesis problem with grades not lower than B; (c) a substantial thesis based upon independent research; and (d) a final oral examination. There is no language requirement.

The thesis should be on a topic within the minor or related field: chemistry, microbiology, hematology, immunohematology, or immunology. The thesis must show ability to work independently and must give evidence of power of independent thought both in perceiving problems and in making satisfactory progress toward their solution. Familiarity with the bibliography of the special area and correct citation of authorities are expected. The thesis must be finished and registered in the office of the Graduate School at least 9 weeks before the end of the quarter in which the student earns the degree.

In addition to the usual course examinations, the candidate must pass a final oral examination that will cover the exposition of the thesis problem and subject matter or theory fundamental to the thesis topic. This examination must be held not later than 5 weeks before the end of the quarter in which the student earns the degree. This

examination will be conducted by the committee (which the student's adviser chairs) appointed by the Graduate School to examine the thesis.

The student's progress is reviewed at regular intervals by the graduate faculty in medical technology. Continuance in the program is dependent upon maintaining a satisfactory scholastic average in required courses and satisfactory progress in developing the thesis problem. Failure to maintain satisfactory progress and levels of achievement may be cause for recommendation for discontinuance in this program.

Minor in Medical Technology—Work for a minor is offered to students in allied sciences. Choice of particular courses to be presented in fulfillment of requirements will be made after consultation with the student's adviser.

5120. SEMINAR: MEDICAL TECHNOLOGY. (1-3 cr; may be taken one or more qtrs)
Review and discussion of current literature; presentation and discussion of research being carried on in the department.

5125. PRACTICUM TEACHING. (Cr ar [max 3 cr]; prereq △)
Supervised experience in teaching; development of skills in effective use of instructional materials, tests and measurements.

5128. ELEMENTS OF LABORATORY ADMINISTRATION. (3 cr; prereq △)
Introduction to laboratory administration. Topics include leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, laboratory safety, labor relations, and governmental regulations.

5130. PRACTICUM IN LABORATORY ADMINISTRATION. (3 cr)
Supervised experience and assignment of specific problems related to laboratory service and management in hospitals.

5133. MEDICAL MYCOLOGY. (3 cr; prereq 5102 or MicB 5232 or #)
Laboratory diagnosis of infections caused by yeasts, dermatophytes, and systemic fungi.

5135. ADVANCED CLINICAL MICROBIOLOGY. (5 cr; prereq #; may be taken one or more qtrs)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical microbiology.

5136. ANAEROBIC BACTERIOLOGY. (2-4 cr; prereq biochemistry, medical microbiology, diagnostic microbiology or #)
Lecture and laboratory. Anaerobic respiration in bacteria. Methods of anaerobic culture. Taxonomy and classification of anaerobes. Biochemical and gas chromatographic differentiation of anaerobes. Role of anaerobes in disease.

5138. SELECTED TOPICS IN MICROBIOLOGY. (Cr ar; may be taken one or more qtrs)
Advanced seminar; topics assigned for conferences and reading.

5140, 5141. TECHNIQUES FOR TEACHING. (3 cr per qtr; prereq △)
Development of objectives, classroom activities, and measurement parameters for medical technology education.

5145. DEVELOPMENT OF MEDICAL TECHNOLOGY. (3 cr)
Current problems; topics and research.

5155. ADVANCED CLINICAL HEMATOLOGY. (5 cr; prereq #; may be taken one or more qtrs)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical hematology.

5165. ADVANCED CLINICAL IMMUNOHEMATOLOGY. (5 cr; prereq #; may be taken one or more qtrs)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical immunohematology.

5175. ADVANCED CLINICAL CHEMISTRY. (5 cr; prereq #; may be taken one or more qtrs)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical chemistry.

5179. CHEMISTRY SEMINAR. (1 cr; prereq #)

8178. PRINCIPLES OF DIAGNOSTIC ENZYMOLOGY. (3 cr, §LMed 8105; prereq 5108, #)
Enzymes of diagnostic interest, their biological and biochemical aspects, and their usefulness in understanding the etiology of disease and its diagnosis, treatment, and prevention. Emphasis on factors that affect the interpretation of enzyme results, including localization of enzymes and/or isoenzymes in various tissues and subcellular organelles; kinetics of enzyme release from damaged tissues; biological half-lives of enzymes in plasma; and induction of enzyme synthesis.

8179. ADVANCED TOPICS IN CLINICAL CHEMISTRY. (3 cr, prereq 5108, #)
External and internal factors that affect the clinical chemistry laboratory. External factors include the use of statistics, predictive value of tests, and effect of biological and analytical factors on laboratory results. Internal factors, new concepts in clinical chemistry methodology, and automation, such as chromatography and immunoassay techniques. Principles and advantages of kinetic and equilibrium assays.

8230. ADVANCED MEDICAL BACTERIOLOGY. (3 cr, §LMed 8230; prereq 5102 or LMed 5103, #)
Unusual bacteria of medical importance, including nonfermentative, gram-negative bacilli, and gram-positive bacilli that may cause disease. Metabolism, biochemical characteristics, disease states, treatment.

MEDICINAL CHEMISTRY (MedC)

OFFERED AT MINNEAPOLIS

Professor

Philip S. Portoghese, Ph.D., *head, director of graduate study*
Frank E. DiGangi, Ph.D.
Herbert T. Nagasawa, Ph.D.
Robert Vince, Ph.D.

Associate Professor

Mahmoud Abdel-Monem, Ph.D.
Patrick E. Hanna, Ph.D.

Assistant Professor

Rodney L. Johnson, Ph.D.

Medicinal chemistry involves application of the principles of the chemical and biological sciences to the study of relationships between molecular structure and biological activity. It deals with all chemically oriented studies that might lead to the development of new biologically active substances as well as those that contribute to an understanding of their modes of action.

Prerequisites—Applicants for graduate study in medicinal chemistry should possess a B.S. or M.S. degree in an appropriate related science field such as pharmacy, chemistry, or biology. All applicants should have completed undergraduate chemistry through the level of elementary organic chemistry. Biologically oriented undergraduate course work is desirable but is not a prerequisite.

Language Requirement—For the master's degree, no language is required. For the Ph.D. degree, one language is required (German is routinely acceptable, but other languages pertinent to the field of study will be considered by the staff on petition).

Students may fulfill the language requirement by completing an approved course in a field of study that will contribute to the development of their research capabilities and that would not normally be included in a medicinal chemistry academic program.

Master's Degree—Generally offered under Plan A. Plan B may be followed by petition. Candidates for the master's degree take a final oral examination.

Doctor's Degree—Graduate work leading to the Ph.D. degree is offered to students prepared for advanced work in medicinal chemistry.

5320-5330-5340-5350. THERAPEUTIC AGENTS I-IV. (4/5/6/3 cr) Staff
Factors involved in drug absorption, distribution, excretion, metabolism, mechanism of action, receptor interaction, and rational drug design; therapeutic properties and uses of individual pharmacological drug categories from structure-activity standpoint. Agents used as pharmaceutical aids and adjuncts.

8100.* MEDICINAL CHEMISTRY SEMINAR. (Cr ar; required of all majors in medicinal chemistry) Staff

8200. SELECTED TOPICS. (1 cr per qtr) Staff
In-depth discussion of selected topics in medicinal chemistry.

8300. GENERAL PRINCIPLES OF MEDICINAL CHEMISTRY. (2 cr; prereq 5320, Chem 3303 or #; offered 1980-81 and alt yrs) Portoghese
General principles of drug design and molecular bases of biological responses to medicinal agents.

8400. NEUROHORMONES AND NEUROPHARMACOLOGICAL AGENTS. (2 cr; prereq 5320 or #; offered 1979-80 and alt yrs) Hanna
Selected topics concerning the molecular aspects of neurotransmitter function and effects of neuroactive chemicals and drugs on nerve function.

8500. DESIGN OF CHEMOTHERAPEUTIC AGENTS. (2 cr; prereq 5320 or #; offered 1979-80 and alt yrs) Vince
Modern methods in design and evaluation of chemotherapeutic agents including enzyme inhibitors and metabolic blockers.

8600. CHEMICAL ASPECTS OF DRUG METABOLISM. (2 cr; prereq 5320; offered 1980-81 and alt yrs) Abdel-Monem and staff
Chemical aspects of drug metabolism including mechanisms of chemical biotransformations of drugs, and methods of identification of their metabolites in biological materials.

8800. MEDICINAL CHEMISTRY LABORATORY TECHNIQUES. (Cr ar; prereq Chem 3303 or #) Staff

8900. RESEARCH IN MEDICINAL CHEMISTRY. (Cr ar; prereq Chem 3303 or #) Staff
Study and experimental investigation of topics in the area of natural products and synthetic organic medicinal agents.

MEDICINE (Med)

OFFERED AT MINNEAPOLIS

Professor

Henry W. Blackburn, Jr., M.D., Ph.D.
Steven D. Douglas, M.D.
Charles W. Drage, M.D.
Ivan D. Frantz, Jr., M.D.
Frederick C. Goetz, M.D.
Robert B. Howard, M.D., Ph.D.
Harry S. Jacob, M.D.
Manuel E. Kaplan, M.D.
B. J. Kennedy, M.D., M.Sc.
Carl M. Kjellstrand, M.D.
Michael D. Levitt, M.D.
Robert O. Mulhausen, M.D.
M. John Murray, M.D., D.Sc.
Frank Q. Nuttall, M.D.
Jack H. Oppenheimer, M.D.
George A. Sarosi, M.D.
Alvin L. Schultz, M.D., M.S.
Athanasios Theologides, M.D., Ph.D.
Louis Tobian, Jr., M.D.
Yang Wang, M.D.
C. Paul Winchell, M.D.
Leslie Zieve, M.D., Ph.D.

Associate Professor

Jonathan S. Bishop, M.D., Ph.D.
John W. Eaton, Ph.D.
Russell F. Hanson, M.D., Ph.D.
Richard S. Kronenberg, M.D.
Charles F. Moldow, M.D.
Naip Tuna, M.D., Ph.D.

Graduate work in the Department of Medicine offers opportunities for physicians with outstanding undergraduate scholastic records or other evidence of promise to prepare for careers of teaching, research, or practice in internal medicine or any of its subdivisions as a specialty. Programs are organized to provide graduate education in clinical medicine and related preclinical areas. Medical fellowships are offered in general internal medicine, or on the advanced level in specialties of internal medicine, to students with evidence of scholarly promise.

A wide range of clinical material for graduate work in internal medicine is available in the wards and outpatient departments of University Hospitals, Hennepin County Medical Center, United Hospitals (Miller Division), Northwestern Hospital, St. Paul-Ramsey Hospital, and Veterans Administration Hospital. These institutions are the primary resources for graduate education in clinical medicine. Opportunities for research in the laboratories in all of the hospitals are open to members of the Department of Medicine.

The pursuit of a minor subject may be carried on simultaneously and in intimate relation with clinical studies. Anatomy, biochemistry, microbiology, pathology, pharmacology, and physiology departments all have their laboratories and teaching centers on the campus; work in any of these subjects may be continued further to meet the requirements of a degree program for a minor field.

In general, fellowships for an advanced degree program are planned for a 4-year period, of which 2½ to 3 years are devoted to clinical medicine and research and 1 to 1½ years to basic sciences and research. During the greater part of the first period,

the individual acts as a resident physician in one of the hospitals. In this position he or she assumes increasing clinical responsibilities in patient care as a part of the clinical medicine experience. In addition, the fellow in medicine is expected to participate in the teaching program.

An advanced degree program must include research toward preparation of an acceptable thesis. For the M.S. degree, this research may be a scholarly clinical project. For the Ph.D. degree, the research must be scholarly, original investigation developed with implications for clinical medicine.

Language Requirement—For the master's degree, no language is required. For the Ph.D. degree, a language or special research technique may be required at the discretion of the adviser.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered. The minor requirements must be logically related to medicine and must be composed of graduate-level courses, preferably in the major basic sciences.

The courses listed below are described in the broadest outline to convey the character of the work. No hard-and-fast program is required, so that the individual capabilities and purposes of the fellow may be given particular consideration.

8201f,w,s,su. CLINICAL MEDICINE. (Cr ar) Howard, Mulhausen, Sarosi, Schultz, and staff
General diagnosis and methods of investigation; recording of clinical data. Emphasis on methods of treatment and primary patient care.

8202f,w,s,su. CLINICAL CONFERENCE. (1 cr) Staff
Presentation of problem cases from the Medical Service. Discussion of diagnosis and treatment and consideration of pertinent literature.

8203f,w,s,su. CLINICAL RADIOLOGY CONFERENCE. (1 cr) Gedgaudas and staff
Presentation and discussion of X-ray films from the Medical Service, with clinical correlation.

8204f,w,s,su. PATHOLOGICAL CONFERENCE. (1 cr) Staff
Presentation of clinical features, necropsy findings, and discussion. Medical and surgical cases.

8205f,w,s,su. ELECTROCARDIOGRAPHIC CONFERENCE. (1 cr) Tuna

8206f,w,s,su. NEPHROLOGY SEMINAR. (3 cr) Kjellstrand
Lecture and discussion of clinical nephrology with emphasis on acute and chronic renal failure, underlying pathophysiology, differential diagnosis, immunology, and glomerular processes.

8209f,w,s,su. TUMOR CLINICAL CONFERENCE. (1 cr) Kennedy and staff

8210f,w,s,su. INFECTIOUS DISEASE SEMINAR. (Cr ar) Hall, Sabath, and staff

8211f,w,s,su. DISEASES OF THE CARDIOVASCULAR SYSTEM. (Cr ar) Cohn, Wang, and staff
Clinical and special laboratory aspects of diseases related to the cardiovascular system with emphasis on consultative and special laboratory skills.

8212f,w,s,su. DISEASES OF THE CHEST. (Cr ar) Drage and staff
Opportunities to study problems relating to the chest from both clinical and laboratory standpoints.

8213f,w,s,su. DISEASES OF THE KIDNEY. (Cr ar) Kjellstrand and staff
Clinical and laboratory aspects of renal disease and hypertension with emphasis on consultative, renal dialysis, and laboratory skills.

8214f,w,s,su. DISEASES OF DIABETES, ENDOCRINOLOGY, AND METABOLISM. (Cr ar) Oppenheimer, Goetz, and staff
Clinical and laboratory aspects of diseases of endocrinology and metabolism with emphasis on consultative, special testing, and laboratory skills.

8215f,w,s,su. DISEASES OF HEMATOLOGY. (Cr ar) Jacob and staff
Clinical and special laboratory aspects of hematology with emphasis on consultative and special laboratory skills.

8216f,w,s,su. DISEASES OF GASTROENTEROLOGY. (Cr ar) Wilson and staff
Clinical and special procedure aspects of diseases of gastroenterology with emphasis on consultative, endoscopy, and laboratory skills.

8217f,w,s,su. DISEASES OF ONCOLOGY. (Cr ar) Kennedy and staff
Clinical and laboratory aspects of cancer and tumor chemotherapy with emphasis on methods of treatment and consultative and laboratory skills.

8220f,w,s,su. RESEARCH IN MEDICINE. (Cr ar) Howard, Mulhausen, Sarosi, Schultz, and staff

8221f,w,s,su. TOPICS IN MEDICINE. (Cr ar) Staff

8223f,w,s,su. TOPICS IN RELATED BASIC SCIENCE. (Cr ar) Staff

MEDICINE

OFFERED AT ROCHESTER

Professor

Richard E. Weeks, M.D., M.S., *chairman*
David L. Ahmann, M.D., M.S.
Howard A. Andersen, M.D., M.S.
Milton W. Anderson, M.D., M.S.
Lloyd G. Bartholomew, M.D., M.S.
Edwin D. Bayrd, M.D., M.S.
Kenneth G. Berge, M.D., M.S.
Harry F. Bisel, M.D.
Leo F. Black, M.D., M.S.
Edward J. W. Bowie, M.B.B.Ch., M.S.
Robert O. Brandenburg, M.D., M.S.
Hugh R. Butt, M.D., M.S.
Haddon M. Carryer, M.D., Ph.D.
Earl T. Carter, M.D., Ph.D.
Daniel C. Connolly, M.D., Ph.D.
Guy W. Daugherty, M.D., M.S.
David E. Dines, M.D., M.S.
Matthew B. Divertie, M.D., M.S.
Thomas P. Dousa, M.D., Ph.D.
Virgil F. Fairbanks, M.D.
Richard H. Ferguson, M.D.
Robert S. Fontana, M.D., M.S.
William T. Foulk, Jr., M.D., M.S.
Robert L. Frye, M.D.
Clifford F. Gastineau, M.D., Ph.D.
Joseph E. Geraci, M.D., M.S.
Emilio R. Giuliani, M.D.
Gerald J. Gleich, M.D.
Vay L. Go, M.D.
Hymie Gordon, M.B.B.Ch., M.D.
John B. Gross, M.D., M.S.
Albert B. Hagedorn, M.D., M.S.
Carlos E. Harrison, Jr., M.D., M.S.
Lowell L. Henderson, M.D., M.S.
Norman G. G. Hepper, M.D., M.S.
Paul E. Hermans, M.D., M.S.
Harry N. Hoffman II, M.D., M.S.
Kenneth A. Huizenga, M.D., M.S.
Gene G. Hunder, M.D., M.S.
Robert E. Hyatt, M.D.
William J. Johnson, M.D.
John L. Juergens, M.D., M.S.
Joseph M. Kiely, M.D., M.S.
Franklyn G. Knox, M.D., Ph.D.
Bruce A. Kottke, M.D., Ph.D.
Robert A. Kyle, M.D., M.S.
W. Eugene Mayberry, M.D., M.S.
William M. McConahey, M.D., M.S.
Douglas B. McGill, M.D., M.S.
James R. McPherson, M.D., M.S.
R. Drew Miller, M.D., M.S.
Charles G. Moertel, M.D., M.S.
Donald R. Nichols, M.D., M.S.
Charles A. Owen, Jr., M.D., Ph.D.
Sidney F. Phillips, M.B.B.S
Robert V. Pierre, M.D.
Howard F. Polley, M.D., M.S.
Raymond D. Pruitt, M.D., M.S.
Raymond V. Randall, M.D., M.S.
Charles E. Reed, M.D.
Richard J. Reitemeier, M.D., M.S.
B. Lawrence Riggs, M.D., M.S.
Robert J. Ryan, M.D.
Robert M. Salassa, M.D., M.S.
William G. Sauer, M.D., M.S.
Donald A. Scholz, M.D., M.S.
Sheldon G. Sheps, M.D.
Murray N. Silverstein, M.D., M.S.
Lynwood H. Smith, M.D.
Ralph E. Smith, M.D.
John A. Spittell, Jr., M.D., M.S.
Cameron G. Strong, M.D., M.S.
Thomas B. Tomasi, Jr., M.D., Ph.D.
Heinz W. Wahner, M.D., M.S.
L. Emmerson Ward, M.D., M.S.
Richard E. Weeks, M.D., M.S.
Richard M. Weinshilboum, M.D.

Associate Professor

Carl F. Anderson, M.D.
William P. Baldus, M.D., M.S.
James C. Broadbent, M.D., M.S.
Ronald D. Brown, M.D.
John A. Callahan, M.D., M.S.
Alan J. Cameron, M.D.
Doyt L. Conn, M.D.
Richard A. DeRemee, M.D.
R. Rolland Dickson, M.D., M.S.
Eugene P. DiMagno, M.D.
James V. Donadio, Jr., M.D.
Bruce E. Douglass, M.D., M.S.
Robert T. Eagan, M.D.
John H. Edmonson, M.D.
John F. Fairbairn II, M.D.
Peter P. Frohnert, M.D., M.S.
Valentin D. Fuster, M.D.
John E. Gerich, M.D.
Colum A. Gorman, M.B.B.Ch., Ph.D.
Douglas R. Gracey, M.D., M.S.
Paul A. Green, M.D.
Richard G. Hahn, M.D.
John A. Higgins, M.D., M.S.
Richard W. Hill, M.D., M.S.
H. Clark Hoagland, M.D., M.S.
David L. Hoffman, M.D.
Edward J. Kamin, M.D.
Francis J. Kazmier, M.D., M.S.

Thomas F. Keys, M.D.
John S. Kovach, M.D.
Edward G. Lufkin, M.D.
Juan R. Malagelada, M.D.
John G. Mayne, M.D., M.S.
Charles H. McKenna, M.D.
George W. Morrow, Jr., M.D., M.S.
Albert D. Newcomer, M.D.
Fred T. Nobrega, M.D.
Robert C. Northcutt, M.D.
Michael J. O'Connell, M.D.
John D. O'Duffy, M.D.
Philip J. Osmundson, M.D., M.S.
Pasquale J. Palumbo, M.D., M.S.
Thomas W. Parkin, M.D., M.S.
Don C. Purnell, M.D., M.S.
Erik L. Ritman, Ph.D.
Joseph R. Rodarte, M.D.
Juan C. Romero, M.D.
Edward C. Rosenow III, M.D., M.S.
Randolph A. Rovelstad, M.D., Ph.D.
David R. Sanderson, M.D.
Thomas T. Schattenberg, M.D., M.S.
Alexander Schirger, M.D.
Allan J. Schutt, M.D.
Frederick J. Service, M.D., Ph.D.
Glen W. Sizemore, M.D.
Hugh C. Smith, M.D.
Ralph E. Spiekerman, M.D., M.S.
Abdul J. Tajik, M.B.B.S.
Johnson L. Thistle, M.D., M.S.
Richard D. Wagoner, M.D.
David M. Wilson, M.D.

Assistant Professor

Leonard A. Brennan, Jr., M.D.
Nelson S. Brewer, M.D.
Philip W. Brown, Jr., M.D., Ph.D.
Thomas W. Bunch, M.D.
Paul C. Carpenter, M.D.
James H. Chesebro, M.D.
Douglas T. Coles, M.D.
Joseph J. Combs, M.D.
Albert J. Czaja, M.D.
William W. Douglas, M.D.
Titus C. Evans, M.D.
C. Richard Fleming, M.D., M.S.
Stephen Frytak, M.D.
Gerald T. Gau, M.D.
Stafford W. Gedge, M.D., M.S.
Philip R. Greipp, M.D.
David G. Hanlon, M.D., M.S.
Hunter Heath, M.D.
James N. Ingle, M.D.
Horace K. Ivy, M.D., M.S.
Arthur J. Kennel, M.D., M.S.
John E. King, M.D.
Iqbal Krishan, M.D.
Stephen B. Kurtz, M.D.
Stephen Lai-Fook, Ph.D.
Nicholas F. J. LaRusso, M.D.
James D. Maloney, M.D.
Harold T. Mankin, M.D., M.S.
John Merideth, M.D.
Michael J. O'Connell, M.D.
Robert M. Petitt, M.D.
Alkis M. Pierides, M.B.B.Ch.
Dietlind L. Roedler-Wahner, M.D., M.S.
Michael S. Rohrbach, Ph.D.
James V. Ross, Jr., M.D., M.S.
Richard E. Sedlack, M.D., M.S.
James B. Seward, M.D., M.S.
Harry A. Swedlund, M.D., M.S.
Ross M. Tucker, M.D.
Christian J. Van Den Berg, M.D., M.S.
Robert E. Van Scoy, M.D.
Jorge A. Velosa, M.D.
Philip R. Westbrook, M.D.
Conrad J. Wilkowske, M.D.
Walter R. Wilson, M.D.

The program in internal medicine offers individualized training with emphasis on helping residents achieve their specific goals in preparing for clinical practice, a research-oriented career, or an academic career.

Applicants may enter the medical residency program in the first or second graduate-level or postdoctoral year. Appointments are made through the National Resident Matching Program for candidates requesting entrance at graduate level 1. For those who plan on pursuing training and ultimately practicing in a subspecialty in addition to internal medicine, up to 3 years of training in the various subspecialties are offered after completing requirements of the American Board of Internal Medicine. Joint training for certification in internal medicine or occupational medicine is available.

Graduated increases in responsibility in the care of medical patients are integral to the residency program in internal medicine. During the residency, primary emphasis is placed upon developing proficiency in the basic skills of internists and their approach to the clinical problem.

Hospital assignments to the various internal medicine subspecialty services occupy up to 36 months. Medical patients are admitted to the hospitals on services organized to reflect both the general and subspecialty aspects of internal medicine, community medicine, cardiovascular diseases, nephrology, thoracic and allergic diseases, rheumatology, gastroenterology, hematology and oncology, infectious diseases, endocrine diseases, and emergency room care. Also available are assignments to neurology, psychiatry, dermatology, clinical nutrition and hypertension

clinic. All residents are required to include general internal medicine, cardiovascular, endocrine, gastroenterological, and neurological hospital experience in their programs.

During the first part of each hospital service, residents become familiar with many of the particulars of the subspecialty. In the remaining time, they are given the opportunity to assume increasing responsibility for the total management of each patient they admit. This graduated assumption of patient management is evaluated by the staff member on full-time duty as a hospital consultant. Flexibility in assignments to the various hospital services permits individualization of the educational program within the general framework of preparing for American Board of Internal Medicine certification.

Hospital rounds with medical students, residents and trainees, and consultants assigned to the service are made daily. Consultants rotate on a 3- to 4-week schedule, permitting residents to gain experience with several consultants during each assignment. Hospital services usually have three residents so that each resident is on call every third night, allowing for time to study and attend evening conferences and seminars.

Senior residents in their third year of the program are assigned a minimum of three months to assume responsibility for patient care in the outpatient clinic. Staff opinions are available to residents from their section or department and from other specialty sections from which residents may request consultations.

A staff consultant acts as an adviser to each medical resident. This association provides continuous personal assistance to residents in achieving their educational goals. Quarterly critiques based on evaluations by each staff consultant with whom residents have worked are reviewed with them by their adviser.

Residents interested in academic degree programs are allowed up to 6 months to carry on full-time laboratory research in pathology, biochemistry, physiology, microbiology, biophysics, or hematology. Conducted during the third year of the residency, this research fulfills a major requirement for the M.S. degree in medicine. Senior clinical fellows in a subspecialty training program who have strong interests in research or in an academic career may spend a year or more in the basic research laboratories and may work toward the Ph.D. degree.

Many seminars, conferences, lectures, and other forms of teaching bring together residents and staff members from a variety of disciplines to further enrich the knowledge and experience of all. Medical grand rounds are held biweekly throughout the year.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 5801. SYSTEMIC ENDOCRINOLOGY. (3 cr; prereq 1 yr organic and inorganic chemistry) Gorman
Lecture and discussion course emphasizing normal and abnormal endocrine physiology and biochemistry. Graduate students required to complete a paper.

M 5802. CELLULAR PHYSIOLOGY INTEGRATIVE METABOLISM. (6 cr; prereq #) Palumbo
To acquaint students with view of nutrition that includes ingestion and digestion of foodstuffs, and cellular nutrition and metabolism.

M 5803. CLINICAL NUTRITION. (1 cr) Gastineau, Anderson, and staff
Lectures on clinical syndromes of malnutrition, principles of enteral and parenteral therapy, assessment of nutritional status, and concepts of energy metabolism.

M 5804. PATHOPHYSIOLOGY OF KIDNEY AND URINARY TRACT. (3 cr; offered yearly) Mitchell and staff
Basic renal pathophysiology. Examination required for credit.

M 5805. GASTROINTESTINAL PHYSIOLOGY. (4 cr; prereq 1 yr general physiology or equiv or #) H.N. Hoffman
Lecture and discussion emphasizing normal and abnormal gastrointestinal physiology. Graduate students required to complete a paper.

M 8800f,w,s,su. PRINCIPLES OF MEDICAL GENETICS AND CLINICAL APPLICATION. (3 cr) Staff
Preparation of special project and presentation of findings; journal review; patients with genetic problems examined and chromosome techniques demonstrated.

M 8851f,w,s,su. GENERAL MEDICAL AND SURGICAL DIAGNOSIS. (6 cr) Staff

M 8852f,w,s,su. MEDICAL HOSPITAL RESIDENCE. (6 cr) Staff
Junior residency service.

M 8853f,w,s,su. MEDICAL DIAGNOSIS AND HOSPITAL SERVICE. (6 cr) Staff
Senior residency service.

M 8854f,w,s,su. ADVANCED MEDICAL DIAGNOSIS AND MANAGEMENT. (6 cr) Senior resident associate

M 8855f,w,s,su. ALLERGY (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8856f,w,s,su. CLINICAL HEMATOLOGY (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8857f,w,s,su. GASTROENTEROLOGY (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8858f,w,s,su. CARDIOVASCULAR DISEASES (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8859f,w,s,su. PERIPHERAL VASCULAR DISEASES (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8860f,w,s,su. NEPHROLOGY (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8861f,w,s,su. RHEUMATOLOGY (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8862f,w,s,su. THORACIC DISEASES (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8863f,w,s,su. INFECTIOUS DISEASES (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8864f,w,s,su. ENDOCRINOLOGY AND METABOLISM (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8865. COMMUNITY MEDICINE (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8866. ONCOLOGY (SPECIAL CLINICAL AND LABORATORY TECHNIQUES). (6 cr) Staff

M 8867. PATHOBIOLOGY OF BILE ACIDS. (1 cr) Staff
Comparative biochemistry, radiochemistry, physical chemistry, and analytical chemistry of bile acids. Enterohepatic circulation; role of bile acids in diarrheal states; diagnostic and therapeutic value of bile acids.

MICROBIOLOGY (MicB)

OFFERED AT MINNEAPOLIS

Microbiology

Professor

Dennis W. Watson, Ph.D., *head*
Anthony J. Faras, Ph.D., *director of graduate study*
Arthur Johnson, M.D., *head, UMD*[1]
Roy E. Ritts, Jr., M.D., *chairperson, Mayo Graduate School of Medicine*[2]
Dwight L. Anderson, Ph.D.
K. Gerhard Brand, M.D.
Francis Busta, Ph.D.
Steven Douglas, M.D.
Martin Dworkin, Ph.D.
V. W. Greene, Ph.D.
W. H. Hall, M.D., Ph.D.
Thomas R. Hamilton, M.D.[1]
Alan B. Hooper, Ph.D.
Howard M. Jenkin, Ph.D.[3]
Russell C. Johnson, Ph.D.
Henry Koffler, Ph.D.
Frederic C. McDuffie, M.D.[2]
Charles F. McKhann, M.D.
Gerald M. Needlam, Ph.D.[2]
Peter G. W. Plagemann, Ph.D.
Paul G. Quie, M.D.
Palmer Rogers, Ph.D.
Charles F. Schachtele, Ph.D.
Edwin L. Schmidt, Ph.D.
Henry M. Tsuchiya, Ph.D.
Lewis W. Wannamaker, M.D.
John A. Washington II, M.D.[2]
Horace Zinneman, M.D.

Associate Professor

P. Patrick Cleary, Ph.D.
Arthur Y. Elliott, Ph.D.
Gerald Gleich, M.D.[2]
Beulah H. Gray, Ph.D.
Bruce Kline, Ph.D.[2]
Harold Markowitz, M.D., Ph.D.[2]
Gary Pearson, Ph.D.[2]
James T. Prince, M.S.
Bernard E. Reilly, Ph.D.
Jon R. Schmidtke, Ph.D.
Richard J. Ziegler, Ph.D.[1]
James F. Zissler, Ph.D.

[1]University of Minnesota, Duluth
[2]Mayo Graduate School of Medicine, Rochester
[3]Hormel Institute, Austin

Assistant Professor

Ronald Crawford, Ph.D.
Gregory R. Germaine, Ph.D.
Barry Handwerger, Ph.D.
William F. Liljemark, D.D.S., Ph.D.
Omelan Lukasewycz, Ph.D.[1]
Paul Meyers, Ph.D.[2]

Lecturer

Donna J. Blazevic, M.P.H.
William Campbell, Ph.D.[2]
Grace M. Ederer, M.P.H.
Larry McKay, Ph.D.
Richard Simmons, M.D.

Graduate degree programs in microbiology may be planned cooperatively with faculty in residence on other campuses.

Degrees Offered—M.S. (Plan A) and Ph.D. See Medical Microbiology section for description of the M.S. (Plan B) program.

Doctor's Degree in Microbiology—No minimum number of credit hours is specified for the Ph.D.; the sole criterion for the Ph.D. is a high degree of competence in microbiology. A written qualifying examination is ordinarily taken upon entering the program or 1 year after residency; the written and oral preliminary examinations are taken 2-3 years after residency. There is a recommended core curriculum that most students will take during their first year of graduate studies that consists of approximately 26 credits in microbiology in addition to a biochemistry sequence.

Emphasis Within the Major—Areas of specialization will include general microbiology, microbial ecology, bacterial physiology, bacterial development, bacterial and phage genetics, medical microbiology, immunology, virology, animal cell culture, and cancer biology.

Prerequisites—An appropriate academic background should normally include standard college courses in inorganic chemistry, qualitative and quantitative chemistry, organic chemistry, biochemistry, physics, mathematics through calculus, 1 academic year or equivalent of biological sciences, preferably physical chemistry, and some reading proficiency in French or German.

Application Deadline—Because the core curriculum begins every fall, it is recommended that students apply for entry in the fall of the preceding year. Applications should be submitted by February 1. Applications for fall quarter received after February 1 will be considered only if space is still available.

Special Major Field Requirements—The following information must be sent to the Department of Microbiology before an application will be evaluated: three letters of recommendation; Graduate Record Examination scores (quantitative, analytical, and verbal sections); and a brief autobiographical sketch including such information as reasons for seeking an advanced degree, career objectives, special area(s) of interest in microbiology, and reasons for these interests. Foreign students must submit Test of English as a Foreign Language scores (minimum score of 550 required).

5105f.[3] BIOLOGY OF MICROORGANISMS. (4 cr, §3103, §Biol 3013; prereq 5 cr in biological sciences, Biol 3021 or #) Dworkin
Lectures, demonstrations, and laboratory exercises in taxonomy, anatomy, physiology, biochemistry, and ecology of microbes. Some emphasis on molecular structure in relation to bacterial function.

5201f.[3] MICROBIOLOGY FOR DENTAL STUDENTS. (7 cr) Anderson, Liljemark, Reilly
Nature and diversity of microorganisms; bacterial anatomy; nutrition and growth; variation and genetic exchange; fundamentals of immunology; pathogenic bacteria, fungi, and viruses; principles of sterilization and disinfection; chemotherapy; development and ecology of the oral flora; microbiology of dental caries and periodontal disease.

[1]University of Minnesota, Duluth

[2]Mayo Graduate School of Medicine, Rochester

[3]Microscope required. Students may obtain use of microscope by purchasing $3 microscope card from bursar.

5205s.[1] MICROBIOLOGY FOR MEDICAL STUDENTS. (6 cr; prereq regis med fr or grad) Brand and staff
Basic and medical aspects of immunology, parasitology, mycology, bacteriology; and virology with emphasis on pathogenesis. Principles and techniques enabling diagnosis, treatment (especially chemotherapy), and prevention of infectious disease.

5206su.[1] MICROBIOLOGY FOR MEDICAL STUDENTS. (4 cr)
(Continuation of 5205) Lecture and laboratory.

5216f. IMMUNOLOGY. (4 cr; prereq Biol 3021) Gray, Schmidtke
Nature of antigens and antibodies; chemical basis of serologic specificity; qualitative and quantitative aspects of antigen-antibody reactions; theories of antibody production; cellular antigens and blood grouping; nature of complement and its role in immunologic phenomena; mechanisms of hypersensitivity; hypersensitivity-like states and immunologic diseases; transplantation and tumor immunity; host-parasite interactions. Includes laboratory.

5218f. IMMUNOLOGY. (3 cr; prereq Biol 3021) Gray, Schmidtke
Same as 5216 without laboratory.

5225s. MICROBIOLOGY FOR MEDICAL STUDENTS. (4 cr; prereq regis microbiology grad student...for others, #) Brand and staff
Basic and medical aspects of immunology, parasitology, mycology, bacteriology, and virology with emphasis on pathogenesis. Principles and techniques enabling diagnosis, treatment (especially chemotherapy), and prevention of infectious disease.

5226sul,II. MICROBIOLOGY FOR MEDICAL STUDENTS. (2 cr)
(Continuation of 5225) Lecture.

5232w.[1] MEDICAL MICROBIOLOGY. (3 cr; not open to med students; prereq 5216 or 5218 and 5105 or 3103 or 8110 or Biol 3013) Cleary
Pathogenic bacteria and fungi, mechanisms of pathogenicity and virulence; properties of microorganisms and their animal hosts that influence the outcome of host-parasite relations analyzed from genetic and metabolic view. Includes laboratory.

5233f.[1] MICROORGANISMS AND DISEASE. (7 cr; not open to microbiology majors; prereq 10 cr in chemistry and 5 cr in biological sciences or #) Johnson
Lectures, demonstrations, and laboratory instruction on nature of microorganisms, immunology, medical bacteriology, virology, mycology, parasitology, and principles of disease control.

5234w.[1] MEDICAL MICROBIOLOGY LABORATORY. (2 cr, prereq 5232 or *5232) Cleary
Exercises designed to demonstrate the principles that influence interactions between microorganisms and humans leading to a diseased state.

5235f. MICROORGANISMS AND DISEASE. (4 cr; not open to microbiology majors, prereq 10 cr chemistry and 5 cr biological science or #) Johnson
Same as 5233 but without laboratory.

5321w. PHYSIOLOGY OF BACTERIA. (3 cr; prereq 3103 or 5105, or Biol 3013...10 cr in organic chemistry or biochemistry...3 cr in genetics) Rogers
Chemical and physical organization of bacteria as related to function; growth; energy metabolism including oxidations and fermentations; nutritional requirements; antimicrobial agents; autotrophic mechanisms; microbial differentiation.

5322w. PHYSIOLOGY OF BACTERIA LABORATORY. (2 cr; prereq 5321 or *5321 and a lab course in basic bacteriology) Rogers
Techniques employed in study of bacterial physiology and metabolism.

5424s. BIOLOGY OF VIRUSES. (4 cr, prereq 5321 or Biol 3021 and #) Plagemann
Structure, composition, and properties of bacterial, plant, and animal viruses; their interaction with cells and effects on host cell metabolism; biochemistry of viral replication; techniques used in study of viruses and viral infections; viral tumorigenesis. Includes laboratory.

5611f. MICROBIAL ECOLOGY. (4 cr; prereq general microbiology course, Biol 3021 or #) Crawford
Microbial adaptation and diversity; role of microorganisms in natural processes; methods in microbial ecology; other topics of interest to microbial ecologists.

5900f,w,s. TOPICS IN MICROBIOLOGY. (1 cr; offered S-N only; open to microbiology undergrad majors) Rogers
Seminars on research programs, historical perspectives, significant emerging fields, professional societies and publications, and career opportunities.

5912f. INTRODUCTION TO ANALYTICAL METHODS. (2 cr; open to microbiology grad students only; prereq #) Peterson and staff
Introduction to basic theory and demonstration of the use of the following methods: radiation counting, centrifugation, chromatography, pH measurements, electrophoresis, and hybridization.

[1]Microscope required. Students may obtain use of microscope by purchasing $3 microscope card from the bursar.

5970f,w,s,su. SPECIAL PROBLEMS. (Cr ar; prereq #) Staff

5990f,w,s,su. PRACTICUM: TEACHING. (1 cr; prereq #) Prince and staff
Supervised experience in laboratory instruction: development of skills in effective use of instructional materials, tests, and measurements.

8110f. BIOLOGY OF MICROORGANISMS. (3 cr; prereq organic chemistry, biochemistry, general biology, or #) Dworkin
Introductory course in microbiology. Lectures only; emphasizing structure and function, biochemistry, physiology, molecular biology, ecology, and classification of bacteria.

8112s. MICROBIAL GENETICS. (Cr ar; prereq #) Zissler
Lecture, discussion, and laboratory instruction in molecular genetics.

8120f.[1] MICROBIOLOGY LABORATORY. (3 cr; prereq ¶8110 or #) Dworkin
Laboratory only: emphasizing isolation and description of variety of common and uncommon bacteria.

8121f. ADVANCED IMMUNOLOGY LABORATORY. (2 cr; prereq 5216, #) Gray, Schmidtke
Current methods and experimentation in immunology.

8122w. ADVANCED MICROBIOLOGY. (3 cr; prereq 5321, 5424 or #)
Experimentation in physiology, genetics, and virology.

8202w. ORAL MICROBIOLOGY. (3 cr; prereq grad student in microbiology or dentistry...others by #) Schachtele and staff
Lectures, assigned readings and discussions on acquisition, distribution, and interactions of the oral flora; mechanisms of dental plaque formation; etiology of dental caries; identification and characterization of cariogenic bacteria; prevention of caries; etiology of periodontal disease; crevicular bacteria and inflammation of the gingiva; other infections of the oral cavity: microbiology in dental specialty areas.

8218s. IMMUNOCHEMISTRY AND IMMUNOBIOLOGY. (3 cr: prereq 5216, # ..LMed 5274 recommended) Gray, Schmidtke
Limited assigned reading and classroom participation on immunoglobulin structure, complement, immunogenetics, cellular immunology, in vitro antibody formation, delayed hypersensitivity and immunologic disease. Emphasis on discussion of current journal articles.

8234. ADVANCED MEDICAL MICROBIOLOGY. (2 cr; prereq #; offered when feasible) Brand

8239f, 8240w. PRECEPTORSHIP IN MEDICAL MICROBIOLOGY. (6 cr; prereq #) Prince and staff
Working experience in participating diagnostic laboratories.

8242f,w,s. DIAGNOSTIC MICROBIOLOGY. (Cr ar; prereq grad student in microbiology, #) Blazevic and staff
Laboratory procedures for isolation and identification of microorganisms from patients. Work is carried out in diagnostic microbiology laboratories of the hospital.

8320f. IMMUNOGENETICS. (3 cr, §Path 8320: prereq 5216 or #) Click
Use of genetics in understanding immune phenomena.

8323. REGULATION OF METABOLISM. (3 cr; prereq 5321, MdBc 5752 or equiv, or #; offered when feasible)
Metabolic pathways of specific bacterial and mammalian cells with emphasis on regulation. Energetics; catabolite repression; enzyme induction, repression and feedback inhibition; transport and pools, turnover, inborn errors of metabolism.

8421f. MOLECULAR BIOLOGY OF CANCER. (3 cr; prereq 2 qtrs biochemistry, 5216, 5424, 8112, #) Faras and staff
Mechanisms of oncogenesis at molecular level; emphasis on pertinent alterations in eukaryotic cell populations that accompany oncogenesis including those induced by viruses and chemicals; differentiation, cell genetics, immunology, epidemiology, and therapy.

8425s.[1] ADVANCED LABORATORY IN VIROLOGY AND ANIMAL CELL CULTURE. (1 cr; prereq ¶5424 and #) Plagemann
Exercises to acquaint student with advanced methods for study of animal cell replication in culture and analysis of cellular and viral nucleic acid synthesis (labeling with radioactive precursors, nucleic acid extraction and analysis by gradient centrifugation). Generally taken in conjunction with 5424.

8910f,w,s. SEMINAR. (1 cr; prereq #) Faras and staff

8911f,w,s. COLLOQUIUM IN MICROBIOLOGY. (1 cr) Faras and staff
Series of independent units, each led by staff member. Several units offered each quarter; students may participate in one or more. Topics include mechanisms of immune response, biochemical aspects of animal virus replication, developmental microbiology, genetics of phage lambda and tumor viruses, comparative metabolism of animal and bacterial cells, epidemiology, mechanisms of pathogenesis, molecular aspects of regulation, carcinogenesis, industrial microbiology, microbial ecology, and regulation of metabolism.

[1]Microscope required. Students may obtain use of microscope by purchasing $3 microscope card from the bursar.

8920f,w,s. ADVANCES IN IMMUNOLOGY. (1 cr; prereq #; offered when feasible) Gray, Schmidtke
Research seminars. Presentation of research or literature seminar required for credit.

8990f,w,s,su. RESEARCH IN MICROBIOLOGY. (Cr ar) Faras and staff
Graduate students with requisite preliminary training may elect research project outside their thesis work.

Medical Microbiology

Professor

Dennis W. Watson, Ph.D., *head*
K. Gerhard Brand, M.D.
Martin Dworkin, Ph.D.
Russell C. Johnson, Ph.D.
Peter G. W. Plagemann, Ph.D.
Palmer Rogers, Ph.D.
John Washington II, M.D.

Associate Professor

James T. Prince, M.S., *director of graduate study*
Paul P. Cleary, Ph.D.
Anthony Faras, Ph.D.
Beulah H. Gray, Ph.D.
Jon R. Schmidtke, Ph.D.

Lecturer

Henry Bates, Ph.D.
Donna J. Blazevic, M.P.H.
Grace M. Ederer, M.P.H.
Seymour Handler, M.D., Ph.D.

A master's degree in medical microbiology is offered under Plan B. The degree program is designed for students interested in training for a career in a supervisory role in clinical diagnostic microbiology. The program includes major and minor course work and a number of preceptorship experiences (see MicB 8239, 8240) in various diagnostic microbiology laboratories of area hospitals affiliated with the Medical School. Satisfactory completion of a project and the written and final oral examinations is required.

Prerequisites—There are no specific prerequisites for admission; however, an appropriate academic background should normally include standard college courses in inorganic and organic chemistry, physics, and mathematics. Strong consideration will be given to applicants with a bachelor's degree in microbiology or the biological sciences and to those with previous experience in a clinical diagnostic or medical microbiology laboratory.

Application Deadline—The core curriculum begins every fall, and it is recommended that students apply for entry approximately a year in advance. Applications should be submitted by February 1; those received after this date will be considered only if space is available.

Special Major Field Requirements—Three letters of recommendation, Graduate Record Examination scores (quantitative, analytical, and verbal sections), and a detailed statement of the applicant's long-range occupational objectives are required before an application is reviewed.

The following core courses are offered by the Department of Microbiology for students majoring in medical microbiology. See the Microbiology section of this bulletin for course descriptions.

5105f.[1] BIOLOGY OF MICROORGANISMS. (4 cr, §3103, §Biol 3013; prereq 5 cr in biological sciences, Biol 3021 or #) Dworkin

5216f. IMMUNOLOGY. (4 cr; prereq Biol 3021) Gray, Schmidtke

5218f. IMMUNOLOGY. (3 cr; prereq Biol 3021) Gray, Schmidtke

[1]Microscope required. Students may obtain use of microscope by purchasing $3 microscope card from the bursar.

5225s.[1] **MICROBIOLOGY FOR MEDICAL STUDENTS.** (6 cr; prereq regis med fr or grad) Brand and staff

5226su.[1] **MICROBIOLOGY FOR MEDICAL STUDENTS.** (4 cr)

5232w.[1] **MEDICAL MICROBIOLOGY.** (3 cr; not open to med students; prereq 5216, or 5218 and 5105 or 3103 or 8110 or Biol 3013) Cleary

5234w.[1] **MEDICAL MICROBIOLOGY LABORATORY.** (2 cr; prereq 5232 or ' 5232) Cleary

5321w. PHYSIOLOGY OF BACTERIA. (3 cr; prereq 3103 or 5105 or Biol 3013...10 cr in organic chemistry or biochemistry...3 cr in genetics) Rogers

5322w. PHYSIOLOGY OF BACTERIA LABORATORY. (2 cr; prereq 5321 or ' 5321 and lab course in basic bacteriology) Rogers

5424s. BIOLOGY OF VIRUSES. (4 cr; prereq 5321, Biol 3021 or #) Plagemann

5611f. MICROBIAL ECOLOGY. (4 cr; prereq general microbiology course, Biol 3021 or #) Crawford

5912f. INTRODUCTION TO ANALYTICAL METHODS

5970f,w,s,su. SPECIAL PROBLEMS. (Cr ar; prereq #) Staff

5990f,w,s,su. PRACTICUM: TEACHING. (1 cr) Prince and staff

8110f. BIOLOGY OF MICROORGANISMS. (3 cr; prereq organic chemistry, biochemistry, general biology, or #) Dworkin

8112s. MICROBIAL GENETICS. (3 cr; prereq #) Zissler

8120f.[1] **MICROBIOLOGY LABORATORY.** (3 cr; prereq ' 8110 or #) Dworkin

8121f. ADVANCED IMMUNOLOGY LABORATORY. (2 cr; prereq 5216, #) Gray, Schmidtke

8122. ADVANCED MICROBIOLOGY. (3 cr; prereq 5321, 5424 or #; offered when feasible)

8218s. IMMUNOCHEMISTRY AND IMMUNOBIOLOGY. (3 cr; prereq 5216...LMed 5274 recommended, #) Gray, Schmidtke

8234. ADVANCED MEDICAL MICROBIOLOGY. (2 cr; prereq #; offered when feasible) Brand

8239f, 8240w. PRECEPTORSHIP IN MEDICAL MICROBIOLOGY. (6 cr; prereq #) Prince and staff

8242f,w,s. DIAGNOSTIC MICROBIOLOGY. (Cr ar; prereq grad student in microbiology, #) Blazevic and staff

8320f. IMMUNOGENETICS. (3 cr, §Path 8320; prereq 5216 or #) Click

8323. REGULATION OF METABOLISM. (3 cr; prereq 5321, MdBc 5752 or equiv, or #; offered when feasible)

8421f. MOLECULAR BIOLOGY OF CANCER. (3 cr; prereq 2 qtrs biochemistry, 5216, 5424, 8112, #) Faras and staff

8425s.[1] **ADVANCED LABORATORY IN VIROLOGY AND ANIMAL CELL CULTURE.** (1 cr; prereq ' 5424, #) Plagemann

8910f,w,s. SEMINAR. (1 cr; prereq #) Dworkin and staff

8911f,w,s. COLLOQUIUM IN MICROBIOLOGY. (1 cr) Dworkin and staff

8920f,w,s. ADVANCES IN IMMUNOLOGY. (1 cr; prereq #; offered when feasible) Gray, Schmidtke

8990f,w,s,su. RESEARCH IN MICROBIOLOGY. (Cr ar) Dworkin and staff

A partial listing of additional specialized courses suggested for major and supporting fields follows. For course descriptions see the section on the appropriate field of instruction in this bulletin.

EBB 5116. INTRODUCTION TO ANIMAL PARASITOLOGY

Ent 5275. MEDICAL ENTOMOLOGY

MdBc 5300. BIOCHEMISTRY FOR MEDICAL TECHNOLOGISTS

MdBc 5301. BIOCHEMISTRY FOR MEDICAL TECHNOLOGISTS

MedT 5102. PRINCIPLES OF DIAGNOSTIC MICROBIOLOGY

MedT 5110. HOSPITAL INFECTION CONTROL

MedT 5128. ELEMENTS: LABORATORY ADMINISTRATION

[1]Microscope required. Students may obtain use of microscope by purchasing $3 microscope card from the bursar.

MedT 5133. MEDICAL MYCOLOGY

MedT 5136. ANAEROBIC MICROBIOLOGY

MedT 5138. CLINICAL MICROBIOLOGY SEMINAR

MedT 8230. ADVANCED MEDICAL MICROBIOLOGY

PubH 5171. ENVIRONMENTAL MICROBIOLOGY

PubH 5342. PUBLIC HEALTH BACTERIOLOGY

PubH 5400. INTRODUCTION TO QUANTITATIVE METHODS IN THE LIFE SCIENCES

PubH 5403. COMPUTER APPLICATIONS IN HOSPITAL AND HEALTH CARE ADMINISTRATION

MICROBIOLOGY

OFFERED AT ROCHESTER

Department of Microbiology

Professor

Roy E. Ritts, Jr., M.D., *chairman*
Gerald M. Needham, Ph.D.
Gary R. Pearson, Ph.D.
John A. Washington II, M.D.

Associate Professor

Bruce C. Kline, Ph.D.
Harold Markowitz, M.D., Ph.D.
Paul Meyers, Ph.D.
Harry B. Neel III, M.D., Ph.D.
Jon E. Rosenblatt, M.D.

Assistant Professor

John P. Anhalt, M.D., Ph.D.
William F. Campbell, Ph.D.
Glenn D. Roberts, Ph.D.
Thomas F. Smith, Ph.D.
Walter R. Wilson, M.D.

Department of Immunology

Professor

Thomas B. Tomasi, M.D., Ph.D., *chairman*
Chella S. David, Ph.D.
Gerald J. Gleich, M.D.
David Steinmuller, Ph.D.

Associate Professor

C. Garrison Fathman, M.D.

Assistant Professor

David J. McKean, Ph.D.

Opportunities are available for advanced work in microbiology (bacteriology, mycology, virology, immunology, parasitology, molecular genetics, and plasmids). Courses may be taken separately or in conjunction with minor programs offered to fellows in the Mayo Graduate School of Medicine who are majoring in clinical fields.

A 2-year accredited residency/fellowship program in medical microbiology is open to Ph.D.'s in microbiology and to physicians. This program satisfies the American Board of Microbiology requirements for certification. Study leading to the Ph.D. degree is available in conjunction with the Department of Microbiology on the Minneapolis campus.

M 5803. MEDICAL MICROBIOLOGY. (5 cr; prereq #) Ritts and staff

M 5804. CLINICAL IMMUNOLOGY. (1 cr; prereq #) Tomasi and staff
Lectures in basic immunology and clinical application.

M 5805w,su. MICROBIOLOGY OF MUSCULOSKELETAL SYSTEM. (1 cr) Washington
Lectures in pathophysiology of infections; usage and mechanisms of action of antimicrobials.

M 5806. BASIC GRADUATE IMMUNOLOGY. (3 cr; prereq #) Tomasi and staff
Structure, genetics, and function of immunoglobulins; biosynthesis of antibody; cellular regulation of immune response; tumor and transplantation immunology; immune response to infectious agents; autoimmunity and immune deficiencies.

M 8801. BIOLOGY OF BACTERIAL AND ANIMAL VIRUSES. (3 cr) Ritts and staff

M 8802w. MEDICAL VIROLOGY. (2 cr) Smith and staff

M 8851f,w,s,su. CLINICAL MICROBIOLOGY AND IMMUNOLOGY. (6 cr) Staff
Experience in routine and special diagnostic laboratories of bacteriology, mycology, virology, and immunology.

M 8852f,w,s,su. EXPERIMENTAL MICROBIOLOGY AND IMMUNOLOGY. (6 cr)
Graduate thesis research under supervision of staff.

M 8853. LECTURES IN CLINICAL MICROBIOLOGY. (3 cr; prereq grad student in microbiology or related field and #) Anhalt, Washington
Didactic presentation of selected topics in bacteriology, mycology, and virology.

M 8854f. IMMUNOLOGY I. (3 cr; offered odd yrs) Tomasi and staff
Detection and measurement of antibody, separation and structure of antibody, antigen and antigen-antibody interaction, nature of complement and its role in immunologic phenomena, mechanisms of hypersensitivity, theories of antibody production, transplantation and tolerance, autoimmunity.

M 8855w. IMMUNOLOGY II. (3 cr; primarily for advanced students; prereq M 8854 and #; offered even yrs) Tomasi and staff
In-depth study of current topics in the field and evaluation of research publications.

M 8856. SEMINAR: IMMUNOLOGY. (1 cr) Staff
Current research in immunology and immunochemistry.

M 8857. SEMINAR: CLINICAL MICROBIOLOGY. (1 cr) Washington and staff
Seminars on current problems, principles, and methods in clinical microbiology.

M 8858f,w,s. SEMINAR: MICROBIOLOGY. (1 cr) Staff

M 8859. BIOLOGY OF TUMOR VIRUSES. (3 cr; prereq M 8801 or equiv, M 8855, and #) Meyers
Biochemistry, molecular biology, and immunochemistry of RNA and DNA tumor viruses; interaction with and effects on host cells; mechanisms of neoplastic transformation.

M 8860. TUMOR BIOLOGY I. (2 cr; prereq M 8855, 8859, and #; offered odd yrs) Ritts and staff
Biology of malignant cells including carcinogenesis, virus tumorigenesis, tumor progression; concept of immunosurveillance; intervention of tumor growth by immunotherapy, chemotherapy, radiation, and surgery.

M 8861. TUMOR BIOLOGY II. (2 cr; prereq M 8860) Ritts and staff
Epidemiological patterns, pathology, and behavior of different cell types, use of animal models, radiobiology, strategies for radio/chemotherapy and clinical considerations.

M 8862w. LABORATORY METHODS IN CLINICAL MICROBIOLOGY. (5 cr; prereq #; offered even yrs) Roberts, Washington
Laboratory, exercises and demonstrations with emphasis on diagnostic procedures and principles used in clinical microbiology.

NEUROLOGY (Neur)

OFFERED AT MINNEAPOLIS

Professor

Joseph A. Resch, M.D., *head*
Kenneth F. Swaiman, M.D., *director of graduate study*
James F. Berry, Ph.D.
Robert J. Gumnit, M.D.
William R. Kennedy, M.D., M.S.
Arthur C. Klassen, M.D.
Joo Ho Sung, M.D.
Fernando Torres, M.D.
David D. Webster, M.D.
Francis S. Wright, M.D.

Clinical Professor

Harold H. Noran, M.D.

Associate Professor

Khurshed A. Ansari, M.D.
Gary Birnbaum, M.D.
Harold P. Cohen, Ph.D.
Myoung C. Lee, M.D.
Sping Lin, Ph.D.
Robert I. Roelofs, M.D.
Bruce D. Snyder, M.D.

Master's and Doctor's Degrees—Excellent facilities are available for the M.S. (Plan A) and Ph.D. degree programs in neurology. The minor may be elected in anatomy, pathology, physiology, or other laboratory fields. Under ordinary circumstances the fellowship runs for a period of 3 years; i.e., it fulfills the requirements of training for the American Board of Psychiatry and Neurology.

To fulfill the Ph.D. requirements, fellows in neurology must spend a minimum of 5 years (6 months to 1 year of which is spent in the basic minor field) in the program. The master's degree may be earned in 3 years but usually requires 4 years.

Language Requirement—None.

8200f,w,s,su. CLINICAL NEUROLOGY. (Cr ar) Resch and staff

8201f,w,s,su. CLINICAL PEDIATRIC NEUROLOGY. (Cr ar) Swaiman and staff

8202f,w,s,su. RESEARCH IN NEUROLOGY. (Cr ar) Resch and staff

8203f,w,s,su. APPLIED ELECTROENCEPHALOGRAPHY. (Cr ar) Torres

8204f,w,s,su. APPLIED ELECTROMYOGRAPHY. (Cr ar) Kennedy

8205f,w,s,su. APPLIED NEUROPATHOLOGY. (Cr ar) Sung

8220. NEUROPHARMACOLOGY. (1 cr; offered every 3rd yr) Staff

8221w,s. NEUROCHEMICAL ASPECTS OF SELECTED CLINICAL DISORDERS. (2 cr; offered every 3rd yr)

8222f,w. APPLIED NEUROPHYSIOLOGY. (2 cr; offered every 3rd yr)

8226s. NEUROMUSCULAR DISEASES. (1 cr; offered every 3rd yr) Kennedy

8227s. NEUROLOGICAL SPEECH DISORDERS. (1 cr; offered every 3rd yr) Rubens

8229su. CLINICAL CORRELATIVE NEUROANATOMY. (1 cr)

8233f,w,s. NEUROLOGICAL CLINICAL PATHOLOGICAL CONFERENCE. (1 cr) Resch and staff

8234f,w,s. NEUROPSYCHOLOGY CONFERENCE. (1 cr) Meier

8235w. ADVANCED NEUROPSYCHOLOGY. (2 cr) Meier

8236f,w,s,su. RESEARCH IN NEUROPATHOLOGY. (Cr ar) Sung

8244w. NEUROEPIDEMIOLOGY. (1 cr; offered every 3rd yr) Loewenson

8245s. DEVELOPMENTAL NEUROSCIENCES. (1 cr; offered every 3rd year) Swaiman

8701. NEUROOPHTHALMOLOGY. (2 cr; offered every 3rd yr)

8702. NEURORADIOLOGY. (1 cr, §Rad 8110; offered alt yrs)

8703f,w. ADVANCED NEUROPATHOLOGY. (2 cr, §Path 8701; offered alt yrs) Sung

8704f,w,s. SURVEY OF NEUROPATHOLOGY. (1 cr, §Path 8702) Sung and staff

8705f,w,s,su. NEUROLOGICAL-NEUROSURGICAL CONFERENCE. (1 cr, §Surg 8318, §Rad 0124)

NEUROLOGY

OFFERED AT ROCHESTER

Professor

Jack P. Whisnant, M.D., M.S., *chairman*
Arnold E. Aronson, Ph.D.
Frederic L. Darley, Ph.D.
Peter J. Dyck, M.D.
Andrew G. Engel, M.D.
Norman P. Goldstein, M.D., M.S.
Manuel R. Gomez, M.D., M.S.
Frank M. Howard, Jr., M.D.
Donald W. Klass, M.D.
Edward H. Lambert, M.D., Ph.D.
Donald W. Mulder, M.D., M.S.
Robert G. Siekert, M.D., M.S.
Juergen E. Thomas, M.D., M.S.
Takehiko Yanagihara, M.D.
Robert E. Yoss, M.D., Ph.D.

Associate Professor

James A. Bastron, M.D., M.S.
J. Keith Campbell, M.B.B.Ch.
Allan J. D. Dale, M.D., M.S.
Jasper R. Daube, M.D., M.S.
Drake D. Duane, M.D.
Jack D. Grabow, M.D.
Robert V. Groover, M.D.
Manfred D. Muenter, M.D.
Burton A. Sandok, M.D.
Frank W. Sharbrough III, M.D.
Barbara F. Westmoreland, M.D.

Assistant Professor

Robert P. Dinapoli, M.D.
Raul E. Espinosa, M.D.
William E. Karnes, M.D.
Donald D. Layton, Jr., M.D.
James F. Mellinger, M.D.
J. Clarke Stevens, M.D.

Two types of residencies are available in neurology. The 4-year program in clinical neurology includes 1 year of medicine at the G-1 level and 3 years in neurology and its subspecialties. The program may be entered at the G-2 level, after 1 or more years of internal medicine at Mayo or elsewhere. The 3 years beyond the G-1 level include 7 quarters of clinical neurology divided between hospital and outpatient

experience and 5 quarters of electives in the laboratory sciences and other fields related to neurology. A 5-year program in academic neurology is similar but includes a full year of research. In both the outpatient department and hospitals, residents work in close collaboration with faculty members who are available for consultation and guidance at all times. In the laboratory sciences and related fields, residents may obtain experience in neuropathology, neuroanatomy, electroencephalography, electromyography, neuroophthalmology, neuroradiology, psychiatry, and other areas. In addition to practical experience, there are organized series of lectures as well as conferences and seminars in clinical neurology, neuroanatomy, neuropathology, neuroradiology, speech pathology, cerebrovascular disease, neuromuscular disease, pediatric neurology, and selected topics in allied specialties. The Department of Neurology is closely associated with other medical and surgical divisions of the Mayo Clinic as well as with various clinical and research laboratories.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 5801. INTRODUCTORY NEUROSCIENCES. (6 cr; prereq #) Daube
Basic neuroanatomy, neurophysiology, and neuropathology as they relate to clinical neurological problems.

M 8850f,w,s,su. DIAGNOSIS IN NEUROLOGY. (6 cr) Staff

M 8851. BASIC CLINICAL NEUROLOGY LECTURES. (2 cr) Karnes
Lectures in basic neurology.

M 8852f,w,s,su. HOSPITAL RESIDENCE IN NEUROLOGY. (6 cr) Staff

M 8857. CLINICAL NEUROLOGY. (6 cr) Staff

M 8858f,w,s,su. BASIC NEUROLOGIC SCIENCES. (6 cr) Staff

M 8859f,w,s,su. NEUROLOGICAL DISEASES OF INFANTS AND CHILDREN. (6 cr) Staff

M 8860. ELECTROMYOGRAPHY. (6 cr) Staff

M 8861, 8862, 8863. NEUROLOGY CONFERENCE ON ELECTROENCEPHALOGRAPHY I, II, III. (6 cr per qtr) Klass
Introductory, intermediate, and advanced electroencephalography.

M 8864. NEUROLOGICAL DIAGNOSTIC ELECTROENCEPHALOGRAPHY. (6 cr) Klass
Continuation of M 8863.

NEUROSURGERY (NSur)

OFFERED AT MINNEAPOLIS

Professor

Shelley N. Chou, M.D., Ph.D., *head*
James R. Bloedel, M.D., Ph.D.
Lyle A. French, M.D., Ph.D.
Edward L. Seljeskog, M.D., Ph.D.

Clinical Professor

Harold I. Buchstein, M.D., M.S.
Leonard A. Titrud, M.D., Ph.D.

Associate Professor

Donald L. Erickson, M.D.

Clinical Associate Professor

Paul S. Blake, M.D.
Robert L. Merrick, M.D., Ph.D.
Charles D. Ray, M.D.
Erich Wisiol, M.D.

Assistant Professor

Robert E. Maxwell, M.D., Ph.D.
Gaylan L. Rockswold, M.D., Ph.D.
Phudhiporn Thienprasit, M.D., Ph.D.
Jesse C. Yap, M.D.

Clinical Assistant Professor

Heinrich Bantli, Ph.D.
David Danoff, M.D.
Stephen H. Martin, M.D.

Clinical Instructor

Walter L. Bailey, M.D.
Harry M. Rogers, M.D.
John L. Seymour, M.D.
Andrew J. K. Smith, M.D., Ph.D.
Max Zarling, M.D.

Master's and Doctor's Degrees—Facilities are available for work toward M.S. (Plan A) and Ph.D. degrees in neurosurgery. The minor may be elected in anatomy, pathology, physiology, or other laboratory fields. The usual fellowship training period in neurological surgery requires a minimum of 5 years; many of the trainees who obtain advanced degrees remain longer than this minimal requirement. The minimal period is adjusted to comply with the requirements for certification by the American Board of Neurological Surgery. At least 36 months are spent on clinical neurological surgery and 6 months on clinical medical neurology and neuropathology. Twelve months are spent in the research laboratories working out, under supervision and guidance, an experimental problem of the trainee's choice; during this 12-month period the trainee also takes lecture and laboratory work in neuroanatomy and neurophysiology so that reasonable competence in these fields is obtained.

More extensive training in basic sciences can be obtained in the fundamental laboratories of the Medical School, which offer numerous graduate courses related to neurological surgery (see statements of the Departments of Anatomy, Physiology, Pathology, etc.). Special investigative and research work in these departments can readily be arranged in the training program. The proximity of the medical buildings and arrangement of courses afford opportunity for coordination of clinical and laboratory work.

Special courses and conferences in the various clinical departments (pediatrics, psychiatry, neurology, radiology, ophthalmology) are presented so that a well-rounded clinical training is obtained through both didactic courses and practical clinical experience.

The Department of Neurological Surgery is closely associated in its training with the Department of General Surgery at the University and with the Section of Neurosurgery at the Mayo Clinic.

8305. NEUROSURGICAL DIAGNOSIS. (4 cr) Chou, French, and staff
The neurosurgical fellow assists in instruction of clinical clerks and interns, and studies problems in diagnosis at University and affiliated hospitals.

8308. NEUROSURGICAL PROBLEMS AND MANAGEMENT. (4 cr) Chou, French, and staff
The neurosurgical fellow acts as house surgeon at University Hospitals and affiliated hospitals.

8311. OPERATIVE NEUROSURGERY. (4 cr) Chou, French, and staff
The neurosurgical fellow acts as first assistant at operations in University Hospitals and affiliated hospitals, and later may be permitted to operate.

8316. NEUROSURGICAL RESEARCH. (6 cr) Bloedel, Chou, French, and staff
Problems in experimental or clinical neurosurgical sciences.

8318. NEURORADIOLOGICAL CONFERENCE. (1 cr) Chou, French, Seljeskog, and staff
Review of X-rays and case histories on neurosurgical service.

8320. NEUROSURGICAL CONFERENCE. (2 cr) Chou, French, Seljeskog, and staff
In-depth review of selected topics in basic or clinical neurosurgery.

8322su,w. SEMINAR: NEUROSURGERY-OPHTHALMOLOGY—PART I. (1 cr) Staff
Review and discussion of topics in neuroophthalmology.

8323f,s. SEMINAR: NEUROSURGERY-OPHTHALMOLOGY—PART II. (1 cr; prereq 8322) Staff

8324. READINGS IN NEUROBIOLOGY. (2 cr; prereq 8104, consent of Medical School) Bloedel, Bantli
Survey of major topics in neurobiology. Specific papers in each area serve as basis for discussion.

8325. ADVANCED READINGS IN NEUROBIOLOGY. (2 cr; prereq 8324) Bantli, Bloedel
(Continuation of 8324) In-depth discussion of fewer topics.

8330. NEUROSURGERY LITERATURE SEMINAR. (2 cr) Staff
Review and discussion of current literature relating to neurosurgery and the neurosciences.

NEUROSURGERY

OFFERED AT ROCHESTER

Professor

Ross H. Miller, M.D., M.S., *chairman*
Frederick W. L. Kerr, M.D.
Collin S. MacCarty, M.D., M.S.
Thoralf M. Sundt, Jr., M.D.

Associate Professor

Edward R. Laws, Jr., M.D.
Burton M. Onofrio, M.D.

Assistant Professor

David G. Piepgras, M.D.

The development of excellence in surgery of the nervous system is the primary goal of this 5-year training program. It provides the background in the neurological sciences now necessary for the practice of surgical neurology and will allow the graduate to pursue a purely clinical, academic, or investigative career. This program, including 12 months of general surgery, completes the requirements of the American Board of Neurological Surgery.

Surgical skill is developed first by assisting, and then operating under the supervision of, the neurosurgical staff. Competence in the evaluation of neurosurgical problems is developed through the care for and evaluation of a wide variety of elective and emergency neurological and neurosurgical problems. The trainee's diagnostic skill is further refined by assignments to diagnostic neurology, neuroophthalmology, electroencephalography, electromyography, and neuroradiology. Virtually all neuroradiologic contrast studies done at the Mayo Clinic are performed by the neurosurgical residents aided by a member of the neuroradiologic staff.

During the second year of the residency trainees are assigned to the basic neurosciences departments, including those of neuroanatomy, neurophysiology, and neuropathology. The opportunity to work on a research problem leading to an advanced degree may be available during this year in the neurophysiology laboratory, in the cerebrovascular laboratory, or in the brain tumor laboratory.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 8851f,w,s,su. SURGERY OF THE NERVOUS SYSTEM. (6 cr) Kerr, Laws, MacCarty, Miller, Onofrio, Piepgras, Sundt
Operative technique and study of special problems involved. Seminar. Residence.

M 8858f,w,s,su. BASIC NEUROLOGIC SCIENCES. (6 cr) Staff

NURSING (Nurs)

OFFERED AT MINNEAPOLIS

Professor

Isabel Harris, Ph.D.
Floris E. King, Ph.D.
Elaine R. Mansfield, D.N.Sc.
Ida M. Martinson, Ph.D.

Associate Professor

Mitzi L. Duxbury, Ph.D., *assistant dean for graduate study*
Judith A. Plawecki, Ph.D., *assistant dean for undergraduate study*
A. Marilyn Sime, Ph.D., *director of graduate study*
Jean K. Kintgen Andrews, Ph.D.
Stephanie Clatworthy, Ed.D.
Sheila A. Corcoran, M.Ed.
Ellen C. Egan, Ph.D.
Bernadine M. Feldman, Ph.D.
Verona C. Gordon, Ph.D.
Eugenia E. Taylor, M.A.

Assistant Professor

Janis K. Beckstrand, Ph.D.
Kenneth R. Burns, M.S.
Patricia Crisham, M.S.
Kathleen G. Dineen, M.S.N.
Evangeline Gronseth, Ph.D.
Marilyne R. Gustafson, M.S.
Diane K. Kjervik, M.S.
Irene Matousek, M.S.
Kathleen A. Maykoski, M.S.N.
Sharon L. Rising, M.S.N.
Sara S. Rode, Ph.D.
Marian Snyder, Ph.D.
Ruth D. Weise, M.A.

Instructor

Karin J. Hangsleben, M.S.

Research Associate

Delores M. Schumann, M.S.

Master's Degree Admission Requirements—Prospective master's degree students apply for admission to the Graduate School and designate nursing as their intended major area of study. Requirements for admission are a baccalaureate degree with a strong scholastic record (a minimum grade point average of 3.00, or a B average) from a recognized college or university and licensure as a registered nurse. Students who submit transcripts without grades will be required to take the aptitude portion of the Graduate Record Examination and must earn a minimum score at the 50th percentile. Three letters of reference are required. Each applicant must also submit a goal statement.

Admission applications are acted upon when they are complete. Quarterly application deadlines are available from the School of Nursing Admissions Office, 3324 Powell Hall. Course sizes are limited, and in areas where admission is competitive (especially midwifery) early application is encouraged.

Master's Degree Program Requirements—For a Plan A major, students select, with the approval of their adviser, a minimum of 20 credits in their major field, and a minimum of 8 credits in related fields or 9 credits in a designated minor field, for a total of at least 28 or 29 credits. With the guidance of a faculty adviser, they complete a thesis.

For a Plan B major, students must complete a minimum of 30 credits in their major field, including 20 credits in core courses, 4 to 6 credits in Focus I courses, and 6 to 9 credits in Focus II courses. Students must also complete a minimum of 8 credits in related fields or 9 credits in a minor and complete a Plan B project. For a Plan B program, a minimum of 44 credits are required for graduation. Many students need to complete more than 44 credits in order to meet program and personal objectives. Each candidate, with a School of Nursing adviser, plans an individual program to meet both personal objectives and those of the M.S. program. Completion of the program usually requires 4 to 6 quarters.

GENERAL PLAN OF PROGRAM

NURSING

The major is composed of two parts, core and nursing focus courses. The core courses provide the foundation for nursing as a scholarly discipline and the basis of knowledge and skills for a second-level practitioner. The nursing focus courses provide the opportunity to develop advanced knowledge and skills to serve selected client populations and to assume various nursing roles. Plan A students select course work in the major with the advice of the program adviser. Plan B students are required to complete the core courses (Nurs 8010, 8011, 8012, 8014, and 8030) and to select at least two nursing focus courses (one Focus I course and one Focus II course) in clinical or functional areas of nursing such as childbearing-childrearing family nursing, health management, medical-surgical nursing, nurse midwifery, psychiatric-mental health nursing, nursing education, nursing leadership, and nursing management.

RESEARCH

The research component includes the core course in nursing research and a Plan A thesis or a Plan B project. A statistics course that includes inferential statistics is prerequisite to the research course and may be taken either before entry or after admission to the program. The School of Nursing has established existing behaviors required for the Plan A thesis and for the Plan B project. The student contracts with the adviser for guidance with the thesis, or with graduate faculty members for guidance with the Plan B project and final examination of competencies.

Required: Nurs 8014 (or a comparable course), knowledge of statistics, and a Plan A thesis or a Plan B project.

RELATED FIELDS OR MINOR

The School of Nursing graduate faculty places high value on completion of course work outside the major. The requirement for related fields is a minimum of 8 credits in one or more fields outside the major (i.e., outside nursing and/or public health nursing). Related field courses may include required supportive nonnursing courses and other elective courses that are related to nursing. The requirement for a minor is a minimum of 9 or more credits in a single field outside the major.

FINAL EXAMINATION

A final oral examination is required of both Plan A and Plan B students.

CORE COURSES

8010. STRUCTURE OF THE DISCIPLINE OF NURSING. (3 cr; prereq △)
Exploration of purposes, characteristics, and kinds of structures with particular emphasis on theories, models, and conceptual frameworks.

8011. MORAL AND ETHICAL POSITIONS IN NURSING. (3 cr; prereq △)
Influence of moral and ethical positions on behavior and decision making in nursing. Emphasis on bases for positions taken, such as selected moral and ethical theory, rights and responsibilities, and conflict.

8012. CONCEPTUAL FRAMEWORK FOR NURSING PRACTICE. (3 cr; prereq 8010)
Exploration and reconceptualization of assumptions, values, and beliefs underlying learner s view of nursing and nursing practice. Analysis of structure of a nursing conceptual framework and development of personal framework. Exploration of concept of intervention model and systematic process that underlies development of such a model.

8014. RESEARCH IN NURSING. (3 cr; prereq inferential statistics, △)
Exploration of research process and research methodologies appropriate to nursing. Analysis of research reports.

8030. NURSING INTERVENTION MODELS. (8 cr; prereq 8011 or ‡8011, 8012, #)
Developing, providing, and evaluating nursing intervention with a specified client population. Students register for a section that focuses on a desired population.

FOCUS I COURSES

8314. NURSE-MIDWIFERY MANAGEMENT DURING CHILDBEARING. (9-10 cr; prereq #)
For students wanting to complete requirements for nurse-midwifery certification. Emphasis on labor and delivery management with opportunity to improve skills throughout childbearing period.

8411. KNOWLEDGE DEVELOPMENT UNDERLYING NURSING THERAPY. (4-6 cr; prereq 8030)
Development of nursing practice for a specified client population. Focus on one element or aspect of an intervention model for the purpose of further expansion of knowledge in that area. Relevant research literature critiqued and evaluated.

8421. PSYCHIATRIC-MENTAL HEALTH NURSING: GROUP DYNAMICS AND LEADERSHIP SKILLS. (3 cr; prereq 8030, Psych-Mental Health Section, course in psychopathology)
Group dynamics and process with emphasis on development of leadership skills. Integration and application of mental health concepts, clinical practice in group therapy.

8422. PSYCHIATRIC-MENTAL HEALTH NURSING: FAMILY DYNAMICS AND THERAPY. (3 cr; prereq 8421)
Family dynamics, development, and communication patterns. Relationship of selected family to community using concepts from systems theory. Clinical practice in family therapy.

8431. CHILDBEARING-CHILDREARING FAMILY NURSING I. (4-6 cr; prereq 8030)
Maintenance, promotion, improvement, and restoration of health in the childbearing-childrearing family unit. Theoretical concepts related to women, children and families, and family development.

8451. TEACHING-LEARNING PROCESS IN NURSING. (4 cr; prereq 8030, ‡ course in learning theory and #)
Use of theories of learning to develop an intervention model for teaching nursing. Testing the intervention model in simulated situations.

8701. NURSING ADMINISTRATION I. (6 cr; prereq 8030, #)
Intensive study of role of nursing administrator by application of major concepts in organization and management theories and nursing process to nursing administration. Emphasis on planning for and organizing nursing administration and assembling resources to carry out plans. Experiences planned to meet individual needs and to maximize previous experience and knowledge.

FOCUS II COURSES

8315. NURSE-MIDWIFERY MANAGEMENT: INTRAPARTAL AND POSTPARTAL. (8-10 cr; prereq 8314)
Theory and clinical experience in management and care of the laboring woman/couple through the six-week restorative period. Early care of the newborn is an integrated component.

8415. NURSE CLINICIAN ROLE DEVELOPMENT. (6-9 cr; prereq any nursing Focus I course, a course dealing with the health care delivery system)
Selection and development of a role, either nurse clinican-specialist or nurse clinician-generalist. Aspects of the role may include patient care, consultation, staff development, research, coordination, and collaboration.

8425. PSYCHIATRIC-MENTAL HEALTH NURSING: ROLE DEVELOPMENT. (6 cr; prereq 8422)
Theoretical and clinical components of modalities of psychiatric-mental health nursing intervention. Opportunity to clarify understanding of interdisciplinary roles and relationships in community mental health setting. Concepts from systems theory related to organizational structure of mental health facilities and community.

8435. CHILDBEARING-CHILDREARING FAMILY NURSING II. (6-9 cr; prereq 8431 or#)
Development, synthesis, and utilization of intervention models as applied to a child and his or her family and to a childbearing family unit.

8455. THE NURSE EDUCATOR IN HIGHER EDUCATION. (6 cr; prereq 8451, course in educational measurement, #)
Analysis of roles and responsibilities of nurse educator in higher education. Data for analysis obtained through review of relevant literature and testing of roles in an academic setting.

8702. NURSING ADMINISTRATION II. (6 cr; prereq 8701, #)
Intensive study of role of nursing administrator by application of major concepts in organization and management theory and nursing process to nursing administration. Emphasis on making operational and evaluating nursing administration goals.

ELECTIVE COURSES

8001. SPECIAL EDUCATIONAL EXPERIENCES IN NURSING. (Cr ar; prereq [illegible])
Various learning experiences planned to meet individual needs.

8003. HEALTH ASSESSMENT. (5-6 cr; prereq 8012, #)
Preparing the nurse to collect systematically subjective and objective data in a nursing assessment. Emphasis on normal health and distinguishing abnormal from normal findings. Classroom and clinical experience in history taking and physical assessment, organized within a systematic framework. Emphasis on incorporation of assessment skills into the student's nursing framework.

8009. SPECIAL TOPICS IN NURSING. (Cr ar; prereq #)

8050. PROBLEMS IN NURSING. (1-9 cr; prereq #)
Individual study of a problem.

8051. SPECIAL TOPICS IN NURSING RESEARCH. (1-9 cr)
Seminar and/or individual study in nursing research.

8060. ADVANCED CLINICAL NURSING. (3-9 cr; prereq [illegible], #)
Hypothesis generation and testing in general nursing to develop creative and critical approaches to nursing.

8063. NURSING CONSULTATION. (3 cr)
Study and practice in consultation in nursing care.

8313. CARE OF THE CHILDBEARING FAMILY IN RISK. (4-6 cr; prereq physiology, #)
Problems encountered during perinatal period with emphasis on nursing care of mothers with medical complications.

8509. SPECIAL TOPICS IN NURSING EDUCATION. (Cr ar; prereq #)

8600. HEALTH CARE INSTITUTIONS AND NURSING LEADERSHIP. (3 cr)
Some aspects inherent in American society (alienation, productivity, roles, youth emphasis) and their impact on health care institutions; nurse's effects upon individuals involved with these institutions.

8601. CLINICAL NURSING LEADERSHIP I. (6 cr; prereq 8600)
Clinical practice involving extension of patient assessment to various health care institutions; individual employee assessment and work with and through others to achieve patient care goals. Consultation and evaluation processes, individual counseling, and group dynamics used to create more positive approaches to care of individuals.

8609. SPECIAL TOPICS IN NURSING SUPERVISION. (Cr ar)

NUTRITION (Nutr)

OFFERED AT MINNEAPOLIS AND ST. PAUL

Professor

Lura M. Morse (food science and nutrition), *director of graduate study*
C. Eugene Allen (animal science)
Elwood F. Caldwell (food science and nutrition)
John D. Donker (animal science)
Margaret D. Doyle (food science and nutrition)
Clifford F. Gastineau (Mayo Foundation, Rochester)
Richard D. Goodrich (animal science)
Joan Gordon (food science and nutrition)
Patrick J. Hegarty (food science and nutrition)
LaVell M. Henderson (biochemistry, biological sciences)
James D. Jones (Mayo Foundation, Rochester)
Bruce A. Kottke (Mayo Foundation, Rochester)
Theodore P. Labuza (food science and nutrition)
Irvin E. Liener (biochemistry, biological sciences)
John J. McCall (Mayo Foundation, Rochester)
Jay C. Meiske (animal science)
Donald E. Otterby (animal science)
Patricia B. Swan (food science and nutrition)
John F. Van Pilsum (biochemistry, medical sciences)
Paul E. Waibel (animal science)
Jesse B. Williams (animal science)

Associate Professor

Carl F. Anderson (Mayo Foundation, Rochester)
Agnes R. Csallany (food science and nutrition)
Annette T. Gormican (food science and nutrition)
Arthur S. Leon (physiological hygiene)
Pasquale J. Palumbo (Mayo Foundation, Rochester)
John D. Smith (animal science)

Assistant Professor

Neil K. Allen (animal science)
Judith E. Brown (public health)
Steven G. Cornelius (animal science)
C. Richard Fleming (Mayo Foundation, Rochester)
Craig J. McClain (Medicine)

Prerequisites—A strong foundation in biological sciences including 1 quarter of microbiology, college mathematics through calculus, the equivalent of 1 year of general chemistry, 1 year of organic chemistry, a course in quantitative analysis, and a minimum of 2 quarters of college physics. Deficiencies in any of these areas must be removed before a student can become a candidate for a degree. Scores from the Graduate Record Examination are also required.

Students interested in the M.S. degree in nutrition with community emphasis may offer as prerequisites courses in general biology, human physiology, microbiology, college algebra, 1 year of general chemistry, 1 year of organic chemistry, a course in nutrition, a course in food chemistry or equivalent, and at least 21 credits in social sciences.

Students interested in the M.S. degree in nutrition with clinical emphasis may offer as prerequisites courses in general biology, human nutrition, microbiology, college algebra, 1 year of general chemistry, 1 year of organic chemistry, 20-25 credits in food and nutrition, and a dietetic internship or equivalent.

Students who complete their M.S. degree with a community or clinical emphasis and then apply for admission to a Ph.D. program must have completed the Ph.D. entrance requirements indicated in the first paragraph above.

For a minor in nutrition, students must satisfy the nutrition graduate faculty that they have an adequate background.

Master's Degree—Offered under Plan A and Plan B. Students take an oral final examination.

Doctor's Degree—For a major, students will be required to develop and demonstrate a general competence in nutrition, including a comprehensive knowledge of basic biochemistry and statistics. In addition, students will be expected to develop a minor or coherent program in field(s) of study closely allied to nutrition; e.g., biochemistry, histology, embryology, anatomy, microbiology, physiology, and zoology. Thesis work can be conducted in the area of human nutrition, nonruminant nutrition (laboratory rat, swine, and poultry), or ruminant nutrition. General competence in nutrition will be required of students with a nutrition minor.

Language Requirement—No language is required for the M.S. or Ph.D. in nutrition. However, an individual adviser may specify one or two languages for a student's program. Students wishing to have proficiency in a language recorded on their transcript must pass the Graduate School Foreign Language Test or be certified as proficient by the appropriate language department.

Note—The following is a list of courses from which selections for major and minor programs are commonly made; other courses are also available. Descriptions of the courses can be found in the bulletins of the colleges offering the courses.

AnSc 8420s.* ENERGY IN ANIMAL NUTRITION. (3 cr; prereq BioC 5002 or equiv or #... BioC 5743 recommended; offered 1981 and alt yrs)

AnSc 8421s.* PROTEIN AND AMINO ACID NUTRITION. (3 cr; prereq BioC 5002 or equiv or #...BioC 5743 recommended; offered 1981 and alt yrs)

AnSc 8423w.* MINERAL NUTRITION. (3 cr; prereq BioC 5002 or #...BioC 5742 recommended; offered 1980 and alt yrs)

AnSc 8440w.* RUMINANT NUTRITION. (3 cr; prereq BioC 5002 or #...MicB 5321 recommended; offered 1980 and alt yrs)

AnSc 8740f. CONCEPTS AND DEVELOPMENTS IN RUMINANT NUTRITION. (2 cr; prereq #)

AnSc 8741f. CONCEPTS AND DEVELOPMENTS IN AVIAN NUTRITION. (2 cr; prereq #; offered 1980 and alt yrs)

AnSc 8742s. CONCEPTS AND DEVELOPMENTS IN SWINE NUTRITION. (2 cr; prereq #; offered 1980 and alt yrs)

AnSc 8840x.* RESEARCH IN ANIMAL NUTRITION. (Cr ar; prereq #)

BioC 5745w. BIOCHEMICAL ANALYSIS LABORATORY. (2 cr; prereq ¶5744, lab work in analytical and organic chemistry, #)

BioC 5751f-5752w†. GENERAL BIOCHEMISTRY. (4 cr per qtr, §MdBc 5751-5752; prereq 5001 or equiv, 2 qtrs physical chemistry or ¶2nd qtr physical chemistry)
Same as MdBc 5751-5752.

BioC 8225f. TRACER TECHNIQUES. (1-3 cr; prereq 5745 or 5752 or MdBc 5750, #)

BioC 8271f. VITAMINS. (3 cr; prereq 5752 or 5002 or #; offered 1979 and alt yrs)

FScN 5111. INDEPENDENT STUDY IN FOOD SCIENCE AND NUTRITION. (1-5 cr [may be repeated for cr]; prereq △)

FScN 5404. CURRENT ISSUES IN FOOD AND NUTRITION. (2-4 cr; prereq 15 cr in food science and nutrition or #)

FScN 5622. HUMAN NUTRITION. (5 cr; prereq 1602, Biol 3021, Phsl 3051 or #)

FScN 5642. FIELD EXPERIENCE IN COMMUNITY NUTRITION. (3-18 cr; prereq course in human nutrition and #)

FScN 5643. SEMINAR: WORLD FOOD SUPPLY PROBLEMS. (4 cr, §AgEc 5790, §PIPa 5200, §Soc 5675, §LACS 5280; prereq sr or grad with #)

FScN 5662. CLINICAL NUTRITION. (3 cr; prereq 5622, Biol 3021 or #)

FScN 5663. CLINICAL NUTRITION LABORATORY. (2 cr; offered S-N only; prereq 5662 or ¶5662 or #)

FScN 5664. FIELD EXPERIENCE IN CLINICAL NUTRITION. (3-18 cr; prereq course in human nutrition and #)

FScN 5668. ADVANCED CLINICAL NUTRITION. (2 cr; prereq 5662 or #)

FScN 5694. METABOLIC BASIS FOR THERAPEUTIC NUTRITION. (4 cr; prereq 5664 or #)

FScN 8101. RESEARCH SEMINAR. (1 cr; prereq #)

FScN 8621. INDEPENDENT STUDY: NUTRITION. (1-9 cr; prereq △)

FScN 8622. ADVANCED HUMAN NUTRITION I. (5 cr; prereq 5622, BioC 5002 or MdBc 5101 or equiv and #)

FScN 8623. ADVANCED HUMAN NUTRITION II. (5 cr; prereq 8622, #)

MdBc 8219f. BIOCHEMISTRY OF SPECIALIZED TISSUES. (3 cr; prereq 5752 or 5101)

Nutr 8745. SEMINAR. (1 cr [may be repeated for cr]; prereq #)

PubH 5380. APPLIED HUMAN NUTRITION. (3 cr; prereq #)

NUTRITION

OFFERED AT ROCHESTER AND AT ST. PAUL

Professor

Clifford F. Gastineau, M.D., Ph.D., *director*
James D. Jones, Ph.D.
Bruce A. Kottke, M.D., Ph.D.
John T. McCall, M.D.

Associate Professor

Carl F. Anderson, M.D.
Pasquale J. Palumbo, M.D.

Assistant Professor

C. Richard Fleming, M.D.

The Mayo Foundation offers a program of study in nutrition leading to the M.S. or Ph.D. degree. Degree programs must conform to the general requirements for advanced degrees as stated in the current *Graduate School Bulletin*. Supervision is by the faculty of the Mayo Graduate School of Medicine. The clinical, laboratory, and research facilities of the Mayo Graduate School, Mayo Clinic, and St. Mary's Hospital are available for training and research.

Application to the nutrition program can be made either through the Department of Nutrition, Twin Cities campus, or the Mayo School of Health-Related Sciences. Students are admitted to the graduate program on the Twin Cities campus and complete courses in nutrition, biochemistry, physiology, statistics, and other appropriate subjects for 1 to 2 years. Admission to the Rochester program requires the recommendation of the director of graduate study for nutrition on the Twin Cities campus and approval of the appropriate Mayo committees. Selection of students is generally made near the time course work is completed on the Twin Cities campus. Arrangements are then made for the student to work in a research laboratory in Rochester where a nutrition-oriented project suitable for a thesis can be undertaken.

Usually 1 to 2 years are required for completion of the project and preparation of the thesis. Students are encouraged to take nutrition courses at the Mayo Medical School. Certain courses in statistics, physiology, and biochemistry are also available for graduate credit. Students are encouraged to attend the seminars and lectures on nutrition-related subjects that are listed in the weekly bulletin of the Mayo clinic.

Nu M 8851f,w,s,su. RESEARCH IN BASIC NUTRITION OR METABOLISM. (6 cr) Anderson, Gastineau, Hoffman, Jones, Kottke, McCall, Palumbo, Wahner
Research project concerned with a problem in human or animal nutrition or with physiologic or biochemical nutritional problems.

Nu M 8852. CURRENT CONCEPTS IN APPLIED NUTRITION. (Cr ar) Gastineau and staff

OBSTETRICS AND GYNECOLOGY (Obst)

OFFERED AT MINNEAPOLIS

Professor

Konald A. Prem, M.D., *head*

Professor

Harry Foreman, M.D.
Takashi Okagaki, M.D., Ph.D.
George E. Tagatz, M.D.

Associate Professor

Leon L. Adcock, M.D.
Richard P. Bendel, M.D.
Julius C. Butler, Jr., M.D.
Erick Y. Hakanson, M.D.
Edward C. Hanisch, Jr., M.D.
Theodore C. Nagel, M.D.
Preston P. Williams, M.D.

Assistant Professor

Doris C. Brooker, M.D.

Master's Degree—Offered under either Plan A or Plan B.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

Language Requirement—For the Ph.D. degree, either (a) two languages or (b) one language and the option of a collateral field of knowledge. Routinely acceptable languages are French, German, and Spanish.

5241. FAMILY PLANNING ADMINISTRATION. (3 cr; prereq #) Foreman
Planning, operation, and administration of publicly funded family planning programs.

5245. HISTORY AND DEVELOPMENT OF FAMILY PLANNING. (3 cr; prereq #) Foreman
Family planning programs over the world (including the United States) that have been instituted to meet family health needs as well as to alleviate population pressures.

5248. DEVELOPMENTS IN CONTRACEPTIVE TECHNOLOGY. (3 cr; prereq #) Foreman
Review of principles, efficacy, and side effects of currently used birth control methods and consideration of contraceptives in investigative stages.

8201-8202-8203-8204. ADVANCED OBSTETRICS AND GYNECOLOGY I. (Cr ar; required of 1st-yr fellows)
Includes service in the University of Minnesota-affiliated hospitals (University, St. Joseph's, St. Mary's, and Fairview hospitals, Metropolitan Medical Center, and Hennepin County Medical Center) with ample experience in diagnosis, care, and treatment (operative and nonoperative) of patients.

8205-8206-8207-8208. ADVANCED OBSTETRICS AND GYNECOLOGY II. (Cr ar; required of 2nd-yr fellows)
Similar to Obst 8201-8202-8203-8204 but more advanced, both in clinical and research aspects of the subjects adapted to increased training and experience.

8209-8210-8211-8212. ADVANCED OBSTETRICS AND GYNECOLOGY III. (Cr ar; required of 3rd-yr fellows)
Similar to Obst 8205-8206-8207-8208, but more advanced.

8213-8214-8215-8216. ADVANCED OBSTETRICS AND GYNECOLOGY IV. (Cr ar; prereq 8212)

8217-8218-8219-8221. SEMINAR IN OBSTETRICS AND GYNECOLOGY. (Cr ar; prereq 8216)

8222-8223. GYNECOLOGICAL ONCOLOGY. (Cr ar; prereq 8221)

8224. GYNECOLOGICAL ENDOCRINOLOGY I. (Cr ar; prereq 8223)

8225. GYNECOLOGICAL ENDOCRINOLOGY II. (Cr ar; prereq 8224)

8226. OBSTETRICAL PHYSIOLOGY AND ANESTHESIOLOGY. (Cr ar; prereq 8225)

8227. PRECEPTORSHIP IN CLINICAL PRACTICE. (Cr ar; prereq 8226)

8228. SELECTED ASPECTS OF RADIATION THERAPY. (Cr ar; prereq 8227)

8229. SELECTED ASPECTS OF MEDICAL ONCOLOGY. (Cr ar; prereq 8228)

8230. RESEARCH IN REPRODUCTION. (Cr ar; prereq 8229)

8243. TOPICS IN FAMILY PLANNING. (3-12 cr; prereq #) Foreman and staff
Flexible course set up to meet individual student needs and interests. Includes thesis preparation, research projects, and field training.

OBSTETRICS AND GYNECOLOGY

OFFERED AT ROCHESTER

Professor

George D. Malkasian, M.D., M.S., *chairman, obstetrics and medical gynecology*
Richard E. Symmonds, M.D., M.S., *chairman, gynecologic surgery*
Leonard A. Aaro, M.D., M.S.
David G. Decker, M.D., M.S.
Roger D. Kempers, M.D., M.S.
Tiffany J. Williams, M.D.

Associate Professor

Carl E. Johnson, M.D., M.S.
Raymond A. Lee, M.D., M.S.
Reginald A. Smith, M.D., M.S.

Assistant Professor

Carolyn B. Coulam, M.D., M.S.
Edward O. Jorgensen, M.D.
Kenneth L. Noller, M.D., M.S.
Richard S. Sheldon, M.D., M.S.
Maurice J. Webb, M.B.B.S.

Graduate work in obstetrics and gynecology is offered in Rochester to qualified physicians. Appointments are presently made to a 4-year residency program through the National Resident Matching Program. Residents accepted into this program receive intensive clinical training that qualifies them for the American Board of Obstetrics and Gynecology certification.

Surgical experience is obtained at St. Mary's Hospital, Rochester Methodist Hospital, and Rochester State Hospital. Emphasis is placed on routine gynecological surgical procedures, although residents are exposed to a large volume of complicated cancer surgery. After completion of the required time as surgical assistants, senior residents are appointed to the position of chief resident associate for a period of 6 months. During this time they assume primary responsibility for the care of gynecological surgery cases.

Obstetrical experience is gained at the obstetric facilities at the Rochester Methodist Hospital. As in the surgery training program, residents assume greater responsibility with experience. After completion of the required time of assistantship in obstetrics, they are promoted to the position of chief resident associate in obstetrics for a period of 6 months. During this time they assume primary responsibility for the care of many obstetrical patients.

Outpatient medical gynecology is strongly emphasized in this residency program. Intensive training in gynecological endocrinology, colposcopy, venereal diseases, and other pelvic pathology is obtained through the outpatient facilities of the Mayo Clinic. Because of the large number of new gynecological oncology patients, residents become familiar with proper workup and diagnostic techniques involved in the care of cancer patients. All residents spend 1 quarter on the Gynecologic Chemotherapy-Radiation Therapy Service; didactic sessions in both chemotherapy and radiation therapy are held daily.

For physicians who wish to pursue a special interest in gynecologic oncology following the completion of the basic requirements for board certification in obstetrics and gynecology, appointments are made to a gynecologic oncology residency at 2-year intervals. Completion of this program fulfills the requirements for certification by the Gynecologic Oncology Subspecialty Board.

A well-structured series of didactic courses is an integral part of the residency in obstetrics and gynecology. Core curricula are presented in obstetrics, general gynecology, gynecologic surgery, and gynecologic pathology. Although primarily structured for the resident in obstetrics and gynecology specialty training, these didactic sessions are open to physicians from other specialties with permission from the director of medical education. Residents in obstetrics and gynecology specialty training are encouraged to attend the didactic session offered in many of the other specialties based in Rochester.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 5801. INTRODUCTION TO OBSTETRICS. (1 cr) Noller
Didactic sessions presented weekly. Student preparation and participation required.

M 5802. INTRODUCTION TO MEDICAL GYNECOLOGY. (1 cr) Malkasian, Noller
Selected topics in gynecology presented weekly. Student preparation and participation required.

M 5803. INTRODUCTION TO SURGICAL GYNECOLOGY. (1 cr) Lee, Symmonds, Webb, Williams
Theoretical and practical basis of gynecologic surgery.

M 5804. GYNECOLOGIC PATHOLOGY. (1 cr per qtr; two qtrs required) Williams
Lectures and clinical correlations of pathologic findings

M 5805. MEDICAL GYNECOLOGY/ONCOLOGY. (3 cr) Decker, Malkasian
Basic training in gynecological oncology, in-depth work in chemotherapy, and formal lectures in radiation therapy.

M 8851f,w,s,su. DIAGNOSIS. (6 cr) Staff
Principally in relation to obstetric and gynecologic conditions. Research. Seminar.

M 8852f,w,s,su. CLINICAL OBSTETRICS AND GYNECOLOGY. (6 cr) Staff
Diagnosis and treatment with special study of selected obstetric and gynecologic cases. Residence. Seminar.

M 8853f,w,s,su. OPERATIVE SURGERY. (6 cr) Lee, Symmonds, Webb, Williams

M 8854. SEMINARS IN GYNECOLOGIC ENDOCRINOLOGY. (1 cr) Coulam
Seminars, case presentations, and didactic sessions arranged on an individual basis.

M 8890. RESEARCH IN OBSTETRICS-GYNECOLOGY. (6 cr; prereq ^\) Staff
Graduate thesis research under supervision of staff.

OPHTHALMOLOGY (Oph)

OFFERED AT MINNEAPOLIS

Professor

Donald J. Doughman, M.D., *head*
William Knobloch, M.D., *director of graduate study*

Clinical Professor

Robert H. Monahan, M.D.

Associate Professor

William L. Fowlks, Ph.D.
Robert D. Letson, M.D.
William B. Rathbun, Ph.D.

Clinical Associate Professor

Richard C. Horns, M.D., M.S.

Graduate work in the field of ophthalmology is open to qualified physicians who wish to prepare for private practice or for teaching or research in the basic science or clinical aspects of the field. The wide variety of ophthalmologic problems presented at the University Hospitals, Hennepin County Medical Center, St. Paul-Ramsey Hospital, and the Veterans Administration Hospital in Minneapolis provides an excellent core for clinical training and insures adequate surgical experience for each fellow. The department's laboratory facilities and its staff are available to all for research in basic or clinical studies of the specialty. Regardless of career goal, all fellows spend a period of time in the laboratory becoming familiar with the research problems of ophthalmology. Additional opportunities for training are available to those who wish to prepare for teaching and research.

Master's Degree—The master's degree program in ophthalmology is offered only under Plan A. The program normally requires 3 years to complete. Students are encouraged but not required to take an additional year of training. Minor fields for the master's degree are arranged in one of the basic science disciplines by special arrangement with the department involved. Particular emphasis is given to such fields as physiology, biophysics, biochemistry, and microbiology.

Doctor's Degree—A Ph.D. degree is not offered in ophthalmology. Individuals who wish to earn the Ph.D. are encouraged to complete it in one of the basic science fields, doing their research on some ophthalmologic problem appropriate to their major subject.

The course work listed is required of all graduate students whether they are working toward a degree or not. Oph 8101, 8131, 8141, and 8151 are offered on a continuing basis throughout the 3-year program. Oph 8151 covers such basic subjects as physiology, biophysics, biochemistry, pharmacology as they apply to the practice of ophthalmology. The remainder of the courses (with the exception of Oph 8142, 8153, and 8154) are offered once during the 3-year program.

8101f,w,s,su. CLINICAL OPHTHALMOLOGY. (8 cr) Doughman and staff

8131f,w,s,su. PRACTICAL OCULAR SURGERY. (3 cr) Doughman and staff

8142f,w,s,su. OPHTHALMIC PATHOLOGY LABORATORY. (2 cr) Cameron

8152. OPHTHALMOLOGY LABORATORY. (15 cr) Staff

8153. RESEARCH IN OPHTHALMOLOGY. (Cr ar) Staff

8154. SEMINAR: OPHTHALMOLOGY. (Cr ar) Staff

8155. SPECIAL TOPICS IN OPHTHALMOLOGY. (Cr ar) Staff

OPHTHALMOLOGY

OFFERED AT ROCHESTER

Professor

John A. Dyer, M.D., M.S.
Robert W. Hollenhorst, M.D., M.S.
Thomas P. Kearns, M.D., M.S.

Associate Professor

Robert R. Waller, M.D., *chairman*
Richard F. Brubaker, M.D.
Thomas J. Kirby, Jr., M.D., M.S.
Theodore G. Martens, M.D., M.S.
Dennis M. Robertson, M.D., M.S.

Assistant Professor

William M. Bourne, M.D., M.S.
Helmut Buettner, M.D.
R. Jean Campbell, M.B.B.Ch.

Residents majoring in ophthalmology receive practical experience in diagnosis and treatment of diseases of the eye under the supervision of full-time staff members. Rotating outpatient assignments include experience in tonography, biomicroscopy, indirect ophthalmoscopy, cryotherapy, office surgery, xenon arc, and laser photo coagulation; refraction and ocular motility with experience in contact lens fitting and orthoptics; and medical and neuroophthalmology with experience in perimetry, ophthalmoscopy, and fluorescein angiography.

Courses in surgical technique, ophthalmic pathology, anatomy and neuroanatomy of the eye, orbit, and intracranium are included during the outpatient assignments.

During a 12-month assignment to the ophthalmic surgical service, the resident cares for hospitalized patients and assists the staff surgeon with all surgery. Upon completion of 3 years of training, the resident has an opportunity to supplement the surgical experience by working and performing surgery in an affiliated hospital for 1 quarter.

Two years of lectures, conferences, and seminars follow the format and subject material of the Ophthalmology Basic and Clinical Science Course of the American Academy of Ophthalmology. The third year of the program is oriented toward senior resident conferences, resident seminars, and other special educational activities. Oral examinations are conducted at appropriate intervals to keep the resident and staff apprised of the individual's progress in the learning experience.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 8851f,w,s,su. REFRACTION AND STRABISMUS. (6 cr) Dyer, Martens
Theory of refraction, retinoscopy, diagnosis of refractive errors of the eye, prescribing of lenses, disturbances of motility of the eyes, orthoptics and strabismus surgery. Prescribing and fitting contact lenses.

M 8852f,w,s,su. OCULAR THERAPY. (6 cr) Bourne, Brubaker, Buettner, Kirby, Robertson, Waller
Diagnosis and treatment of diseases of the eye and its adnexa.

M 8853f,w,s,su. MEDICAL AND NEUROLOGIC OPHTHALMOLOGY. (6 cr) Hollenhorst, Kearns, Trautmann
Ophthalmology and ophthalmoscopy as they pertain to the fields of internal medicine and neurology.

M 8854f,w,s,su. OPHTHALMIC SURGERY. (6 cr) Bourne, Brubaker, Buettner, Robertson, Waller
A 12-month hospital service.

M 8855f,w,s,su. OPHTHALMIC PATHOLOGY, ANATOMY, AND SURGICAL TECHNIQUE. (6 cr; prereq resident in ophthalmology) Kirby, Campbell

ORAL BIOLOGY (OBio)

OFFERED AT MINNEAPOLIS

Professor

Burton L. Shapiro, D.D.S., Ph.D., *chairperson, director of graduate study*
Robert J. Gorlin, D.D.S., M.S.
Lawrence H. Meskin, D.D.S., M.P.H., Ph.D.
Quenton T. Smith, Ph.D.
Carl J. Witkop, D.D.S., M.S.

Associate Professor

Gregory R. Germaine, M.S., Ph.D.
Harold H. Messer, B.D.Sc., M.D.Sc., Ph.D.

Oral biology is the study of the orofacial region, its development (including aging), structure, function, and pathology. Graduate programs in oral biology train individuals for academic and research careers concerned with problems of the mouth and its contained and related tissues, and thus prepare them for employment in dental schools, oral research centers, and other institutions engaged in similar activities. Students may choose to obtain clinical specialty training concurrently or at some other time. However, clinical training cannot be used to fulfill requirements for oral biology programs.

Master's Degree—Offered under Plan A and Plan B as described in the General Information section of this bulletin.

Doctor's Degree—During the first year, all students must take for credit OBio 8010. During each quarter of their first year, students will work with a faculty member to acquire research experience through quarter-long apprenticeships. These assignments will be the product of negotiation among the director of graduate study, the student, and the faculty members involved, with a view that they reflect the student's interests and provide the student with a breadth of exposure to faculty activities. Registration will be through OBio 8002. Students will also be required to attend a weekly seminar, OBio 8030. The oral preliminary examination will consist of the defense of two written research proposals (the written preliminary examination) assigned by the graduate faculty through the director of graduate study. Other than these requirements, programs will be individually designed through consultation among students, their adviser, and the director of graduate study. Together with their adviser students will choose both a minor and those areas in the major field of oral biology that will best meet their needs and interests.

Prerequisites—Programs are designed for individuals who have completed requirements for graduation with high standing from dental or medical schools and desire to undertake advanced studies in oral biology. In some cases an individual who has not yet obtained the D.D.S. (D.M.D.) or M.D. degree but who has demonstrated exceptional potential for graduate study may be admitted on a combined program. Individuals with a bachelor's or master's degree who can demonstrate sufficient background and interest in oral biology will also be considered for admission.

Language Requirement—Will be determined individually for candidates in consultation with their adviser and the director of graduate study. The need for language proficiency, the level of such proficiency, and the choice of language(s) will depend on the area in which students expect to concentrate their efforts.

8001. RESEARCH IN ORAL BIOLOGY. (Cr ar) Staff

8002. TUTORIAL IN ORAL BIOLOGY. (Cr ar [2 hrs per wk = 1 cr; may be repeated for cr]) Staff
Quarter-long apprenticeship with faculty members to familiarize students with faculty research interests.

8010. ORAL BIOLOGY I. (4 cr) Staff
Basic concepts of cell biology and human biology for dental specialist and/or oral research trainees.

8018. BIOLOGY OF MINERALIZED AND OTHER CONNECTIVE TISSUES. (3 cr; offered spring 1981 and alt yrs) Smith
Lectures and discussions on developmental biology of connective tissues, morphologic and biochemical composition of connective tissue components, structure and biosynthesis of connective tissue components, normal and pathologic mineralization and changes in connective tissue during aging, wound healing, and various disease processes.

8021, 8022, 8023, 8024. TOPICS IN ORAL BIOLOGY. (1-3 cr [may be repeated for cr]; prereq #) Staff
Different topic or subject area each quarter, announced in advance. May include: saliva and salivary glands; pain and sensation; aging; biomaterials; hard tissue metabolism.

8030. SEMINAR. (1 cr [may be repeated for cr]) Staff
Faculty and student participation in discussion of current topics in oral biology.

Additional major course work may be drawn from medical basic sciences and other areas appropriate to the individual program.

ORTHOPAEDIC SURGERY (OrSu)

OFFERED AT MINNEAPOLIS

Professor
Roby C. Thompson, *head, director of graduate study*
David S. Bradford, M.D.
Robert B. Winter, M.D.

Associate Professor
James H. House, M.D., M.S.

Assistant Professor
Theodore R. Oegema, Ph.D.

Master's Degree—Four-year fellowships are offered to students working toward a graduate degree in orthopedic surgery. This work is carried on at University Hospitals, Gillette State Hospital for Crippled Children, Shriners Hospital for Crippled Children, etc., and there is an interchange with the Orthopedic Department of the Mayo Graduate School of Medicine. The master's degree is offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

8401. ORTHOPEDIC CONFERENCE. (3 cr) Staff
Review of X-rays and case histories of patients on orthopedic inpatient or outpatient service.

8403. FRACTURES. (5 cr) Staff
The orthopedic fellow acts as house surgeon on fracture service at Hennepin County Medical Center.

8404. FRACTURES. (5 cr) Staff
The orthopedic fellow acts as house surgeon on fracture service at St. Paul-Ramsey Hospital.

8405. ORTHOPEDIC DIAGNOSIS. (3 cr) Staff
The orthopedic fellow assists in instruction of clinical clerks and interns and studies problems in diagnosis in Outpatient Department at University Hospitals.

8407. PEDIATRIC ORTHOPEDICS. (5 cr) Staff
The orthopedic fellow acts as house surgeon at Gillette State Hospital for Crippled Children.

8408. ORTHOPEDIC PROBLEMS AND MANAGEMENT. (5 cr) Staff
The orthopedic fellow acts as house surgeon at University Hospitals.

8409. ORTHOPEDIC PROBLEMS AND MANAGEMENT. (5 cr) Winter and staff
The orthopedic fellow acts as house surgeon on fracture service at Fairview Hospital.

8410. ORTHOPEDIC PATHOLOGY. (2 cr) Staff
Seminar for systematic review of pathology of ossified tissues and soft tissues of extremities.

8411. ORTHOPEDIC OPERATIVE SURGERY. (5 cr) Staff
The orthopedic fellow acts as first assistant at operations at University Hospitals and later may be permitted to operate.

8412. ORTHOPEDIC ANATOMY. (2 cr) House and staff
The orthopedic fellow dissects upper and lower extremities and aids in instruction of medical students in anatomy of extremities.

8416. ORTHOPEDIC RESEARCH. (5 cr) Bradford
Problems in experimental or clinical surgery. Study of University Hospitals.

ORTHOPEDIC SURGERY

OFFERED AT ROCHESTER

Professor

Edward D. Henderson, M.D., M.S., *chairman*
Anthony J. Bianco, Jr., M.D., M.S.
Richard S. Bryan, M.D., M.S.
Mark B. Coventry, M.D., M.S.
John C. Ivins, M.D., M.S.
Einer W. Johnson, Jr., M.D., M.S.
Patrick J. Kelly, M.D., M.S.
Ronald L. Lindscheid, M.D., M.S.
Lowell F. A. Peterson, M.D., M.S.

Associate Professor

Edmund Y. S. Chao, Ph.D.
James H. Dobyns, M.D.
Hamlet A. Peterson, M.D., M.S.
Franklin H. Sim, M.D., M.S.
Richard N. Stauffer, M.D., M.S.

Assistant Professor

Robert D. Beckenbaugh, M.D.
Miguel E. Cabanela, M.D., M.S.
Robert H. Cofield, M.D., M.S.
Robert H. Fitzgerald, M.D., M.S.
Kenneth A. Johnson, M.D.
Douglas J. Pritchard, M.D., M.S.

The residency in orthopedic surgery is designed to prepare the student for the practice of this specialty in all its phases and is tailored to the specific needs of each student. Additional training is available in research, hand surgery, children's orthopedics, and orthopedic oncology. Qualified applicants are accepted only for either a 4- or 5-year program, which meets certification requirements of the American Board of Orthopaedic Surgery.

The resident gradually assumes increasing responsibility for the care of orthopedic patients. Approximately 1 year is spent on the orthopedic service of a hospital and in outpatient assignments at the junior residency level. Training includes 1 quarter in a hand surgery clinic. Integrated into this year may be ancillary fields such as general surgery, neurosurgery, neurology, rheumatology, physical medicine, and emergency room care. These assignments vary according to prior experience and the needs of the resident.

A 6-month block in basic sciences follows, with no concurrent clinical responsibilities. This period relates to basic sciences, orthopedics, microanatomy and pathology of bone, various aspects of bone and muscle physiology, musculoskeletal anatomy, biomechanics, and metabolic bone diseases. Didactic teaching periods in pediatric orthopedics, hand surgery, and prosthetics also take place during this time.

A second block assignment provides additional time in children's orthopedics, either at Mayo or at an affiliated institution off campus. This assignment comes near the last year of the resident's training, when the resident can assume considerable responsibility in the care of children to supplement previous experience in the Mayo Graduate School program. Off-campus affiliations are with Gillette State Hospital for Crippled Children, St. Paul; Primary Children's Hospital, Salt Lake City; and Shriners Hospital, Salt Lake City.

At the senior residency level during the last 2 years of training, residents are assigned to specific staff services. They carry out consultations on orthopedic patients and take part in making preoperative surgical decisions. They participate actively in surgical procedures and in postoperative management within the hospital and in the outpatient area. Senior residents are given considerable responsibility and independence in these activities. Experience is enhanced by the large number of patients seen and by the complex nature of many of their medical and surgical orthopedic problems.

Trauma is taught in conjunction with the relatively large number of fracture cases treated in the affiliated hospitals in Rochester. Residents participate in trauma study throughout the entire period of studies. Difficult problems are reviewed with residents and staff at weekly fracture conferences. All fracture problems are under the direction of the orthopedic section of the Mayo Clinic.

Members of the orthopedic staff are in charge of surgery of the hand. In addition

to the quarter at the junior residency level, further training in the area can be obtained through assignments to services that emphasize hand surgery.

Rochester State Hospital assignments enable residents to be in charge of orthopedic services under staff supervision. Patients from other state institutions are referred to the hospital for definitive orthopedic care.

During the 4- or 5-year program outlined above, residents receive training in general surgery, adult orthopedics, children's orthopedics, fractures and traumatic surgery, and basic sciences required by the American Board of Orthopaedic Surgery. As part of the residency program, assignments as chief resident associate are made. Four or five such positions are available on a 6-month basis. The chief resident associate has his or her own service, with staff supervision. Opportunity is also afforded for research, and additional time for orthopedic research may be provided in certain instances under the guidance of a full-time staff member in research. The resident may earn an M.S. or a Ph.D. degree in orthopedic surgery by writing a thesis, passing written and oral examinations, and fulfilling the requirements of the Mayo Graduate School.

Didactic Program—Fracture conferences are held each week throughout the year. Emphasis is placed on the review of fresh fractures and their treatment or on discussion of allied problems in treatment.

A complete review program in basic sciences is presented through a series of lectures during the resident's 6-month assignment in the area. In addition, other lectures are given in basic fields related to orthopedic surgery.

Weekly clinical seminars are presented by residents in consultation with staff members. During the 4- or 5-year program an attempt is made to cover all aspects of orthopedic problems, both congenital and acquired.

Lectures on orthopedic pathology are given regularly during the basic science period. All orthopedic residents participate in periodic pathologic conferences.

Orthopedic conferences or grand rounds are conducted once a week in affiliated hospitals.

Visiting faculty members each year enhance the program, as do section guests who present lectures to the residency and consulting staffs.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 5803. PROSTHETICS FOR ORTHOPEDICS. (1 cr) Pritchard and staff
Biomechanics of skeletal system.

M 8851. ORTHOPEDIC DIAGNOSIS. (6 cr) Henderson and staff
Outpatient clinical practice with emphasis on diagnosis and decisions regarding treatment. History taking, examination, X-ray interpretation and joint discussions regarding diagnosis and management. Postoperative follow-up of patients. Participation in special clinics such as hip, knee, and scoliosis. Seminars.

M 8852. ADULT RECONSTRUCTION. (6 cr) Henderson and staff
Includes surgical aspects at the junior and senior residency level with more advanced participation in surgery as abilities of the resident develop. Surgical experience every other day with pre- and postoperative evaluation and follow-up on alternate days. Seminars.

M 8853. SURGERY OF THE HAND. (6 cr) Dobyns, Linscheid, and staff
Hand service clinic in Mayo Building, Methodist Hospital operating rooms, and St. Mary's Hospital. Congenital anomalies, deformities, fractures, tendon injuries, multiple injuries, rheumatoid arthritis joint replacement. Hand grand rounds and Thursday breakfast conferences.

M 8854. PEDIATRIC ORTHOPEDICS. (6 cr per qtr; 2 qtrs required) Bianco, Peterson, and staff
Management of all orthopedic problems in children and adolescents. Emphasis on the outpatient management of these problems, the operative treatment, and pre- and postoperative care.

M 8855. ORTHOPEDIC ONCOLOGY. (6 cr per qtr; 2 qtrs required) Ivins, Sim, and staff
History taking, physical examination, surgical, medical, and radiologic management of patients with benign and malignant lesions of bone and soft tissues. Daily care of patients with a wide variety of neoplastic conditions both in and out of the hospital, regularly scheduled conferences on surgical pathology of neoplasia, and in-hospital clinical conferences on patient management.

M 8856. FRACTURES. (2 cr) Bryan and staff
Comprehensive exposure to fracture problems and adult trauma.

M 8860. STRUCTURE AND FUNCTION OF BONE. (3 cr; prereq #) Henderson and staff
Lectures to include bone morphology, bone infections and treatment, statistics, techniques of bone evaluation, and immunology and joint diseases.

OTOLARYNGOLOGY (Otol)

OFFERED AT MINNEAPOLIS

Professor

Michael M. Paparella, M.D., *head*
S. K. Juhn, M.D., M.S., *director of graduate study*
Arndt J. Duvall III, M.D., M.S.
Earl R. Harford, Ph.D.
Frank M. Lassman, Ph.D.
W. Dixon Ward, Ph.D.

Clinical Professor

Jerome A. Hilger, M.D., M.S.
Albert Hohmann, M.D.
Robert E. Priest, M.D., M.S.

Associate Professor

Lawrence R. Boies, Jr., M.D.
Mary Jayne Capps, Ph.D.
David A. Nelson, Ph.D.

Clinical Assistant Professor

John D. Banovetz, M.D.

The residency program of the Department of Otolaryngology is designed to provide training in both clinical and experimental aspects of otolaryngology. Rotations at the University Hospitals, Minneapolis Veterans Administration Hospital, St. Paul-Ramsey Hospital, and Hennepin County Medical Center provide a wide range of material for clinical training and surgical experience. The several research laboratories of the department provide opportunities for independent research in a variety of areas of otolaryngology. These include the laboratories of psychoacoustics, electronmicroscopy, biochemistry, histochemistry, temporal bone pathology, audiology, and vestibular physiology.

All residents in the program spend 1 year in general surgery and 4 years in otolaryngology. During the last 4 years each resident (fellow) is required to spend time in basic or applied research directed toward preparation of an acceptable thesis for a master's degree in otolaryngology.

Master's Degree—Offered under Plan A.

Doctor's Degree—A Ph.D. program is offered, which involves additional time spent in basic research.

8220. RESEARCH IN OTOLARYNGOLOGY. (18 cr) Paparella and staff

8230. CLINICAL OTORHINOLARYNGOLOGY. (6 cr) Paparella, Duvall, and staff
Diagnostic and management instruction and experience in all phases of clinical otorhinolaryngology. Both inpatient and outpatient services are provided at the University of Minnesota, St. Paul-Ramsey, and Veterans Administration hospitals and at Hennepin County Medical Center.

8231. SURGERY OF THE EAR, NOSE, AND THROAT. (4 cr) Paparella, Duvall, and staff
Surgical training and experience with a broad scope of surgical problems encountered in otorhinolaryngology provided at the University of Minnesota, St. Paul-Ramsey, and Veterans Administration hospitals and at Hennepin County Medical Center.

8232. MAXILLOFACIAL SURGERY. (1 cr) Staff
Basic science principles and management principles of maxillofacial diseases. Problems of maxillofacial trauma. Experience with these problems in the hospitals of the training program, especially the county hospitals

8233. PLASTIC AND RECONSTRUCTIVE SURGERY OF THE HEAD AND NECK. (1 cr) Staff
Teaching and practical training for otolaryngologic cosmetic surgery with emphasis on rhinoplasty and otoplasty.

8234. ANATOMY OF THE HEAD AND NECK AND TEMPORAL BONE DISSECTION. (2 cr) Paparella
Head and neck anatomy is studied from cadaver material through programmed learning. Temporal bones are dissected to learn anatomy and to practice all otologic surgical procedures.

8235. ROENTGENOLOGY OF THE HEAD AND NECK. (2 cr) Staff
Experience in X-ray diagnostic procedures for otolaryngologic problems.

8236. PHARMACOLOGY IN OTOLARYNGOLOGY. (2 cr) Staff
General principles of pharmacology as they relate to otolaryngology.

8237. ENDOSCOPY. (2 cr) Duvall
Instruction, didactic and practical, in laryngoscopy, esophagoscopy, bronchoscopy, and mediastinoscopy. General management principles stressed.

8238. PATHOLOGY OF THE EAR, NOSE, AND THROAT. (2 cr) Paparella, Duvall
Gross pathology and histopathology of diseases of the ear, nose, throat, and related regions.

8239. OTONEUROLOGY. (2 cr) Paparella, Duvall, Capps
Instruction and experience in diagnosis and management of otoneurologic problems including training in electronystagmographic analysis of vestibular function.

8240. ALLERGY. (2 cr) Staff
Concepts and management of otolaryngologic allergy.

8241. TUMOR CLINIC. (1 cr) Staff
Clinical head and neck oncology including consideration of etiology, treatment (both surgical and nonsurgical), and other principles of management.

8242. AUDIOLOGY OF SPEECH PATHOLOGY. (2 cr) Lassman, Harford and staff
Fundamentals of audiology and speech pathology. Measurement and description of disorders of hearing, speech, and language in children and adults. Peripheral vs. central differential diagnostic signs, hearing aids. Special educational management of children and adults. Community resources.

8243. INTRODUCTION TO RESEARCH METHODOLOGY. (2 cr) Capps, Ward, and staff
Basic introduction to such topics as statistical methods, experimental design, and execution of otolaryngologic research. Required for all 1st-year otolaryngology residents.

8244. SEMINAR: CURRENT LITERATURE. (1 cr)
Presentation and discussion of selected articles required for all residents.

8245. MASTER'S THESIS RESEARCH. (Cr ar) Staff

8246. PH.D. THESIS RESEARCH. (Cr ar) Staff

8247f. PHYSIOLOGY OF HEARING. (3 cr, §Phsl 8216; prereq #)
Basic functional mechanisms of the auditory system, peripheral and central.

OTOLARYNGOLOGY

OFFERED AT ROCHESTER

Professor

D. Thane R. Cody, M.D.C.M., Ph.D., *chairman*
Arnold Aronson, Ph.D.
Kenneth D. Devine, M.D.

Associate Professor

Lawrence W. DeSanto, M.D.
Eugene B. Kern, M.D., M.S.
Harry B. Neel III, M.D., Ph.D.
Darrell E. Rose, Ph.D.

Assistant Professor

George W. Facer, M.D.
Stephen G. Harner, M.D.
Thomas J. McDonald, M.D., M.S.
Bruce W. Pearson, M.D.

A 4-year residency program is offered in otolaryngology. In addition, 1 year of general surgery training is required by the American Board of Otolaryngology and is prerequisite to the otolaryngology residency. It may be completed at the Mayo Graduate School or through other approved programs of general surgery. The general surgery experience at the Mayo Clinic is designed for maximal benefit to the otolaryngologist.

During the otolaryngology program, residents are offered training in diseases of the ear, including neuro-otology, pediatric otology and audiology; nonmalignant and malignant diseases of the nose and paranasal sinuses; physiologic nasal surgery; laryngology and head and neck surgery; and related basic sciences. Usual assignments are 9 months as a junior resident at the Rochester Methodist Hospital and 15 to

21 months as a senior resident at the Rochester Methodist Hospital and the outpatient facilities of the Mayo Clinic.

Three months' training on a hospital thoracic service provides experience in endoscopy and diseases of the chest. Nine months of the last year are spent as a chief resident associate. Under the direction of a member of the Mayo Clinic staff, the chief resident associate is responsible for the diagnostic evaluation, therapy, and rehabilitation of patients. This period is divided between the Rochester State Hospital and the Rochester Methodist Hospital.

From 6 to 12 months are spent studying a basic science related to otolaryngology. Nine to 12 months is usually a sufficient period of time to fulfill the research requirements for the M.S. or Ph.D. degree in otolaryngology. Among opportunities available are courses in cadaver surgery of the ear, nose, head, and neck and microsurgery of the ear on laboratory material.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 8851f,w,s,su. CLINICAL OTORHINOLARYNGOLOGY. (6 cr) Staff
Theory and practice with differential diagnosis and treatment of diseases of the ear, nose, paranasal sinuses, pharynx, larynx, head, and neck; their relation to general diagnosis.

M 8852f,w,s,su. PREOPERATIVE AND POSTOPERATIVE CARE OF PATIENTS. (6 cr) Staff
Junior residency service.

M 8853f,w,s,su. OPERATIVE OTORHINOLARYNGOLOGY. (6 cr) Staff
Senior residency service.

M 8854f,w,s,su. OPERATIVE OTORHINOLARYNGOLOGY. (6 cr) Staff
Chief resident associate.

M 8855f,w,s,su. ADVANCED AUDIOLOGY. (2 cr) Olsen, Rose
Tests of hearing; evaluation of speech disorders for purposes of diagnosis and as a basis for advising use of hearing aids; educational therapy.

M 8856w. SURGICAL ANATOMY AND SURGERY OF THE NOSE AND PARANASAL SINUSES. (2 cr) Kern, Devine, Facer, DeSanto, McDonald, Pearson
Experience in surgical anatomy of the nose and paranasal sinuses and participation in cadaver surgery.

M 8857w. TEMPORAL BONE ANATOMY AND SURGERY OF THE TEMPORAL BONE. (3 cr) Facer, Harner, McDonald
Lectures in basic anatomy of and surgical techniques for the temporal bone.

M 8890. GRADUATE RESEARCH. (6 cr; prereq #) Staff
Graduate thesis research under staff supervision.

PATHOBIOLOGY (Path)

OFFERED AT MINNEAPOLIS

Professor

Ellis S. Benson, M.D., *head, director of graduate study*
Miguel Azar, M.D., Ph.D.
David M. Brown, M.D.
Agustin P. Dalmasso, M.D.
John W. Eaton, Ph.D.
Jesse E. Edwards, M.D.
Richard D. Estensen, M.D.
Nelson D. Goldberg, Ph.D.
Franz Halberg, M.D.
John H. Kersey, M.D.
Norman B. Ratliff, Jr., M.D.
Juan Rosai, M.D.
Andreas Rosenberg, Ph.D.
Burton L. Shapiro, D.D.S., Ph.D.
John R. Sheppard, Ph.D.
Judson D. Sheridan, Ph.D.
R. Dorothy Sundberg, M.D., Ph.D.
Lee W. Wattenberg, M.D.
James G. White, M.D.
Jorge J. Yunis, M.D.

Associate Professor

Khalil Ahmed, Ph.D.
Barbara A. Burke, M.D.
Leo T. Furcht, M.D.
Kazimiera Gajl-Peczalska, M.D.
Leonard Greenberg, Ph.D.
Erhard Haus, M.D., Ph.D.
Toni N. Mariani, Ph.D.
Michael W. Steffes, M.D.
Walid Yasmineh, Ph.D.

Assistant Professor

Connie Clark, Ph.D.
William R. Swaim, M.D.
Michael J. Wilson, Ph.D.

Master's Degree—The M.S. degree with designation in pathology is offered under Plan A only.

Doctor's Degree—The Ph.D. with designation in pathobiology is offered. The student is expected to maintain a B average in courses for both the major and minor. In addition to the usual course examinations, candidates must pass a preliminary written examination at the end of the first year of course work, and the preliminary oral examination after approximately 2 to 3 years in the program.

Prerequisites—Graduate students who wish to pursue major work in pathobiology must present a bachelor's degree in some area of science or present credits for the first 2 years' work in the Medical School of the University of Minnesota. Completion of a course in biochemistry and in histology is required prior to entry. Completion of a course in microbiology is not required but is highly recommended.

Special Major Field Requirements—The following information must be sent to the Department of Laboratory Medicine and Pathology before an application will be evaluated for the pathobiology program: three letters of recommendation; Graduate Record Examination scores (quantitative, analytical, and verbal sections); the Test of English as a Foreign Language score (for foreign students); and a brief autobiographical sketch including such information as reasons for seeking a degree in pathobiology, career objectives, and areas of special interest.

5101. PATHOLOGY. (5 or 6 cr; prereq regis 1st-yr med school...grad by #; offered during med school Phase A) Ratliff and staff
General pathology.

5104x. AUTOPSIES. (Cr ar; prereq regis grad med or #) Staff

5105. DISEASES OF THE KIDNEY. (3 cr; prereq regis grad med or #) Staff

5106. DISEASES OF THE HEART. (1 cr; prereq regis grad med or #) Edwards

5110x. SEMINAR: PATHOLOGY. (1 cr; prereq #) Benson

5111x. CONFERENCE ON AUTOPSIES. (1 cr; prereq regis grad med or #) Staff

5113x. SURGICAL PATHOLOGY. (Cr ar; prereq regis grad med or #) Rosai

5124. VIRUSES IN THE PATHOGENESIS OF DISEASE. (Cr ar) Kersey

5125. IMMUNOPATHOLOGY. (2 cr; prereq #) Gajl-Peczalska, Greenberg, Kersey
Discussion of immunogenetics, function of white cells, surface markers, tumor immunology, autoimmunity, aging, and immunopathology of renal diseases.

5126. TECHNIQUES IN IMMUNOPATHOLOGY. (1 cr; prereq 5125) Gajl-Peczalska, Greenberg, Kersey
Techniques for study of transplantation and fetal antigens, lymphocyte function, immunofluorescence, immunochemistry, and serologic techniques in viral and autoimmune diseases.

5128. EXPERIMENTAL IMMUNOPATHOLOGY. (4 cr; prereq regis med or grad med) Azar, Kersey

5134. JOURNAL REVIEW. (1 cr; prereq regis med or grad med)

5140. SEMINAR: EXPERIMENTAL CHRONOBIOLOGY. (1 cr) Halberg

5141. PROBLEMS IN EXPERIMENTAL CHRONOBIOLOGY. (Cr ar) Halberg

5160s. HUMAN CYTOGENETICS. (3 cr; prereq #; offered 1980-81 and alt yrs) Yunis
Chromosome structure and function, and genetic and clinical problems associated with the study of human chromosomes.

5161s. HUMAN CYTOGENETICS LABORATORY. (2 cr; prereq #; offered 1980-81 and alt yrs) Yunis and staff
Techniques for study of mammalian and human chromosomes: cell culture, autoradiography, new techniques for chromosome identification, and chromosome isolation techniques.

5162s. HUMAN BIOCHEMICAL GENETICS. (3 cr; prereq #; offered 1979-80 and alt yrs) Yunis
Molecular and genetic basis of genetic traits in mammals.

5163s. HUMAN BIOCHEMICAL GENETICS LABORATORY. (2 cr; prereq #; offered 1979-80 and alt yrs) Yunis and staff
Biochemical techniques used in the study of human genetic traits.

5166. FORENSIC PATHOLOGY. (2 cr; prereq 5104 or *5104, or △) Coe

5168f,w. SEMINAR: GENETICS. (1 cr, prereq #) Yunis

5169f,w,s,su. RESEARCH IN HUMAN GENETICS. (Cr ar; prereq #) Yunis

5170f,w,s,su. ADVANCED PROBLEMS IN MEDICAL GENETICS. (Cr ar; prereq #) Yunis and staff

8108f. MECHANISMS OF DISEASE I. (3 cr, 8108-8109†; prereq MdBc 5100, 5101 or ‡5101, Anat 5103, 5104 or ‡5104 or #) Ahmed, Estensen
In-depth examination of six major areas of pathology: cell injury and death, thrombosis, immunopathology, growth control and carcinogenesis, cytogenetics and inborn errors of metabolism, and acute and chronic inflammation.

8109w. MECHANISMS OF DISEASE II. (3 cr, 8108-8109†; prereq MdBc 5100, 5101 or ‡5101, Anat 5103, 5104 or ‡5104 or #) Ahmed, Estensen
Continuation of 8108.

8110s. PROBLEMS IN PATHOLOGY. (3 cr; prereq #) Ahmed, Estensen
Discussion of human pathology including epidemiology, pathogenesis, and pathophysiology of selected disease processes.

8122w. BASIC SCIENCE OF CANCER. (Cr ar; prereq MdBc 5100 or equiv) Wattenberg

8135s. BIOCHEMICAL ASPECTS OF CELL GROWTH AND CELL DAMAGE. (3 cr; prereq #; offered 1979-80 and alt yrs) Ahmed
Current studies on biochemical mechanisms in model systems relating to (a) gene action, cell cycle, physiological, and pathological cell growth, and (b) cell damage and necrosis.

8200f,w,s,su. ADVANCED PROBLEMS IN PATHOLOGY. (Cr ar; prereq #) Benson

8201x. RESEARCH. (Cr ar; grad students with necessary preliminary training may elect research, either as majors or minors in pathology) Azar, Benson

8207. RESEARCH IN EXPERIMENTAL CHRONOBIOLOGY. (Cr ar) Halberg

8267. MECHANISMS OF CELLULAR MOTILITY AND RELATIONSHIP OF MOTILITY TO CELLULAR FUNCTION. (2 cr; prereq MdBc 5101 or #) Schollmeyer
Biochemistry and structure of contractile proteins and their relationship to cellular events in various normal and pathologic settings.

8270. IMMUNOHEMATOLOGY. (3 cr; prereq #) Azar, Clark
Immune response. Band T lymphocytes-cell cooperation. T-dependent responses. Helper cell activity. Autoimmunity-tolerance.

8271f,w. IMMUNOHEMATOLOGY LABORATORY. (4 cr; prereq #) Azar, Clark

8272. IMMUNOBIOLOGY. (2 cr; prereq #) Azar, Clark
Review of basic research outlines in immunobiology. Methodology, experimental outline, and significance. Dynamic group discussions with full participation.

8273. ADVANCED IMMUNOBIOLOGY. (6 cr; prereq #) Azar, Dalmasso
Molecular aspects of immunopathology. Genetics of immune response. Genetic control of histocompatibility. Difference of immunoblasts. T-B cell cooperation. Research review.

8274s. MOLECULAR ASPECTS OF IMMUNOLOGY. (3 cr; prereq #; offered 1979-80 and alt yrs) Dalmasso
Molecular pathology of immunoglobulins and their interaction. Genetics of all types. Cell membranes. Complement and molecular features of mediators of immunity.

8701. ADVANCED NEUROPATHOLOGY. (Cr ar, §Neur 8703)

8702. SURVEY OF NEUROPATHOLOGY. (Cr ar, §Neur 8704)
Examination of specimens from current autopsies.

PATHOLOGY

OFFERED AT ROCHESTER

Professor

David C. Dahlin, M.D., M.S., *chairman, surgical pathology*
Robert C. Bahn, M.D., Ph.D.
Paul Didisheim, M.D.
Jaun T. Lie, M.D., M.S.
Harold L. Moses, M.D.
Charles A. Owen, M.D., Ph.D.
Roy G. Shorter, M.D.
Edward H. Soule, M.D.
Howard F. Taswell, M.D., M.S.
Heinz W. Wahner, M.D., M.S.
Lewis B. Woolner, M.D., M.S.

Associate Professor

Keith E. Holley, M.D., *chairman, pathology and anatomy*
J. Aidan Carney, M.B.B.Ch., Ph.D.
George M. Farrow, M.D.
Keith E. Holley, M.D.
Jurgen Ludwig, M.D.
Haruo Okazaki, M.D.
Michael B. O'Sullivan, M.B.B.Ch.
Robert E. Scott, M.D.
Louis H. Weiland, M.D.

Assistant Professor

R. Jean Campbell, M.B.B.Ch.
Thomas A. Gaffey, M.D.
Michael J. Getz, Ph.D.
Krishnan Unni, M.B.B.S., M.S.

Instructor

Peter M. Banks, M.D.

Prerequisites—Graduate training leading to a designated M.S. or Ph.D. degree in pathology is offered. Two departmental programs are available: one for candidates holding an M.D., D.D.S., or D.V.M. degree or the equivalent in the biological sciences and one for candidates who do not possess one of these degrees. Candidates in the latter category seeking a Ph.D. degree may enter the program either (1) with an undergraduate degree in zoology, biology, biochemistry, chemistry, cell biology, molecular biology, or related fields; or (2) after completion of credits equivalent to the first years of medical school at either the University of Minnesota Medical School, Mayo Medical School or another medical school approved by the department.

Master's Degree—Offered under Plan A only. Course work in the major field should include representative courses such as Introduction to Structure, Systemic Pathology, Topics in Electron Microscopy, Experimental Pathology, or their equivalents. Minors will be in related fields or in the basic sciences as approved by the department.

Ph.D. Degree—Candidates without an M.D., D.D.S., or D.V.M. degree will be required to have or to acquire a core background in biological sciences including cell biology, biochemistry, and microbiology/immunology in addition to the other requirements of the major field. Minors will be in related fields or in the basic sciences as approved by the department. Specific requirements for a Ph.D. degree are available from the Mayo Graduate School.

M 5801. SYSTEMIC PATHOLOGY. (6 cr) Bahn, Holley, Ludwig, Moses

M 5802f. INTRODUCTION TO STRUCTURE. (6 cr) Holley and staff

M 8851f,w,s,su. GENERAL PATHOLOGY. (8 cr) Bahn, Holley, Ludwig, Moses, Okazaki, Scott, Shorter

M 8852f,w,s. SEMINAR: PATHOLOGY. (1 cr) Bahn, Holley, Ludwig, Moses, Okazaki, Scott, Shorter

M 8853f,w,s. CONFERENCE ON AUTOPSIES. (1 cr) Bahn, Holley, Ludwig, Moses, Okazaki, Scott, Shorter

M 8854f,w,s. DISEASES OF THE LIVER. (2 cr) Ludwig

M 8855f,w,s. DISEASES OF THE CARDIOVASCULAR SYSTEM. (3 cr) Lig

M 8856f,w,s. DISEASES OF THE KIDNEY. (2 cr) Holley

M 8857f,w,s. PROBLEMS IN PATHOLOGY. (Cr ar) Bahn, Carney, Dahlin, Farrow, Gaffey, Holley, Ludwig, Moses, Okazaki, Scott, Shorter, Soule, Unni, Weiland, Woolner

M 8858f,w,s. NEUROPATHOLOGY. (8 cr) Okazaki

M 8859f,w,s. PROBLEMS IN NEUROPATHOLOGY. (2 cr) Okazaki

M 8860. MEMBRANE BIOLOGY AND PATHOLOGY. (1 cr) Scott

M 8861f. ELECTRON MICROSCOPY. (1 cr) Moses, Scott

M 8862. SEMINAR IN HEMATOPATHOLOGY. (2 cr) Banks

M 8867f,w,s. GENERAL PATHOLOGY—SURGICAL PATHOLOGY. (8 cr) Carney, Dahlin, Farrow, Gaffey, Soule, Unni, Weiland, Woolner

M 8868f. LECTURES: SURGICAL PATHOLOGY. (2 cr) Carney, Dahlin, Farrow, Gaffey, Soule, Unni, Weiland, Woolner

M 8870f,w,s,su. CYTOLOGY. (3 cr) Carney, Dahlin, Farrow, Gaffey, Soule, Unni, Weiland, Woolner

M 8871f,w,s,su. OBSTETRIC AND GYNECOLOGIC PATHOLOGY. (1 cr) Gaffey

M 8872f,w,s,su. BONE AND SOFT TISSUE PATHOLOGY. (3 cr) Unni

M 8873f,w,s,su. ORAL PATHOLOGY. (2 cr) Dahlin

M 8885f,w,s,su. SOFT TISSUE PATHOLOGY. (1 cr) Soule

M 8890. GRADUATE RESEARCH. (6 cr; prereq #) Staff
Graduate thesis research under staff supervision.

PEDIATRICS (Ped)

OFFERED AT MINNEAPOLIS

Professor

William Krivit, M.D., Ph.D., *head*
C. Carlyle Clawson, M.D., *director of graduate study*
Ray C. Anderson, M.D., Ph.D.
David M. Brown, M.D.
Russell J. Lucas, Jr., M.D.
Alfred F. Michael, M.D.
Bernard L. Mirkin, M.D., Ph.D.
James H. Moller, M.D.
Mark E. Nesbit, M.D.
Arthur R. Page, M.D.
Paul G. Quie, M.D.
Richard B. Raile, M.D.
Harvery L. Sharp, M.D.
Kenneth F. Swaiman, M.D.
Robert W. ten Bensel, M.D.
Robert A. Ulstrom, M.D.
Homer D. Venters, M.D.
Robert L. Vernier, M.D.
Lewis W. Wannamaker, M.D.
Warren J. Warwick, M.D.
James G. White, M.D.
Francis S. Wright, M.D.

Associate Professor

Rolf R. Engel, M.D.
Patricia Ferrieri, M.D.
Alfred J. Fish, M.D.
Edward L. Kaplan, M.D.
Sheldon M. Mauer, M.D.

Clinical Associate Professor

Edward N. Nelson, M.D.

The Department of Pediatrics offers broad opportunities for graduate training in the general field of pediatrics as well as in subspecialties related to the field. The graduate training program permits candidates to complete the requirements for the specialty of pediatrics established by the American Board of Pediatrics. Highly qualified candidates desiring to pursue a full-time career in teaching and research in the field of pediatrics or to pursue further graduate work in certain subspecialties of pediatrics may extend their clinical training program to include further training in the basic fields of medicine appropriately related to the field of pediatrics.

Three years of clinical work satisfies the requirements for certification by the Specialty Board in Pediatrics. An additional 1 to 2 years are required to complete work for the M.S. or Ph.D. degree. The graduate work includes clinical training in all practical aspects of pediatrics. Candidates participate in clinical or laboratory research programs while preparing a thesis on such work. Considerable flexibility in the graduate training program is permitted. The clinical training program may be interrupted in favor of an opportunity for further orientation in the basic fields of medicine. Following completion of basic science requirements for the minor for the Ph.D. degree, candidates may return to the clinical department to complete specialty requirements.

Following completion of the basic clinical training program, qualified candidates may extend their clinical program 1 or more years by pursuing additional training in the fields of pediatric cardiology, endocrinology, neurology, hematology/oncology, pathology, infectious disease and immunology, clinical pharmacology, and community pediatrics.

The clinical experience in pediatrics is obtained in the outpatient and inpatient services of the University of Minnesota Hospitals and affiliated hospitals. The affiliated hospitals are the Hennepin County Medical Center, St. Paul-Ramsey Hospital, Children's Hospital of St. Paul, and Minneapolis Children's Health Center. Extensive clinical experience is provided in care of premature and newborn infants, communi-

cable and infectious diseases, heart disease, pathology, neurology, child psychiatry, endocrinology and metabolism, immunology, nephrology, hematology, oncology, and community pediatrics.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Programs leading to the Ph.D. with designation may be arranged with members of the graduate faculty.

Prerequisites—General understanding of bacteriology, immunology, pathology, physiology, and biochemistry; the M.D. degree.

Minor—Students are required to carry a minor in one of the fundamental branches or allied fields.

Language Requirement—For the Ph.D. degree, either (a) two languages or (b) one language and the option of a collateral field of knowledge.

8202f,w,s,su. PEDIATRIC CLINICS. (Cr ar. prereq #) Krivit and staff

8204f,w,s,su. RESIDENCY IN PEDIATRICS. (Cr ar; prereq #) Krivit and staff
Two- to 4-month rotations on the outpatient, inpatient, and special pediatric services of the University Hospitals, Hennepin County Medical Center, Children's Hospital of St. Paul, St. Paul-Ramsey Hospital, and Minneapolis Children's Health Center.

8206f,w,s,su. PEDIATRIC SPECIAL INTEREST. (Cr ar; for grad students who have completed at least 1½ years of general grad pediatric training; prereq #) Staff
Advanced clinical and basic training in one or more of the following special fields: neurology, cardiology, pathology, endocrinology and metabolism, hematology, immunology, nephrology, infectious diseases, and community pediatrics. Clinical training is obtained in the inpatient and outpatient services of University and affiliated hospitals. Training in basic sciences related to these fields may be obtained in preclinical divisions of the Medical School.

8208f,w,s,su. PEDIATRIC RESEARCH. (Cr ar; prereq #) Staff

PEDIATRICS

OFFERED AT ROCHESTER

Professor

Gunnar B. Stickler, M.D., Ph.D., *chairman*
E. Omer Burgert, Jr., M.D., M.S.
Edmund C. Burke, M.D., M.S.
Robert H. Feldt, M.D., M.S.
Gerald S. Gilchrist, M.D.
Manuel R. Gomez, M.D., M.S.
Alvin B. Hayles, M.D., M.S.
Donald G. Ritter, M.D., M.S.
William H. Weidman, M.D., M.S.

Associate Professor

Douglas D. Mair, M.D.
Edward J. O'Connell, M.D.
Kathleen Hable Rhodes, M.D.
Abdul J. Tajik, M.B., B.S.
John W. Yunginger, M.D.

Assistant Professor

Donald J. Hagler, M.D.
Fredric Kleinberg, M.D.
John Merideth, M.D.
James B. Seward, M.D., M.S.

The Departments of Pediatrics and Neurology (Section of Pediatric Neurology) of the Mayo Clinic and the Mayo Graduate School of Medicine provide opportunities for graduate training in all aspects of pediatrics. Clinical clerkships for 1 quarter and residencies for 3 years of training are offered as a broad educational background for general pediatrics, fulfilling the requirements of the American Board of Pediatrics for certification in the specialty and equipping the candidate for medical practice in this field.

The program includes experience in the care of acute and chronic diseases of the usual type as well as complex diagnostic problems in hospitalized children. Outpatient clinic services include children with acute illnesses and those with unu-

sual problems referred to the Mayo Clinic. Clinical experience with newborn and premature infants as well as with all aspects of preventive pediatrics is afforded through the Well-Child Clinics. Time is devoted to child psychiatry under the direction of the faculty in child psychiatry, and experience is gained in evaluation of children with emotional and psychosomatic disorders and in application of the various techniques of psychotherapy.

Advanced training in clinical subspecialties such as pediatric allergy, pediatric cardiology, pediatric endocrinology and metabolism, pediatric gastroenterology, pediatric infectious disease, pediatric neurology, pediatric nephrology, pediatric hematology, and child psychiatry is available to qualified individuals for 1 or more additional years. Opportunity for participation in laboratory programs in pathology, hematology, chemistry, and physiology leading to the M.S. degree is offered in the third year for those desiring to pursue such research opportunities. In addition, selected individuals may fulfill the requirements for the Ph.D. degree.

Fellows participate in seminars and conferences covering growth and development, fluid balance and renal function, metabolism, hematology, cardiology, allergy, roentgenology, neurology, and case presentations of ambulatory and hospitalized patients.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 5801. PEDIATRIC CARDIOLOGY. (2 cr per qtr) Ritter and staff
Experience and responsibility in clinical problems of children with heart disease. Emphasis on clinical diagnosis, noninvasive diagnostic techniques, and exposure to postoperative problems. Clinical research projects encouraged for pediatric cardiology trainees.

M 5802. CARDIAC CATHETERIZATION IN CONGENITAL HEART DISEASE. (2 cr per qtr) Ritter and staff
Provides expertise in cardiac catheterization.

M 5803. CLINICAL PEDIATRIC CARDIOLOGY. (1 cr) Ritter and staff
Exposure to and experience in clinical problems of children with heart disease. Emphasis on clinical diagnosis, electrocardiography, management of congestive heart failure, and postoperative problems.

M 8851f,w,s,su. DIAGNOSIS OF MEDICAL AND SURGICAL DISEASES OF INFANTS AND CHILDREN. (6 cr) Staff

M 8852f,w,s,su. HOSPITAL RESIDENCE. (6 cr) Staff
Diagnosis and care of sick infants and children.

M 8853f,w,s,su. CHILD HEALTH. (6 cr) Staff
Diagnosis and care of sick infants and children of the community under direction of consultants.

M 8854f,w,s,su. CARE OF NEWBORN AND WELL INFANTS. (6 cr) Staff
St. Mary's Hospital newborn nursery and Mayo well-baby clinic.

M 8855f,w,s,su. HEALTH SUPERVISION. (6 cr) Staff
City and county well-baby and well-child clinics and schools of city and county.

M 8856f,w,s,su. PEDIATRIC CARDIOLOGY. (6 cr) Staff

M 8857f,w,s,su. PEDIATRIC ALLERGY. (6 cr) Staff

M 8858f,w,s,su. PEDIATRIC HEMATOLOGY. (6 cr) Staff

M 8859f,w,s,su. PEDIATRIC ENDOCRINOLOGY. (6 cr) Staff

M 8860f,w,s,su. PEDIATRIC NEPHROLOGY. (6 cr) Staff

PHARMACEUTICS (Phm)

OFFERED AT MINNEAPOLIS

Professor

Edward G. Rippie, Ph.D., *head, director of graduate study*

Associate Professor

Kenneth W. Miller, Ph.D.
Kenneth G. Nelson, Ph.D.
Ronald J. Sawchuk, Ph.D.

Pharmaceutics is concerned with the elucidation, analysis, and means of control of the physical chemical properties of drugs and their dosage forms as they influence availability to the site of action in the living organism. Such studies include the investigation of the functional relationships existing between tissue or body fluid concentrations of drugs or related compounds, and the rates or mechanisms of their absorption, distribution, metabolism, excretion, and pharmacological activity. Thus the area is broad, allowing for specialization ranging from highly physical to strongly biological orientations.

Degrees Offered—M.S., Plan A and Plan B; Ph.D.

Prerequisites—A degree from a college of pharmacy and an exceptional scholastic record. Consideration will also be given to applicants who are graduates of institutions other than colleges of pharmacy, provided their undergraduate course work satisfies the prerequisites for the graduate course work in pharmaceutics.

The department offers a comprehensive program of course work and research opportunities leading to the M.S. and Ph.D. degrees. A basic background in the physical and biological sciences is provided as a firm foundation for the study of modern pharmaceutics. The broad scope of the program affords the student an opportunity to elect a course of study that best meets individual needs and interests. Minor fields that are particularly desirable include chemistry, chemical engineering, biochemistry, biometry, and pharmacology.

Language Requirement—For the master's degree, none. For the Ph.D. degree, the option of one foreign language or a collateral field of knowledge chosen with the consent of the director of graduate study. The choice must have the approval of the major adviser.

To satisfy the collateral field requirement, the student must complete a total of 9 credits in courses numbered 5000 or above, with grades of at least C. Courses that are a part of the major may not be included.

Master's Degree Final Examination—Oral.

Minor—The choice of the particular courses to be presented in fulfillment of a minor will be made after consultation with the student's adviser.

5670-5680. BIOPHARMACEUTICS—DRUG INFORMATION EVALUATION. (4 cr per qtr; prereq 5th yr, 5640, Phcl 5102; 3 lect hrs per wk, 1 workshop per wk [2 hrs]) Miller, Sawchuk
Processes of drug absorption, distribution, metabolism, and excretion in vivo. Statistical methods and procedures for critical evaluation of current literature dealing with those subjects.

5696.* PREPARATION OF PARENTERAL PRODUCTS. (3 cr; prereq #) Nelson
Principles and procedures involved in manufacture of parenteral products.

5699.* SPECIAL PROBLEMS IN PHARMACEUTICS. (Cr ar; prereq #) Staff
Problems in formulation, production, and evaluation of pharmaceutical products.

8100.* SEMINAR: PHARMACEUTICS. (1 cr; required of majors in pharmaceutics) Staff

8101. READINGS IN PHARMACEUTICS. (1 cr; prereq #) Staff
Current literature.

8200.* RESEARCH PROBLEMS. (Cr ar; prereq #) Staff
Experimental investigation of problems in pharmaceutics.

8410. STABILIZATION OF PHARMACEUTICALS. (3 cr; prereq Chem 5503) Staff
Application of physiochemical principles (e.g., chemical kinetics) to elucidate and minimize stability problems in pharmaceutical systems.

8420-8421.* PHARMACOKINETICS. (3 cr per qtr; prereq 5680, Math 1444, or #; offered when demand warrants) Miller, Sawchuk
Application of compartmental models to study of absorption, distribution, metabolism, and excretion of drugs. Introduction to and use of analog computer in determination of model parameters. Techniques of drug administration and biological fluid sampling in laboratory animals.

8430. DRUG TRANSPORT. (3 cr; prereq Chem 5503) Nelson
Theory of diffusional transport of drug molecules with applications to pharmaceutical dosage forms.

8440. PHYSICAL PHARMACY. (4 cr; prereq 5860 and survey course in physical chemistry or #; 4 hrs per wk; offered when demand warrants) Rippie
Application of physical chemical relationships between drugs and their formulations for optimization of bioavailability.

8441. PHYSICAL PHARMACY. (3 cr; prereq 5680 and survey course in physical chemistry or #; offered when demand warrants) Rippie
Physical and physical chemical properties of drugs in solid state form as related to their bioavailability.

8442. PHYSICAL PHARMACY LABORATORY. (1 cr; prereq 5680, ‡8441, and a survey course in physical chemistry or #; offered when demand warrants) Rippie
Laboratory experimentation dealing with application of physical and chemical information to dosage form design.

PHARMACOGNOSY (Phcg)

OFFERED AT MINNEAPOLIS

Professor
E. John Staba, Ph.D., *chairman, director of graduate study*

Associate Professor
Yusuf Abul-Hajj, Ph.D.

Assistant Professor
Daniel G. Miller, Ph.D.

The graduate pharmacognosy program provides an opportunity to study the medicinals in biological systems from one of the four following perspectives: microbiological, biochemical, immunological, botanical. Because of the multidisciplinary nature of pharmacognosy, each student's program will be constructed to meet individual specialized needs and interests. The student may be engaged in interdisciplinary studies through other University departments such as anthropology, biochemistry, botany, microbiology, medicinal chemistry, chemistry, pharmacology, and pharmaceutics.

Degrees Offered—M.S., Plan A (Plan B by special arrangement); Ph.D.

Prerequisites—A degree from an accredited college of pharmacy and a superior scholastic record. Consideration will also be given to applicants who are graduates of institutions other than colleges of pharmacy.

Language Requirement—For the M.S. degree, none. For the Ph.D degree, a reading proficiency in French, German, Russian, Chinese, or Japanese.

5810s. MEDICINAL PLANTS. (2 cr. prereq #) Staba
Survey of the biologic, biochemical, and economic features of natural drugs and their constituents. Emphasis on drugs from higher plants.

5820f. INTRODUCTORY PHARMACOGNOSY. (3 cr; prereq MicB 3103, MedC 5440 or #) Miller
Principles of immunology and allergy, pathogenic microorganisms, and treatment or prevention of disease states with immunizing biologicals.

5830s. INTRODUCTORY PHARMACOGNOSY. (2 cr; prereq MicB 3130, Phar 5440 or #) Staba
Production, constituents, metabolism, and therapeutic uses of drugs containing antibiotics and enzymes, and pharmaceuticals of blood origin.

5840w. INTRODUCTORY PHARMACOGNOSY. (3 cr; prereq MicB 3103, Phar 5440 or #) Abul-Hajj
Production, constituents, metabolism, and therapeutic uses of drugs containing hormones, vitamins, and alkaloids.

5860w. ANTIBIOTICS. (2 cr; prereq 5830 or #; offered 1979-80 and alt yrs) Staba
Natural antibiotic substances. Methods of production, biosynthesis, extraction, and assay; chemical, pharmaceutical, and chemotherapeutic properties. Emphasis on antibiotic development and manufacture.

5870f. HORMONES. (2 cr; prereq #; offered 1979-80 and alt yrs) Abul-Hajj
Biosynthesis, chemistry, biochemical functions, mechanisms of actions, production, and uses.

5880f. PHARMACEUTICAL IMMUNOLOGY. (2 cr; prereq #) Miller
Selected topics dealing with pharmaceutical and clinical aspects of immunology.

5899. SPECIAL PROBLEMS IN PHARMACOGNOSY. (Cr ar; prereq #) Staff
Microbiology, chemistry, or biology of medicinal natural products.

8100w. MEDICINAL PRODUCT ISOLATION AND IDENTIFICATION. (4 cr; prereq 5810 or #) Staff
Isolation and identification of selected natural product types (e.g., steroids, terpenes, phenylpropides, alkaloids, glycosides, pigments).

8300f. PHARMACEUTICAL CELL SYSTEMS. (4 cr; prereq #; offered 1980-81 and alt yrs) Staff
Laboratory exercises demonstrating the uses of cellular techniques in production, biotransformation, and assay of antibiotics, steroids, alkaloids, growth regulators, and other useful compounds by microorganisms, tissue cultures, and extracellular enzyme preparations.

8400. SELECTED TOPICS. (3 cr) Staff
Lectures and discussions on topics varying from quarter to quarter according to staff availability and needs of department.

8500. PHARMACOGNOSY SEMINAR. (1 cr) Staff

8600w. READINGS IN PHARMACOGNOSY. (1 cr; prereq #) Staff
Evaluation of current literature.

8900x. RESEARCH IN PHARMACOGNOSY. (Cr ar; prereq #) Staff

PHARMACOLOGY (Phcl)

OFFERED AT MINNEAPOLIS

Professor

Frederick E. Shideman, M.D., Ph.D., *head, director of graduate study*
Marion W. Anders, Ph.D., D.V.M.
Nelson D. Goldberg, Ph.D.
Norman O. Holte, D.D.S.
Gilbert J. Mannering, Ph.D.
Jack W. Miller, Ph.D.
Bernard L. Mirkin, M.D., Ph.D.
Norman E. Sladek, Ph.D.
Sheldon B. Sparber, Ph.D.
Akira E. Takemori, Ph.D.
Lawrence C. Weaver, Ph.D.
Ben G. Zimmerman

Associate Professor

James F. Cumming, M.D., Ph.D.
Earl W. Dunham, Ph.D.
Patrick E. Hanna, Ph.D.
Jordan L. Holtzman, M.D., Ph.D.
Donald B. Hunninghake, M.D.
Richard J. Meisch, M.D., Ph.D.
Aloysius J. Quebbemann, Ph.D.

Assistant Professor

Mark R. Montgomery, Ph.D.
George L. Wilcox, Ph.D.

Lecturer

Faruk S. Abuzzahab, M.D., Ph.D.

Pharmacology is a broad science that deals with the interactions between drugs and other chemicals and living organisms or life processes at all levels of organization. Facilities are available for most types of training and research in this field. For those primarily interested in toxicology or psychopharmacology, appropriate programs are available. Excellent opportunities exist for cooperative clinical research through members of the staff who hold joint appointments in clinical departments of the Medical School and are members of the Division of Clinical Pharmacology of the Department of Pharmacology.

Graduate training in the field of pharmacology is usually oriented toward the Ph.D. degree. The M.S. degree is offered only under special circumstances. Several graduate fellowships, research assistantships, teaching assistantships, or traineeships are usually available.

Degrees Offered—Ph.D. and, under special circumstances, the M.S., Plan A.

Prerequisites—In addition to fulfilling requirements for admission to the Graduate School, students should be well grounded in the biological and physical sciences.

Major—For a major the student is required to complete pharmacology courses 5111 (or an acceptable alternative), 8203, 8204, 8211 and 8212, and any other advanced major courses (8206, 8208, 8209 or 8214 through 8219) totaling a minimum of 5 credits. Prerequisite courses include physiology and biochemistry. Additional requirements are courses in histology, statistics, calculus, microbiology, and such others as may be indicated by the major adviser.

Minor—To meet the requirements for a minor in pharmacology the student must satisfactorily complete 22 credits of course work. This work must include courses 5111 (or an acceptable alternative) and 8211 or 8212, and no more than 6 credits of seminar of which at least 3 credits shall be 8204.

Language Requirement—For the master's degree, no language is required. For the Ph.D. degree, either (a) one language or (b) an additional program cf course work approved by the department. Routinely acceptable languages for the Ph.D. degree are French, German, Italian, Russian, and Spanish

5110. PHARMACOLOGY A. (3 cr; prereq regis med or #) Shideman and staff
Lectures and laboratories on general principles of pharmacology and autonomic and central nervous system drugs.

5111. PHARMACOLOGY B. (5 cr; prereq 5110 or #) Shideman and staff
(Continuation of 5110) Lectures and laboratories on the major classes of drugs not considered in 5110.

8203. RESEARCH IN PHARMACOLOGY. (Cr ar; prereq #) Shideman and staff

8204. SEMINAR: SELECTED TOPICS IN PHARMACOLOGY. (3 cr on completion of 3 qtrs; prereq 5111 or #) Sladek and staff

8206f. SEMINAR: MICROASSAY OF DRUGS. (1 cr; prereq Chem 3101 or #; offered 1979-80 and alt yrs) Holtzman and staff
Review of analytical methods for identification and quantification of drugs in body fluids with emphasis on instrument and radiometric technics. Basic principles, applications, and limits of each method. Demonstrations.

8207. SEMINAR: PSYCHOPHARMACOLOGY. (3 cr on completion of 3 qtrs; prereq #) Sparber and staff
Selected topics on behavioral aspects of drug action.

8208s. NEUROPSYCHOPHARMACOLOGY. (3 cr; prereq 5111, Psy 5018, Psy 5062, or #; offered 1980-81 and alt yrs) Sparber and staff
Lectures on methodologies currently in use to study relationships between drugs and biochemical, behavioral, and neurophysiological consequences. Includes discussions of functional biogenic amine, pepitergic, and other pathways and how specific manipulations result in altered neuronal function and behavior; theories of feedback mechanisms, induction, and inhibition; and theories of tolerance to and/or dependence upon stimulants, hallucinogens, depressants, and opiates.

8209w. NEUROHORMONES AND NEUROPHARMACOLOGICAL AGENTS. (2 cr; prereq 5111 or equiv, or #; offered 1979-80 and alt yrs) Hanna
Selected topics on the molecular and bioorganic aspects of the activities of neuroactive chemicals and drugs.

8211w. PHYSIOLOGICAL DISPOSITION OF DRUGS. (3-4 cr; prereq MdBc 5101 or equiv or #) Mannering and staff
Principles underlying absorption, distribution, biotransformation, and excretion of drugs.

8212s. PHARMACODYNAMICS. (3 cr; prereq 5111 or #) Sladek and staff
Lectures and laboratory experiments for studying physiological, biochemical, and behavioral effects of drugs.

8214s. TOXICOLOGY. (3 cr; prereq MdBc 5101 or equiv, or #; offered 1979-80 and alt yrs) Anders and staff
Lectures on toxic effects and mechanisms of intoxication of drugs and foreign chemicals known to adversely alter health and ecology of humans and animals.

8215w. CANCER CHEMOTHERAPY. (2 cr; prereq MdBc 5101 or equiv, or #; offered 1980-81 and alt yrs) Sladek and staff
General principles of antineoplastic chemotherapy with emphasis on mechanisms of action and bases for selective toxicity. Lectures, assigned reading, discussion periods, and demonstrations.

8217w. CARDIOVASCULAR-RENAL PHARMACOLOGY. (3 cr; prereq 5111 or equiv. or #; offered 1979-80 and alt yrs) Zimmerman, Quebbemann, Goldberg, and staff
Lectures on neurogenic and humoral control of circulation, transport, and metabolism in the kidney and biochemical and molecular aspects of hormone and neurohormone actions including mechanisms by which pharmacological agents affect these systems.

8219s. ADVANCED TOXICOLOGY. (1 cr; prereq 8214 or #; offered 1980-81 and alt yrs) Anders, Montgomery
Lectures on the biochemical mechanisms of intoxication of selected compounds.

PHARMACOLOGY

OFFERED AT ROCHESTER

Professor

John R. Blinks, M.D., *chairman*
Joseph H. Szurszewski, Ph.D.
Russell A. Van Dyke, Ph.D.
Richard M. Weinshilboum, M.D

Associate Professor

William S. Brimijoin, Ph.D.
Garth Powis, D.Phil.
Elliott Richelson, M.D.
Joseph H. Szurszewski, Ph.D.
Stuart R. Taylor, Ph.D.

Assistant Professor

Matthew M. Ames, Ph.D.
Franklyn G. Prendergast, Ph.D.

A program leading to the Ph.D. is offered at the Mayo Graduate School of Medicine under the aegis of the graduate program in pharmacology in Minneapolis. Candidates whose goal is the master's degree will not normally be considered for admission. Well-prepared students may complete the course requirements for the Ph.D. entirely in Rochester. Students whose backgrounds are deficient in certain subjects may find it necessary to take courses in these fields on the Minneapolis campus. Others may wish to take elective courses in Minneapolis that are not offered in Rochester. For either or both of these reasons, some students may elect to spend one or more quarters on the Minneapolis campus during the course of their graduate work.

Prerequisites—In addition to fulfilling all requirements for admission to the Graduate School, students should be well-grounded in the biological and physical sciences. Specifically, they should have taken college-level courses in general biology, physics, and chemistry; organic chemistry; physical chemistry; and calculus through differential equations. Courses in comparative vertebrate anatomy, histology, and molecular biology are recommended. Students who lack knowledge in some of these areas may in some cases be admitted, but they will be required to make up the deficiencies by completing appropriate courses during their graduate training.

Course Requirements—*General:* Whatever minors they choose, students will be expected to have or to acquire a broad background in the basic medical sciences, including anatomy/pathology, biochemistry, physiology, microbiology/immunology, and statistics. This requirement and the requirements for a minor in any of these fields can be met by taking courses offered in Rochester.

Pharmacology: Students will be expected to take the following courses (or Minneapolis courses, which are in parenthesis): M 5800, M 5801, M 5802 (5110-5111); M 8805 (8211); M 8808 (8212); M 8806; M 8807 (8204); 9 credits of elective courses in pharmacology.

Language Requirement—One language (French, German, or Russian) or an additional program of course work approved by the department is required. The additional program usually is in computer science.

Minor—To meet the requirements for a minor in pharmacology, the student must satisfactorily complete 22 credits of course work in pharmacology and statistics. If the student has not already taken comparable courses, these courses must include:

BioS M 5823, M 5824, and M 5825 (or Phcl 8210)
Phcl M 5800, M 5801, and M 5802 (or 5110 and 5111)
Phcl M 8805 (or 8211)
Phcl M 8808 (or 8212)

M 5800f, 5801w, 5802s. GENERAL PHARMACOLOGY. (3 cr per qtr; prereq medical school physiology and biochemistry or equiv) Blinks and staff
Survey course for medical and graduate students with no previous training in pharmacology.

M 8800. READINGS IN PHARMACOLOGY. (1 cr) Staff

M 8801. RESEARCH IN PHARMACOLOGY. (6 cr)

M 8802. PHARMACOLOGY OF HEART MUSCLE. (1½ cr; prereq #) Blinks
Lectures, discussions, and demonstrations on the cellular basis of action of drugs on heart muscle.

M 8803. NEUROPHARMACOLOGY. (1½ cr) Brimijoin, Weinshilboum
Lectures, discussions, and demonstrations on the cellular and biochemical basis of action of drugs on the nervous system.

M 8804. CLINICAL PHARMACOLOGY. (1½ cr; prereq M 5800, 5801, 5802; offered every third year) Weinshilboum and staff
Rational pharmacologic basis of therapy with major categories of drugs used in clinical practice of medicine with emphasis on pharmacokinetics, drug metabolism, pharmacogenetics, and mechanism of action of drugs.

M 8805s. PHARMACOKINETICS AND DRUG METABOLISM. (3 cr; offered alt yrs) Powis and staff
Principles of disposition of drugs in biological systems. Lectures in absorption, distribution, excretion, and metabolic transformation of drugs; descriptions of enzyme systems and factors affecting them.

M 8806w. PHARMACOLOGY OF RECEPTORS. (3 cr; offered even yrs) Brimijoin and staff
Origin of concept of drug-receptor interaction; molecular basis for drug-macromolecule interactions; mathematical theories; isolation and physicochemical characterization of receptors.

M 8807. SEMINAR: SELECTED TOPICS IN PHARMACOLOGY. (1 cr per qtr [minimum 3 qtrs required]; prereq M 5800-5802 or #) Staff

M 8808. RESEARCH TECHNIQUES IN PHARMACOLOGY. (3 cr) Staff
Students rotate through a series of laboratories to gain experience with a broad spectrum of research techniques useful in pharmacology.

M 8809. MOLECULAR PSYCHOPHARMACOLOGY. (1½ cr; prereq M 5800-5802 or equiv) Richelson
In-depth review of mechanism of action of psychotherapeutic drugs designed to give an understanding of their molecular basis of action as therapeutic agents and as laboratory tools.

M 8810. TOXICOLOGY. (1½ cr) Van Dyke and staff
Lectures, discussion, and demonstrations on the principles of intoxication by drugs and other foreign substances. Includes mechanisms of intoxication, detoxification, and a review of specific organic and inorganic intoxicants.

M 8811. PHARMACOLOGY AND PHYSIOLOGY OF SYNAPTIC TRANSMISSION. (3 cr; prereq courses in physical sciences, mathematics, and Phys M 8856 or equiv) Taylor and staff
Lectures, seminars, journal club, and demonstrations on the identification of neurotransmitters and the mechanism of excitatory and inhibitory synaptic transmission, particularly at the neuromuscular junction.

PHYSICAL MEDICINE AND REHABILITATION (PMed)

OFFERED AT MINNEAPOLIS

Professor

Frederic J. Kottke, M.D., Ph.D. *head*
Essam A. Awad, M.D., Ph.D., *director of graduate study*
Gary T. Athelstan, Ph.D.
Glenn Gullickson, Jr., M.D., Ph.D.
Daniel Halpern, M.D.
William G. Kubicek, Ph.D.
Alan H. Roberts, Ph.D.

Clinical Professor Emeritus

Miland E. Knapp, M.D., M.A.

Clinical Professor

Paul M. Ellwood, Jr., M.D.

Associate Professor

Thomas Anderson, M.D., M.S.
Pearl Rosenberg, Ph.D.

The field of physical medicine and rehabilitation, which includes physical therapy, occupational therapy, vocational counseling, guidance, and training of the physically handicapped, is one of the most rapidly expanding specialties in medicine. Trained physiatrists are in great demand in medical schools, private practice, Veterans Administration hospitals, and many state hospitals for the chronically disabled. The field of physical medicine, therefore, offers unusual opportunity to the young physician.

Opportunity for clinical and fundamental research as well as for clinical experience and training is offered at University of Minnesota Hospitals. Additional clinical experience is obtained at the Hennepin County Medical Center, Veterans Hospital in Minneapolis, Kenny Rehabilitation Institute, and St. Paul-Ramsey General Hospital.

Students devote full time to their training program and may not carry on outside practice. The 3-year program fulfills the requirements of training for the American Board of Physical Medicine and Rehabilitation. As a part of the program, all graduate students are required to carry out a problem of independent research under the direction of their major adviser. For the minor field of study, anatomy, physiology, biophysics, or pathology are especially recommended.

Master's Degree—For graduate physicians, the M.S. degree is offered under Plan A. This program, which also fulfills the didactic requirements of the American Board of Physical Medicine and Rehabilitation, usually requires 3 years for completion.

Doctor's Degree—The Ph.D. degree in physical medicine and rehabilitation is designed for physicians interested in a career of teaching and research. Completion of this program requires approximately 5 years. In addition to the clinical training and participation in the teaching program, extensive experience is obtained in laboratory and clinical research.

Language Requirement—For the Ph.D. degree, either (a) one language and the option of a collateral field of knowledge, or (b) two collateral fields of knowledge. Routinely acceptable languages are French, German, Italian, Russian, and Spanish.

8200f,w,s,su. PHYSIATRY SERVICE. (Cr ar) Staff
Service at University Hospitals, Hennepin County Medical Center, St. Paul-Ramsey Hospital, Kenny Rehabilitation Institute, Veterans Administration Hospital, and other affiliated hospitals.

8204f,w,s,su. PERIPHERAL VASCULAR DISEASE CLINIC. (Cr ar; for physicians) Gullickson

8205f,w,s,su. READINGS IN PHYSICAL MEDICINE AND REHABILITATION. (2 cr per qtr) Kottke

8206f,w,s. CONFERENCE ON PHYSICAL MEDICINE AND REHABILITATION. (2 cr per qtr) Awad
Topics vary from quarter to quarter. Prepared papers required.

8207. BASIC AND APPLIED PHYSIATRY. (2 cr) Staff
Assigned readings, lectures, and discussions on the anatomic, physiologic, pathologic, biophysical, and psychological bases of physiatry.

8210f,w,s,su. RESEARCH IN PHYSICAL MEDICINE. (Cr ar) Awad, Gullickson, Kottke, Kubicek, and staff

8211f,w,s,su. ELECTRONICS IN PHYSICAL MEDICINE. (2 cr) Kubicek
Review of principles of electronic circuits, vacuum tubes, power supplies, and their application in physical medicine.

8212f,w,s. ELECTROMYOGRAPHY. (Cr ar; prereq #) Awad
Clinical and laboratory training in use and interpretation of electromyography.

8213f,s. ELECTRODIAGNOSIS CONFERENCE. (Cr ar; prereq 8211 or #) Awad
Clinical presentation and discussion of cases examined in the Electrodiagnostic Laboratory.

8214f,w,s. READINGS IN ELECTROMYOGRAPHY. (1 cr; prereq #) Awad
Assigned readings and discussions on the anatomic, physiologic, pathologic, and technical developments in electromyography.

8220f,w,s. SEMINAR: PHYSICAL MEDICINE AND REHABILITATION. (Cr ar) Awad

8230. LEADERSHIP TRAINING FOR INTERDISCIPLINARY SETTINGS. (1 cr) Rosenberg

PHYSICAL MEDICINE AND REHABILITATION

OFFERED AT ROCHESTER

Professor

G. Keith Stillwell, M.D., Ph.D., *chairman*
Gordon M. Martin, M.D., M.S.

Associate Professor

Donald J. Erickson, M.D., M.S.
Henry H. Stonnington, M.B.B.S., M.S.

The residency program in physical medicine and rehabilitation, which meets the requirements of the specialty board and is approved by the Liaison Committee on Graduate Medical Education, is available to physicians, whether or not they have previously completed any graduate medical education. The program involves 4 quarters of inpatient comprehensive medical rehabilitation (for one of which an elective may be substituted), 3 quarters of consultative experience working with patients for whom other services have primary responsibility, 1 quarter of neurology, and 2 quarters of clinical electromyography. For those who have not completed a postgraduate year of medical education, 1 quarter of internal medicine and 1 quarter of orthopedic surgery are included early in the program, as required by the American Board of Physical Medicine and Rehabilitation. Extensions of the clinical training by 1 or 2 quarters can be arranged. Residents demonstrating superior performance may receive appointments as senior resident associates during the last quarter or two of their programs.

Consultative experience is gained both in the hospital divisions of the department and in the outpatient division. Experience is gained in applying physiatric practices to a wide variety of clinical conditions and problems through working with patients (about 9,000 patients are seen in the hospitals and 15,000 in the outpatient division each year). Residents work in a preceptorship relationship with staff physiatrists.

On the 58-bed service at St. Mary's Hospital, where the Department of Physical Medicine and Rehabilitation has primary responsibility for the total care of patients, residents become proficient in the medical and physical management of patients with spinal cord injury, hemiplegia, and other major physical disabilities. Residents learn to prescribe rehabilitation programs for severely handicapped patients and to follow their progress. They also gain experience in coordinating and using the services of other medical specialists and health professionals, including speech patholgists, physical and occupational therapists, prosthetists, orthotists, social service personnel, psychologists, and vocational counselors.

Clinical conferences, seminars, lectures, and informal discussions of clinical problems with a staff of about 14 full-time physiatrists make it possible for residents to obtain clinical and theoretical experience in various aspects of physical medicine and rehabilitation as well as in related medical and surgical fields.

Requirements for the M.S. degree include an additional 6 to 9 months of training, and for the Ph.D. degree, an additional 24 months. The additional time is required for completion of a research project, a thesis, additional course work, and written and oral examinations. Research is also generally carried out in one of the basic or nonclinical science departments such as physiology, biophysics, electromyography, biomechanics, anatomy, or statistics. The research is usually completed in the minor field for the degree and provides the material for the thesis.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 8850su. INTRODUCTION AND ORIENTATION TO PHYSICAL MEDICINE AND REHABILITATION. (2 cr) Staff Introduction to the functions of the Department of Physical Medicine and Rehabilitation and the roles of physicians and other health professionals in the department.

M 8851f,w,s,su. OUTPATIENT CLINICAL PHYSICAL MEDICINE AND REHABILITATION. (6 cr) Staff

M 8852f,w,s,su. PHYSICAL MEDICINE AND REHABILITATION HOSPITAL CONSULTING SERVICE. (6 cr) Staff
Physical medicine and rehabilitation as related to rheumatology, orthopedic surgery, neurology, and various other medical and surgical specialties.

M 8853f,w,s,su. HOSPITAL REHABILITATION SERVICE. (6 cr) Staff

M 8854f,w,s. BASIC AND APPLIED PHYSIATRY. (2 cr) Staff
Study, presentation, and discussion of selected relevant subjects.

M 8855f,s. AMPUTATIONS AND PROSTHETICS. (3 cr) Staff
Surgical, medical, and rehabilitative aspects of amputee management. Lectures, laboratories, experience, and attendance at the Amputee Clinic.

M 8856f,w,s. SEMINARS IN PHYSICAL MEDICINE AND REHABILITATION. (1 cr) Staff
Selected readings, seminars, and research papers presented by staff and residents.

M 8857f,w,s,su. READINGS IN PHYSICAL MEDICINE AND REHABILITATION. (1 cr) Staff
Presentation by students and staff of selected readings devoted to a single subject area at each session.

M 8890f,w,s,su. RESEARCH WORK ON SELECTED PROBLEMS. (6 cr)

PHYSICAL THERAPY (PMed)

OFFERED AT MINNEAPOLIS

Professor

Frederic J. Kottke, M.D., Ph.D., *head*
Thomas P. Anderson, M.D.
Essam A. Awad, M.D., Ph.D.
Glenn Gullickson, Jr., M.D., Ph.D.
William G. Kubicek, Ph.D.

Associate Professor

Helen V. Skowlund, M.S., *director of graduate study*
John D. Allison, M.S.
Martin O. Mundale, M.S.

Graduate study in physical therapy is available for qualified candidates who wish to prepare for a career in teaching, research, or administration. The curriculum is planned to meet Graduate School requirements and to provide students with course material and clinical experience to meet individual goals.

Qualified physical therapists desiring to prepare for a career in public health are advised to contact the School of Public Health for information regarding the M.P.H. program.

Master's Degree—Offered under both Plan A and Plan B.

Prerequisites—Completion of a physical therapy curriculum approved by the American Physical Therapy Association or the American Medical Association Committee on Allied Health Education and Accreditation or its equivalent is required. Candidates must also have completed a baccalaureate degree with sufficient scholarly attainment in the sciences to justify graduate work. Two years of previous clinical experience in physical therapy are recommended. Applicants should submit a statement of their goals and evidence of personal and professional qualifications as supplied by three letters of reference. Submission of Graduate Record Examination scores is recommended but not required. Summer or fall entry is recommended.

Minor Field—Students who major in physical therapy under Plan A may select a minor in anatomy, educational psychology, psychology, public health, or education.

Related Fields—Under Plan A or Plan B not less than 8 of the 44 required credits must be outside the major. The related fields should be selected by students in consultation with their major adviser with consideration of their background and goals. Suggested fields include education, educational administration, social and philosophical foundations of education, psychology, sociology, public health, child psychology, and business administration.

Language Requirement—None.

Examinations—All candidates will be required to take a final oral examination.

Physical Therapy as a Minor—Offered only to qualified physical therapists majoring in an allied field. Choice of particular courses to be presented in fulfillment of requirements will be made after consultation with the student's adviser.

5182w. FUNCTIONAL NEUROANATOMY AND NEUROPHYSIOLOGY. (5 cr) Huss

5291. SEMINAR: CONTEMPORARY ISSUES IN PHYSICAL THERAPY. (2 cr; prereq #) Ellingham, Pauley

8103f,w,s,su. PHYSICAL THERAPY CLINIC. (Cr ar; prereq physical therapist) Awad, Gullickson, Kottke, Price
Clinical physical therapy in adult and pediatric rehabilitation.

8130x. CURRENT LITERATURE SEMINAR IN PHYSICAL THERAPY. (1 cr [may be repeated for cr]) Staff
Presentation and discussion of current literature in physical therapy and related medical fields.

8135. ADVANCED KINESIOLOGY. (3 cr) Mundale, Pohtilla
Functional anatomy stressing anatomical, physiological, and biomechanical aspects of normal and pathological human motion. Lecture with laboratory to include various techniques available for analysis.

8140. PHYSIOLOGICAL ASSESSMENT IN PHYSICAL THERAPY. (1 cr) Allison, Mundale
Introduction to objective methods of assessing function of neuromuscular, cardiovascular, and perceptual motor systems.

8150. RESEARCH METHODOLOGY IN PHYSICAL THERAPY: ELECTROMYOGRAPHY AND NERVE CONDUCTION. (3 cr) Allison, Awad
Lecture and laboratory sessions on instrumentation, physiological, anatomical, and kinesiological considerations related to electromyography and nerve conduction research.

8161, 8162. CLINICAL MEDICINE IN REHABILITATION. (3 cr per qtr) Kottke

8170. SPECIAL TOPICS IN PHYSICAL THERAPY. (1 cr per qtr; prereq #) Staff
Advanced seminar. Topics vary from quarter to quarter. Prepared papers required.

8171. ADMINISTRATION OF PHYSICAL THERAPY SERVICES. (Cr ar; prereq #) Pauley
Selected problems in administration of physical therapy in hospitals, clinics, and community agencies.

8172, 8173. EDUCATIONAL ADMINISTRATION IN PHYSICAL THERAPY. (Cr ar; prereq #)
Philosophy and objectives of physical therapy education, administrative structure, curriculum, and accreditation. 8172: Lectures and discussion. 8173: Clinical practice; analysis and construction of courses of study.

8180s, 8181f. PHYSIOLOGICAL BASES FOR THERAPEUTIC EXERCISE. (3 cr per qtr) Kottke, Mundale
Lectures on therapeutic exercise plus assigned projects.

8185f,w,s,su. PROBLEMS IN PHYSICAL THERAPY. (Cr ar; prereq physical therapist)

8188. TEACHING PRACTICUM. (Cr ar [max 8 cr]; prereq #) Staff
Supervised experience in teaching and evaluation; development of skills in effective use of instructional materials in lecture and laboratory courses.

8192w. RESEARCH DESIGN IN PHYSICAL THERAPY. (3 cr; prereq #) Skowlund
Critical appraisal of current medical literature; fundamentals of research design and techniques of medical writing.

8193. RESEARCH PROBLEMS IN PHYSICAL THERAPY. (Cr ar; prereq 8192 or #) Allison, Mundale, Skowlund
Methods of research appropriate to physical therapy. Experimental research study.

8195. RESEARCH IN PHYSICAL THERAPY. (Cr ar; prereq 8192 or #) Allison, Kottke, Mundale, Skowlund

8211f,w,s,su. ELECTRONICS IN PHYSICAL MEDICINE. (2 cr) Kubicek

8230. LEADERSHIP TRAINING FOR INTERDISCIPLINARY SETTINGS. (1 cr) Rosenberg

PHYSIOLOGICAL HYGIENE (PubH)

OFFERED AT MINNEAPOLIS

Professor

Arthur S. Leon, M.D., M.S., *director of graduate study*
Henry W. Blackburn, M.D., M.S.
Ronald J. Prineas, M.B.B.S., Ph.D.
Henry L. Taylor, Ph.D.

Associate Professor

Richard S. Crow, M.D.
Richard F. Gillum, M.D.
Robert W. Jeffery, Ph.D.
Russell V. Luepker, M.D., M.S.
Maurice B. Mittlemark, Ph.D.

Master's Degree—Offered only under special circumstances under Plan A.

Doctor's Degree—Members of the physiological hygiene faculty who are appointed to the graduate faculty in physiological hygiene, epidemiology, biostatistics, biochemistry, or nutrition may advise students majoring in those fields. The program will incorporate interdisciplinary subjects within the major. The Ph.D. program in physiological hygiene is open to a limited number of well-qualified students planning an academic career related to the public health aspects of cardiovascular disease.

Minor—It is suggested that students who major in physiological hygiene present a minor in one of the following fields: epidemiology, biochemistry, nutrition, medicine, physiology, or health behavior.

Language Requirement—For the master's degree, none. For the Ph.D. degree, either one foreign language or a collateral field of knowledge.

Note—For course listings, see the Public Health section of this bulletin.

PHYSIOLOGY (Phsl)

OFFERED AT MINNEAPOLIS

Professor Emeritus

Maurice B. Visscher, M.D., Ph.D.

Professor

Eugene Grim, Ph.D., *head, director of graduate study*
Marvin B. Bacaner, M.D.
James R. Bloedel, M.D., Ph.D.
H. Mead Cavert, M.D., Ph.D.
Irwin J. Fox, M.D., Ph.D.
Franz Halberg, M.D.
Rodney B. Harvey, M.D., Ph.D.
John A. Johnson, M.D., Ph.D.
William G. Kubicek, Ph.D.
David G. Levitt, M.D., Ph.D.
Nathan Lifson, M.D., Ph.D.
Jack H. Oppenheimer, M.D.
Richard E. Poppele, Ph.D.
Richard L. Purple, Ph.D.
Henry L. Taylor, Ph.D.
Carlo A. Terzuolo, M.D.
Esmail D. Zanjani, Ph.D.

Associate Professor

Charles K. Knox, Ph.D.
C. P. Lee, Ph.D.
Jui S. Lee, Ph.D.
Arthur S. Leon, M.D.
Maurice W. Meyer, D.D.S., Ph.D.
John F. Soechting, Ph.D.
O. Douglas Wangensteen, Ph.D.

Assistant Professor

John H. Anderson, M.D., Ph.D.
Jurgen F. Fohlmeister, Ph.D.
Gordon Kepner, Ph.D.
Richard J. Stish, B.E.E.

Lecturer

Robert L. Evans, Ph.D.
Richard Kronenberg, M.D., Ph.D.
Ida M. Martinson, Ph.D.
Lester D. Michels, Ph.D.
Fernando F. Vargas, D.D.S., Ph.D.

Degrees Offered—Ph.D., M.S. under Plan A or Plan B.

Prerequisites—For a major or minor in physiology, background in mathematics, physics, chemistry, and morphology acceptable to the graduate faculty is required.

Special Major Field Requirements for Admission—In addition to transcripts of prior course work, applicants are encouraged to take the Graduate Record Examination (verbal, analytical, and quantitative sections).

Program Requirements—Programs are highly individualized and are developed to meet the needs of each student. For all doctoral candidates the 6-quarter sequence 8103 to 8108 is strongly recommended.

Language Requirement—There is no language requirement for the M.S. degree. For the Ph.D. degree, students, in consultation with their adviser, will elect to demonstrate a reading knowledge in one language or to complete a collateral field of knowledge.

Final Examination for Master's Degree—Master's degree students will take a final oral examination.

5094f-5095w. HUMAN PHYSIOLOGY. (3 cr; primarily for medical-surgical and public health nurses; prereq courses in biochemistry and human or mammalian anatomy) Staff
Survey from a regulatory and control system point of view with emphasis on pathophysiology and regulatory imbalances in disease.

5100s. NEUROSCIENCE FOR DENTAL STUDENTS. (2 cr; prereq courses in biochemistry and human anatomy, concurrent regis in Anat 5110 [2 cr]; 3 lect and 3 lab hrs per wk)
Basic principles of nervous function through a combined study of neuroanatomy and neurophysiology.

5101w. HUMAN PHYSIOLOGY. (5 cr; primarily for dental students; prereq biochemistry and 5100; 6 lect and 3 lab hrs per wk for 1st 7 wks of qtr)
Principles of physiology of circulation, respiration, digestion, excretion, metabolism, endocrine glands.

5102w. PHYSIOLOGY AND DENTISTRY. (1 cr; for dental students only; prereq 5101) Meyer and staff
Lecture-conference course for integrating physiology and dentistry.

8103f. GENERAL PHYSIOLOGY. (3 cr; prereq physical chemistry, #; offered even-numbered yrs) Grim, Johnson, Kepner, Levitt, Lifson
Mechanisms of transport and energy transformation in living organisms.

8104w. NEUROPHYSIOLOGY. (4-6 cr [1-2 cr term paper option], prereq neuroanatomy and #; offered odd-numbered yrs) Knox, Poppele, Purple, Terzuolo

8105s. CARDIOVASCULAR PHYSIOLOGY. (4 cr; prereq #; offered odd-numbered yrs) Bacaner, Cavert, Fox, Johnson

8106f. RESPIRATORY PHYSIOLOGY. (3-4 cr [4 cr regis includes laboratory and is intended for physiology grad students only]; prereq #; offered odd-numbered yrs) Kronenberg, Wangensteen

8107w. ALIMENTARY PHYSIOLOGY. (3 cr; prereq #; offered even-numbered yrs) Grim, Lifson

8108s. NEPHROLOGY. (4 cr; prereq #; offered even-numbered yrs) Harvey

8110w. HUMAN PHYSIOLOGY. (5 cr; prereq anatomy, biochemistry)

8111s. HUMAN PHYSIOLOGY. (6 cr; prereq 8110, anatomy, biochemistry; course ends in July)

8113f,w,s,su. PROBLEMS IN PHYSIOLOGY. (Cr ar; prereq #) Staff
Topics assigned for readings or lab study; conferences.

8114f. BIOPHYSICS OF NERVE CELLS. (3 cr; prereq #; offered odd-numbered yrs) Staff
Electrostatics, cable theory, the Hogkin-Huxley model, propagated action potential, theoretical considerations of nerve impulse initiation, generalized Nernst-Goldman equation, noise.

8115w. MATHEMATICAL NEUROPHYSIOLOGY. (4 cr; prereq calculus through ordinary differential equations, Stat 8501 or #; offered even-numbered yrs) Knox
Analysis of nerve impulse trains; interval distributions, auto- and cross-correlation functions, shot noise processes, applications of information theory. Models of neurons, including McCullock-Pitts, random walk, and "leaky integrator" models. Neural networks; randomly connected nets, discrete and cellular space models. Computer simulation techniques.

8116s. BIOPHYSICAL APPROACHES TO PHYSIOLOGY. (4 cr; prereq 3055 or #; 2 hrs lect, 2 hrs conf per wk) Kepner
Basic concepts of membrane permeability and transport. Detailed study of fundamental and classic research papers that provide the physical-chemical foundations for these concepts.

8117. CHRONOPHYSIOLOGY. (Cr ar, prereq #) Halberg
Emphasis on predictable aspects of physiological variability and their role in the definition of health and the diagnosis of disease. Physiological self-measurements, their analysis and interpretation. Course can be tailored to focus on specific interests of a given student.

8201f,w,s. LITERATURE SEMINAR. (1 cr) Staff
Registration in quarters of oral presentation only.

8202.* READINGS IN PHYSIOLOGY. (Cr ar) Staff
Topics selected for each student; written reviews prepared and discussed.

8203.* RESEARCH IN PHYSIOLOGY. (Cr ar)

8204.[1] HISTORY OF PHYSIOLOGY. (Cr ar) Visscher, Wilson

8210.[1] SELECTED TOPICS IN PERMEABILITY. (Cr ar; prereq 8103 or equiv, #) Grim, Johnson, Kepner, Levitt, Lifson
Advanced seminar.

[1]Students should consult the department for offerings during any specific quarter.

8211.[1] SELECTED TOPICS IN HEART AND CIRCULATION. (Cr ar; prereq 8105 or equiv, #) Bacaner, Cavert, Fox, Visscher
One or more seminars in advanced physiology of heart and circulation.

8212.[1] SELECTED TOPICS IN RESPIRATION. (Cr ar; prereq 8106 or equiv, #) Kronenberg, Wangensteen
Advanced seminar.

8213.[1] SELECTED TOPICS IN ALIMENTARY PHYSIOLOGY. (Cr ar; prereq 8107 or equiv, #) Grim, Lifson

8214.[1] SELECTED TOPICS IN NEPHROLOGY. (3 cr; prereq 8108 or equiv) Harvey
Advanced seminar.

8216f. SELECTED TOPICS IN NEUROPHYSIOLOGY. (Cr ar, §Otol 8247; prereq 8104 or equiv, #) Poppele, Purple, Terzuolo
Advanced seminar.

8217s. PROPERTIES OF RECEPTOR SYSTEMS. (3 cr; prereq #; offered even-numbered yrs) Poppele
Physiological role of receptors as information gathering and relay devices; behavior of a number of specific receptor organs and their functional components.

8218f. PHYSIOLOGY OF VISUAL SYSTEMS. (3 cr; prereq #, offered even-numbered yrs) Purple
Graduate-level seminar on visual systems. Primary material emphasis on vertebrate visual system, including receptor transduction, retinal structure and physiology, and central visual processes. Conceptual emphasis on visual system as an information-reception and information processing system.

8219s. SPINAL CORD PHYSIOLOGY AND MOTOR CONTROL. (3 cr; prereq #; offered odd-numbered yrs) Terzuolo
Physiological basis of motor control at different functional levels (spinal cord, brain stem, thalamus and basal ganglions, cerebral cortex and cerebellum) in terms of cellular mechanisms, input-output relations and modeling.

8227s. METHODS IN PHYSIOLOGY. (3 cr, prereq #) Stish

8230, 8231.[1] TRANSPORT PROCESS IN BIOLOGY. (3 cr per qtr; prereq 8103 or equiv) Grim, Johnson, Lifson
Relatively systematic coverage of biological transport processes.

8234.[1] RESPIRATION, ACID-BASE CHEMISTRY, AND ELECTROLYTE METABOLISM. (3 cr; prereq 8106 or equiv)

8235.[1] BIOENERGETICS OF CARDIAC CONTRACTION. (3 cr; prereq 8105 or equiv) Cavert

8239w.[1] PHYSIOLOGY OF LYMPHATIC SYSTEM AND MICROCIRCULATION. (Cr ar) Lee, Meyer

PHYSIOLOGY (Phys)

OFFERED AT ROCHESTER

Professor

Franklyn G. Knox, M.D., Ph.D., *chairman*
David E. Donald, D.V.M., Ph.D.
Thomas P. Dousa, M.D., Ph.D.
Robert E. Hyatt, M.D.
Patrick J. Kelly, M.D., M.S.
Edward H. Lambert, M.D., Ph.D.
Charles A. Owen, Jr., M.D., Ph.D.
John T. Shepherd, M.D., D.Sc.
Joseph H. Szurszewski, Ph.D.
Earl H. Wood, M.D., Ph.D.

Associate Professor

George W. Beeler, Ph.D.
Edmund Y. S. Chao, Ph.D.
James F. Greenleaf, Ph.D.
Erik L. Ritman, M.D., Ph.D.
Juan C. Romero, M.D.
Robert G. Tancredi, M.D.
Stuart R. Taylor, Ph.D.
Gertrude M. Tyce, Ph.D.

Assistant Professor

James C. Lynch, Ph.D.

Within the Mayo Graduate School, physiology and biophysics are combined into one administrative department. The biophysics program is therefore closely related to the physiology program, and listings under biophysics may be found to be pertinent to the student's interests.

Degrees Offered—Graduate training leading to the Ph.D. degree is offered. Programs leading to the M.S. degree are offered only to candidates who hold the M.D. degree.

[1]Students should consult the department for offerings during any specific quarter.

Prerequisites—A bachelor's degree and a superior undergraduate record. Undergraduate college course work should include biology, mathematics (including calculus), physics, and chemistry (inorganic, organic, qualitative and quantitative, physical). Foreign language study is encouraged but not essential. A limited number of deficiencies are allowed, but candidates are required to make them up after admission.

Program Requirements for the Ph.D. Degree–*General*: Some of the courses in basic physiology are commonly taken on the Minneapolis campus. In addition, the sequence M 8855 through M 8860 at Rochester (or equivalent courses at Minneapolis) is recommended for all doctoral candidates. A total of 24 to 30 credits in physiology are required.

Minor Subjects: The Ph.D. degree also requires a minor field of study. A minimum of 18 credits of course work are required in the minor. A supporting program composed of studies in more than one discipline can be substituted for the minor. A minimum of 6 credits should be completed in each of three component programs; these can include biochemistry, biophysics, bioengineering, biometrics, and any of the physical, chemical, or mathematical sciences.

Language Requirement—For the Ph.D., students may demonstrate either a reading knowledge of one language or competence in a collateral field of knowledge. In the collateral field, the requirement is 9 credits (or equivalent) constituting a coordinated program of study; these credits may not be applied to fulfill the major or minor requirements.

Physiology as a Minor—For programs in nonclinical basic sciences, 12 credits in graduate-level courses exclusive of Phsl M 8853 are required for M.S. programs and 18 to 24 credits for Ph.D. programs. For programs in clinical fields, in addition to the course requirements for the minor in the nonclinical fields, 6 to 9 months of work in a laboratory under the sponsorship of a faculty member in physiology are also recommended.

M 5801f,w,s,su. PRINCIPLES OF BIOMECHANICS. (3 cr) Chao and staff
Basic concepts of orthopedic biomechanics.

M 8851f,w,s. PHYSIOLOGY SEMINARS. (1 cr; prereq M 8854 or, with other listed courses, by arrangement with a staff member)
Weekly seminars in which whole department participates. Research papers presented by students, staff, or invited lecturers.

M 8852f,w,s,su. SEMINARS IN PHYSIOLOGICAL SPECIALTIES. (1½ cr)
Specialized area of physiology reviewed in depth. Research papers presented by students and staff with active discussion.

M 8853f,w,s,su. RESEARCH IN PHYSIOLOGY. (6 cr; prereq ⚠) Staff
Opportunities in research to be arranged with individual staff members, subject to departmental approval.

M 8854f,w,s,su. READINGS IN PHYSIOLOGY. (Cr ar) Staff

M 8855f. MAMMALIAN PHYSIOLOGY I—CARDIOVASCULAR PHYSIOLOGY. (3 cr; offered even yrs only) Donald and staff
Current concepts of cardiovascular physiology offered in depth.

M 8856w. MAMMALIAN PHYSIOLOGY II—NEUROPHYSIOLOGY. (3 cr; offered odd yrs only) Lynch and staff
Neural mechanisms of sensation, perception, and motor control. Lectures, discussions of assigned topics in the current research literature.

M 8857s. MAMMALIAN PHYSIOLOGY III—RENAL. (3 cr; offered odd yrs only) Romero and staff
Current concepts in renal physiology reviewed in depth.

M 8858f. MAMMALIAN PHYSIOLOGY IV—RESPIRATORY. (3 cr; offered odd yrs only) Hyatt and staff
Lung mechanics, ventilation-perfusion ratios, gas diffusions, transport and exchange, acid-base balance, control of ventilation.

M 8859w. MAMMALIAN PHYSIOLOGY V—GASTROINTESTINAL. (3 cr; offered even yrs only) Go, Phillips, Szurszewski, and staff
Salivary, gastric, and pancreatic secretion; bile composition, function, and control. Motility and absorption mechanisms, regional differences, and control.

M 8860s. MAMMALIAN PHYSIOLOGY VI—ENDOCRINE. (3 cr; during some qtrs may substitute for Med M 8864; offered even yrs only) Dousa and staff
Neural-hypophyseal systems; reproductive endocrinology; thyroid, parathyroid, and adrenal physiology; mineral metabolism; glucose regulation.

M 8861. PHYSIOLOGY AND PHARMACOLOGY OF THE NERVE IMPULSE. (3 cr; prereq courses in physical sciences, mathematics and M 8856 or equiv; offered odd yrs only) Taylor and staff
Lectures, seminars, journal club, and demonstrations on impulse conduction and electrical properties of axons, excitable membrane theory, and physical and chemical bases of action potential.

M 8862. PHYSIOLOGY AND PHARMACOLOGY OF EXCITATION-CONTRACTION COUPLING. (3 cr; prereq courses in physical sciences, mathematics and M 8856 or equiv; offered odd yrs only) Taylor and staff
Lectures, seminars, journal club, and demonstrations on the physical chemistry of contractile proteins, and cellular and molecular control mechanisms in contraction of striated muscle.

M 8863su. ANALOG AND DIGITAL ELECTRONICS FOR BIOLOGICAL RESEARCH. (3 cr; offered odd yrs) Taylor, Shevlin
Lectures and demonstrations integrating electrical principles with measurement and control concepts and instrumentation used in laboratory research.

M 8870. COMPUTER ANALYSIS OF PHYSIOLOGICAL DATA. (3 cr) Beeler and staff
Data acquisition systems, concepts of noise, sampled data representation, aliasing, filtering. Principles of analog computation, component description, ordinary differential equations.

M 8878f,s. PHYSIOLOGY OF BONE I. (3 cr; prereq #) Kelly and staff
Lectures in physiology of both normal and abnormal bone; renal, respiratory, and endocrine physiology and function as related to bone.

M 8879w,su. PHYSIOLOGY OF BONE II. (2 cr; prereq #) Kelly and staff
Lectures in crystal structure and mineralization, both normal and abnormal ion transport, and mineral and hormonal metabolism as related to bone.

M 8880. PRINCIPLES OF SOLID MECHANICS. (3 cr; prereq physics and calculus) Chao
Application of vector mechanics to musculoskeletal systems; experimental methodology in obtaining anatomic kinematic data.

M 8881. MECHANICS OF DEFORMABLE MATERIALS. (3 cr; prereq M 8880) Chao
Stress and strain concepts and method of calculation for biological and implantable materials. Methodology and instrumentation for measuring stress, strain, fracture, and wear.

M 8890f,w,s. ADVANCED RESPIRATORY PHYSIOLOGY. (2 cr per qtr [3 qtrs required]) Hyatt and staff

PLASTIC SURGERY (PIS)

OFFERED AT ROCHESTER

Professor
James K. Masson, M.D.

Associate Professor
John E. Woods, M.D., Ph.D., *head*

Assistant Professor
George B. Irons, Jr., M.D.
Thaddeus J. Litzow, M.D.

The residency in plastic surgery provides training in all aspects of this surgical specialty. Included in the program are the care and management of acute trauma, burns, major tumors of the head and neck, cleft lip and palate, other congenital anomalies, and reconstructive and cosmetic surgery.

The residency meets the requirements of the American Board of Plastic Surgery for a 2-year program. Five years of prior general surgery training or board eligibility are required and may be taken in any institution that offers a board-approved residency.

During the first year, residents rotate on 3-month services at St. Mary's Hospital and Rochester Methodist Hospital. Surgery is performed during the first year under supervision on consultants' individual services. Exposure to hand surgery is provided by a 3- to 6-month rotation on the orthopedic hand surgery service during the first year of training.

During the second year of training the resident is designated chief resident associate. The resident maintains an active service, both emergency and elective in nature, at St. Mary's and Rochester Methodist Hospitals as well as Rochester State Hospital. Residents have an opportunity to develop microsurgical techniques in the laboratory and to participate in anatomic dissection.

Opportunity for laboratory investigation is available but must be taken in addition to the 2-year training program. The didactic program in plastic surgery includes weekly teaching conferences, journal clubs, case presentations, cleft palate clinics, and joint rounds. In addition, visiting professors in plastic surgery will be invited to lecture on a regular basis.

M 8852f,w,s,su. DIAGNOSTIC AND CLINICAL PLASTIC SURGERY. (6 cr) Staff
Theory and practice of plastic surgery. Diagnosis of diseases and defects requiring plastic repair. Pre- and postoperative care of patients.

M 8853f,w,s,su. OPERATIVE PLASTIC SURGERY. (6 cr) Staff
Hospital residence. Junior residency in operative service.

M 8854f,w,s,su. OPERATIVE PLASTIC SURGERY. (6 cr) Staff
Operative plastic and reconstructive surgery of entire body including cosmetic surgery; management of burns, tumors of the head and neck, and maxillofacial injuries. Senior residency in operative service.

PROGRAM IN HUMAN SEXUALITY

OFFERED AT MINNEAPOLIS

Professor

Gerhard Neubeck, Ed.D.
Ira Reiss, Ph.D.

Associate Professor

James Maddock, Ph.D., *education and training coordinator*
Melvin Goldberg, J.D.
Pearl Rosenberg, Ph.D.

Instructor

Joseph G. Bohlen, M.D., Ph.D.

Courses In Which Graduate Credit May Be Earned When Program-Related

InMd 5516. RESEARCH IN HUMAN SEXUALITY. (Cr ar; prereq #)
Clinical and/or laboratory research related to human sexuality. This elective is flexible according to the specific interests of the student. Contact Dr. Bohlen (376-7520) to discuss possible topics and to make course arrangements.

InMd 5970. DIRECTED STUDY. (1-15 cr, prereq #; qualified students may register with # for work on tutorial basis) Staff

InMd 8101-8102-8103†. INTERDISCIPLINARY SEMINAR ON SEX. (9 cr; prereq #) Maddock and staff
Exploration of contemporary issues related to human sexuality from the perspectives of various disciplines and professions. Each quarter has a different focus: (1) sex research; (2) sex-related services (education and counseling); (3) public policy. Designed primarily for students whose graduate programs include human sexuality as a major component of study or professional training.

PSYCHIATRY

OFFERED AT MINNEAPOLIS

Professor

William Hausman, M.D., *head*
John P. Brantner, Ph.D.
Floyd K. Garetz, M.D., M.S.
Lawrence M. Greenberg, M.D.
Gordon Heistad, Ph.D.
Leonard L. Heston, M.D.
David T. Lykken, Ph.D.
Roy W. Pickens, Ph.D.
William Schofield, Ph.D.
Lloyd K. Sines, Ph.D.
Joseph J. Westermeyer, M.D.

Clinical Professor

Gove Hambidge, M.D.
James J. Lawton, M.D.

Associate Professor

Jerome L. Kroll, M.D.
Richard Meisch, M.D.
Michael K. Popkin, M.D.

Clinical Associate Professor

Faruk S. Abuzzahab, M.D.

Master's and Doctor's Degrees—Programs are offered for the M.S. (Plan A) and Ph.D. (for students accepted for residency in psychiatry) degrees. The minor may be elected in such fields as anthropology, psychology, sociology, philosophy, or in a related field that provides a background in broad cultural areas. Under ordinary circumstances the fellowship runs for a period of 3 years; i.e., it fulfills the requirements for training of the American Board of Psychiatry and Neurology. A 4-year program offering advanced training in child psychiatry is also available. No foreign language is required.

Psychiatry (AdPy)

5800. CASE CONFERENCE: PSYCHIATRY IN MEDICINE. (1 cr; prereq MD or #) Popkin

5801. CONSULTATION-LIAISON PSYCHIATRY. (Cr ar; prereq MD) Popkin

5810. ALCOHOL AND DRUG ABUSE. (3 cr) Westermeyer

8201. CLINICAL PSYCHIATRY. (Cr ar; prereq MD) Staff

8203. ADVANCED CLINICAL PSYCHIATRY. (Cr ar; prereq MD, 8201) Staff

8205. SPECIAL ASSIGNMENTS IN PSYCHIATRY. (1 cr, prereq MD, 8201, 8203) Staff

8206. RESEARCH IN PSYCHIATRY. (Cr ar; prereq #) Staff

8208. SURVEY OF PHYSIOLOGICAL TREATMENTS. (2 cr; prereq #) Staff

8209. DESCRIPTIVE PSYCHOPATHOLOGY. (3 cr) Sines

8216. INTRODUCTION TO FAMILY THERAPY. (1 cr; prereq #) Miner

8221. SEMINAR: CURRENT LITERATURE. (1 cr; prereq #) Simon

8224. INTRODUCTION TO GROUP THERAPY. (1 cr) Hausman

8226. BIOLOGICAL PSYCHIATRY. (3 cr; prereq MD or #) Heston

8238. CASE CONFERENCE IN PSYCHOLOGICAL MEDICINE. (1 cr; prereq MD or #)

8239. CONTINUOUS CASE SEMINAR: PSYCHOANALYTICALLY ORIENTED PSYCHOTHERAPY. (1 cr; advanced psychiatric residents and psychology interns only; prereq #)

8240. PSYCHOLOGICAL PROBLEMS OF THE AGED. (2 cr; prereq #) Garetz

8243. SEMINAR: INTRODUCTION TO CLINICAL THEORY OF PSYCHOANALYSIS. (3 cr; prereq #)

8244. COMPARATIVE THEORIES OF PSYCHOTHERAPY. (3 cr; prereq #) Schofield

8249. CLINICAL NEURO-PSYCHO-PHARMACOLOGY. (2 cr) Abuzzahab

8264. PRESENTATIONS ON CURRENT AND APPROPRIATE LITERATURE PERTAINING TO ALL PHASES OF MENTAL HEALTH CARE. (1 cr; limited to residents on rotation to Mpls Veterans Administration Hospital Psychiatry Service) Posey

8265. READINGS: PSYCHOSOMATIC MEDICINE, CONSULTATION-LIAISON PSYCHIATRY. (Cr ar [max 3 cr]; prereq MD or #) Popkin

8970. DIRECTED STUDIES. (Cr ar [max 9 cr]) Staff

Child and Adolescent Psychiatry (CAPy)

5202. ADOLESCENT INPATIENT PSYCHIATRY FOR HEALTH CARE PSYCHOLOGY INTERNS. (Cr ar; prereq #)
Experience in the psychological asessment and therapeutic management of adolescents hospitalized for diagnosis and treatment in a milieu-oriented psychiatric unit.

5203. CHILD AND ADOLESCENT OUTPATIENT PSYCHIATRY FOR HEALTH CARE PSYCHOLOGY INTERNS. (Cr ar; prereq #)
Experience in assessment and therapeutic interventions with children, adolescents, and families in an outpatient child and adolescent psychiatric care setting.

5204. DIAGNOSTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq med student, #) Greenberg
Multidisciplinary evaluations of children, adolescents, and their families presented for discussion, dynamic and diagnostic formulations, and disposition planning in a conference setting.

5206. THERAPEUTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq med student, #) Greenberg
Therapeutic techniques utilized in child, adolescent, and family psychiatry reviewed through presentation and discussions of ongoing cases.

5500. PEDIATRIC AND PEDIATRIC NEUROLOGY-PSYCHIATRIC LIAISON. (9 cr for 6 wks full time...option: 18 cr for 12 wks full time; prereq med student, #) Greenberg
Supervised consultation, diagnostic, and short-term therapy experience in pediatrics and pediatric neurology.

5520. OUTPATIENT CLINICAL CHILD AND ADOLESCENT PSYCHIATRY. (9 cr for 6 wks full time...option: 18 cr for 12 wks full time; prereq med student, #) Greenberg
Supervised diagnostic and therapeutic experiences in an outpatient setting.

5522. CLINICAL INPATIENT ADOLESCENT PSYCHIATRY. (9 cr for 6 wks full time...option: 18 cr for 12 wks full time; prereq med student, #) Greenberg
Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary adolescent psychiatry unit with an emphasis on group and milieu therapies.

5602. INTRODUCTORY READINGS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq med student or MD, #) Greenberg
Assigned readings and discussion with faculty as an introduction to child, adolescent, and family psychiatry. Topics include child development, diagnostic and therapeutic techniques, and psychopathology.

5603. INPATIENT CLINICAL CHILD PSYCHIATRY. (9 cr for 6 wks full time...option: 18 cr for 12 wks full time; prereq med student, #) Greenberg, Miner
Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary child psychiatry unit with an emphasis on group and milieu therapies.

5608. INTRODUCTION TO FAMILY THERAPY: THEORY AND PRACTICE. (1 cr; prereq MD and/or #, satisfactory completion of course in basic psychopathology [or its equiv], current supervised involvement with treatment of cases, and #) Miner and staff
Introduction to the ideas and treatment approaches of some of the major figures in the current clinical practice of psychotherapy with families: Carl Whitaker, Salvador Minuchin, Lyman Wynne, Jay Haley, Murray Bowen, Virginia Satire, and others. Provides practice training experience in the problems and techniques for beginning family therapists through review and discussion of videotapes of current treatment cases of course participants.

5609. CHILD DEVELOPMENT PRACTICUM. (Cr ar; prereq MD and/or #)
Observation conducted at the University-affiliated child care center consisting of three sessions with infants, three sessions with toddlers, and four sessions with preschoolers. Each session consists of one hour observation of unstructured activities under the guidance of faculty members, one hour of group discussion with child psychiatry and child development faculty, and a demonstration hour illustrating the characteristic behaviors of each age group.

5610. BIOMEDICAL RESEARCH: PRINCIPLES AND DESIGN. (2 cr; prereq introductory statistics, #)
Designed to help students develop a basic understanding and skills for planning and executing biomedical research and for critical reading of research reports and articles. Topics include: theoretical models, generating research hypotheses, selecting appropriate research strategies, determining appropriate statistical analyses, interpreting results. Related topics include issues in research with human subjects, and relationship between research and clinical work, the computer as a research tool, resources available for literature searches.

8100. READINGS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq MD, #)
Comprehensive review of classical and contemporary literature in the field of child, adolescent, and family psychiatry including growth and development, diagnostic and therapeutic techniques, and psychopathology with supplemental course work in other departments and schools.

8110. DIAGNOSTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq MD, #)
Multidisciplinary evaluations of children, adolescents, and their families presented for discussion, dynamic and diagnostic formulations, and disposition planning in a conference setting.

8120. THERAPEUTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq MD, #)
Therapeutic techniques utilized in child, adolescent, and family psychiatry reviewed through presentation and discussions of ongoing cases.

8200. OUTPATIENT CLINICAL CHILD AND ADOLESCENT PSYCHIATRY. (3 cr, 15 hrs per wk; prereq MD, #)
Supervised diagnostic and therapeutic experiences in an outpatient setting.

8212. CLINICAL INPATIENT CHILD PSYCHIATRY. (3 cr, 15 hrs per wk ar; prereq MD, #)
Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary child psychiatry unit with emphasis on group and milieu therapies.

8214. INPATIENT CLINICAL ADOLESCENT PSYCHIATRY. (3 cr; prereq MD, #)
Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary adolescent psychiatry unit with emphasis on group and milieu therapies.

8216. PEDIATRIC AND PEDIATRIC NEUROLOGY-PSYCHIATRIC LIAISON. (3 cr; prereq MD, #)
Supervised consultation, diagnostic, and short-term therapy experience in pediatrics and pediatric neurology.

8218. GROUP THERAPY. (1 cr; prereq MD, #)
Readings and illustrative group therapy examples reviewed to complement the concurrent clinical experiences.

8223. FAMILY THERAPY. (1 cr; prereq MD, #)
Readings and illustrative family therapy examples reviewed to complement the concurrent clinical experiences.

8228. RESEARCH IN CHILD AND ADOLESCENT PSYCHIATRY. (1 cr; prereq MD, #)
Research design, methodology, and current research projects reviewed with faculty and invited guests.

8243. SCHOOL CONSULTATION. (2 cr; 10 hrs per wk; prereq MD, #)
Supervised clinical and consultative experiences in a school setting with literature and clinical seminars.

8301. SEMINAR: CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY. (1 cr; prereq MD, #)
Current diagnostic, therapeutic, and theoretical issues in child, adolescent, and family psychiatry reviewed through clinical and didactic presentations and discussion by students, faculty, and invited guests.

PSYCHIATRY (P)

OFFERED AT ROCHESTER

Professor

Maurice J. Martin, M.D., M.S., *chairman*
Alexander R. Lucas, M.D.
David W. Swanson, M.D.
Wendell M. Swenson, Ph.D.
Francis A. Tyce, M.B., M.S.

Associate Professor

Robert C. Colligan, Ph.D.
Jane W. Duncan, M.D.
Harold R. Martin, M.D.
Robert M. Morse, M.D., M.S.
David Osborne, Ph.D.
Elliott Richelson, M.D.
Alan H. Rosenbaum, M.D.

Assistant Professor

Maurice J. Barry, Jr., M.D., M.S.
Leo J. Davis, Jr., Ph.D.
James G. Delano, M.D.
Glen M. Duncan, M.B.B.Ch.
Toshihiko Maruta, M.D., M.S.
Gordon L. Moore II, M.D., M.S.
Gerald C. Peterson, M.D.

The clinical work in psychiatry consists of diagnostic and therapeutic outpatient assignments in adult and child psychiatry as well as assignments to hospital services caring for psychotic, nonpsychotic, and chemically dependent patients. These assignments provide opportunities for individual and group therapy as well as training in the standard psychiatric treatment techniques. The hospital services are organized as therapeutic communities with their own recreational and occupational therapy facilities. Clinical psychological services and psychiatric social services are available.

A minimum of 6 months is devoted to child psychiatry. During that time there is opportunity for long-term intensive psychotherapy of children. There is also an 18-bed residential treatment unit for adolescents.

The resident takes part in long-term intensive psychotherapy of adults and spends at least 1 quarter in the Intensive Psychotherapy Center, which provides training in short-term intensive group psychotherapy.

There is an opportunity to study a wide variety of psychosomatic problems as a consultant to medical and surgical departments. As an integral part of the residency, there are several conferences, lectures, and seminars, both formal and informal, dealing with the entire range of psychiatric therapy and practice. There is organized instruction in the basic behavioral sciences and related fields such as neuroanatomy, neurophysiology, neuropathology, electroencephalography, and electromyography. Assignment to clinical neurological services is also included.

A 3-month rotation at Rochester State Hospital provides experience in commu-

nity and forensic psychiatry and the opportunity to look after patients with both acute and chronic psychiatric disorders. There is a close liaison with the Student Health Service at St. Olaf College, Northfield, Minnesota, where the mental health problems of the college-age student are studied. There is also a close affiliation with local nursery schools and nearby facilities for the mentally retarded. An alcoholism treatment unit and a pain management center provide opportunity to study inpatients with these two special types of problems.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 8851f,w,s,su. DIAGNOSIS IN PSYCHIATRY. (6 cr) Staff
Research Seminar.

M 8853f,w,s,su. HOSPITAL RESIDENCE IN PSYCHIATRY. (6 cr) Staff

M 8854f,w,s,su. SPECIAL PSYCHIATRY AT ROCHESTER STATE HOSPITAL. (6 cr) Staff

M 8855f,w,s,su. CHILD PSYCHIATRY. (6 cr)

M 8856f,w,s,su. CLINICAL PSYCHIATRY. (6 cr) Staff

M 8858f,w,s,su. BASIC NEUROLOGIC SCIENCES. (6 cr) Staff

M 8859f,w,s,su. PSYCHOLOGY. (6 cr) Staff
Exposure to scientific bases of psychological assessment through readings, observation, and supervised experience in test administration and interpretation. Research.

PUBLIC HEALTH (PubH)[1]

OFFERED AT MINNEAPOLIS

Professor

James Boen, Ph.D., *director of graduate study*
Robert K. Anderson, D.V.M.
Henry W. Blackburn, M.D.
Richard G. Bond, M.P.H., M.S.
Stanley L. Diesch, D.V.M.
Velvl W. Greene, Ph.D.
Harold J. Paulus, Ph.D.
Leonard M. Schuman, M.D., M.S.
Henry L. Taylor, Ph.D.
Robert W. ten Bensel, M.D., M.P.H.

Associate Professor

Lester E. Block, D.D.S., M.P.H.
Norman A. Craig, M.P.H.
James Kincannon, Ph.D.
Rexford D. Singer, B.S.C.E., M.S.
Lee D. Stauffer, M.P.H.
Robert L. Veninga, Ph.D.

Adjunct Associate Professor

Lee E. Schact, Ph.D.

Assistant Professor

Michael L. Baizerman, Ph.D.
Judith E. Brown, Ph.D.
Marilee A. Miller, M.S.
E. Charlotte Pflug, M.P.H.
Marla S. White, Sc.D.

Instructor

Patricia A. Woodbury, M.S.

The curriculum offers preparation for broad, multidisciplinary work in public health as well as concentrations in such specialties as public health nursing and public health physical and occupational therapy. Public health nursing offers preparation for leadership in teaching and supervision/administration as well as in the subspecialty areas of family, pediatric, adult, and school health practice and maternal and child health care. For information regarding admission procedures and

[1]Inquiries concerning course work leading to the master of public health or master of hospital administration degree should be addressed to: Dean of the School of Public Health, 1360 Mayo Memorial Building, 420 Delaware Street S.E., University of Minnesota, Minneapolis, Minnesota 55455. Applicants planning to pursue an M.S. or a Ph.D. degree in biometry and health information systems, environmental health, epidemiology, hospital and health care administration (Ph.D. only), or physiological hygiene are referred to the separate listings in this bulletin.

course selections, contact the Director of Graduate Study in Public Health, 1360 Mayo Memorial Building, 420 Delaware Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Degree Offered—M.S.

Language Requirement—None.

Prerequisite—Applicants must have a baccalaureate degree from an accredited academic institution.

Minor Requirements—Ph.D. students choosing a minor in public health must complete a minimum of 18 credits of course work in public health. Courses will be selected by agreement among the candidate, the major adviser, and the director of graduate study in public health.

5001. PHILOSOPHICAL AND CONCEPTUAL BASES OF PUBLIC HEALTH PRACTICE. (2 cr; prereq graduate public health student, adviser s consent or △) Stauffer and others.
Multidisciplinary examination of major historical milestones, developments, problems, controversies; ethical-technical issues that have shaped basic philosophies, principles, concepts, values, attitudes, and assumptions influencing public health practices and programs. Emphasis on current trends and probable future challenges to traditional public health practice.

5004. FIELD INSTRUCTION IN PUBLIC HEALTH (Cr ar; prereq #)
Generalized, function-oriented, or discipline-oriented community experience under academic and professional supervision. Emphasis on application of acquired knowledge and skills relevant to health issues and problems.

5005.* TOPICS IN PUBLIC HEALTH. (Cr ar; prereq advance proposal and #) Staff
Individualized, directed instruction. Selected readings in public health with discussion based on these readings.

5006. INTRODUCTION TO COMMUNITY HEALTH. (5 cr, §5016; prereq pharmacy and nursing students, other health professionals, or #) Greene
(Same as Nurs 5625) Lectures, discussions, seminars, personalized readings on critical and current issues in community health emphasizing public health programs and controversies.

5007. HEALTH LEADERSHIP AND EFFECTING CHANGE. (4 cr, §HSU 5007; prereq #)
Leadership qualities and their effect on organizational behavior. Various theories of change and their practical application to the field of health. Changing role of the health professional.

5008. WORKSHOP OR INSTITUTE IN PUBLIC HEALTH. (Cr ar; prereq advanced application and #) Staff
Special topics, nonregular program or course in public health for preservice or in-service helping professionals.

5009. HONORS COURSE: ISSUES AND CONTROVERSIES IN CONTEMPORARY COMMUNITY HEALTH. (3 cr; prereq 3001, 3004, 5006 or equiv, advanced application and #) Greene and others
Exploration of selected current issues and controversies in health through readings, discussion, and limited field assignment. Emphasis on balance between personal and community needs, interests, rights, and responsibilities.

5010. INTERPERSONAL BEHAVIOR IN HEALTH ORGANIZATIONS. (4 cr, §HSU 5010) Gordon, Veninga
Observing, analyzing, and interpreting behavior patterns in human service organizations. Topics include: communication skills (listening, feedback, empathy, nonverbal cues); group behavior (agenda setting, decision making, leadership roles); conflict resolution (causes of conflict, strategies for working through conflict).

5011. HUMAN RESOURCES MANAGEMENT IN HEALTH SERVICE ORGANIZATIONS. (4 cr) Pyle
Introduction to concepts in human resource management as applied to health service organizations. Relationship between human resources management and general management, nature of work, nature of human resources, compensation and benefits, personnel planning, recruitment and selection, training and development, employee appraisal and discipline, and union-management relations.

5012. FINANCIAL MANAGEMENT IN HEALTH SERVICES ORGANIZATION. (4 cr)
Financial requirements to meet legislative, employer, and community demand for health care services. Operational, capital, and cash flow budget management. Seminars when appropriate.

5013. INTERDISCIPLINARY TEAM TRAINING IN HEALTH SERVICES DELIVERY. (3 cr, §HSU 5001, §HSU 5300; prereq #) Schwanke
Basics of interpersonal and group communications, with application to team health projects, organization, function, and membership. Lectures, readings, and discussions heavily supplemented by experiential methods and activities to develop attitudes and skills essential to effective team goal setting, decision

making, problem solving, and task accomplishment. Emphasis through student projects is on team leadership styles, professional roles and functions, active listening, giving and receiving feedback, and conflict resolution to enhance quality of project outcome.

5016. INTRODUCTION TO PUBLIC/COMMUNITY HEALTH. (3 cr, §5006, §SW 5131; prereq pharmacy, dental hygiene, or graduate public health students or #) Greene
Lectures, discussions, and seminars on the historical evolution of public/community health, status of organization and delivery of health services, and future organizational changes and innovative models for prevention. Emphasis on epidemiology and prevention of communicable and chronic diseases, chemical dependency, mental health, and measurement of community health status. Health problems and service needs of the poor, minorities, and women. Group or individual project interviews with community health professionals.

5020. PUBLIC HEALTH SOCIAL WORK INTEGRATIVE SEMINAR. (1 cr; prereq MSW/MPH major) Schwanke
Student-faculty-practitioner presentations and discussions aimed at building an integrated public health social work professional identity by synthesizing from both fields the relevant historical developments, philosophies and concepts, roles and functions, trends, and professional values and ethics.

5024. HEALTH ASPECTS OF AGING. (3 cr, §PE 5403; prereq upper division or grad student) E Anderson, Stryker
Social, cultural, psychological, and economic factors associated with health problems and care of the aging. Development of personal insight into the aging processes as related to self, family members, and/or preparation for professional work with the aging.

5025. HEALTH AND THE CONSUMER. (4 cr; prereq #) Greene
Facts, fads, fables, and frauds associated with the purchase of health products and services.

5031. MENTAL HEALTH. (3 cr; prereq #)
Emotional factors underlying wholesome family relations or interfering with successful adjustment in family and community.

5032. EDUCATIONAL ASPECTS OF DRUG USE AND ABUSE. (3 cr, §Hlth 5400; prereq education sr, licensed teacher, school nurse, or #) Staff
Basic information on alcohol and other drugs and chemicals with emphasis on curriculum concepts, teaching methodology, materials, and referral procedures appropriate for elementary, junior, and senior high schools.

5033. FUNDAMENTALS OF ALCOHOL AND DRUG PROBLEMS. (3 cr, §HSU 5033) Kincannon, Rothenberger
Lecture, discussion, readings on scientific, sociocultural, and attitudinal aspects of alcohol and other drug abuse problems emphasizing incidence, prevalence, high risk populations, prevention, and intervention.

5034. TOPICS IN ALCOHOL AND DRUG PROBLEMS. (Cr ar; prereq advanced proposal, #) Armstrong, Boen, Kincannon, Schwanke
Selected readings and discussion. Individualized, directed instruction.

5035. CONTRIBUTORS TO ALCOHOL AND DRUG PROBLEMS. (3 cr, §HSU 5035) Kincannon
Lectures and readings to enable health professionals to understand the various pharmacological, genetic, behavioral, psychological, sociological, and cultural contributors to drug problems. Theories of drug problem causation.

5036. GROUP COUNSELING IN CHEMICAL DEPENDENCY. (3 cr; prereq #) Pletcher
Lecture and group discussion and/or exercise to enhance communication skills that will enable students to better facilitate and participate in group counseling activities.

5037. SEMINAR IN PREVENTION OF ALCOHOL AND DRUG PROBLEMS. (3 cr, §HSU 5037) Kincannon
Discussions to help health professionals contribute to the prevention of various pharmacological, genetic, behavioral, psychological, sociological, and cultural contributors to drug problems.

5038. COMMUNICATION SKILLS DEVELOPMENT FOR HELPING PROFESSIONALS. (Cr ar; prereq #) Schwanke
Combines theoretical and practical aspects of communications and group dynamics with emphasis on verbal, nonverbal, and group process skill development. Includes films, exercises, and small group discussions designed to explore how feelings, attitudes, values, conflict, and interpersonal dynamics relate to the development of trust, self-awareness, active listening, sharing, and understanding peer pressures.

5039. ALCOHOL AND DRUG PROBLEMS: ASSESSMENT AND RESPONSE. (3 cr, §HSU 5039; prereq 5033 or #) Kincannon
Lectures and readings to enable health professionals to assess and make appropriate response to most common alcohol and other drug-related problems. Screening, referral, description of ideal resources and areas of controversy.

5040. DEATH EDUCATION IN CONTEMPORARY SOCIETY. (3 cr, §Hlth 5402, §Mort 5040; prereq education sr, licensed teacher, mortuary science major or #) Fredlund
Concepts and attitudes toward death, grief, and bereavement with emphasis on instructional aspects for elementary and secondary schools and role of the school in suicide prevention.

5054. FOUNDATIONS IN COMMUNITY HEALTH EDUCATION PRACTICE. (3 cr; prereq grad student in health education, #) Craig, Mills, Veninga
History and development of current concepts of health education practice; representative work settings and related health education opportunities; factors affecting health behavior; learning theory and process, application in commonly used educational methods and materials.

5055. ADVANCED STUDIES IN HEALTH EDUCATION I. (3 cr; prereq grad student in health education, 5054, #) Craig, Mills
Health education skills; use of mass media, potential and limitations; procedures for organizing, conducting, and evaluating large educational meetings, workshops, working conferences, etc.; written communication; consultation; supervision.

5056. ADVANCED STUDIES IN HEALTH EDUCATION II. (3 cr; prereq grad student in health education, 5054, #) Craig, Mills
Elements of comprehensive health/health education planning; theory, process, models for educational planning; fact-finding procedures and models; setting behavioral content and methodological objectives; theories, principles, and procedures for evaluating health services and their educational components.

5058. SEMINAR: EVALUATION OF COMMUNITY HEALTH EDUCATION PRACTICE. (1 cr; prereq grad student in health education, 5068, #) Craig
Student, agency staff, and faculty evaluation of experiences in community health education practice; review of student experiences; alternate approaches.

5061, 5062. COMMUNITY HEALTH EDUCATION LABORATORY. (5 cr total; 20 hrs per wk; prereq grad student in health education, 5054, 5055, 5056) Craig, Mills
Review of procedures and techniques utilized in collecting health education data; visits to major health resources in metropolitan area; discussion of goals and organization of each visited resource; representative health education programs and opportunities in metropolitan area.

5063. COMMUNITY HEALTH EDUCATION LABORATORY. (6 cr; 20 hrs per wk; prereq grad student in health education, 5061-5062, #) Craig, Mills
Practical experience in community agencies and organizations; background studies in specific neighborhood areas; supervised health education practice; action planning for health education.

5065. HEALTH EDUCATION PREPARATION AND ALLIED PERSONNEL. (2 cr; prereq grad student in health education, 5068, #) Craig, Mills, Veninga
Methods, procedures, and techniques for planning, implementing, and evaluating in-service and short-course health education programs for health and allied personnel.

5067. COMMUNITY HEALTH EDUCATION LABORATORY. (12 cr; prereq 5054, 5055, 5056, grad student in health education; 40 hrs per wk)
Practical experience in community agencies and organizations; background studies in specific health service areas; supervised health education practice.

5068. COMMUNITY HEALTH EDUCATION PRACTICE. (12 cr; prereq grad student in health education, 5061-5062, and #) Craig, Mills
One-quarter of full-time supervised health education experience in a selected health agency, institution, service, or organized health-related, community-based program.

5069. COMMUNITY HEALTH EDUCATION PRACTICE. (6 cr; for school health education majors only; prereq 5080, #) Craig, Mills
One-quarter of half-time experience in community health education activities in selected community health agencies and institutions.

5074. GROUP PROCESS IN HEALTH EDUCATION. (3 cr; prereq school health education major, 5054,#) Craig, Veninga
Leadership, role behaviors, dependency behaviors, and evaluation procedures for task-centered groups. Formulation and implementation of educational groups in community setting.

5080. INTRODUCTION TO COMMUNITY HEALTH EDUCATION. (2 cr; prereq grad student in health sciences, #) Craig, Mills, Veninga
Role and function of health education as an integral part of health programs and services, basic principles and procedures of health education planning and evaluation; methods, materials, and techniques of community health education process.

5083. PATIENT EDUCATION IN REPRESENTATIVE HEALTH CARE SETTINGS. (3 cr; prereq #) Craig, Mills, Veninga
Current theories, principles, methods, procedures, and techniques applicable to patient education in a variety of heath care settings; e.g., hospitals, health maintenance orgainzations, clinics, health agency services. Planning, implementation, and evaluation of patient education.

5091. HEALTH EDUCATION RESEARCH I. (4 cr; prereq 5055 and #) Craig, Mills, Veninga
Methods in health education research; identification and use of resources; selection of research areas, format and construction of research papers.

5098. TOPICS IN COMMUNITY HEALTH EDUCATION. (Cr ar; prereq #) Craig, Mills, Veninga
Selected readings; seminars.

5150. TOPICS IN ENVIRONMENTAL HEALTH. (Cr ar; prereq #) Staff
Selected readings and discussions of problems in environmental health.

5152. ENVIRONMENTAL HEALTH. (2 cr; prereq #) Staff
General principles of environmental health relating to macro and micro environments and products consumed or used by people.

5156. ENVIRONMENTAL HEALTH I. (2 cr; prereq #) Straub and staff
Biological, chemical, and physical aspects of both natural and artificially produced environments. Mechanisms by which environmental components reach and affect people.

5157. ENVIRONMENTAL HEALTH II. (2 cr; prereq #) Straub and staff
Environmental health prevention and control strategies, measurements, monitoring, surveillance, dose-response relationships, and remedial actions.

5159. SEMINAR: ENVIRONMENTAL HEALTH. (Cr ar; prereq #) Staff

5161. ADMINISTRATION OF ENVIRONMENTAL HEALTH PROGRAMS. (3 cr; prereq #) Bond
Administrative organization of environmental health activities.

5169. SEMINAR: ENVIRONMENTAL HEALTH ADMINISTRATION. (Cr ar; prereq #) Bond

5170. TOPICS IN ENVIRONMENTAL BIOLOGY. (Cr ar; prereq #) Staff
Selected readings in environmental biology with discussion of control techniques.

5171. ENVIRONMENTAL MICROBIOLOGY. (3 cr; prereq MicB 3103 or #) Greene
Survival, dissemination, transportation, and significance of microorganisms in the environment; application of principles to environmental health problems.

5172. ENVIRONMENTAL MICROBIOLOGY LABORATORY. (2 cr; prereq 5171, #) Greene, Vesley
Laboratory and field exercises in microbiological sampling, detection, enumeration, and control.

5177. PUBLIC HEALTH BIOLOGY. (3 cr; prereq #) Ruschmeyer
Introduction to plant and animal forms important in environmental health; biological aspects of water supply, waste treatment, stream and special phenomena related to human disease transmission.

5180. TOPICS IN AIR POLLUTION. (Cr ar; prereq #) Staff
Selected readings in air pollution with discussion based on these readings.

5181. INTRODUCTION TO THE AIR POLLUTION PROBLEM. (3 cr; prereq #) Paulus
History, sources, controls, effects, surveys, legal aspects; administration of programs.

5182. AIR POLLUTION CONTROLS AND SURVEYS. (3 cr; prereq 5181 or #) Paulus
Public health engineering approach to air pollution controls and surveys.

5183. PROBLEMS OF AIR POLLUTION CONTROL. (Cr ar; prereq 5181, #) Paulus
Special supervised studies involving laboratory and field investigation procedures; review of pertinent literature.

5184. AIR ANALYSIS I. (3 cr; prereq 5181, 5183 or 5211, #) Paulus
Laboratory and field exercises involving air flow calibration, dynamic calibration of field equipment for analysis of air contaminants, respirable mass sampling, dust counting and sizing, and instrumentation for measuring physical environment stresses.

5185. AIR ANALYSIS II. (3 cr; prereq 5184, #) McJilton, Paulus
Laboratory and field exercises involving sampling and analysis techniques for stack sampling and for ambient air monitoring. Group surveys of air pollution problems and special projects.

5190. TOPICS: INJURY CONTROL. (Cr ar; prereq #) Staff
Directed readings and reports on selected problem areas in injury control.

5193. CHEMICAL LABORATORY SAFETY. (1 cr; prereq #) Herron
Principles of accident and fire prevention in chemical laboratories.

5194. OCCUPATIONAL SAFETY. (2 cr; prereq #) Herron
Occupational safety procedures, environmental controls to reduce injuries on and off the job, safety program development and administration.

5200. TOPICS IN RADIOLOGICAL HEALTH. (Cr ar; prereq #) Staff
Selected readings in radiological health with discussion based on these readings.

5201. MEASUREMENT AND APPLICATION OF IONIZING RADIATION. (3 cr [lect and lab], 2 cr [lect only]; prereq #) Barber
Introduction to principles of measurement and use of radiative sources; emphasis on health hazards.

5202. ENVIRONMENTAL RADIOACTIVITY. (2-3 cr; prereq 5201 or #)
Sources, measurement, evaluation, and control of environmental radioactivity; hazards to general population

5207. RADIATION PROTECTION CRITERIA FOR HOSPITALS. (2 cr; prereq #) Wollan
Applied procedures and methods for control of ionizing radiation exposure: emphasis on design, surveys, and evaluation of X-ray facilities and radioisotope laboratories.

5209. SEMINAR: HEALTH PHYSICS. (1 cr; prereq #)
Review and discussion of current health physics problems.

5210. TOPICS IN OCCUPATIONAL HEALTH. (Cr ar; prereq #) Staff
Selected readings in occupational health with discussion based on these readings.

5211. INDUSTRIAL HYGIENE ENGINEERING. (3 cr; prereq #) McJilton
Concepts and techniques used in occupational health; emphasis on fieldwork, evaluation of potential hazards, and preventive techniques.

5212. VENTILATION CONTROL OF ENVIRONMENTAL HAZARDS. (3 cr; prereq 5211, #) McJilton
Theory and application of exhaust ventilation in control of airborne environmental hazards; principles of exhaust hoods, air moving devices, gas cleaning devices; demonstration of measurement techniques; relationship of hazard and process to ventilation design criteria.

5213. PUBLIC HEALTH ASPECTS OF TOXIC PRODUCTS. (2 cr; prereq 5215) Long
Problems of protecting industrial workers and private consumers from useful but potentially harmful products; product testing programs and administration; labeling problems.

5215. APPLIED OCCUPATIONAL TOXICOLOGY. (3 cr; prereq 5181 or 5211, #) Long
Basic toxicology and physiology with emphasis on environmental contaminants. Inhalation toxicology of the work environment and air pollution.

5219. SEMINAR: OCCUPATIONAL HEALTH. (1 cr; prereq occupational health student, #) Johnson, McJilton, Richard
Interdisciplinary discussions of current occupational health issues.

5220. TOPICS IN FOOD SANITATION. (Cr ar; prereq #) Staff
Review of literature and practice to identify association of food sanitation problems with public health.

5221. INSTITUTIONAL FOOD PROTECTION PROGRAMS. (3 cr; prereq #) Jopke
Basic principles of food hygiene; development of educational program for food service workers; health aspects of regulatory control for public health agencies.

5222. FOOD SANITATION. (3 cr; prereq #) Jopke, Pflug
Review of current literature on sanitary problems in production, processing, and distribution of milk, meat, shellfish, and other foods; methods of supervision.

5230. TOPICS IN INSTITUTIONAL ENVIRONMENTAL HEALTH. (Cr ar; prereq #) Staff
Review of literature and practice to identify institutional environmental health problems.

5231. ENVIRONMENTAL HEALTH AND SAFETY IN HEALTH CARE FACILITIES I. (4 cr; prereq #) Vesley
Environmental health concepts and problems related to isolation techniques, cleaning, disinfection, and sterilization; laundry processes, food service; physical plants; interdepartmental relationships.

5232. ENVIRONMENTAL HEALTH AND SAFETY IN HEALTH CARE FACILITIES II. (4 cr; prereq #) DeRoos
Ventilation; water supply; plumbing; solid and liquid waste systems; and other environmental engineering problems.

5233. BIOHAZARD CONTROL IN BIOMEDICAL LABORATORIES. (2 cr; prereq 5171, 5231, #) Vesley
Topics include assessment of risk, primary barriers, laboratory design criteria, safety devices and equipment, personnel practices, sterilization and disinfection, laboratory animals, and shipping and disposal of biohazardous agents.

5240. TOPICS IN WATER HYGIENE. (Cr ar; prereq #) Staff
Selected readings and discussions of problems relating to health aspects of water supply and waste water systems.

5241. ENVIRONMENTAL HEALTH ASPECTS OF WATER SUPPLY. (3 cr; prereq #) Singer, Straub
Role of water in human health; physical, chemical, and biological characteristics; evaluation of source, treatment, and distribution systems.

5242. ENVIRONMENTAL HEALTH ASPECTS OF GROUNDWATER SYSTEMS. (2 cr; prereq #) Singer
Groundwater geology, quality, and treatment; well design, construction, and maintenance; special references to public and environmental health problems.

5244. ENVIRONMENTAL HEALTH ASPECTS OF WASTEWATER SYSTEMS. (3 cr; prereq #) Singer
Role of liquid wastes in human health; physical, chemical, and biological characteristics; evaluation of source, treatment, and disposal facilities.

5246. MICROBIOLOGY OF WATER AND WASTEWATER. (3 cr; prereq #) Straub and staff
Basic principles and methods used in identification of indicator and other microorganisms of concern in water and wastewaster

5247. ENVIRONMENTAL ANALYSES. (3 cr; prereq #) Goppers, Straub
Basic laboratory procedures used in examination of water and wastewater. Application of methods to water and wastewater treatment processes.

5261. ENVIRONMENTAL TOXICOLOGY. (3 cr, prereq #) Long
Application of toxicology to environmental problems; interpretation and evaluation of data, assessment of potential health hazards, and approaches to solution of problems.

5300. COMPARATIVE MEDICINE AND PUBLIC HEALTH. (2 cr; prereq #) Anderson, Diesch
Survey of comparative medicine in human relationship to biologic environment, interrelationship between animal and human health; sources of animal diseases; ecology of zoonoses; food production and hygiene; laboratory animal medicine.

5303. PERSPECTIVES: ANIMAL-HUMAN RELATIONS AND COMMUNITY HEALTH. (3 cr)
The interrelationships of people and animals sharing a common environment and the effects these relationships have on individual, family, and community health. Problems that arise in animal-human-environmental relationships; students help develop solutions to these problems.

5306. ANIMAL MODELS OF HUMAN DISEASE. (3 cr; prereq 5300 or 5330)
Selected animal models of human disease; principles involved in developing criteria for meaningful and appropriate use; methods for evaluation of experimental design and objectives of users; criteria for identification of additional models for comparative medical research.

5310. DISEASES TRANSMITTED BETWEEN ANIMALS. (4 cr; prereq #)
Selected diseases transmitted between animals and humans with emphasis on diagnostic problems, epidemiology, prevention, control, and evaluation.

5315. PROBLEMS IN DISEASE CONTROL AND ERADICATION. (Cr ar; prereq 5330 or #)
Past and present disease control and eradication programs and factors influencing degree of success and failure. Students will develop models for proposed disease control and eradication programs in the United States or a foreign country for group evaluation and analysis.

5317. PROBLEMS IN VETERINARY MEDICAL ADMINISTRATION AND SUPERVISION. (3 cr; prereq #)
Case studies of selected problems with emphasis on application of knowledge to problem solving, developing and using appropriate skills, evaluation, decision making.

5320. MEAT HYGIENE RELATED TO THE CONSUMER. (3 cr)
Consumer s role in protecting wholesomeness of meat from time of purchase by the consumer through transportation, storage, preparation, and serving for consumption. What the consumer should expect when purchasing meat in terms of industry and government responsibility for wholesomeness and freedom from adulteration. Examples of problems encountered and suggestions to aid consumers.

5323. CHEMICAL DRUG ASPECTS OF MEAT HYGIENE. (3 cr; prereq #)
Factors leading to drug residues in food producing animals; residue detection; criteria for determination of tolerance and action levels by government agencies; harmful effects of drug residues in relation to human health.

5326. RESEARCH IN ANIMAL HUMAN HEALTH. (Cr ar; prereq #) Anderson, Diesch, Pullen, Robinson
Research in animal health as related to human health.

5330.* EPIDEMIOLOGY I. (5 cr; prereq course in microbiology and a 3-cr course in biostatistics or #) Schuman, Anderson, Mandel
Basic concepts and mechanisms of production of infectious and noninfectious disease and maintenance of the health state; basic epidemiologic principles applicable to infectious and noninfectious disease; host-agent-environment complex; factors underlying spread of infectious disease; laboratory applications of statistical and epidemiologic methods.

5331. FUNDAMENTALS OF BIOSTATISTICS. (3 cr) Visiting lecturers
Rates, probability methods, statistical inference, sampling distributions.

5332. FUNDAMENTALS OF EPIDEMIOLOGY. (3 cr) Visiting lecturers
Basic epidemiologic concepts and methods of investigation of diseases.

5333. BIOLOGICAL BASES AND EPIDEMIOLOGY OF HEALTH AND DISEASE. (4 cr; prereq course in microbiology, a 3-cr course in biostatistics or #) Schuman, Anderson, Mandel
Introduction to basic concepts and mechanisms of infectious and noninfectious diseases, maintenance of the healthy state, and principles of epidemiology illustrative of the factors leading to the rise and fall of disease in populations. Laboratory application of statistical and epidemiologic methods.

5335.* EPIDEMIOLOGY II. (3 cr; prereq 5330) Schuman
Extension of epidemiologic principles to detailed study of selected infectious diseases.

5336. INFECTIOUS DISEASE EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics) Evans
Factors involved in epidemic occurrence; clinical response to infection; impact on humans of zoonoses; immunologic responses; vaccine evaluation.

5337. SEROLOGIC EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Applications of immunologic and biochemical methods to epidemiologic problems of disease.

5338. HOSPITAL EPIDEMIOLOGY AND INFECTION CONTROL. (2 cr; prereq basic epidemiology) Hierholzer
Application of epidemiologic methods to investigation and control of hospital risk (infections, drug reactions, accidents, excess costs). Review of opportunities for collection and use of hospital data for patient care evaluation in the context of current regulatory efforts.

5339. EPIDEMIOLOGY OF DISEASES DUE TO DRUGS AND OTHER THERAPIES. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Methods of monitoring, detecting, and investigating diseases and reactions due to medical therapies; specific examples of epidemiologic investigations. Use of intensive hospital monitoring, vital statistics, and drug utilization data in detection and control of adverse drug reactions. Analyses and discussion of case-control and cohort investigations of adverse reactions due to oral contraceptives, hormones, other drugs, surgical and diagnostic techniques.

5340. EPIDEMIOLOGY: STRATEGIES AND METHODS. (3 cr; prereq 5330, 5413 and 5414 or equiv, #) Mandel
Measures of disease occurrence, and strategies and design principles of etiologic and evaluative studies. Measurement problems, interactions, sensitivity and precision, validity and the need for data specification and control of variables.

5341. HEALTH SURVEY METHODS. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Problems of sampling, sample size determination, interview, questionnaire development, and organization of community health research.

5342. PUBLIC HEALTH BACTERIOLOGY. (Cr ar; prereq MicB 5216, 5232, 5234, #) Stickles
Bacteriologic and serologic diagnosis, public health laboratory administration and methods.

5344. CLINICAL TRIALS—DESIGN, OPERATION, AND ANALYSIS. (2 cr; prereq basic epidemiology and biostatistics) Kjelsberg
For physicians, statisticians, epidemiologists, and others with little or no previous experience in the conduct of clinical trials. Characteristics influencing design of preventive, intervention, therapeutic, and surgical trials; organization of collaborative studies. Techniques for randomization, sample size determination, and data quality control. Statistical analysis illustrated by case examples.

5345. EPIDEMIOLOGY OF CANCER. (3 cr; prereq basic epidemiology and biostatistics, 5357 or ¶5357) Cole
Epidemiology of selected cancer sites. Emphasis on existing gaps in knowledge.

5346. EPIDEMIOLOGY OF CARDIOVASCULAR DISEASES. (3 cr; prereq basic epidemiology, biostatistics, 5357 or ¶5357) Kuller, Tyroler
Epidemiologic aspects of various types of cardiovascular disease with emphasis on multivariate settings of etiologies.

5347. EPIDEMIOLOGY OF MENTAL DISORDERS. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Application of epidemiologic concepts and methods to psychiatric problems. Specific mental disorders.

5348. EPIDEMIOLOGY OF NEUROLOGIC DISEASES. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Epidemiologic approach to selected diseases of the nervous system including multiple sclerosis, Parkinsonism, cerebrovascular diseases, malignant diseases, and congenital deformities of the central nervous system.

5349.* EPIDEMIOLOGY OF CHRONIC RESPIRATORY DISEASE. (Cr ar; prereq #) Visiting lecturers
Critical review of current status of chronic respiratory disease epidemiology and methods. Design and analysis of longitudinal studies.

5350. EPIDEMIOLOGIC BASIS FOR HEALTH SERVICES PLANNING AND EVALUATION. (2 cr; prereq 5330, 5332 or equiv, 5407, 5331 or equiv) Ibrahim
Epidemiologic approaches to planning and criteria of evaluation

5353. EPIDEMIOLOGY OF NUTRITIONAL DISEASES AND ABNORMALITIES. (3 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Concepts of the influence of nutritional status on health and disease. Methodologies for assessment of nutrition and relationship of nutrition to major disease problems.

5355. GENETICS AND EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics) Li
Genetic methods of evaluating families; topics in population genetics.

5356. POPULATION DYNAMICS. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Historical and current levels and changes in rates of population growth, mortality, natality, migration.

5357. SELECTED STATISTICAL TOPICS IN EPIDEMIOLOGY. (3 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Rate adjustment, relative risk, measures of association, matched pair analyses, force of mortality, and estimation of survivorship.

5358. RADIATION EPIDEMIOLOGY. (2 cr; prereq basic epidemiology, biostatistics, advanced statistics) Visiting lecturers
Critical review of epidemiological studies of biological effects of radiation exposure in man with emphasis on methodological problems encountered.

5359. EPIDEMIOLOGY OF OCCUPATIONAL HAZARDS. (3 cr; prereq basic epidemiology and biostatistics) Decouflé
Epidemiologic approaches to occupational hazards. Selected disease examples.

5360. EPIDEMIOLOGY OF TRAUMA. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Characteristics of accidents, homicide, suicide, and disasters, and application of epidemiologic principles to their control.

5361. EPIDEMIOLOGIC METHODS IN ORAL DISEASE RESEARCH. (3 cr; prereq regis dental public health) Katz
Application of the concepts, principles, and practices of epidemiology to oral diseases. Topics include dental caries, periodontal disease, oral cancer, oral malformations, and occupational diseases. Emphasis on how research designs and methods combine with statistical analysis and common sense to produce valid interpretation of data.

5365. EXPERIMENTAL EPIDEMIOLOGY. (Cr ar; prereq 5335 and 5407 or 5450 or equiv and #) Anderson, Diesch
Infectious and noninfectious diseases in laboratory animal populations and simulated environmental conditions; effect of alterations in agent-host-environment on health and disease under varying controlled experimental conditions measured and evaluated. Results analyzed in terms of application to disease prevention and control programs.

5370. APPLIED EPIDEMIOLOGY. (Cr ar; prereq 5330 and 5407 or 5450 or equiv and #) Anderson, Diesch
Application of epidemiologic principles and methods in field studies of outbreaks of disease in cooperation with veterinary medical practitioners, state Livestock Sanitary Board, USDA, Minnesota Department of Health, and HEW. Application of principles and methods of planning investigations; collection and analysis of data for proposed prospective and retrospective studies of acute and chronic diseases of animals; analysis and evaluation of field investigations and factors influencing their outcome.

5375. BIOLOGICAL BASES OF HEALTH AND DISEASE. (3 cr; prereq course in microbiology or #) Schuman
Introduction to basic concepts and mechanisms of production of disease, infectious and noninfectious, and of maintenance of the healthy state. Illustrative diseases utilized as samples or models.

5378. DEVELOPMENT OF AND PERSPECTIVES IN EPIDEMIOLOGY. (2 cr; prereq basic epidemiology and biostatistics) Lilenfeld
Historical development of epidemiological concepts and methods presented in seminar-lecture form. Potential for use of these concepts and methods in a broad variety of applications. Interrelationships of past and future developments with those in other disciplines such as statistics, genetics, and sociology.

5379.* TOPICS IN EPIDEMIOLOGY. (Cr ar; prereq #) Staff
Selected readings with discussion based on these readings.

5380. APPLIED HUMAN NUTRITION. (3 cr; prereq Biol 3021 or equiv) Leon
Food composition and functions; energetics; assessment of nutritional adequacy in individuals and populations; protein-calorie insufficiency; food-drug interactions; food additives; management of obesity; behavior modification and exercise; importance of food fiber; nutrition and dental health; relationship of diet to blood lipids and coronary heart disease.

5385. PHYSIOLOGY OF EXERCISE. (Cr ar; prereq Phsl 5101 or equiv and #) Leon, Taylor
Effects of exercise conditioning and deconditioning on body composition, metabolism, and function.

5386. PUBLIC HEALTH ASPECTS OF CARDIOVASCULAR DISEASES. (3 cr; prereq basic epidemiology and biostatistics) Blackburn, Gillum, and staff
Evaluation of population studies and trials on cardiovascular diseases; modifiable risk factors for coronary heart disease; prevention of other types of heart diseases.

5387. DETECTION OF CORONARY HEART DISEASE. (4 cr, §PE 5387; prereq introductory course in anatomy and physiology, #) Crow, Leon, Prineas, Serfass
Coronary circulation; pathophysiology of atherosclerosis; clinical manifestations of coronary heart disease; relationship of exercise physiology to coronary heart disease; blood pressure determination; resting and exercise ECG interpretation.

5388. EXERCISE TESTING, CONDITIONING, AND REHABILITATION. (4 cr, §PE 5388; prereq 5387) Crow, Leon, Serfass
Exercise testing, prescription and programs for healthy adults, and rehabilitation of cardiac myocardial patients; cardiopulmonary resuscitation.

5389. PRACTICAL EXPERIENCE: GRADED EXERCISE TESTING PRESCRIPTION AND DIRECTION. (2-6 cr, §PE 5389; prereq 5388) Crow, Leon, Serfass
Participation in exercise testing, conditioning, rehabilitation, and/or coronary risk factor modification programs.

5400. INTRODUCTION TO QUANTITATIVE METHODS IN THE HEALTH AND LIFE SCIENCES. (4 cr; for students majoring in biological and health sciences; prereq Biol 1011, Chem 1004-1005, Math 1231 or equiv, #) McHugh
Basic quantitative methods for design and analysis of clinical and laboratory studies in biology and health sciences.

5403. COMPUTER APPLICATIONS IN HEALTH SERVICES ADMINISTRATION. (4 cr; prereq non-biometry major, health science regis or #) Gatewood
Survey of current applications of digital computers for health services, clinical algorithms, and health-related information systems. Costs, benefits, and interrelationships among data acquisition, reduction, storage, interpretation, and dissemination for health services. Administration needs for planning, personnel, backup, and evaluation stressed. Applications illustrated through the use of BASIC computing language and package computer programs.

5404. INTRODUCTION TO BIOSTATISTICS AND STATISTICAL DECISION. (4 cr; prereq #) Weckwerth
Variation; frequency distribution; probability; significance tests; estimation; trends; data handling; simple operations research applications. Statistical approach to rational administrative decision making. Lectures and laboratory.

5406. BIOMETRIC METHODS IN ENVIRONMENTAL HEALTH. (3 cr; prereq environmental health student and 5414 with grade of B or equiv or #) Johnson
Estimation; tests of significance; Poisson distribution applications; elements of bioassay; radiologic statistics; research design; special topics in data analysis and interpretation.

5407. VITAL AND HEALTH STATISTICS I. (3 cr) Kjelsberg
Official sources; population changes; rates; trends; significant differences.

5408. BIOMETRIC METHODS II. (3 cr; prereq 5414 with grade of B or #) Goldman
Demographic techniques and statistical inference.

5409. BIOMETRY IN CLINICAL STUDIES I. (3 cr; prereq DDS, MD, DVM, PharmD or clinical nursing student or #)
Introduction to numerical and graphical treatment of data from dental, medical, and veterinary research. Examples taken from recent literature. Design, conduct, and analysis of clinical studies. Prophylactic and therapeutic trials. Validity and reliability of measurements and calibration studies for clinical setting. Sensitivity and specificity of tests and their application in clinical research and diagnosis. Special problems of cooperative studies.

5410. BIOMETRY IN CLINICAL STUDIES II. (3 cr; prereq DDS, MD, DVM, PharmD or clinical nursing student or #)
See 5409.

5412. SURVEY SAMPLING IN SOCIAL AND HEALTH SCIENCE RESEARCH. (3 cr, §Soc 5970; prereq #) Staff
Introduction to methodology of probability sampling in social and health science surveys. Analysis and application of simple random, stratified, systematic, multistage, and cluster sampling.

5413. VITAL AND HEALTH STATISTICS. (1 cr) Kjelsberg
Morbidity, mortality, fertility, health personnel and facilities, data sources; demographic characteristics and projections; rates; adjustment of rates; federal-state-local statistical programs.

5414. BIOMETRIC METHODS I. (3 cr; prereq public health regis or #) Staff
Basic quantitative methods for public health students including descriptive statistics; graphic methods; measures of variation; tests of significance; estimation concepts and procedures; introduction to correlation, regression, sampling techniques, and principles of study design.

5415-5416-5417. MATHEMATICAL BIOLOGY I, II, III. (3 cr per qtr; prereq 5432, knowledge of differential equations and biological science or #) Ackerman and staff
Mathematical models as tools for communication and concept analysis in health-related disciplines. Emphasis on design, selection, simulation, and interpretation of computer-programmable models. Topics include goals and guidelines, deterministic models of physiological systems, transforms and transfer functions, analysis and classification of EKGs and EEGs, information theory, population models, and stochastic applications for genetics, ecology, and epidemiology.

5430. BIOMEDICAL COMPUTING I. (4 cr; prereq Math 1111) Ellis
Digital computers and their use in biology and medicine through the BASIC programming language. Simple algorithms for data processing; using and modifying statistical and graphical library programs; elements of conversational programming.

5431. BIOMEDICAL COMPUTING II. (4 cr; prereq 5430 or #) Ellis
Biomedical FORTRAN programming, introduction to data base management, file and magnetic tape handling, statistical and graphical package programs.

5432. BIOMEDICAL COMPUTING III. (4 cr; prereq 5431 or #) Ellis
Survey of special purpose computer systems and languages useful in biology and medicine for computer-aided instruction, hospital information systems, patient monitoring, and simulation.

5433-5434-5435. COMPUTER METHODOLOGY IN THE DELIVERY OF HEALTH CARE I, II, III. (3 cr per qtr; prereq 5432 or #) Gatewood and staff
Records and files, file maintenance, report generation, hospital administrative information, and accounting systems. Medical records; abstracting the medical record; information systems based on medical records for hospitals, surveys, physicians, outpatient clinics, and research. Monitoring of clinical laboratory equipment; physiological monitoring of acutely ill patients; total hospital information systems.

5436. ANALYTICAL TECHNIQUES FOR HEALTH DELIVERY SYSTEMS. (3 cr; prereq calculus, 5450, 5451, FORTRAN or #) Johnson
Operations research and systems analysis techniques applied to medical service systems. Special emphasis on applications of linear programming, theory of queues, and inventory models in health care systems.

5440-5441. QUANTITATIVE PHYSIOLOGY I, II. (3 cr per qtr, §PhsI 3052-3053; prereq 1-yr sequences in mathematics, physics, chemistry, and biology or #)
Diffusion, surface tension, and mechanics of respiration, circulation, digestion, and locomotion. Chemical aspects of blood, respiration, renal function, nutrition, and metabolism. Endocrine, sensory, neuromuscular, and central neural functioning.

5446. BIOCOMPUTING CONSULTING SEMINAR. (3 cr; prereq biometry major, 5432, 5452 or #) Gatewood
Overview of computer hardware, operating systems, languages and packages for statistics, graphics, file maintenance, report generation, and health science applications. Case examples illustrate roles and responsibilities of project manager in analyzing requirements of health science project, designing and specifying computer interfaces, and supervising development, training, documentation, and evaluation for implementation effort.

5450. BIOMETRY I. (3 cr; prereq ¶5451...familiarity with basic concepts of calculus desirable) Jeffries
Basic concepts in probability; binomial, Poisson, and normal probability models for random phenomena in biological and health sciences.

5451. BIOMETRY LABORATORY I. (2 cr; prereq ¶5450) Jeffries
Application of concepts of probability to development of probability models for random phenomena in biological and health sciences.

5452. BIOMETRY II. (3 cr; prereq 5450, ¶5453) Jeffries
Further consideration of testing statistical hypotheses and interval estimation; chi square applied to frequency data; regression analysis; correlation; analysis of variance; contrasts and multiple comparison techniques.

5453. BIOMETRY LABORATORY II. (2 cr; prereq ¶5452) Jeffries
Application of concepts of testing and estimation of parameters of basic probability models; application of chi square to goodness of fit and heterogeneity tests; application of regression to bioassay; application of analysis of variance to bioassay.

5454. BIOMETRY III. (3 cr; prereq 5452, ¶5455) Jeffries
Analysis of nested, randomized block, factorial, and split plot designs.

5455. BIOMETRY LABORATORY III. (2 cr; prereq ¶5454) Jeffries
Basic designs illustrated with numerous examples from biological sciences.

5456. BIOMETRY CONSULTING SEMINAR. (Cr ar; prereq biometry major) Boen and staff
Consultant and client interaction; communication and formulation of the biometric problem. Role and responsibility of the biometrician. Robustness and relevance of frequently used analytical techniques. Internship experiences.

5457. STOCHASTIC MODELS IN BIOLOGY AND MEDICINE. (3 cr; prereq 5451, theoretical statistics, biometry major...others #) Boen
Applications of stochastic processes to health care systems and to such varied biologic phenomena as epidemics, urinary track infection, and carcinogenesis.

5459. INTRODUCTION TO MATHEMATICAL THEORY IN BIOMETRY. (1 cr per qtr [may be repeated for cr]; prereq ¶5450, 2 qtrs calculus or #) Jeffries
Generating functions, curve fitting, iterative estimation, tests, propagation of error, and related topics with illustrations from epidemics and population growth, bioassay, clinical trials, demography, and other biohealth science areas.

5460. DEMOGRAPHY AND HEALTH. (3 cr, §Soc 5561; prereq biometry major...others #) McHugh
Needs, sources, collection, and interpretation of data in the areas of population mortality, morbidity, natality, and health services.

5461. BIOMETRIC TOPICS IN EPIDEMIOLOGY. (3 cr, prereq biometry major...others #) Kjelsberg
Relative risk; summarization of rates; misclassification; matching designs; incidence as a function of several variables; selection, clustering; familial aggregation.

5462. CLINICAL TRIALS AND LIFE TABLE TECHNIQUES. (3 cr; prereq biometry major...others #) Staff
Introduction to methodology of large-scale collaborative clinical trials; case examples; operational aspects of a data center. Elementary life table techniques and application to follow-up studies in medicine and public health.

5470. TOPICS IN BIOMETRY. (Cr ar, prereq #) Staff
Selected readings with discussion based on these readings.

5500. PUBLIC HEALTH—NORMAL GROWTH AND DEVELOPMENT. (4 cr; prereq #) Pflug, Leonard, and staff
Selected theories of physical and psychosocial development; emphasis on development stages throughout the life span. Administration and interpretation of selected developmental and psychological screening tests.

5501. PUBLIC HEALTH-MENTAL HEALTH NURSING. (4 cr; prereq #) Pflug, Reynolds
Clinically oriented course with emphasis on systems approach to viewing families. Students are expected to develop their own philosophy and theoretical framework based on family intervention theories presented in class and apply theoretical content in clinical situation. Class presentations, seminar discussion, audiotaping, peer review, and student-faculty conferences.

5502. PUBLIC HEALTH: PREVENTIVE ASPECTS OF COMMUNITY HEALTH ASSESSMENT. (4 cr; prereq #) Pflug, Reynolds
Community viewed as a system. Emphasis on the process of community or program assessment and development relevant to preventive aspects.

5510. RESEARCH METHODOLOGY IN NURSING. (3 cr) Staff
Selected research studies in nursing; development of models and theory in nursing research; steps in formulating a research design.

5517. SEMINAR: PATIENT CARE AND REHABILITATION IN THE COMMUNITY. (Cr ar; open to grad students in the health sciences)
Multidisciplinary approach to developing community programs for patient care.

5519. ADULT AND GERIATRIC HEALTH MAINTENANCE, LONG-TERM CARE AND REHABILITATION. (Cr ar; prereq #)
Independent study. Comprehensive multidisciplinary approach to maintenance of wellness and to continuity of care for long-term patients.

5520. FIELD EXPERIENCE: PHYSICAL AND OCCUPATIONAL THERAPY IN COMMUNITY AGENCIES. (Cr ar; prereq #)
Individualized directed experiences in local, county, and state health departments and other health agencies.

5525. NURSING IN FAMILY PLANNING. (3 cr; prereq RN) Fredlund, Josten
Masculine-feminine adaptation to the psychosocial and physiological dimensions of family planning. Planned to help nurses contribute more effectively to the delivery of maternal and family health care in the community.

5526. MATERNITY NURSING: PUBLIC HEALTH PERSPECTIVE. (3 cr; prereq BS in nursing) Fredlund, Josten
Focuses on the pregnant family in the community. Assists public health nurses to increase skills in working with pregnant women and significant others. Emphasizes adaptation to psychosocial and physical dimensions of pregnancy and integration of new infant into family unit. Clinical experience not included.

5535. CONTEMPORARY SCHOOL NURSING. (3 cr) Fredlund
Changes occurring in school health programs with emphasis on changing role of the public health nurse. Review of related research.

5537. SCHOOL NURSING FOR HANDICAPPED CHILDREN. (3 cr; prereq school nurse) Fredlund
To meet the needs of school nurses in working with handicapped children, their families, and their teachers.

5538. CHILD-CENTERED SCHOOL NURSING. (3 cr; open to RNs employed in school nursing) Fredlund
Role of school nurse in providing health services and contributing to health education for school children. Some recent trends in school nursing and the team approach in meeting children's health needs. Specific problem areas designated by the class. Lecture/discussions, student projects, and films.

5539. HEALTH ASSESSMENT OF CHILDREN FOR NURSES. (5 cr; prereq #) Kempf
Introduction to nursing assessment of health status of children, birth through adolescence. Includes problem oriented approach to health care with subjective data collection, objective data collection (including physical inspection), and developmental, psychosocial, and physical assessment. Application through selected assignments and 5-day workshop.

5560. FOUNDATIONS IN AMBULATORY CHILD HEALTH CARE I. (8 cr; open only to RNs enrolled in Pediatric Nurse Associate Program; prereq #) Leonard and staff
Preparation of the nurse to perform comprehensive health appraisals on children from birth through adolescence, review of anatomy and principles of examination; supervised clinical experience.

5561. FOUNDATIONS IN AMBULATORY CHILD HEALTH CARE II. (8 cr; open only to RNs enrolled in Pediatric Nurse Associate Program; prereq #) Leonard and staff
Second course in a three-course series designed to provide foundational knowledge and clinical experience necessary to assess the health of children from birth through adolescence and to manage their health care within their family and community environments. Knowledge, normative criteria, and clinical skills essential for assessing the health of school-age children and adolescents.

5562. FOUNDATIONS IN AMBULATORY CHILD HEALTH CARE III. (Cr ar; open only to RNs enrolled in Pediatric Nurse Associate Program; prereq #) Leonard
Final course in three-course series designed to prepare the nurse for primary role in ambulatory child health care. Focuses on deepening knowledge and skill in treatment and management of common health care problems of children and their parents. Special emphasis on collaborative role in health care delivery.

5563. ADOLESCENT HEALTH, DEVELOPMENT, AND BEHAVIOR. (3 cr; prereq #) Blum, Leonard, Woodbury
Review of current literature or research on adolescent development, both physical and psychosocial, and related health concerns of the age group. Sexuality, drug abuse, family and peer relationships, and the legal rights of youth in health care. Includes independent study and seminars and is designed for students who intend to work with adolescents and youth.

5564. ADOLESCENT HEALTH, DEVELOPMENT, AND BEHAVIOR: CLINICAL PRACTICUM. (2 cr; limited to pediatric nurse associate students or grad students by special arrangement)
Supervised, clinical practicum with adolescents and youth in a health care facility or clinical setting. Seminars with faculty to integrate theory and provide opportunity for case discussion.

5570. HEALTH ASSESSMENT I. (3 cr; prereq #) Kempf, Miller, Ostwald, Richard
Prepares registered nurses to obtain and record a health history relative to chief complaint, present illness, past health, family health, psychosocial history, and review of systems. Interviewing skills and introduction to problem-oriented system. Supervised laboratory experience.

5571. HEALTH ASSESSMENT II. (4 cr; prereq 5570 and #) Kempf, Miller, Ostwald, Richard
Prepares registered nurses to perform a physical examination using the techniques of inspection, palpation, percussion, and auscultation. Focus on systematic collection and recording of this objective data. Supervised laboratory experience.

5575. TOPICS IN PUBLIC HEALTH NURSING. (Cr ar; prereq #) Staff
Selected readings and discussion.

5576. ISSUES, TRENDS, AND PUBLIC HEALTH NURSING LEADERSHIP. (4 cr; prereq #) Staff
Designed to investigate and conceptualize master's-level public health nursing leadership through analysis of public health issues and trends.

5580. ADULT NURSE PRACTITIONER CERTIFICATE PROGRAM I. (8 cr; prereq #) Miedema, Ostwald, Shepard
First quarter of a 3-quarter sequence leading to a certificate. Application of theories related to communications and preventive health care; principles and skills of complete health assessment of adults. Supervised, concurrent clinical experience with physician preceptors in community primary care settings.

5581. ADULT NURSE PRACTITIONER CERTIFICATE PROGRAM II. (9 cr; prereq #) Miedema, Ostwald, Shepard
Second quarter of a 3-quarter sequence leading to a certificate. Knowledge and clinical skills necessary to collaboratively manage adults with minor acute and chronic problems. Patient education, counseling, and continuity of care. Supervised, concurrent clinical experience with physician preceptors in community primary care settings.

5582. ADULT NURSE PRACTITIONER CERTIFICATE PROGRAM III. (10 cr; prereq #) Miedema, Ostwald, Shepard
Third quarter of a 3-quarter sequence leading to a certificate. Role implementation with application of theories related to nursing: role change; intra- and inter-professional collaboration, conflict resolution, and quality assurance. Management of patients with selected complex physical and psychosocial problems; use of community resources; collaborative development of joint practice statements and protocols. Clinical experience includes options for independent study related to role implementation.

5585. PUBLIC HEALTH NURSING. (6 cr for 10 wks; prereq current RN licensure and #) Lentsch
For nurses interested in gaining theoretical knowledge and clinical skills in community health nursing.

5590. THEORY AND PRACTICE OF OCCUPATIONAL HEALTH NURSING. (2-4 cr ar; prereq #) Dingman, Richard
Focus on selection and implementation of a conceptual framework for nursing practice in an occupational setting. Standards of occupational health nursing practice; students expand knowledge and skills in assessment and management of common employee health problems. Supervised clinical experience.

5591. PREVENTIVE ASPECTS OF OCCUPATIONAL HEALTH PROGRAMMING. (3 cr; prereq #) Dingman, Richard
Focus on nursing intervention at primary, secondary, and tertiary levels of prevention. Students participate in health hazard evaluation survey and development of health surveillance programs. Supervised clinical experience.

5592. PLANNING AND COORDINATING AN EMPLOYEE HEALTH SERVICE PROGRAM. (3 cr; prereq 5590, 5591 or #) Dingman, Richard
Focus on the emerging role of the master's-prepared occupational health nurse. Includes coordination with management, labor, and other health/safety professionals. Supervised clinical experience.

5600. FIELD COURSE I IN PUBLIC HEALTH NUTRITION. (Cr ar; prereq #) Stief and associates
Placement in an approved agency with opportunity for experience in nutritional aspects of public health programs.

5601.* SEMINAR: PUBLIC HEALTH NUTRITION. (Cr ar; prereq #) Brown and staff

5602. MATERNAL AND CHILD NUTRITION. (3 cr; prereq #) Brown and staff
Nutrient functions and requirements throughout pregnancy, lactation, infancy, and childhood through adolescence.

5603. NUTRITION ASSESSMENT. (2 cr; prereq #) Brown and staff
Methods used to assess nutritional status of populations and individuals throughout various stages of the life cycle.

5604. FACTORS AFFECTING NUTRITION BEHAVIOR. (2 cr; prereq #) Brown and staff
Basic factors involved in formation of food habits; methods used to modify food habits and to promote and maintain nutritional health of individuals or groups.

5605. PRINCIPLES OF PUBLIC HEALTH RESEARCH. (3 cr; prereq grad status, completion of or concurrent regis in course in statistics or vital statistics)
Designed to prepare students to critically evaluate public health research literature and to undertake independent research projects. Formulation of the research question, research design, sampling techniques, use of research concepts, and data analysis. Data collection techniques examined include questionnaires, interviews, structured and unstructured observation, data analysis, and secondary analysis of existing data.

5606. FIELD COURSE II IN PUBLIC HEALTH NUTRITION. (Cr ar, prereq *5600, #)
Placement in an approved agency with opportunity for experience in nutritional aspects of public health programs. For students desiring more than one concurrent field placement.

5606. FIELD COURSE III IN PUBLIC HEALTH NUTRITION. (Cr ar, prereq *5600, 5606, #)
Placement in an approved agency with opportunity for experience in nutritional aspects of public health programs. For students desiring more than one concurrent field placement.

5608. CURRENT NUTRITION ISSUES IN PUBLIC HEALTH. (3 cr) Brown
Current national and international nutrition issues and prevention or resolution of problems through various disciplines of public health.

5609. TOPICS: PUBLIC HEALTH NUTRITION. (Cr ar; prereq #) Brown
Selected readings and problems.

5610. PRINCIPLES, PROBLEMS, AND ISSUES IN MATERNAL AND CHILD HEALTH. (3 cr; prereq grad student or #) ten Bensel
General introduction to current issues related to health needs of families, mothers, and children. Emphasis on principles of primary care, health maintenance, preventive care, organization, and evaluation.

5611. PROBLEMS AND PROGRAMS IN MATERNAL AND CHILD HEALTH. (3 cr; prereq 5610 or #) ten Bensel and staff
Current programs and related problems in maternal and child health programs including C&Y, MIC, family planning, nutrition, dental care, EPSDT, neonatal intensive care, SIDS, and school health. Community program leaders participate in class discussion.

5612. HUMAN GENETICS AND PUBLIC HEALTH. (3 cr; prereq #) Schacht
Evaluation of current studies in human genetics and applications to community health.

5613. CHRONIC AND HANDICAPPING CONDITIONS OF CHILDREN. (3 cr; prereq 5610 or #) Davis and staff
In-depth look at the epidemiology, identification, management, follow-up, and prevention of chronic and handicapping conditions of children. Community programs for emotional, physical, and intellectual handicaps.

5614. FIELD EXPERIENCE IN MATERNAL AND CHILD HEALTH. (Cr ar; prereq 5610, 5611 or #) ten Bensel and staff
Field experiences selected by students to meet their career goals.

5615. HEALTH OF THE SCHOOL-AGE CHILD. (3 cr; prereq 5610 or #) Fredlund and staff
Review of major health problems among children of school age; methods of providing and evaluating school health services.

5616. THE RIGHTS OF CHILDREN: NEGLECT AND ABUSE. (3 cr) ten Bensel
The rights of children and neglect and abuse of children. Historical and legal aspects of the problem, identification and reporting procedures, family assessment and treatment modalities, follow-up processes, research, prevention and implications for societal action. Designed for health, social work, legal, and educational personnel. Experts from community will participate.

5617. SEMINAR IN MATERNAL AND CHILD HEALTH—MENTAL CLINIC. (3 cr; prereq #) Williams
Mental health aspects of maternal and child health programs. Structured around individual needs of participants. Selected readings and paper required.

5618. YOUTH AND HEALTH: AN INTRODUCTION. (3 cr, §YoSt 5133) Baizerman
Age-specific morbidity and mortality data regarding youth as basis for class discussion and individual work on a health topic important to a youth population. Introduction to a youth development concept for use in problem analysis.

5619. SOCIAL WORK ASPECTS OF MATERNAL AND CHILD HEALTH PROGRAMS. (2 cr; prereq 5611 or #) Bamford
Social work aspects of programs presented in 5611. Discussion and on-site presentations.

5620. FAMILY STRESS, COPING AND ADAPTATION. (3 cr. §SW 8203, §FSoS 8251)
Theories related to family development, structure, and behavior in response to social and psychological stress. Normal and dysfunctional family behavior. Emphasis on applications to crisis intervention in family systems.

5621. MCH STUDENT SEMINAR. (1 cr; prereq MCH grad student) ten Bensel and staff
Biweekly discussion group allowing interaction between maternal and child health students and faculty. Format decided by students; includes presentation of topics of student interest. Faculty members act as resource persons.

5622. WOMEN'S HEALTH: ISSUES AND CONTROVERSIES. (4 cr; prereq #)
Health needs of women as an underserved population within a historical context from a public health perspective. Methods of health care delivery, education, current literature, discussion with guest speakers from community.

5625. SEMINAR ON CHILD ABUSE AND NEGLECT. (2 cr; prereq 5616 or #)
Designed for individuals who wish greater depth of knowledge in child abuse and neglect. The student selects a topic area in child abuse and neglect for presentation to the class. Discussion format, decided on by students and faculty.

5626 (formerly 5620). MATERNAL CHILD HEALTH NURSING SEMINAR I. (2 cr. §5620; prereq MCH/PHN grad student or #) Fredlund
Selected maternal and child health nursing issues and problems. Students help select topics and lead discussions.

5627 (formerly 5620). MATERNAL CHILD HEALTH NURSING SEMINAR II. (2 cr. §5620; prereq MCH/PHN grad student or #) Fredlund
Practical approaches to solving maternal and child health nursing problems, and to providing nursing leadership intervention.

5628. SEMINAR: PERSONAL SOCIAL SERVICES: PREVENTIVE INTERVENTION FOR CHILDREN AND FAMILIES "AT RISK." (Cr ar, §SW 8450; prereq SW 8401, 6 cr personal social services. #)

5639. PREVENTION: THEORY, PRACTICE, AND APPLICATION IN PUBLIC HEALTH SERVICE. (4 cr; prereq #)
Designed for students (undergraduate, graduate, or continuing education) and professionals in health and related disciplines interested in current issues and controversies concerning prevention and how it relates to the health services. Emphasis on history, idea of prevention, terminology, life-style intervention, programs and legislative issues, education, roles, and implications for societal action.

5640. CHILD ABUSE AND NEGLECT SEMINAR FOR SCHOOL PERSONNEL. (1 cr) ten Bensel
Designed for teachers, administrators, nurses and other school personnel dealing with child abuse and neglect. Historical overview of terminology and dynamics of the school s and community's role in, and prevention of child abuse and neglect. Intended to increase awareness of child abuse and neglect in the schools and to provide material for teachers to incorporate in their curricula.

5641. CHILD ABUSE AND NEGLECT IN THE JUVENILE JUSTICE SYSTEM. (2 cr. offered during summer as part of the Juvenile Justice Institute)
Designed for juvenile justice personnel. Historical aspects of child abuse, terminology, identification, dynamics, outcomes, treatment programs, the role of the police and courts, and prevention programs. Includes a paper on some aspect of the juvenile justice system regarding child abuse and neglect or a critique of an actual case.

5649. TOPICS: MATERNAL AND CHILD HEALTH. (Cr ar; prereq #) Staff
Selected readings and problems.

5650. DENTAL HEALTH. (1 cr; for non-dentists and non-dental hygienists; prereq #) Block
Conditions resulting in tooth decay and loss; preventive and corrective measures; oral hygiene; community programs for dental health.

5651. PHILOSOPHY AND CONCEPTS OF PREVENTIVE DENTISTRY. (Cr ar; prereq #) Block and staff
Basic principles of preventive dentistry, relationship between oral and general disease processes; epidemiology of oral diseases; preventive procedures; organizing and evaluating community dental health programs.

5652. CURRENT ISSUES IN DENTAL PUBLIC HEALTH. (Cr ar; prereq #) Block, Jenny, and staff
Review and discussion of recent dental literature and current controversies involving dentistry and the public.

5653. DENTAL HEALTH PROGRAMS. (Cr ar; prereq #) Block, Martens, Meskin
Activities, problems, issues, and administration of dental public health programs at the community, local, state, and federal levels.

5654. TOPICS IN DENTAL PUBLIC HEALTH. (Cr ar; prereq #) Staff
Selected readings with discussion based on these readings.

5655. SEMINAR: DENTAL HEALTH LITERATURE II. (Cr ar; prereq #) Block, Meskin
Review of current literature pertinent to dental public health: critical examination for design, content, and validity of conclusions.

5656. DENTAL HEALTH ADMINISTRATION. (Cr ar; prereq #) Block and staff
The management process in the delivery of dental services.

5657. INDEPENDENT STUDY IN DENTAL PUBLIC HEALTH. (Cr ar; prereq #) Staff
Independent study under tutorial guidance of selected problems and current issues in the field of dental health and dental health services.

5658. ECOLOGY OF DENTAL HEALTH. (Cr ar; prereq #) Block, Martens, Meskin
Role of dentistry in health care system. Topics include dental epidemiology, dental health education, dental personnel problems, economic and political influences on dentistry, and sociocultural implications for dental health.

5659. ANALYSIS OF DENTAL HEALTH EDUCATION. (Cr ar; prereq #) Block
Analysis of dental health education programs from a public health perspective: examination of educational objectives, resources, barriers, methods, target populations, and outcomes of current programs in terms of effectiveness and practicality; development of priorities in planning dental health education programs.

5660. FIELD EXPERIENCE IN DENTAL PUBLIC HEALTH. (Cr ar; prereq #) Block
Supervised field experience in selected community or public health agencies and institutions.

5662. COMMUNAL WATER FLUORIDATION: EFFICACY AND SAFETY. (3 cr; prereq 5661, 5330, 5414 or equiv)
Use of historical as well as current issues to investigate the fluoridation issue from an epidemiological perspective. The biological efficacy and safety of fluoridation. Analysis of pro- and anti-fluoridation literature with emphasis on statistical interpretations and research methodologies employed. Ethical issues related to water fluoridation as a public health measure. Includes design of individual research projects.

5663.* ADMINISTRATIVE RESIDENCY IN DENTAL PUBLIC HEALTH. (Cr ar; prereq #) Block, staff, and clinical preceptors
Eleven months of fieldwork in an approved community or public health agency; delivery of dental services and implementation of programs; solution of management problems and special projects. Preparation of formal report.

5700.* PUBLIC HEALTH ADMINISTRATION. (Cr ar; prereq #)
Structure, basic functions, and activities of public health agencies.

5701. PUBLIC HEALTH ADMINISTRATION ISSUES. (Cr ar; prereq 5700 and #)
Issues and problems affecting public health agencies and the interrelationships of public health agencies in the community.

5702. PUBLIC HEALTH ADMINISTRATION CLERKSHIP. (Cr ar; prereq 5701)
Assignment to state health department or other health agency for supervised work on a project of limited scope, and preparation of a formal report.

5703. PUBLIC HEALTH ADMINISTRATION ISSUES II. (Cr ar; prereq 5701 and #)
Issues and problems affecting public health agencies and the interrelationship between public agencies and its impact on public health.

5704. FIELD EXPERIENCE IN PUBLIC HEALTH ADMINISTRATION. (Cr ar; prereq #) Block
Supervised field experience at a management level in selected community or public health agencies and institutions.

5705. BASIC SOCIAL SCIENCE RESEARCH SKILLS FOR PUBLIC HEALTH ADMINISTRATION. (Cr ar; prereq #) Samuels
Role of the social research process in public health administration; designed for those students whose primary professional role is administrative and who desire an understanding of how to approach a health problem using social research methods.

5711. PUBLIC HEALTH LAW. (4 cr; prereq #) McInerney
Introductory course for those with little or no formal legal background. Basic concepts of the law, legislative process, legal bases for existence and administration of public health programs, legal aspects of current public health issues and controversies, and regulatory role of government in health services system.

5712. PRINCIPLES OF ORGANIZATION AND MANAGEMENT OF HEALTH MAINTENANCE ORGANIZATIONS. (2 cr; prereq #) Rupprecht
Background lectures and seminars on the concept, history, organizational structure, human resources, and consumers of health maintenance organizations reviewed from local, national, and international perspectives; quality assurance, marketing, fiscal management, and economic and public health aspects of, and national health insurance implications for, prepaid health delivery organizations.

5749.* TOPICS: PUBLIC HEALTH ADMINISTRATION. (Cr ar; prereq #) Staff

5750. MANAGEMENT PROBLEM SOLVING IN HOSPITAL AND HEALTH CARE ADMINISTRATION. (4 cr; prereq #) Westerman, Dornblaser, Sweetland, and staff
Lectures, seminars, and demonstrations on problem solving theory and technique. Management problem solving of cases. Solution of a management problem within a health services organization and presentation of report.

5751. PRINCIPLES OF ORGANIZATION MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS. (4 cr, §HSU 5016; prereq #) Dornblaser and staff
Lectures and case studies on the role of health care services administrators, principles of management, and the administrative process.

5752. CLERKSHIP. (4 cr; prereq ¶5755) Bieter and staff
Survey and solution of management problem within administrative residency organization, and preparation of formal report.

5755. ADMINISTRATIVE RESIDENCY. (Cr ar; prereq #) Dornblaser and staff
Eleven months of fieldwork in an approved health care planning or operating organization, weighted rotation through departments, solution of management problems, and special projects. Preparation of a formal report.

5756. PLANNING PRACTICUM. (Cr ar; prereq #) Dornblaser and staff
Eight weeks of fieldwork in an approved planning agency, solution of special problems, preparation of a formal report.

5757. CRITICAL ISSUES IN AGING. (6 cr; prereq #)
Physical, psychosocial, and cultural dynamics of aging (gerontology) and public policy affecting adaptation.

5759. MANAGEMENT OF ORGANIZATIONAL BEHAVIOR IN LONG-TERM CARE FACILITIES. (3 cr) Gordon
Experience-based learning focused on interplay of factors such as power, authority, communications, small group development, leadership, individual and organizational goals, and motivation in nursing home setting.

5762. MANAGING THE EFFECTS OF INSTITUTIONAL LIVING. (3 cr) Gordon
Applied theory and research on the effects of institutionalization, identifying organizational factors affecting patient care.

5763. HEALTH ORGANIZATIONS, STANDARDS, AND EVALUATION. (3 cr; prereq #) Culbertson
Characteristics of health organizations and current standards in the health care field; implications for hospital and health care management; relationship of standards to health care evaluation.

5764. PRINCIPLES OF FINANCIAL MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS. (4 cr; prereq #) Dornblaser, Oszustowicz
Principles of financial management including basic accounting and statistical tools; analysis of hospital financial statements; sources and uses of operating and capital funds; long-term finances; audits and internal control; cost finding; budgeting; hospital rates, rate setting, and relationships with third-party payers.

5767. HOSPITAL FACILITIES PLANNING, ROLE AND PROGRAM PLANNING FOR HEALTH CARE ORGANIZATIONS. (3 cr; prereq #) Bieter, Sweetland
Lectures, discussions, and project work on the planning of health care and hospital facilities, roles and programs. Principles, methodologies, and strategies of planning. The complete planning process, roles of various members of the planning team, and numerous external and internal forces.

5768. LONG-TERM CARE. (3 cr; prereq #) Stryker-Gordon
Management within long-term care organizations; emphasis on nursing home administration; lectures, case studies.

5769. COMPREHENSIVE HEALTH PLANNING. (3 cr; prereq #) Orr
Alternative health systems and their planning requirements; planning strategies and technologies; application to planning agency work programs; lectures, case studies, seminars.

5773. MENTAL ILLNESS/MENTAL RETARDATION: LEGAL ASPECTS, IMPLICATIONS, AND TRENDS. (3 cr) Malban and staff
Introduction to issues and developments in the legal sphere affecting mental health/ mental retardation workers. Prominent legal issues, ways in which these issues develop, and resolutions and legal remedies.

5774. MENTAL HEALTH FINANCIAL MANAGEMENT. (4 cr; prereq 5764, 5791, and #) Farrell
Application of financial management principles taught in fall and winter quarters to mental health settings and issues.

5775. MANAGEMENT AND ORGANIZATION IN HOSPITAL AND HEALTH CARE FACILITIES. (15 cr; prereq current employment as health care facility administrator. #) Weckwerth, DeGeyndt and staff
A 12-month program of on-campus residential (3 weeks) and independent study including periodic seminars and monthly sessions with clinical preceptors. Management, organizational behavior, problem solving, executive role, personnel management, financial management, and patient care and support services.

5776. ADMINISTRATIVE AND PROFESSIONAL RELATIONSHIPS WITHIN THE HEALTH CARE FACILITY. (15 cr; prereq 5775 or #) Weckwerth, Gordon, Malban, Heinemann and staff
A 12-month program of on-campus residential (3 weeks) and independent study that includes periodic seminars and monthly sessions with clinical preceptors. Organizational behavior, change theory, governance, medical staff, legal aspects, medical records, planning, community health systems, continuing education.

5777. EXTERNAL FORCES AFFECTING HEALTH CARE DELIVERY. (25 cr; prereq 5776 or #) Weckwerth and staff
Ten-month program of on-campus residential (3 weeks) and off-campus study that includes three regional seminars covering financing, manpower, organizing, social policy, and project planning and design. Required project can be either a management study or research thesis. Ends with week-long symposium in which students present and defend their projects.

5778. PATIENT CARE MANAGEMENT AND ORGANIZATION WITHIN THE HOSPITAL AND HEALTH CARE ORGANIZATION. (25 cr; prereq present employment as director of nursing or equiv. #) Weckwerth, Danielsen and staff
A 12-month program of on-campus residential sessions (3 weeks), independent study, monthly meetings with clinical preceptors, and one required seminar. Principles of management, organizational behavior, hospital development and organization, personnel management, administrative and professional relationships within the hospital, role of the patient care administrator, legal aspects, budget, policy development, continuing education.

5779. MANAGING MULTIPLE FORCES: INTERNAL AND EXTERNAL ASPECTS OF PATIENT CARE ADMINISTRATION. (Cr ar; prereq present employment as director of nursing or equiv, 5778, and #) Weckwerth, Danielsen, Gordon, and staff
A 12-month program of on-campus (3 weeks) and independent study that begins with a 1-week introductory residential session each August. Seminars on planning, organizing, staffing, directing, and controlling scheduled during initial phase. Students return to campus the following summer to share and demonstrate their research projects with their peers.

5780. ADMINISTRATION OF LONG-TERM CARE FACILITIES. (6 cr; prereq courses in principles of management, accounting, business law) Stryker-Gordon and staff
A 16-week program of on-campus residential seminars (5 days) and off-campus independent study that includes general principles of administration and aspects of administrative organization, personnel administration, and fiscal management in the area of long-term care.

5781. SERVICES FOR LONG-TERM CARE PATENTS. (6 cr; courses in medical terminology, basic health, and gerontology recommended) Stryker-Gordon and staff
A 16-week program of on-campus residential seminars (5 days) and off-campus independent study that includes physical and psychosocial aspects of aging, paramedical services, nursing services, environmental standards, statutory and legal requirements.

5782. PRACTICUM IN LONG-TERM CARE ADMINISTRATION. (6 cr; prereq 3750, 3760 or 3760 or #) Stryker-Gordon and staff
A 300-hour practicum in a nursing home setting under guidance of a preceptor, and 4 seminar days on campus.

5783. FINANCIAL MANAGEMENT AND PLANNING FOR LONG-TERM CARE. (6 cr)
Basic tools of financial management in long-term care facilities. Opportunity for practical application of these tools in class and also at work site for students employed in long-term care facilities.

5785. QUANTITATIVE METHODS APPLIED TO HEALTH ADMINISTRATIVE PROBLEMS. (4 cr; prereq hospital administration student or #) Weckwerth
Application of quantitative methods including analysis of cyclicities, PERT, data handling systems, simple ANOVA, linear programming, cost benefit analysis, task analysis, and inventory control in the solution of health problems at administrative levels.

5786. RESEARCH METHODOLOGY IN HOSPITAL AND HEALTH CARE ADMINISTRATION. (2 cr; open to hospital administration students only; prereq 5404) Litman, Weckwerth
Research design.

5787. ADMINSTRATION OF THE LONG-TERM CARE ORGANIZATION. (15 cr; prereq #) Gordon, Stryker-Gordon, Anderson, others
Problem solving in management, personnel management, financial management, organizational behavior, and quality assurance areas.

5788. PROGRAM MANAGEMENT FOR LONG-TERM CARE. (15 cr; prereq #) Gordon, Stryker-Gordon, Anderson, others
Program for long-term care patients; gerontology, interdisciplinary health care services environmental control, planning community services, and special needs of the mentally ill, mentally retarded, and chemically dependent patient.

5789. WORK-STUDY SEMINAR FOR LONG-TERM CARE ADMINISTRATORS. (6 cr; prereq 5782 or licensed administrator in position as administrator, assistant administrator or director of nursing) Woehrer, others
On-the-job educational experience designed to enhance the less experienced administrator's skill in carrying out responsibilities through project assignments and six monthly seminars. Areas of study may include financial management; personnel management; relationships with the community, residents, families, and board; and program evaluation.

5791. FINANCIAL ASPECTS OF HEALTH CARE. (4 cr; prereq #) Dornblaser, Oszustowicz
Financial problems associated with current issues in health care delivery. Emphasis on recent legislation affecting sources of capital and control on expenditure for health programs and facilities.

5792. LEGAL ISSUES IN HEALTH CARE ADMINISTRATION. (3 cr; prereq #) Staff
Law and legal liability of hospitals and other health care organizations.

5793. HOSPITAL FINANCIAL STATEMENT ANALYSIS. (3 cr; prereq #) Oszustowicz
Case studies and readings involving the review and analysis of actual hospital financial statements, third-party payer cost reports, and other basic financial documents. Application of key financial ratios to financial statement analysis; tests students' ability to apply concepts presented in winter and spring quarters.

5794. FINANCIAL MANAGEMENT SEMINARS. (3 cr; prereq 5764, 5791) Oszustowicz
Major financial management topics presented by outside experts in fields of public accounting, investment banking, lease financing, insurance counseling, hospital-based physician financial negotiating, rate setting/rate review negotiation, etc. Presentation of papers for class analysis and practical application. Government and third-party payer representatives discuss the impact of legislation and regulation on health care financial management.

5795. THE SOCIOLOGY OF MEDICINE AND HEALTH CARE: AN INTRODUCTION TO THE FIELD OF MEDICAL SOCIOLOGY. (4 cr, §Soc 5855) Litman
Social and psychological components of health and medical care. Organization and delivery of health care services; problems and perspectives with focus on the patient, the provider of care, and the environment within which health care services are delivered.

5796. INTERNAL OPERATIONS OF A MENTAL HEALTH FACILITY. (15 cr; prereq 1 yr experience as mental health facility administrator and #) Malban and staff
A 12-month program of on-campus residential (2 weeks) and off-campus independent study that includes periodic seminars and monthly classes under program preceptors. Principles of management, organizational behavior, personnel, problem solving and decision making, financial management, mental health professionals, and mental health programs and services.

5797. EXTERNAL RELATIONSHIPS AFFECTING THE ROLE AND FUNCTION OF THE MENTAL HEALTH FACILITY. (15 cr; prereq 5796) Malban and staff
A 12-month program of on-campus residential (3 weeks) and off-campus independent study that includes periodic seminars and monthly classes under program preceptors; governance, legal aspects, public education and information, evaluation of mental health programs, prevention and primary treatment and mental health, current trends and concepts, biostatistics and quantitative methods.

5798. SOCIAL, POLITICAL, ECONOMIC, AND GOVERNMENTAL FORCES AFFECTING THE ROLE AND SERVICES OF THE MENTAL HEALTH FACILITY. (25 cr; prereq 5797 or practicing administrator holding an advanced degree with 3 yrs experience, and #) Malban and staff
A 12-month program of on-campus residential (3 weeks) and off-campus independent study that includes periodic seminars and monthly classes under program preceptors. Completion of demonstration and research projects. Mental health community, regional, state, and national planning; legislation; affirmative action; consumerism and citizen participation; economics of mental health; political and social issues.

5799. MENTAL HEALTH ADMINISTRATION SEMINAR. (2-3 cr; restricted to and required of all students registered in mental health administration training project) Peterson
Readings, group discussions, debate, and presentation of current issues in mental health field. Field trips. Follow-up to the A.K. Rice Institute experience.

5800 (formerly HCPy 5701). RESEARCH PROJECT IN HEALTH CARE PSYCHOLOGY. (Cr ar [max 6 cr per qtr]) Staff
Individual supervision for participation in some form of research project in the area of health care psychology, i.e., application of psychological and behavioral science research methods to some aspect of health care. The extent and conditions of participation are negotiated directly between student and faculty member in health care psychology.

5801 (formerly HCPy 5801). DIRECTED STUDY IN HEALTH CARE PSYCHOLOGY. (Cr ar [max 4 cr per qtr]) Staff
Individually supervised and directed study of some aspect of health care psychology, i.e., the application of psychological principles and methods to any aspect of the process of health care delivery, research, and education. Specific terms arranged directly between student and instructor should include a statement of objectives, procedures, and means of evaluation.

5802. TOPICS IN HEALTH CARE PSYCHOLOGY. (Cr ar prereq #) Staff
Small group seminars on selected topics and issues in health care psychology. Topics and procedure are negotiated between students and instructor.

5803 (formerly HCPy 8201). READINGS IN THE HISTORY OF PSYCHIATRY. (2 cr [2 sequential qtrs required]) Schofield
Two-quarter sequence of assigned readings with an objective examination based on quarterly readings. First quarter focuses on earliest recorded accounts of recognition and treatment of insanity, up to the Middle Ages. Second quarter reviews the Age of Enlightenment, the development of humane treatment, and concepts and treatments in colonial America.

5804. SEMINAR ON PROFESSONAL ETHICS. (2 cr) Schofield
Review of the general evolution of professional ethics with emphasis on the design and revision of the Code of Ethics of the American Psychological Association. Sample cases and current issues.

5811 (formerly HCPy 8203). CLERKSHIP IN PSYCHOLOGICAL ASSESSMENT. (Cr ar [max 4 cr per qtr]; prereq #) Staff
Individual supervision in psychological assessment. Includes clinical interviewing, psychological test administration, test interpretation, and report writing within various clinical settings of University Hospitals.

5212. CLERKSHIP IN NEUROPSYCHOLOGICAL ASSESSMENT. (Cr ar [max 4 cr per qtr]; prereq #) Meier, Thomas
Administration of neuropsychological test batteries and introduction to the elements of neuropsychological inference. Students administer and report results of at least eight complete batteries with actual patients. Each report discussed individually with staff member.

5813 (formerly HCPy 5110). FIELDWORK EXPERIENCE IN HEALTH CARE PSYCHOLOGY. (Cr ar [max 4 cr per qtr]; prereq #) Staff
Psychological assessment, intervention, and consultation experience in health care settings.

5814. CASE CONFERENCE IN HEALTH CARE PSYCHOLOGY. (1 cr; prereq #) Staff
Individual supervision of a comprehensive psychological assessment for a single clinical case and formal presentation of the findings to a health care team for the purpose of treatment planning.

5815. CASE CONFERENCE IN NEUROPSYCHOLOGY. (1 cr; prereq #) Meier, Thomas
Cases presented weekly by students and discussed by students and staff. While major emphasis is on neuropsychological assessment, treatment recommendations are considered for appropriate cases.

5820 (formerly HCPy 8204). INTERNSHIP IN CLINICAL PSYCHOLOGY. (Cr ar [max 4 cr per qtr]; prereq PhD candidate and 400 hrs clerkship experience) Staff
Supervised training experience in psychological assessment, intervention, research, community service, and teaching and supervising others.

5821 (formerly HCPy 5102). HEALTH CARE PSYCHOLOGY CLINIC INTERNSHIP. (Cr ar [max 4 cr per qtr]; prereq #) Hafner, Petzel, Quast, and staff
Experience in psychological assessment, intervention, and consultation regarding child, adolescent, and adult patients.

5822 (formerly HCPy 5103). MEDICAL CONSULTATION FOR HEALTH CARE PSYCHOLOGY INTERNS. (Cr ar [max 4 cr per qtr]; prereq #) Brantner
Experience in consultation for medical services regarding psychological functioning of medical patients.

5823 (formerly HCPy 5104). HEALTH CARE PSYCHOLOGY INTERNSHIP AT THE STUDENT HEALTH SERVICE. (Cr ar [max 4 cr per qtr]; prereq #) Heiberg
Experience in assessment and individual and group therapy at the Mental Health Clinic of the student Health Service.

5824 (formerly HCPy 5105). HEALTH CARE PSYCHOLOGY FOR THE PHYSICALLY HANDICAPPED CHILD. (Cr ar [max 4 cr per qtr]; prereq #) Briggs and staff
Experience in psychological assessment and management of disabled children and staff consultation at Gillette Children's Hospital.

5825 (formerly HCPy 5106). INTRODUCTION TO NEUROPSYCHOLOGICAL ASSESSMENT. (Cr ar [max 4 cr per qtr]; prereq #) Meier, Thomas
Experience in administering neuropsychological test batteries and principles of neuropsychological inference.

5826 (formerly HCPy 5107). ADVANCED NEUROPSYCHOLOGICAL ASSESSMENT. (Cr ar [max 4 cr per qtr]; prereq #) Meier, Thomas
Emphasis on more subtle or less common discriminations required in neuropsychological inference. Students required to do less testing but more assessment than in PubH 5825. Introduction to current areas of research and their implications.

5827 (formerly HCPy 5108). RURAL COMMUNITY MENTAL HEALTH INTERNSHIP FOR PSYCHOLOGISTS. (Cr ar [max 4 cr per qtr]; prereq #) Morgan and staff
Experience in assessment, intervention, and consultation in a rural community mental health center.

5828 (formerly HCPy 5109). COMMUNITY CHILD GUIDANCE CENTER PSYCHOLOGY INTERNSHIP. (Cr ar [max 4 cr per qtr]; prereq #) Hanvik, Reed, and staff
Experience in assessment, intervention including family therapy and parent counseling, and consultation to schools and social agencies.

5829 (formerly HCPy 5112). STUDENT COUNSELING BUREAU PSYCHOLOGY INTERNSHIP. (Cr ar [max 4 cr per qtr]; prereq #) Loper and staff
Experience in assessment and educational-vocational and personal counseling with a college-age population.

5830. HEALTH CARE PSYCHOLOGY OF THE ELDERLY. (Cr ar [max 4 cr per qtr]; prereq PhD candidate and 400 hrs clerkship experience) Staff
Supervised training experience in psychological assessment, intervention, research, and community service as applied to the elderly.

5840 (formerly HCPy 5113). CASE SEMINAR IN HEALTH CARE PSYCHOLOGY. (2 cr; prereq #) Roberts, Schofield, and staff
Experience in preparing and presenting a formal patient work-up including personal history, course of illness, diagnostic data, and therapeutic interventions.

5841 (formerly HCPy 5115). SUPERVISED PSYCHOLOGICAL THERAPY. (Cr ar [max 4 cr per qtr]; prereq #) Staff
Intensive supervision of individual or group psychological therapy approaches. Use of audio and video tapes.

5850. HEALTH SCIENCES EDUCATION IN THE 20TH CENTURY. (3 cr) Garrard
Trends and developments in the health sciences in the 20th century. Focus on educational change and reform; funding of education; professional regulations (licensure and certification) and their impact on education; and specialization and professionalism and the effects of education. Medical education is major paradigm used to examine these issues; dental and nursing education are also examined. Theme underlying all lectures and discussions is: "Who controls the education of the profession, what is controlled, and why?"

5851f,w,s. HUMAN INTERACTION LABORATORY. (4 cr) Ayers
One 2-hour class and one 3-hour laboratory per week. Intensive application of videotape media according to the interpersonal process recall method of self-study.

8001. SEMINAR: PUBLIC HEALTH. (Cr ar)

8002. FIELD OBSERVATION OF SELECTED PUBLIC HEALTH PRACTICES. (Cr ar; prereq #)

8150. RESEARCH: ENVIRONMENTAL HEALTH. (Cr ar) Staff
Opportunities to pursue research in the importance of environmental stresses on human health.

8170. RESEARCH: ENVIRONMENTAL BIOLOGY. (Cr ar; prereq #) Ruschmeyer

8180. RESEARCH: AIR POLLUTION. (Cr ar; prereq #) Paulus

8190. RESEARCH: INJURY CONTROL. (Cr ar; prereq #) McJilton

8200. RESEARCH: RADIOLOGICAL HEALTH. (Cr ar; prereq #)

8201. RADIATION DOSIMETRY. (3 cr; prereq #)
Radiant energy absorption in liquids, gases, and solids; absorption in biological systems.

8202. RADIATION DOSIMETRY LABORATORY. (1 cr; prereq *8201)
Laboratory exercises involving principles discussed in 8201.

8208. FIELD PRACTICE IN RADIOLOGICAL HEALTH. (Cr ar; prereq#)

8210. RESEARCH: OCCUPATION HEALTH. (Cr ar; prereq #) McJilton

8211. HEALTH SURVEY OF MANUFACTURING PROCESSES. (2 cr; prereq 5211, #) McJilton
Occupational disease problems and preventive measures in major industries and in operations common to many industries, field trips.

8218. FIELD PROBLEMS IN OCCUPATIONAL HEALTH. (3 cr; prereq 5211, 5212 or *5213, #) McJilton
Guided evaluation of potential occupational health problems; recommendations and design criteria for correction if indicated.

8220. RESEARCH: FOOD SANITATION. (Cr ar; prereq #) Pflug

8230. RESEARCH: INSTITUTIONAL ENVIRONMENTAL HEALTH. (Cr ar; prereq #) Vesley

8240. RESEARCH: WATER HYGIENE. (Cr ar; prereq #)

8260. RESEARCH: ENVIRONMENTAL TOXICOLOGY. (Cr ar; prereq #) Straub

8330. RESEARCH EPIDEMIOLOGY. (Cr ar) Staff
Opportunities offered by the School of Public Health and by various cooperating ogranizations for qualified students to pursue research work.

8331. FIELD PRACTICE IN EPIDEMIOLOGIC INVESTIGATIONS. (Cr ar; prereq epidemiology major, #) Mandel
Supervised participation in epidemiologic investigations in the field under the auspices of official and voluntary health agencies.

8340. EPIDEMIOLOGIC ASPECTS OF CANCER. (3 cr; prereq 5330) Mandel
Magnitude of problem, epidemiologic background for current research, examples from cancers of selected sites. Emphasis on studies of those factors offering the best potential for cancer prevention.

8341. EPIDEMIOLOGY OF SELECTED CHRONIC DISEASES. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Application of epidemiologic concepts and methods to study of selected chronic diseases other than cardiovascular and cancer; e.g., diabetes, arthritis, chronic respiratory disease.

8342. ADVANCED STATISTICAL METHODS IN EPIDEMIOLOGY. (3 cr; prereq 5331, 5332 or #) White
The fourfold table, with applications to epidemiological and clinical studies. Significance versus magnitude of association; tests of hypotheses and confidence intervals for the relative risk; matching in case-control studies; effects, measurement, and control of misclassification errors; comparing and combining evidence from many studies.

8345. EPIDEMIOLOGIC BASIS FOR CANCER CONTROL. (2 cr; prereq basic epidemiology and biostatistics, 5357 or *5357) Visiting lecturers
Epidemiologic background and rationale for development and application of programs for the control of cancer.

8346. EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE AND CANCER. (3 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Epidemiologic aspects of various types of cardiovascular disease and cancers with emphasis on methodologic approaches to their study and the multivariate setting of the etiologies.

8356. EPIDEMIOLOGIC ASPECTS OF POPULATION CHANGE. (2 cr; prereq basic epidemiology and biostatistics) Visiting lecturers
Epidemiologic aspects and health implications of changes in population size, composition, and stability.

8379. SEMINAR: EPIDEMIOLOGY. (Cr ar; prereq #) Mandel
Discussion of selected current epidemiologic problems.

8385. SEMINAR: PHYSIOLOGICAL HYGIENE. (1 cr) Staff
Nutrition, tests and measurements of human physical fitness; geronology; adaptation in health and disease; body composition; circulatory dynamics and related topics.

8386. READINGS IN PROBLEMS OF PHYSIOLOGICAL HYGIENE. (Cr ar; prereq #) Staff

8387. RESEARCH: PHYSIOLOGICAL HYGIENE AND RELATED AREAS. (Cr ar) Staff

8400. SEMINAR IN BIOMETRY. (Cr ar)

8405-8406-8407. ADVANCED TOPICS IN HEALTH COMPUTER SCIENCE I, II, III. (3 cr per qtr; prereq 5432-5435, 5452 and #) Staff
Selected topics that may include computer systems design for the health sciences, small computer concepts and utilization, computers for clinical services, computer-aided medical decision making, biomedical image processing and pattern recognition, and others of current interest. All topic discussions treat techniques and incorporate actual examples or case studies from the health sciences.

8420. ADVANCED BIOMETRIC METHODS I. (3 cr; prereq 5455, 5459 or equiv. knowledge of FORTRAN) Johnson
Multivariate regression, linear and nonlinear; bioassay, quantitative and quantal.

8421. ADVANCED BIOMETRIC METHODS II. (3 cr; prereq 8320 or #) Johnson
Classification techniques with discrete, continuous, or mixed variables with emphasis on quadratic discriminant function and nearest neighbor techniques; multivariate clustering algorithms.

8422. ADVANCED BIOMETRIC METHODS III. (3 cr; prereq 5455, 5459 or equiv. knowledge of FORTRAN) Staff
Basic optimization concepts of operations research such as linear programming, inventory policy, and queuing models. Brief introduction to examples of systems simulation. Evaluation concepts in health care delivery systems research. Bayesian a priori distributions in estimation with emphasis on consulting difficulties. Multifactor contingency table analysis.

8430-8431-8432. ADVANCED BIOMETRIC ANALYSIS I, II, III. (3 cr per qtr; prereq 8422, advanced calculus, theoretical statistics) McHugh
Randomization theory in clinical and laboratory trials. Biometric theory of epidemiologic case control and cohort studies. Nonparametric and parametric survivorship analysis including censoring and competing risk. Biometric models in demography, medical genetics, and screening and detection of disease. Radioimmunoassay and generalized bioassay models.

8449. TOPICS IN BIOMETRY. (Cr ar; prereq 5450 and #) Staff
Special topics for advanced students.

8450. RESEARCH IN BIOMETRY. (Cr ar) Staff
Opportunity for qualified students to pursue research work.

8503. CLINICAL SEMINAR: ADVANCED COMMUNITY NURSING I. (Cr ar; prereq #) E Anderson, Reynolds
Selected clinical experiences with mentally ill patients within the community; multidisciplinary approach to total care of patients. Related theory.

8504. CLINICAL SEMINAR: ADVANCED COMMUNITY NURSING II. (Cr ar; prereq #) E Anderson
Focus on families with health problems, maternal and child health, and chronic illness. Utilizes behavioral and mental health concepts.

8505. PUBLIC HEALTH NURSING IN THE GROUP SETTING. (Cr ar; prereq #) Fredlund, Veninga, and staff
Opportunity for working with small groups in the community, with emphasis on the group method of rendering public health nursing services.

8510. DIRECTED RESEARCH. (Cr ar; prereq 5510) Staff
Guided study in developing a research design.

8511. DIRECTED RESEARCH. (6 cr; prereq 5510, 8510) Staff
Guided completion of a research study.

8519. DIRECTED RESEARCH. (Cr ar; prereq 5510, 8510 or PMed 8192) E Anderson, Reynolds
Guided research on occupational or physical therapy in community health programs.

8530. EDUCATION, SUPERVISION, AND CONSULTATION IN PUBLIC HEALTH NURSING. (Cr ar; prereq #) Fredlund and staff
Analysis of theoretical concepts and frameworks of public health nursing, education, supervision, and consultation as they apply to the practice of public health nursing. Focus on conceptual skill development.

8531. PRACTICUM IN ADVANCED PUBLIC HEALTH NURSING PRACTICE. (6 cr; prereq 8530, grad student nearing program completion) Fredlund and staff
Designed to promote integration of theory and experiential learning. Synthesis and application of the concepts of advanced public health nursing practice. Field experience in an educational, supervisory, or consultative situation with an appropriate preceptor.

8535. SEMINAR: SCHOOL NURSING WITH RELATED FIELD EXPERIENCE. (Cr ar; prereq #) Fredlund
Public health nursing in the school setting. Emphasis on school nurse coordinator role and selectively on the practitioner role.

8570. FOUNDATION COURSE IN ADULT/GERIATRIC HEALTH CARE I. (Cr ar; prereq #) Russell, Woehning
Focus on increasing the quality and quantity of health care available to the consumer by preparing the nurse to perform comprehensive health appraisals of adults based on knowledge of anatomy, physiology, psychology, and sociology, supervised clinical experience.

8571. FOUNDATION COURSE IN ADULT/GERIATRIC HEALTH CARE II. (Cr ar; prereq #) Russell, Woehning
The second course in a three-course series designed to expand the nurse's understanding of and capabilities in history taking, physical assessment, and management. Focus on recognition and interpretation of signs and symptoms revealed by the assessment and implementation of the plan of care. Supervised clinical experience.

8572. FOUNDATION COURSE IN ADULT/GERIATRIC HEALTH CARE III. (Cr ar; prereq #) Russell, Woehning
The third in a three-course series designed to prepare the nurse to provide total health care for adults. Focus on knowledge and clinical experience related to assessment and management of adult health care within the family and community environments and on collaboration with other health care professionals. Supervised clinical experience.

8611. MATERNAL AND CHILD HEALTH PROBLEMS. (3 cr; prereq 5610, 5611 or #) Staff
Problems in administration of health programs for infants, preschool and school-age children, handicapped individuals, and women of childbearing age.

8750-8751†. SEMINAR: ALTERNATIVE PATTERNS OF HEALTH CARE. (3 cr per qtr; prereq #; offered 1980-81 and alt yrs) Litman
Alternative approaches to meeting the health care problems of ambulatory care, the aging, chronic disease, physical rehabilitation, material and child care, mental health, and the poor.

8752. SEMINAR: COMPARATIVE HEALTH CARE SYSTEMS. (3 cr; prereq #; offered fall 1979 and alt yrs) Litman
Origin and development of various national systems of health care and their relationship to the social, political, economic, and cultural characteristics of the countries involved.

8760. TOPICS: HOSPITAL AND HEALTH CARE ADMINISTRATION. (3 cr, prereq #) Weckwerth
Independent study under tutorial guidance of selected problems and current issues in health and health care.

8761. READINGS IN THEORY AND PRINCIPLES OF HOSPITAL AND HEALTH CARE ADMINISTRATION. (3 cr; prereq #) Weckwerth

8762. CONTEMPORARY PROBLEMS OF HOSPITAL AND RELATED HEALTH SERVICES. (3 cr; prereq #) Weckwerth
Current concepts, problems, principles, and future developments in health and health care.

8770. SEMINAR: HEALTH AND HUMAN BEHAVIOR. (3 cr, prereq 5795 or Soc 5855; offered spring 1980 and alt yrs) Litman
Sociology of heath and health care: social and personal components of behavior in sickness and in health; community health; and the relationship of social and cultural factors in organization and delivery of health care services.

8780. ADVANCED STATISTICAL METHODS IN HEALTH CARE RESEARCH. (3 cr, prereq 5450 or #) Weckwerth
Survey and analysis of application of nonparametric statistics to health care research.

8781. SEMINAR: RESEARCH STUDIES IN HEALTH CARE. (3 cr; prereq #; offered spring 1981 and alt yrs) Litman
Review and appraisal of design, measuring instruments, research methodology, and findings of contemporary studies.

8782. RESEARCH PRACTICUM. (6 cr; prereq #) Litman, Weckwerth, and staff
Summer field experience in health care research. Supervised independent and team research on selected topics and problems in the field of health care.

8790. SEMINAR: POLITICAL ASPECTS OF HEALTH CARE. (3 cr; prereq #; offered winter 1981 and alt yrs) Litman
Interrelationships between government, politics, and health care: the political and social basis of health legislation and community decision making in provision and modification of health services.

8795. ECONOMIC ASPECTS OF HEALTH CARE. (3 cr; prereq #) Bognanno
Economic analysis of America s health care sector, emphasizing problems of pricing, production, and distribution. Evaluation of health care services as one factor contributing to the nation s health.

8796. TOPICS IN HEALTH ECONOMICS. (3 cr; prereq at least one economics course and #) Dahl
General principles of health economics applied to current issues in health such as insurance, licensure, family practice, malpractice and hospital costs. Models of hospital functioning, area planning, and disease intervention presented within the framework of economic analysis and used to explain and predict health behavior. Concepts of cost benefit and cost effectiveness analysis discussed and applied to problems in health care delivery.

8800 (formerly HCPy 8206). HEALTH CARE PSYCHOLOGY LABORATORY. (2 cr; prereq Psy 8611, 8612, 8613, 8614) Staff
Instruction and individually supervised practice in administration of psychological tests, interpretation of test results, and psychological test report writing. Emphasis on demonstrated competency with intelligence tests (Stanford-Binet, Wechsler Intelligence Scales), projective personality tests (Rorschach, Thematic Apperception Test), and objective personality tests (Minnesota Multiphasic Personality Inventory).

8801 (formerly HCPy 8200). DESCRIPTIVE PSYCHOPATHOLOGY. (3 or 4 cr; prereq #) Fall, Sines
Systematic study through assigned readings, lecture material, and case presentations of the major psychiatric syndromes and disorders. Focus on current nosological system, DSMIII.

8802. (formerly HCPy 8215). PROFESSIONAL PROBLEMS IN CLINICAL PSYCHOLOGY. (1 cr; prereq #) Spring, Sines
Seminar involving reading about and discussion of professional ethics, interprofessional relations (e.g., with psychiatry), the psychologist as expert witness, economic issues in professional psychology, and a design for training of future psychologists.

8803 (formerly HCPy 8227). GROUP SUPERVISION OF PSYCHOTHERAPY. (2 cr; for psychiatry residents and psychology interns only; prereq #) Fall, Schofield
Intensive group supervision of long-term cases in individual therapy.

8804 (formerly HCPy 8228). GROUP SUPERVISION OF PSYCHOTHERAPY. (2 cr; for psychiatry residents and psychology interns only; prereq #) Schofield, Winter
Intensive group supervision of long-term cases in individual therapy.

8805. (formerly HCPy 8229). GROUP SUPERVISION OF PSYCHOTHERAPY. (2 cr; for psychiatry residents and psychology interns only; prereq #) Schofield, Spring
Intensive group supervision of long-term cases in individual therapy.

RADIOLOGY (Rad)

OFFERED AT MINNEAPOLIS

Eugene Gedgaudas, M.D., *professor and head*

Division of Roentgen Diagnosis

Professor

Eugene Gedgaudas, M.D., *head*
Kurt Amplatz, M.D.
Samuel B. Feinberg, M.D.

Associate Professor

Lawrence H. A. Gold, M.D.
Marvin E. Goldberg, M.D.
Philippe R. L. Heureux, M.D.
Richard Moore, Ph.D.

Assistant Professor

Richard Latchaw, M.D.

Division of Nuclear Medicine

Professor

Merle K. Loken, M.D., Ph.D., *director, director of graduate study*

Associate Professor

Lawrence E. Williams, Ph.D.

Graduates of Class A medical schools are eligible for appointment as medical fellow specialists with stipend in radiology upon completion of 1 year of satisfactory internship in a recognized hospital. Previous preparation in internal medicine or pathology, or both, is highly desirable although not required.

For those who have been away from medical practice for an extended period, a preliminary program of education in the laboratory sciences and general medicine is recommended.

Training in radiology covers a 3-year span, excluding time devoted to other subjects. Appropriate time is devoted to the various subdivisions of roentgen diagnosis (including special procedures) and to nuclear medicine and ultrasound.

Medical fellows may assist in the teaching of medical students and may teach in elective courses. Research in one or more aspects of radiology should be carried out during the course of the program.

The following institutions are used for practical training in cooperation with and under the general direction of the Department of Radiology of the University of Minnesota:

1. *University Hospitals and Outpatient Departments (UMH)*—A general referral hospital of approximately 800 beds and a very active outpatient clinic offer unusual clinical material.

In addition, Variety Club Heart Hospital, which is connected directly with University Hospitals, offers approximately 100 beds for the study of acquired and congenital heart disease and has an extensive research program in this field.

Another institution closely connected to University Hospitals is the University Health Service, which permits the study of acute health problems that occur in relatively young individuals.

2. *Hennepin County Medical Center (HCMC)*—This institution provides valuable experience, particularly in acute medical problems including trauma. Fellows are usually assigned to this service for a period of 3 months.

3. *St. Paul-Ramsey Hospital (SPRH)*—Here, as in HCMC, there is abundant opportunity to study radiology in both acute and chronic disease. Assignment to this service is usually for a period of 3 months.

4. *Veterans Administration Hospital (VAH)*—A hospital of approximately 1,000 beds, catering entirely to veterans. Thus, the patient population predominantly adult males. This hospital participates actively in graduate training and provides ample opportunities for research. VAH serves as the principal training site for some fellows in radiology.

5. *St. Paul Children's Hospital (SPCH)*--This rotation has been established to provide fellows with an opportunity to interact with pediatricians in an acute care center. Fellows are usually assigned to this service for 1 month.

Master's Degree—The M.S. in radiology is offered under Plan A only.

Diagnostic Roentgenology

0120f,w,s. X-RAY CONFERENCE. Staff
Weekly departmental meetings at which important cases seen in University, Hennepin County Medical Center, St. Paul-Ramsey, and Veterans Administration hospitals and most of the private hospitals of the Twin Cities are reviewed.

0121f,w,s,su. MEDICAL ROENTGENOLOGIC CONFERENCE. (No cr) Staff

0122f,w,s,su. PEDIATRIC ROENTGENOLOGIC CONFERENCE. (No cr) Staff

0123f,w,s,su. SURGICAL ROENTGENOLOGIC CONFERENCE. (No cr) Staff

0124f,w,s,su. NEUROSURGICAL ROENTGENOLOGIC CONFERENCE. (No cr) Staff

0125f,w,s,su. CARDIOVASCULAR ROENTGENOLOGIC CONFERENCE. (No cr) Staff

0126f,w,s,su. ROENTGENOLOGIC CONFERENCE ON CHEST DISEASES. (No cr) Staff

0127f,w,s,su. ROENTGEN SURGICAL PATHOLOGY CONFERENCE. (No cr) Staff

5140f,w,s,su. SPECIAL PROBLEMS IN ROENTGENOLOGY. (Cr ar) Staff

5174s. PHYSICS OF DIAGNOSTIC RADIOLOGY. (3 cr) Staff
Physics of diagnostic imaging; includes CAT scanning and ultrasound.

8100f,w,s,su. GASTROINTESTINAL ROENTGENOLOGY. (Cr ar) Staff
In-service training in roentgenological evaluation of the gastrointestinal system.

8101f,w,s,su. UROLOGIC ROENTGENOLOGY. (Cr ar) Staff
In-service training in roentgenological evaluation of the genitourinary system.

8102f,w,s,su. NEUROLOGICAL ROENTGENOLOGY. (Cr ar) Staff
In-service training in roentgenological evaluation of the central nervous system.

8103f,w,s,su. CARDIOVASCULAR ROENTGENOLOGY. (Cr ar) Staff
In-service training in roentgenological evaluation of the cardiovascular system.

8104f,w,s,su. PEDIATRIC ROENTGENOLOGY. (Cr ar) Staff
In-service training in roentgenological evaluation of infants and children.

8105f,w,s,su. PULMONARY ROENTGENOLOGY. (Cr ar) Staff
In-service training in roentgenological evaluation of the pulmonary system.

8110f,w,s. NEURORADIOLOGY. (2 cr; offered alt yrs) Staff
Roentgen diagnostic procedures and roentgen findings in study of the head, including diseases of skull, orbits, and intracranial conditions, and in study of spine and spinal canal.

8150f,w,s,su. RESEARCH IN ROENTGENOLOGY. (Cr ar) Staff
Problems in roentgen diagnosis.

Nuclear Medicine

0220f,w,s,su. NUCLEAR MEDICINE CONFERENCE. (No cr) Loken
Weekly presentations of informative nuclear medicine cases seen in University and affiliated hospitals.

5170f. BASIC RADIOLOGICAL PHYSICS. (3 cr; prereq #) Khan, Williams
Theoretical and experimental aspects of radiological physics.

5171w. PHYSICS OF NUCLEAR MEDICINE. (3 cr; prereq 5170 or #) Williams
Theoretical and experimental applications of radionuclides in medicine and biology.

5172s. RADIATION BIOLOGY. (3 cr; prereq 5170 or #) Buchsbaum, Song
Effects of ionizing radiations of cells.

5173. PHYSICS OF RADIATION THERAPY. (3 cr; prereq 5170 or #) Khan
High energy and teletherapy machines.

5240f,w,s,su. SPECIAL PROBLEMS IN NUCLEAR MEDICINE. (Cr ar) Loken

5510w,s,su. BASIC PRINCIPLES OF RADIOLOGICAL PHYSICS. (1 cr) Staff

5540w,s,su. SPECIAL PROBLEMS IN RADIOLOGICAL PHYSICS. (Cr ar) Staff

8200f,w,s,su. NUCLEAR MEDICINE. (Cr ar) Loken
In-service training in uses of radioisotopes in diagnosis and treatment of disease.

8210f,w,s. FUNDAMENTALS OF NUCLEAR MEDICINE. (1 cr, prereq 1st-yr resident) Loken
Lectures and demonstrations on nuclear instrumentation and applications of radioisotopes in medicine.

8250f,w,s,su. RESEARCH IN NUCLEAR MEDICINE. (Cr ar) Staff

For additional course work in radiology see Therapeutic Radiology.

RADIOLOGY

OFFERED AT ROCHESTER

Department of Diagnostic Radiology

Professor

Hillier L. Baker, Jr., M.D., M.S.
Harley C. Carlson, M.D., Ph.D.
John R. Hodgson, M.D., M.S.
Colin B. Holman, M.D., M.S.
Owings W. Kincaid, M.D., M.S.

Associate Professor

John W. Beabout, M.D.
Glen W. Hartman, M.D.
Robert R. Hattery, Jr., M.D.
O. Wayne Houser, M.D.
W. Eugene Miller, M.D., M.S.
David F. Reese, M.D., M.S.
Patrick F. Sheedy, M.D.
David H. Stephens, M.D.

Assistant Professor

John J. Gisvold, M.D.
Robert L. MacCarty, M.D., M.S.
Richard A. McLeod, M.D.
John R. Muhm, M.D.
Anthony W. Stanson, M.D.
Byrn Williamson, M.D.

Division of Therapeutic Radiology

Professor

Donald S. Childs, Jr., M.D., M.S.
Paul W. Scanlon, M.D., M.S.

Associate Professor

John D. Earle, M.D. *chairman*
Malcolm Y. Colby, Jr., M.D., M.S.
Edwin C. McCullough, Ph.D.
Alan L. Orvis, Ph.D.

Assistant Professor

Roger E. Cupps, M.D., M.S.
Joel E. Gray, Ph.D.
Margaret A. Holbrook, M.S.
Robert E. Lee, M.D., M.S.
Martin Van Herik, M.D., M.S.

Diagnostic Radiology

The Department of Diagnostic Radiology carries out approximately 580,000 diagnostic examinations a year. Fully equipped departments are maintained in the Mayo Building and at Methodist and St. Mary's hospitals. In addition to these clinical facilities, adequate space has been set aside in the department for conferences, and study cubicles for individual residents are available. A complete film library and a library of radiology texts are available in the department. A main clinic library and the research facilities of the Mayo Clinic laboratories are readily available to graduate students working in the field of radiology.

Thirty-four regular residencies in radiology are offered in the Mayo Graduate School of Medicine; approximately 10 appointments are made each year. Five of these appointments are offered at the G-1 level, and an opportunity to spend 4 years of training in radiology is offered such appointees. For candidates entering the G-2 level, the program is 3 years in duration. In addition, four 1-year positions are available for advanced study beyond completion of a regular residency. Such time may be spent in most areas of subspecialty interest or may be spent as an additional

year of general training. Training usually begins in July but in exceptional circumstances can begin at the start of the other academic quarters. The graduate training program in radiology is designed, in accordance with the basic requirements stipulated by the American Board of Radiology, to provide training in radiologic physics, radiologic technique, film interpretation, fluoroscopy, ultrasound, computed tomography, radiologic biology, and pathology. Numerous departmental and intradepartmental conferences and seminars are held each week. In addition to observation of and progressive participation in the clinical work of everyday practice, there is ample opportunity for study, research, and writing in conjunction with and under the supervision of members of the staff. Those electing to prepare a thesis as well as other requirements may earn the degree of M.S. in radiology. Additional time is required for the Ph.D. degree.

Therapeutic Radiology

The program in radiation therapy offers individualized training with emphasis on helping residents achieve their specific goals in preparing for clinical practice, academic pursuit, or research-oriented careers. Both 3- and 4-year residencies that fulfill the requirements of the American Board of Radiology are offered. Therapeutic radiology applicants may enter the radiation therapy residency program immediately upon graduation from medical school or may be considered for admission after completion of 1 postgraduate year in another program.

Participation in cancer therapy research is encouraged among residents with investigative abilities and interests. It is possible to earn a graduate degree (M.S. or Ph.D.) from the Mayo Graduate School.

Residents in the 3-year program (PG 2-4) in therapeutic radiology spend 2 years in clinical therapeutic radiology and 1 year divided among surgical pathology, antitumor chemotherapy, and an elective of their choice. The 4-year program (PG 1-4) includes the same 3 years of training in radiation therapy plus 1 year of clinical rotations designed to develop the physician's clinical skills.

The Division of Therapeutic Radiology is located in the Curie Pavilion, where patients may be seen jointly with members of the Division of Medical Oncology. Many patients with malignant disease of all origins and stages are treated in these sections annually. Special consulting groups are concerned with breast cancer, gastrointestinal cancer, lung cancer, gynecologic cancer, and hematologic malignancy.

The members of the Division of Therapeutic Radiology conducted 2,675 initial or reevaluation consultations in 1978. During the same year, 2,012 patients received radiation therapy, and a total of 29,858 treatments were administered. A total of 364 patients received radioisotope therapy. The radiology resident examines patients referred to the Division of Therapeutic Radiology, participates in decisions regarding their management, assists in the application of radiation therapy to patients so treated, and takes part in follow-up care.

A new-patient conference is held daily. Interesting and instructive problems in the management of patients with cancer are presented during weekly seminars and the core curriculum lecture series. The radiation physics program for radiation therapy residents includes a 50-lecture didactic course in basic radiologic sciences. An additional series of six lectures on radiation biology is also available. During the time residents spend in the division, they are expected to obtain working knowledge of treatment planning. This includes both hand and computer assisted approaches. Members of the radiation physics staff are always available for direct consultation and provide a series of work sessions designed to familiarize the residents with computer assisted treatment planning.

Facilities and resources incude a laboratory for radioactive isotopes; three linear accelerators; one cobalt teletherapy unit; an orthovoltage X-ray unit; a treatment

planning simulator; a PC-12 treatment planning computer; a tumor data registry; a simulator with fluoroscopy; beam block modifiers; 137-cesium, 192-iridium, and 125-iodine for intracavitary and interstitial treatment; equipment for the radiation therapy of animals; a laboratory for radiobiology and physics; conference rooms; and a library.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 8852f,w,s,su. DIAGNOSTIC RADIOLOGY. (6 cr) Staff
At least 36 months in diagnostic radiology, of which 3 months are spent in isotopes and 3 months in pathology. Additional time may be arranged. Through observation, precept, and progressive participation in film interpretation, the student becomes thoroughly familiar with the entire field of diagnosis and observes and participates in a wide variety of special techniques in neuroradiology, cardiovascular radiology, urologic radiology, etc.

M 8853f,w,s,su. THERAPEUTIC RADIOLOGY. (6 cr) Staff
At least 2 years are spent in clinical therapeutic radiology, observing and participating in the treatment of a wide variety of malignant diseases that are amenable to treatment by x- or gamma radiation, electrons, radium, or radioactive isotopes.

M 8854f,w,s,su. RADIOLOGY OF THE MUSCULOSKELETAL SYSTEM. (1 cr) Beabout and staff
Radiological principles in evaluation of bone pathology and skeletal disorders.

SOCIAL AND ADMINISTRATIVE PHARMACY (SAPh)

OFFERED AT MINNEAPOLIS

Professor

Albert I. Wertheimer, Ph.D., *director of graduate study*
Hugh F. Kabat, Ph.D.
Theodor J. Litman, Ph.D.
Lawrence C. Weaver, Ph.D.
Vernon E. Weckwerth, Ph.D.

Assistant Professor

Marian Adcock, M.P.H.
Paul B. Batalden, M.D.
John T. Bush, B.S.
Donald A. Dee, M.S.
Cyrus B. Elliott, B.S.
Larry R. Fredrickson, J.D.
Laël C. Gatewood, Ph.D.
William Hodapp, M.S.
Richard L. Holloway, Ph.D.
David E. Holmstrom, B.S., J.D.
C. Anderson Johnson, Ph.D.
Thomas Jones, M.P.H.
Teresa Kurzman-Seppala, M.A.
Donnalee Kutchera, M.S.
Lois A. Maiman, Ph.D.
Thomas McKennell, Ph.D.
Steven R. Orr, Ph.D.
James M. Schaefer, Ph.D.
Darwin E. Zaske, Pharm.D.

Graduate work is available to qualified applicants who wish to prepare themselves to investigate the relationships of various biological and physical factors in the social setting in which pharmaceutical functions exist. This flexible interdisciplinary program utilizes the resources of the University's many social science departments to prepare students to investigate drug use, abuse, and nonuse; to research the clinical setting in which pharmacy is practiced; and to direct educational programs for pharmacy practitioners and students.

Master's Degree—Work leading to the M.S. degree is offered under both Plan A and Plan B. Students take both a written and an oral final examination.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

Prerequisites—A baccalaureate degree with an exceptional scholastic record.

Language Requirement—For the master's degree, none. For the Ph.D. degree, none; however, either a collateral field of knowledge or a special research technique is required.

Minor—The choice of minor and collateral fields and special research techniques may vary considerably depending on the research interest of the student, but will be developed in consultation with graduate faculty advisers in that specific area. The most frequently selected minor areas include public health, business administration, sociology, psychology, and public affairs.

Program in Hospital Pharmacy

Professor

Hugh F. Kabat, Ph.D., *director of graduate study*
Albert I. Wertheimer, Ph.D.

Assistant Professor

David N. Angaran, M.S.
Daniel M. Canafax, Pharm.D.
James C. Cloyd, Pharm.D.
S. Albert Edwards, M.S., Pharm.D.
Ricci Giese, M.S.
James, D. Herrick, M.S.
Thomas F. Jones, M.H.A.
Marc R. Summerfield, M.S.

Graduate work is open to qualified pharmacists who wish to prepare to manage pharmacy services in organized health care settings.

Degrees Offered—M.S., Plan A or Plan B.

Prerequisites—A degree from a college of pharmacy and an exceptional scholarship record. Evidence of personal capability and fitness for work in the hospital field is also considered an essential requirement for admission.

Language Requirement—Students taking the degree under Plan B (without thesis) are not required to offer a language; those taking a Plan A degree (with thesis) must offer one.

Minor Fields—The choice of minor fields of study may vary considerably depending on the research interest of the student. The selection of courses will be made after consultation with the student's adviser.

Final Examination for the Master's Degree—Oral.

5840. PRINCIPLES OF HEALTH BEHAVIOR. (2 cr; prereq PubH 5795 or #) Maiman
Review and evaluation of theoretical, conceptual, and experimental approaches in the behavioral sciences contributing to an understanding of health attitudes and behaviors, and of motivational and educational approaches to changes of attitude and subsequent health behaviors. Topics include extent and kinds of health beliefs possessed by various segments of the population, cultural and psychosocial determinants of health attitudes, appraisal of the relationships between attitudes and behaviors, methods used in research on health-related attitudes, concepts and models to explain individuals' health-related perceptions and behaviors, influence processes, attempts to modify health attitudes and behaviors.

8100. SEMINAR. (1 cr per qtr) Staff

8200. RESEARCH PROBLEMS. (Cr ar) Staff

8235. LEGISLATIVE CONTROLS. (3 cr; prereq #) Fredrickson
Historical development; social and economic causes and consequences; federal and state drug, cosmetic, and narcotic laws. Development of state pharmacy laws, dangerous drug laws, and their regulation. Current legislation affecting practice of pharmacy.

8255. DRUG MARKETING. (3 cr; prereq #) Kabat
Historical development of distributive systems, underlying economic principles, marketing channels, agencies, institutions, functions, policies, and practices as they relate to the pharmaceutical industry.

8265. ADVANCED DRUG MARKETING. (3 cr; prereq #) Wertheimer
Specialized problems involved in marketing of health care products and services. Quantitative, statistical techniques used in contemporary pharmaceutical marketing and marketing research methodologies and strategies.

8270. CLINICAL CONFERENCES. (2 cr [may be repeated for max 6 cr])
Monitoring of patient drug therapy in a clinical setting.

8280. ADMINISTRATIVE CLERKSHIP. (Cr ar; prereq △)
Coordinated clerkship with the student assisting in ongoing work and projects at local health agencies, planning boards, and legislative staffs to gain experience with and appreciation of the planning and implementation of health policy. Emphasis on pharmaceutically related work where possible. Supervision by departmental faculty in conjunction with agency staff.

8290. CLINICAL CLERKSHIP. (2-5 cr; prereq 8270) Staff
Supervised study of pharmaceutical services at University Hospitals or affiliated institutions.

8300, 8301, 8302. CLINICAL THERAPEUTICS. (2 cr per qtr) Staff
Clinical lectures on diagnosis and treatment of common diseases.

8400. SPECIAL CLINICAL PROBLEMS. (Cr ar) Staff
Medication errors, drug distribution systems, patterns of drug utilization, cost benefit analysis of prescribed medication according to diagnosis, age, dosage form, effectiveness, side effects, incidence of adverse effects, or drug use and misuse.

8420. SOCIAL AND BEHAVIORAL ASPECTS OF PHARMACY PRACTICE. (3 cr; prereq #) Wertheimer
Historical development of the profession, its growth and development with emphasis on the forces of education, professionalization, attitude modification, and the resultant changes occurring as a product of legal and organizational forces in society.

8500, 8501, 8502. PHARMACY AND ITS ENVIRONMENT. (3 cr per qtr; prereq #; offered 1979-80 and alt yrs) Wertheimer
Cultural foundations of pharmacy. Development of present state of pharmacy practice. Social-psychological factors in drug use, abuse, or nonuse by the patient practitioner. Role of pharmacist as health practitioner: with the profession, in relation to other health practitioners, and in relation to the general public.

8610. BEHAVIORAL AND SOCIAL RESEARCH METHODOLOGIES IN THE HEALTH SCIENCES. (3 cr; prereq #) Johnson
Survey of research methodologies for studying social and behavioral aspects of health care. Development of strategies for selecting and modifying existing research tools for particular purposes. Ethics of doing research on humans.

8611. RESEARCH DESIGN. (3 cr; prereq 8611 and #) Johnson
Survey of behavioral and social measures and development of skills in research design. Students present their own research designs and measurement tools for class critique and conduct at least a pilot study.

8612. RESEARCH SEMINAR. (2 cr) Johnson
Research issues, ideas, designs, findings, and interpretations presented by students and faculty for discussion.

8700. HOSPITAL PHARMACY ADMINISTRATION I. (2 cr) Jones
History, classification, organization, and functions of hospital departments in relation to the pharmacy service.

8701. HOSPITAL PHARMACY ADMINISTRATION II. (3 cr; prereq 8700, #)

8702. HOSPITAL PHARMACY SURVEY. (1 cr; prereq 8701, #) Kabat

8810. SOCIAL PSYCHOLOGY OF HEALTH CARE. (3 cr, §PubH 5094; prereq #) Staff
Social psychological aspects of health care delivery. Topics include: behavioral and social aspects of pain and suffering, emotions, disease and recovery, responses to drugs and other therapies, patients' continuity with prescribed therapies, relationships between the health care professional and the patient, and relationships between members of various health care professions.

8820. ADVANCED SEMINAR IN THE SOCIAL PSYCHOLOGY OF HEALTH CARE. (3 cr; prereq #) Staff
In-depth assessment of one or more specific topics related to behavioral and social aspects of health care. Possible topics include: relations among members of the health care team, patient counseling, causal attributions as they affect well-being and self-care, and diagnosis and treatment of the health care expert; pain and suffering; positive and negative placebo effects; problem of the "difficult" and dying patient.

SURGERY (Surg)

OFFERED AT MINNEAPOLIS

Regents' Professor

Richard L. Varco, M.D., Ph.D.

Professor

John S. Najarian, M.D., *chairman*
Henry Buchwald, M.D., Ph.D.
M. Michael Eisenberg, M.D.
John J. Haglin, M.D., Ph.D.
Claude H. Hitchcock, M.D., Ph.D.
Edward W. Humphrey, M.D., Ph.D.
Carl M. Kjellstrand, M.D.
Arnold S. Leonard, M.D., Ph.D.
Richard C. Lillehei, M.D., Ph.D.
Charles F. McKhann, M.D.
Donald G. McQuarrie, M.D., Ph.D.
John F. Perry, M.D., Ph.D.
Yoshio Sako, M.D., Ph.D.
Richard L. Simmons, M.D.

Clinical Professor

Lyle J. Hay, M.D., Ph.D.
Fletcher Miller, M.D., Ph.D.
Earl G. Yonehiro, M.D., Ph.D.

Associate Professor

Demetre Nicoloff, M.D., Ph.D., *director of graduate study*
Robert W. Anderson, M.D.
John P. Delaney, M.D., Ph.D.
Robert L. Goodale, M.D., Ph.D.
Theodor B. Grage, M.D., Ph.D.
Hovald K. Helseth, M.D.
Jon Schmidtke, Ph.D.
W. Albert Sullivan, M.D., M.S.

Clinical Associate Professor

Ronald H. Dietzman, M.D., Ph.D.

Assistant Professor

John Foker, M.D., Ph.D.
William G. Lindsay, M.D.
Albert Mowlem, M.D., Ph.D.
Robert D. Nelson, Ph.D.
Alan R. Shons, M.D., Ph.D.
David E. R. Sutherland, M.D., Ph.D.

Instructor

Richard Condie

The goal of the residency program in general surgery is to provide excellent training both on the clinical wards and in the laboratory. The ultimate aim of the program is to train medical doctors both for the practice of surgery and for academic positions.

The residency training programs include appointments at the University of Minnesota Hospitals, the Minneapolis Veterans Administration Hospital, and St. Paul-Ramsey Hospital. In addition, the program offers rotations at Methodist and Mount Sinai hospitals in Minneapolis and at Miller Hospital in St. Paul. Each residency appointment is for 1 year; reappointment is contingent upon superior performance.

All residents in general surgery begin their training with 3 years of junior assistant residency on the clinical services. The fellows aid the surgical staff in diagnosis and in the preoperative and postoperative care of patients. They help to direct and supervise the work of the G-1 and after their first year assist in the bedside teaching of the surgical clerks. They act as first assistant in operations performed by the general surgical staff. As soon as they prove themselves capable, they perform the simpler major operations, with a staff surgeon acting as first assistant. Later they are permitted to operate under the supervision of the surgeon, and finally, when they have demonstrated their ability, they operate independently. Increasingly difficult cases are assigned as their ability warrants. Supervision is always given until the staff surgeon is satisfied with the fellow's ability to operate independently.

In the second year, residents may rotate on several specialty services including vascular surgery, plastic and head and neck surgery, cardiothoracic surgery, colon and rectal surgery, and other specialty rotations. In general, residents select some specialty rotations from this group. Approximately two or three of the four second-year rotations are specialty services, with the remaining time spent on general surgical services.

In the fourth year most residents enter the experimental laboratory. Senior residents have 8 to 12 months of intensive surgical operative experience under supervision. The remainder of the year consists of clinical rotations by special arrangement. In the fifth and final year of the clinical program, fellows serve as chief

surgical resident for 12 months on the General Surgical Services of the University Hospitals or Veterans Administration or St. Paul-Ramsey hospitals.

Trainees spend approximately 2 to 3 years in the laboratory preparing for advanced degree qualification, either in a basic science or in surgery. Research time may be spent in either a basic science or surgical research laboratory. Following completion of laboratory experience, trainees progress through senior residency and chief residency years.

An additional degree, the master of science in experimental surgery, is offered to acceptable candidates from other institutions who are fully trained in clinical surgery. This degree requires 2 to 3 years of training and provides an opportunity to learn modern research techniques, application of the scientific method, and practical experience in a research area.

Additional training in thoracic and cardiovascular surgery is available to selected residents following completion of the general surgery training program.

The fundamental laboratories of the Medical School offer numerous graduate courses closely related to surgery. (See anatomy, biochemistry, laboratory medicine, microbiology, pathology, pharmacology, and physiology.) These fields also offer opportunities for special investigative and research work. Proximity of medical buildings and arrangement of courses permit coordination of clinical and laboratory work.

Supervised work is offered by the Department of Surgery in the Experimental Research Laboratories, as well as in its hospital and outpatient departments, in surgical diagnosis, and in operative surgery. Similar opportunities are available in some surgical specialties such as colon and rectal surgery, transplantation, and thoracic, cardiovascular, and pediatric surgery.

Medical School surgical fellowships are offered also at Hennepin County Medical Center. Surgical staffs of the affiliated hospitals supervise training of their surgical fellows.

Master of Science in Experimental Surgery—Plan A only. Requirements: (a) thesis—research topic; (b) 40 credits (2 years' work), not less than 30 of them in surgical research; (c) minor of 9 credits plus certification from department in which minor is obtained; (d) oral thesis defense.

Master of Science in Surgery—Plan A only. Requirements: (a) thesis—research topic; 140 credits (5 years' work)[1], including at least 20 in surgical research; (c) passage of departmental surgical examination; (d) minor of 9 credits plus certification from department in which minor is obtained; (e) combined oral thesis defense and surgery examination.

Ph.D. in Surgery—Requirements: (a) thesis—research topic; (b) 170 credits (6 years' work)[1], including at least 40 in research (basic science laboratory credit may be interchangeable with surgical laboratory credit at departmental discretion); (c) passage of departmental surgical examination; (d) minor consisting of 18-24 credits in a nonclinical field; (e) written and oral preliminary examinations; (f) oral thesis defense.

Language Requirement—None.

The following courses are given at participating hospitals unless otherwise indicated. Registrants taking fellowships at Hennepin County Medical Center should indicate their section by adding after the course number "Section G."

[1]Two years (40 credits) of clinical training may be transferred from other institutions at departmental discretion.

8200. CLINICAL SURGICAL PROBLEMS IN MANAGEMENT. (5 cr) Staff
Graduate students act as house surgeons and are required to study all phases of patient care including diagnosis, pre- and postoperative management, and operative therapy. Graded responsibility offered under supervision of staff. Fellows operate under supervision beginning with simple procedures. When properly qualified, senior and chief residents manage entire care of some patients. Attendance at rounds, conferences, and seminars is mandatory.

8201. SURGICAL-ROENTGENOLOGICAL CONFERENCE. (1 cr) Delaney, Najarian, and staff
Weekly review of films of all surgical patients presenting interesting roentgen findings. Staffs of the Departments of Radiology and Surgery.

8202. SURGICAL RESEARCH. (5 cr) Staff
Properly qualified students undertake original investigation of problems in either experimental or clinical surgery.

8203. SURGERY COMPLICATIONS AND RESEARCH CONFERENCE. (1 cr) Najarian and staff
Evaluation of selected surgical patients including postoperative course. Current research problems are presented for discussion and critical evaluation.

8204-8205-8206. BIOMEDICAL ENGINEERING SEMINAR. (1-3 cr per qtr) Blackshear, Nicoloff
Lectures, demonstrations, and individual research activities designed to introduce graduate students and faculty of mechanical engineering and surgery to techniques and goals of the two disciplines.

8207. TRANSPLANTATION AND BONE MARROW CONFERENCE. (1 cr) Najarian, Simmons
Current clinical and research problems are presented for interdepartmental discussion and evaluation.

SURGERY

OFFERED AT ROCHESTER

Professor

Robert B. Wallace, M.D., *chairman*
Martin A. Adson, M.D., M.S.
Oliver H. Beahrs, M.D., M.S.
Philip E. Bernatz, M.D., M.S.
Gordon K. Danielson, M.D.
Michael P. Kaye, M.D., M.S.
Keith A. Kelly, M.D., M.S.
Karl A. Lofgren, M.D., M.S.
Dwight C. McGoon, M.D.
Donald C. McIlrath, M.D., M.S.
W. Spencer Payne, M.D., M.S.
William H. ReMine, M.D., M.S.
John S. Welch, M.D., M.S.

Associate Professor

Eric P. Lofgren, M.D., M.S.
James R. Pluth, M.D., M.S.
Sylvester Sterioff, M.D.
Robert L. Telander, M.D.
Jonathan A. van Heerden, M.B.C.H.B., M.S.
John E. Woods, M.D., Ph.D.

Assistant Professor

Robert W. Beart, M.D.
Roger R. Dozois, M.D., M.S.
Anthony J. Edis, M.D.
Peter C. Pairolero, M.D.
Francisco J. Puga, M.D.

Graduate training in general surgery at the Mayo Graduate School of Medicine combines the opportunities for an advanced academic degree and surgical education to fulfill the requirements of the American Board of Surgery.

Appointments to the program are made quarterly; continuation in the program is contingent upon satisfactory performance. Individuals successfully completing the first 3 years are expected to complete the final 2 years of the program. Assignments during the usual 5-year program are flexible, but generally include, in addition to general surgery, 2 or 3 quarters in surgical subspecialties and 1 quarter of surgical pathology and may include an elective quarter in a medical subspecialty.

There is opportunity for research experience in surgical or basic science laboratories in addition to the 5 clinical years of the program. A limited number of 1- and 2-year appointments are available to provide basic surgical experience prior to surgical specialty training.

The final year of the program is spent as a chief resident, with accompanying increased consulting and operating responsibility. Operative experiences are principally located in Rochester Methodist Hospital and St. Mary's Hospital with an affiliated service at the Rochester State Hospital. Patients at these hospitals, together with the outpatient facilities of the Mayo Clinic, provide a wide exposure to general and special surgical disease.

A large number of integrated seminars, lectures, and conferences are held each week.

Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M 8851f,w,s,su. PERIPHERAL VEIN SURGERY. (6 cr) Staff
Treatment of complications, surgical and medical, and varicose veins.

M 8852f,w,s,su. SURGICAL PROBLEMS AND MANAGEMENT (JUNIOR RESIDENTS). (6 cr) Staff
Graduate students act as house surgeons and are required to study patients, prepare them for conferences and operative surgery, and participate in postoperative care. Formal conferences, seminars, and informal study in special areas of surgery.

M 8853f,w,s,su. OPERATIVE SURGERY (SENIOR RESIDENTS). (6 cr) Staff
Senior surgical residency with the teaching staff. Management of the patient during entire hospital stay. Surgery performed under direction of faculty by the resident when properly qualified.

M 8854f,w,s,su. OPERATIVE SURGERY. (6 cr) Staff
Chief surgical residency at Mayo Clinic or affiliated Rochester State Hospital. Elective and urgent surgical cases are managed by senior residents appointed by surgical faculty. Faculty direction continues throughout entire management period.

M 8890. SURGICAL RESEARCH. (6 cr; prereq 1 yr clinical surgery) Staff
Original investigation in surgical fields.

Colon and Rectal Surgery/Proctology

Associate Professor
Robert J. Spencer, M.D., *head*

Assistant Professor
Markham J. Anderson, Jr., M.D., M.S.
Clyde E. Culp, M.D.

Graduate training in colon and rectal surgery/proctology is carried out in conjunction with the Department of Surgery. Residents who have completed the requirements for the American Board of Surgery are eligible to apply for training to obtain certification from the Board of Colon and Rectal Surgery.

The graduate program requires a minimum of 5 years. The major portion of the program, 4 years, is devoted to the field of general surgery (see Department of Surgery), with special reference to abdominal surgery in which emphasis is on conditions that involve the colon. Four quarters of the 5-year period are devoted to the field of anorectal surgery and diagnostic proctoscopy. Two of these 4 quarters are spent as chief resident associate, performing surgery under supervision of the proctology staff. (See description of M 8853 below.)

Master's Degree—Offered only under Plan A.

M 8851f,w,s,su. COLON AND RECTAL SURGERY. (6 cr) McIlrath and staff

M 8852f,w,s,su. SURGICAL PROBLEMS AND MANAGEMENT (JUNIOR RESIDENTS). (6 cr) Adson, Beahrs, Kelly, McIlrath, ReMine
Graduate students act as house surgeons and are required to study patients, prepare them for conferences and operative surgery, and participate in postoperative care. Formal conferences, seminars, and informal study in special areas of general surgery.

M 8853f,w,s,su. OPERATIVE SURGERY (SENIOR RESIDENTS). (6 cr) Adson, Beahrs, Kelly, McIlrath, ReMine
Senior surgical residency with the teaching staff. Management of the patient during entire hospital stay. Surgery performed under direction of faculty by the resident when properly qualified.

THERAPEUTIC RADIOLOGY (TRad)

OFFERED AT MINNEAPOLIS

Professor

Seymour H. Levitt, M.D., *head*
Faiz M. Khan, Ph.D.
Chang W. Song, Ph.D.

Associate Professor

Thomas K. Jones, Jr., M.D.

Assistant Professor

Donald J. Buchsbaum, Ph.D.
Robert E. Haselow, M.D.
Tae H. Kim, M.D.
Chung Kyu Kim Lee, M.D.

The primary objective is to train physicians in the field of therapeutic radiology in a well-rounded program geared to acquaint them with all aspects of clinical and experimental radiotherapy. The ultimate aim is to train physicians for both the practice of therapeutic radiology and for academic positions.

Master's and Doctor's Degrees—The master of science in therapeutic radiology degree is offered under Plan A only. For the Ph.D., see the section on radiology.

Requirements—Graduates of Class A medical schools are eligible for appointment as medical fellows with a stipend in therapeutic radiology upon completion of 1 year of satisfactory internship in a recognized hospital. Medical fellows without stipend are also accepted if places are available.

Previous preparation in internal medicine, pathology, or both is highly desirable although not required. The course extends over a period of 3 to 4 years, excluding any time devoted to other subjects. For those who have been away from medical practice for a considerable period, a preliminary program of education in the laboratory sciences and general medicine is highly desirable.

Plan A Program: Master's Degree With Thesis—Students must take a minimum of 20 quarter credits in therapeutic radiology and a minimum of 8 quarter credits in one or more nonclinical fields to make up the minimum of 28 quarter credits required for the degree. If students wish to complete a designated minor, they must take 9 or more quarter credits in a single nonclinical field, making the minimum requirement for a Plan A degree with a designated minor not less than 29 credits.

The minimum residence requirement will be 13 quarters. There is no language requirement. Medical fellows may assist in the teaching of undergraduate students and may teach elective courses. Research in one or more aspects of therapeutic radiology should be carried out during the course of the program.

5170f. BASIC RADIOLOGICAL PHYSICS. (3 cr; prereq #) Khan
Theoretical and experimental aspects of radiological physics. Physical properties of various ionizing radiations; interactions of ionizing radiations with matter; methods of radiation dose measurement.

5171w. MEDICAL NUCLEAR PHYSICS. (3 cr; prereq 5170 or #) Loken, Williams
Theoretical and experimental applications of radionuclides in medicine and biology. Imaging devices and techniques, dynamic tracer analysis; internal emitter dosimetry. Radioimmunoassay and the statistics of counting.

5172s. RADIATION BIOLOGY. (3 cr; prereq 5170 or #) Song
Effects of ionizing radiations on cells, tissues, and organisms; biochemical and physiological basis of radiation effects, biological rationale for radiation therapy practices.

5173w. PHYSICS OF RADIATION THERAPY. (3 cr; prereq 5170 or #) Khan
High energy and teletherapy machines. Measurements of radiation quality, output and depth dose distributions for clinical use. Calculation of treatment parameters. Beam modification and shaping. Treatmer planning for fixed field and rotational therapy. Physics of intracavitary and interstitial therapy. Comput applications in treatment planning. Principles and criteria for radiation protection.

5174s. PHYSICS OF DIAGNOSTIC RADIOLOGY. (3 cr; prereq 5170 or #) Loken
Physics of diagnostic X-ray imaging, X-ray production, image receptors, radiation exposure and pr tion. Special imaging modes including computerized tomographic scanning, ultrasound, and el radiography included.

5340f,w,s,su. SPECIAL PROBLEMS IN RADIATION THERAPY. (Cr ar) Haselow, Jones, Kim, Lee, Levitt

5512f,w,s,su. DOSIMETRY OF INTERNAL AND EXTERNAL RADIATION. (1 cr) Khan
Basic principles of radiation dosimetry discussed in detail; clinical applications.

5540f,w,s,su. SPECIAL PROBLEMS IN RADIOLOGICAL PHYSICS. (Cr ar) Khan

5800. RADIATION ONCOLOGY PATHOLOGY. (Cr ar)

8300f,w,s,su. RADIATION THERAPY. (Cr ar) Haselow, Jones, Kim, Lee, Levitt
In-service training in treatment and management of patients with malignant diseases.

8310f,w,s,su. FUNDAMENTALS OF RADIATION THERAPY. (1 cr) Haselow, Jones, Kim, Lee, Levitt
Lectures on physical and clinical aspects of radiation therapy. Techniques of radiation therapy including radium and other isotopic implants.

8315f,w,s,su. RADIATION THERAPY PATHOLOGY. (1 cr) Staff
Weekly ½- to 2-hour seminar relating microscopic and gross anatomy of tumors to clinical findings, diagnostic workup, and therapy of patients receiving radiation therapy. Includes clinical descriptions of patients followed by comprehensive discussion of the microscopic, gross pathology, and overview of tumor pathology. Offered in conjunction with the Department of Pathology.

8320f,w,s,su. RADIATION THERAPY TREATMENT PLANNING PROBLEMS. (1 cr) Staff
Weekly ½- to 2-hour seminar. Treatment planning, computer treatment planning, treatment fields of patients under treatment, and treatment planning programs discussed with staff of the clinical and physics sections.

8325f,w,s,su. RADIATION THERAPY PEDIATRICS ONCOLOGY. (1 cr) Staff
Weekly 1½-hour seminar. Pediatric oncology radiation therapy problem situations discussed by pediatric oncology and therapeutic radiology staff. Case presentations and details of radiation therapy, chemotherapy, and instruction in combination therapy outlined. Offered in conjunction with pediatric oncology.

8350f,w,s,su. RESEARCH IN RADIATION THERAPY. (Cr ar)

8410f,w,s,su. SEMINAR: RADIATION BIOLOGY. (1 cr) Staff

8450f,w,s,su. RESEARCH IN RADIATION BIOLOGY. (Cr ar) Staff

8550f,w,s,su. RESEARCH IN RADIOLOGICAL PHYSICS. (Cr ar)

UROLOGY (Urol)

OFFERED AT MINNEAPOLIS

Professor
Elwin E. Fraley, M.D., *director of graduate study*
Colin Markland, M.B.B.Ch.

Clinical Professor
Baxter A. Smith, Jr., M.D., M.S.

Assistant Professor
Alexander S. Cass, M.D.

Clinical Assistant Professor
Milton P. Reiser, M.D., M.S.

Three-year fellowships, approved by the Council on Medical Education, are offered to students working toward a graduate degree in urology. Work in urology is done at University, Minneapolis Veterans Administration, or St. Paul-Ramsey Hospital, and Hennepin County Medical Center.

Master's Degree—Offered under Plan A only.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

8250. UROLOGICAL SURGERY. (4 cr)

8251. CYSTOSCOPY AND UROLOGICAL DIAGNOSIS. (4 cr)

8252. UROLOGICAL CONFERENCE. (4 cr)

8253. RESEARCH IN UROLOGY. (4 cr)

8254. UROLOGICAL SEMINAR. (3 cr)

8255. UROLOGICAL-RADIOLOGICAL CONFERENCE. (3 cr)

8256. UROLOGICAL-PATHOLOGICAL CONFERENCE. (3 cr)

8257. SPECIAL UROLOGY. (3 cr) Fraley and staff

UROLOGY

OFFERED AT ROCHESTER

Professor

David C. Utz, M.D., M.S., *chairman*
James H. DeWeerd, M.D., M.S.
Panayotis P. Kelalis, M.D., M.S.

Associate Professor

William L. Furlow, M.D., M.S.
Frank J. Leary, M.D., M.S.
Reza S. Malek, M.B.B.S., M.S.
Joseph W. Segura, M.D.
Horst Zincke, M.D.

Assistant Professor

Robert P. Myers, M.D., M.S.

Instructor

David M. Barrett, M.D.

The Department of Urology at the Mayo Graduate School of Medicine seeks to provide excellent training for the residents in all phases of clinical and experimental urology. The curriculum as established by the Department of Urology leads to certification by the American Board of Urology.

Three-year (G-3 through G-5), 4-year (G-2 through G-5), and 5-year (G-1 through G-5) programs are offered. The 5-year program is designed for medical school graduates. The 4-year program is available to trainees who have completed 1 year (G-1) of postgraduate training in an approved program. The 3-year progrram is available to trainees who have completed 2 years (G-1 through G-2) of postgraduate training in an approved program.

The 3-year program is devoted to 12 quarters of clinical urology and generally does not afford an opportunity for meeting M.S. degree requirements.

The 4- and 5-year programs are also devoted to 12 quarters of clinical urology, as well as 4 or 8 additional quarters devoted to basic sciences or clinical studies leading to the M.S. degree.

Ph.D. candidates usually require an additional year (G-6) or two (G-6 and G-7) for completion of their work.

The care of the urologic patient is the paramount objective of the training program. The resident receives instruction in all aspects of diagnostic, therapeutic, and surgical (both endoscopic and open operative) urology by precept and by participation. With increasing experience the resident assumes greater obligations, progressing to first assistant and in some instances to chief resident associate. In these latter capacities the resident is responsible, under the supervision of a consultant, for the definitive care of the patient. Abundant opportunities for basic and applied urologic research are available, and participation in such activities is encouraged as part of the 4- and 5-year programs.

Teaching is provided in the clinic, at the bedside, in the operating room, and during ward walks. Assignments include the daily interpretation of urologic roentgenograms. Clinical urographic conferences and urologic conferences are held daily as well as weekly. During the fall, winter, and spring quarters, weekly seminars are presented by the resident staff and by urologic consultants. A Urology Journal Club meets monthly to review the current urologic literature. Attendance at monthly meetings of the general staff and clinicopathologic conferences is encouraged. A series of urologic lectures by distinguished guest urologists is presented two or three times yearly.

During training the resident comes into intimate contact with related or ancillary disciplines such as nephrology, gynecology, nuclear medicine, oncology, roentgenology, microbiology, and pathology. Special training in these and other related fields is possible.

Fellows majoring in urology may also, if they wish, take work in anatomy, biochemistry, laboratory medicine, physiology, and dermatology. For details, see these departments.

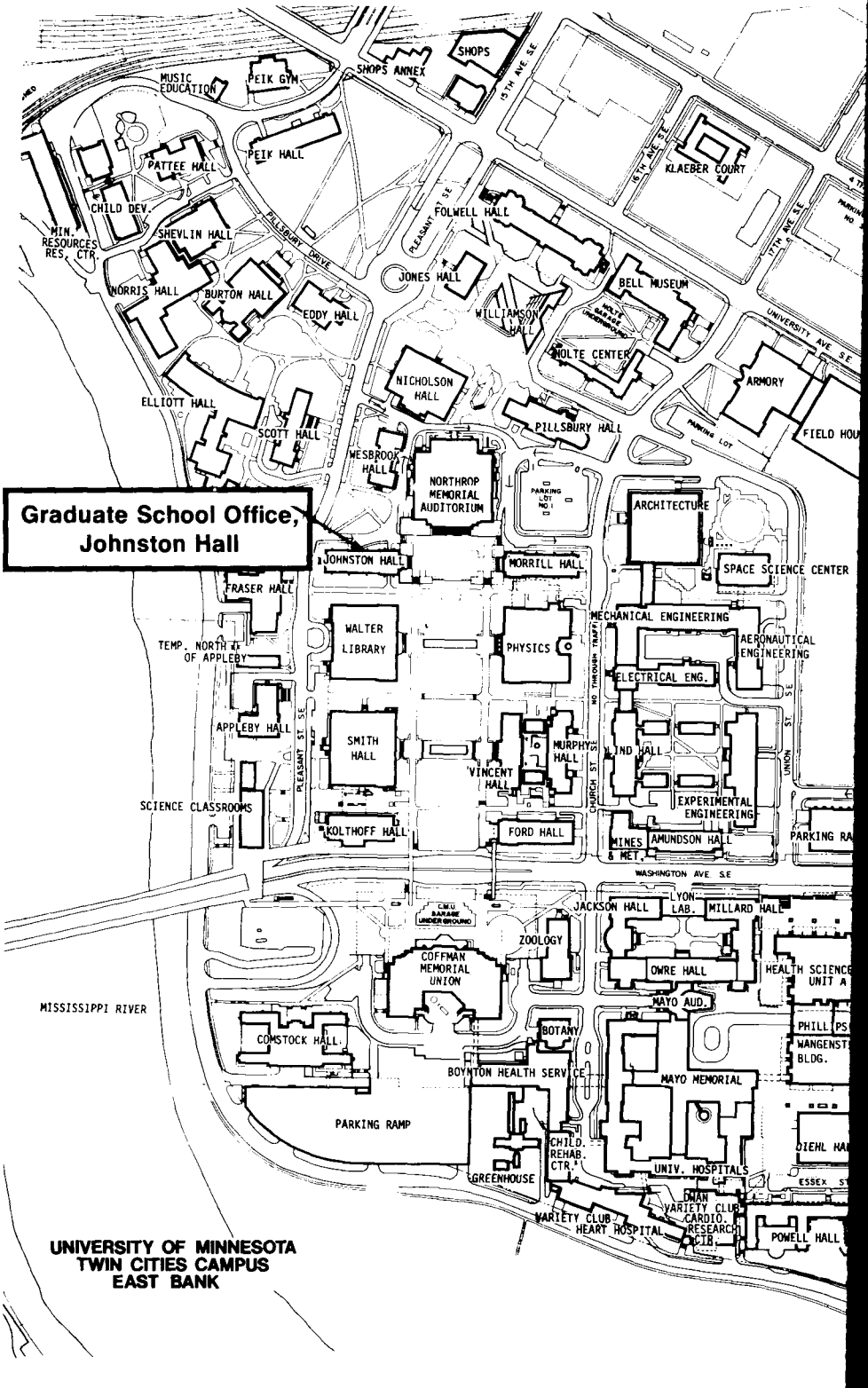
Master's Degree—Offered only under Plan A.

Doctor's Degree—Work leading to the Ph.D. degree is offered.

M8851f,w,s,su. UROLOGIC DIAGNOSIS AND SPECIAL UROLOGIC TREATMENT. (6 cr) Staff
Cystoscopic examination. Urography, both retrograde and excretory. History taking and clinical examination in diseases of the genitourinary tract. Study and treatment of acute and chronic infection of the genitourinary tract. Seminar.

M8852f,w,s,su. GENITOURINARY SURGERY INCLUDING ENDOSCOPIC AND OPEN PROCEDURES. (6 cr) Staff

INDEX



UNIVERSITY OF MINNESOTA
TWIN CITIES CAMPUS
EAST BANK

Symbols and Explanations

Symbols—The following symbols are used throughout the course descriptions in lieu of page footnotes:

- * Courses in which graduate students may prepare Plan B projects.
- † All the courses preceding the dagger must be completed before credit will be granted for any quarter of the sequence.
- § Credit will not be granted if the equivalent course listed after the section mark has been taken for credit.
- ¶ Concurrent registration is allowed (or required) in the course listed after the paragraph mark.
- # Consent of the instructor is required prior to registration.
- △ Consent of the department, division, or school offering the course is required prior to registration.
- x Course is offered more than 1 quarter.
- f,w,s,su Following course number indicate fall, winter, spring, or summer quarters.

A hyphen between course numbers (e.g., 8142-8143-8144) indicates a sequence of courses that must be taken in the order listed.

A comma between course numbers (e.g., 5234, 5235, 5236) indicates a series of courses that may be entered any quarter.

Courses numbered 8000 or above are open to graduate students only, except by specific permission of the dean of the Graduate School.

Courses numbered 0000 to 0098 are noncredit courses.

A prerequisite course listed by number only (e.g., prereq 5246) is always in the same department as the course being described.

1979-81 UNIVERSITY OF MINNESOTA BULLETIN

SCHOOL OF NURSING

UNIVERSITY OF MINNESOTA

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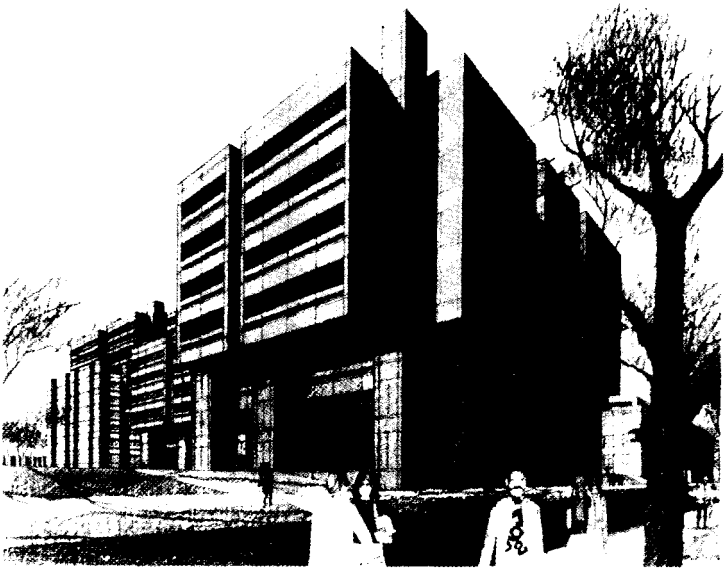
School of Nursing

UNIVERSITY OF MINNESOTA



An architect's drawing of Health Sciences Unit F (Nursing-Pharmacy), scheduled for completion in 1980.

How to Use This Bulletin

This bulletin is the basic source of information about the programs of the School of Nursing. It is organized in four sections.

I. General Information

Development of the School
Philosophy of Nursing
Philosophy of Nursing Education
Philosophy of Nursing Research
Philosophy of Public Service
Philosophy of Continuing Education
Programs and Accreditation
Governance
Facilities
Admission and Progression
Expenses
Financial Aid
Student Welfare and Services
Organizations
Access to Student Educational Records
Letters of Reference

II. Educational Programs

Program Leading to the Bachelor of Science Degree in Nursing
Program Leading to the Master of Science Degree
Minor in Nursing for Doctoral Students
Continuing Education

III. Courses in Nursing

For Baccalaureate Students
For Graduate Students

IV. Faculty

School of Nursing Faculty
Adjunct Faculty

The following bulletins will be helpful to students and prospective students: General Information, College of Liberal Arts, Graduate School, Graduate Programs in the Health Sciences, Summer Session, Extension Classes. They may be obtained from the Office of Admissions and Records, 110 Williamson Hall, 231 Pillsbury Drive S.E., University of Minnesota, Minneapolis, Minnesota 55455. They may also be available in library reference rooms and in high school and college counseling offices.

A Message From the Dean...

"On the move" is a fitting description of the University of Minnesota School of Nursing. As a primary center for preparing professional nurses, the school has developed programs based on a concept of nursing that emphasizes the uniqueness of nursing and the potential for definition of new roles for nurses.

The purpose of this bulletin is to describe to prospective and current students the educational programs offered by the School of Nursing. It is our hope that the descriptions presented convey the excitement of nursing, the challenge of nursing study, and our commitment to serving nursing and the state of Minnesota.

In an environment of study and change and a setting that allows interaction with other scholars and leaders in the University and the community, students are exposed to new ideas and challenges. We are fortunate in being part of the University of Minnesota, with its many and varied resources, its progressive leadership, and its tradition for excellence.

Irene G. Ramey, R.N., Ph.D., F.A.A.N.
Dean

School of Nursing

I. GENERAL INFORMATION

Development of the School

The University of Minnesota School of Nursing is the oldest nursing school on a university campus in the United States. The school opened in March 1909, offering a 3-year program in which four students were enrolled. In 1919, a 5-year program leading to a baccalaureate degree in nursing was begun. The shorter nondegree program continued until 1947. In response to the need for more prepared teachers and supervisors, specialized baccalaureate programs for RNs were established in the fields of nursing education (1922) and nursing administration (1955). These specialized programs were phased out in the early 1960s with the establishment of a general nursing program for RNs with many requirements identical to those of the generic baccalaureate program. Beginning in 1968, all undergraduate students were admitted to a single baccalaureate program. There have been some modifications in programming for RNs, but all undergraduate students pursue the same program objectives and complete the same curriculum.

The first graduate programs in nursing were initiated in 1951 and 1952. These were the master of education, offered cooperatively with the College of Education, and the master of nursing administration, offered by the School of Nursing. These programs were phased out between 1965 and 1968 as master's degree programs in nursing were developed and offered through the Graduate School. The first clinical programs were developed in psychiatric nursing (1963) and medical-surgical nursing (1965). In 1967, options in teacher preparation, clinical leadership, and advanced practice were added to the clinical focus. A childbearing and childrearing family nursing focus with a midwifery option was initiated in 1972. The nursing curriculum of the graduate program has undergone considerable change over the last decade, and the curriculum core has evolved to offer a variety of focuses to accommodate the diverse interests of students.

The School of Nursing assumes responsibility for the improvement of nursing care through its programs in nursing education, research, and service. Statements of philosophies of nursing and missions of the school guide the faculty in the development of programs and activities. The responsibilities related to research and service are fulfilled through activities such as continuing education programs for a variety of groups within the field of nursing, consultation services for individuals and agencies, and ongoing research in the area of patient care. In 1958, the University of Minnesota School of Nursing Foundation was established. Its purpose is the improvement of patient care through appropriate assistance to the school in carrying forward programs of nursing education, research, and community service. This evidence of public interest and support indicates concern for the quality of preparation of professional practitioners for the vital service of nursing.

Philosophy of Nursing

The goal of nursing is to assist an individual, group, or community to move toward optimal health. Optimal health may be defined as a dynamic integration within human beings allowing for maximum human effectiveness.

Nursing is an interpersonal process that takes place in a milieu composed of participants, the climate they generate, and the social forces that affect them. The primary participants in this process are the nurse and the patient/client. Patient/clients (individuals, groups, or communities who receive a desired or required service) are responsible for themselves within their capabilities and, as such, have the right both to participate in decision making and to accept or reject the service offered. Nurses actively participate in decision making and assume responsibility for their decisions.

The nurse is perceived as the individual who delivers the service desired or required by the patient/client. The service the nurse practitioner offers is directed toward helping the patient/client to utilize her or his strengths to attain the goal of optimal health. In an attempt to influence the patient/client in moving toward this goal, the nurse—by means of an analytical process—assesses the health status of the patient/client and formulates, implements, and evaluates a plan of nursing intervention based on her or his breadth of professional knowledge, an awareness of the milieu, and the unique health requirements of the patient/client.

The nurse has the ability to establish a relationship with the patient/client characterized by caring and to initiate and accept change in partnership with the patient/client.

Philosophy of Nursing Education

Nursing education at the University of Minnesota is directed toward maturation of the student as a fully sensitive human being with an investigative orientation, and achievement of competencies as a developing professional.

Nursing education is a process involving a relationship between student and teacher that fosters independence on the part of the learner. This process occurs in a milieu that encourages intellectual curiosity and mutual respect. It involves a progression of contemporary, challenging, and flexible learning experiences that make use of a wide variety of academic, professional, and community resources.

The student is an active participant with teachers, peers, and others involved in the learning process. The student is involved in establishing a personal identity as a nurse and human being. The student learns to exercise rights and responsibilities through challenging and questioning the educational process, and to be self-directive through utilizing resources, seeking educational experiences, and developing an ability for self-evaluation. The teacher guides the student throughout this process.

Philosophy of Nursing Research

Research is an essential part of academic life, a part that must be nurtured as diligently as other institutional activities if it is to flourish. Systematic and school-wide attention to the problems as well as the accomplishments of research contribute to the development of the climate of scholarship. Without such centralized concern both the difficulties and the rewards of research are more likely to be limited to individual or team interest rather than school-wide interest.

The school encourages institutional research activity. It does not attempt to determine what research will be done or how it will be carried out, except to enforce the school, University, and federal regulations. Care is taken to retain the prerogative of the individual investigator.

Philosophy of Public Service

Mutual benefit to the community, to the profession, and to the School of Nursing results from an active public service effort. Nurturance of public service outreach activities is essential and is consistent with the goals of the University Health Sciences and of the University.

The School of Nursing is committed to applying its teaching, clinical, and research knowledge externally to meet the health care needs of people throughout the state. The role is fulfilled through services that are solely the responsibility of the School of Nursing and others that are shared with other institutions or agencies. Because the University is a tax-supported land grant institution, the state community has a right to benefit from the expertise available from the faculty it employs. The state and regional community has the right to expect leadership from its nursing educators in resolving health care issues.

This attention to public service contributes substantially to furthering the acquisition of knowledge and development of nursing theory. Through such involvement, the School of Nursing can influence and be influenced by the identified health care needs for which it is preparing practitioners.

Philosophy of Continuing Education

Nurses have the responsibility to continue learning throughout their lifetimes, whether through independent or group efforts. Continuing education programs in nursing at the University of Minnesota focus on the development of the individual nurse and groups of nurses as fully aware human beings with an investigative orientation and a commitment to the achievement of standards and acquisition of competencies that are changing as the profession evolves. Continuing education offerings are designed to enhance the competencies of the professional nurse, whether in nursing practice, nursing education, or nursing administration, and it is assumed that this will improve the quality of patient care in Minnesota.

Continuing education offerings are submitted for approval to the Minnesota Nurses' Association Continuing Education Approval Program committee. All offerings are developed to meet Minnesota Board of Nursing criteria for continuing education studies mandatory for relicensure.

Programs and Accreditation

Over the years, the School of Nursing has conducted various types of programs designed to meet the community's need for nursing services and in keeping with current concepts of exemplary education in the field. Today, the school offers programs in nursing that lead to the bachelor of science degree and to the master of science degree.

The bachelor of science degree program is designed to prepare high school graduates and graduates of diploma or associate degree programs in nursing for beginning professional practice. This program is approved by the Minnesota Board of Nursing, and students graduating from the program are eligible to take the licensing examination offered by the board. Satisfactory performance on the examination is required in order to practice as a registered nurse in Minnesota as well as to be certified by the State Board of Health as a public health nurse.

The master of science degree program provides opportunity for graduates of baccalaureate programs in nursing to gain additional knowledge and skills necessary for the more expert practice of clinical nursing, beginning competence in a functional area of teaching or leadership in nursing services, as well as beginning

competence in carrying out clinical studies related to nursing practice.

The baccalaureate and master's degree programs in the School of Nursing are accredited by the National League for Nursing, which is the body designated by the National Commission on Accrediting to evaluate nursing education programs.

Governance

The faculty of the School of Nursing is responsible for decisions about school goals and priorities as well as planning programs to carry out the education, research, and service missions of the school and the University. Committees of the faculty are concerned with the areas of curriculum; admission and progression; faculty, student, and staff welfare; research; and public service. Students and civil service staff members are represented on the committees, and consultants are utilized when appropriate. The committees recommend major policies to the General Assembly of the School of Nursing, which acts as the governing body of the school.

Facilities

To provide opportunity for all students to acquire essential skills, the School of Nursing contracts with a variety of agencies, including the University of Minnesota Hospitals and Hennepin County Medical Center, for use of their facilities for planned clinical experiences. Faculty members of the school are responsible for planning and supervising the clinical experiences. The types of facilities used include acute care hospitals, public health agencies, residence facilities, long-term care homes, clinics, child care centers, and schools. While most of the agencies are located in areas serviced by the metropolitan transit system, students should be prepared to arrange transportation if assigned to a more distant site.

Admission and Progression

The School of Nursing offers programs of study leading to the bachelor of science in nursing and master of science degrees. To be admitted to the undergraduate program, students must have completed 45 quarter credits of acceptable liberal arts courses. To be admitted to the graduate program, students must have completed a baccalaureate program and be a registered nurse. Specific information regarding admission to and progression in each of the programs is included in the Educational Programs section of this bulletin. The faculty is presently studying the possibility of allowing applicants to present special credentials or descriptions of themselves for admission purposes. Individuals who believe they might qualify for a special category of admission should address inquiries to the School of Nursing.

Expenses

For tuition and fees, students should consult the current *General Information Bulletin.*

With an ever-increasing number of clinical assignments at off-campus locations, students should include transportation costs in their educational planning.

Uniforms, laboratory coat, name pins, and a watch with a second hand are essential items and must be considered in educational costs. Purchase of a stethoscope is recommended. While there is considerable variation in the price of these items, it is likely to cost $75 or more to acquire them.

Financial Aid

LOANS AND SCHOLARSHIPS

Federal Loan and Scholarship Program—Undergraduate or graduate students enrolled halftime or more in the School of Nursing are eligible for a maximum of $2,500 in federal loan money and $2,000 in federal scholarship money per school year, although it is likely that only a minimal amount of the scholarship money will be available in 1979-81. Interest at a rate of 3 percent and repayment of the loan begin 9 months after leaving the School of Nursing. Cancellation of as much as 85 percent of a loan may be granted for practicing nursing full time in a public or nonprofit private agency, institution, or organization for 5 years or, in some special cases, for 3 years.

Applications are available at the Office of Student Financial Aid.

State Scholarships for Nursing Students—Through Minnesota law, scholarship funds are available for state residents enrolled in nursing programs. Students accepting scholarships must agree to practice in the field of nursing in Minnesota for 1 year immediately after graduation. Students may apply for scholarship funds at any time during their nursing programs. The scholarship program is administered by the Minnesota Higher Education Coordinating Board. Information about scholarships and application procedures is assembled in the Application Packet for Minnesota State Scholarship and Grant-In-Aid Program, which is available from the University Office of Student Financial Aid, from most college financial aid offices, and from many high school counseling offices. The application deadline for priority consideration is March 1.

University Scholarship Funds—University scholarship funds for School of Nursing students are administered by the Office of Student Financial Aid. For scholarships to be awarded for the following year, students may apply after completing 1 quarter in the School of Nursing. Applications should be submitted before March 1. Eligibility is based on financial need, and applicants must have a minimum cumulative grade point average of 3.00. Information concerning application for these scholarships appears in the "Official Daily Bulletin" column of the *Minnesota Daily* during winter quarter.

The School of Nursing extends appreciation to all who donate funds for scholarships and wishes to acknowledge the assistance of many individuals and groups for their contributions to the support of ongoing scholarship awards, especially to the School of Nursing Foundation, which aids in the collection and handling of many of the following funds:

Ruth Thomas Brinker Scholarship in Nursing
Markell C. Brooks Scholarship Fund
Margaret Caldwell Memorial Scholarship
Grace B. Dayton Scholarship Fund
Katharine J. Densford Scholarship
Suzanne J. Doehring Memorial Scholarship in Nursing
Anna and Ottilie Eisenmenger Scholarship
Freda Kantor Scholarship in Nursing
School of Nursing Scholarship
Alice and Gale Perry Scholarship Fund
Railway Business Women's Association of the Twin Cities Scholarship
Jennie Siebold Memorial Scholarship Fund
Sigma Theta Tau—Zeta Chapter Scholarship
Margaret Wahlquist Memorial Scholarship—Women's Auxiliary of the Minnesota State Medical Association

Obtain and file applications at the Office of Student Financial Aid.

Nurses Educational Funds—A limited number of scholarships, fellowships, and loans are available to registered nurses enrolled in baccalaureate and master's degree programs. Applicants must be members of the American Nurses' Association and must have had at least 1 year of successful nursing experience. For application information write to Nurses Educational Funds, Inc., 2420 Pershing Road, Kansas City, Missouri 64108.

Sarah T. Colvin Loan Fund—This fund is administered by the Minnesota Nurses' Association to aid members of the association who are enrolled in bachelor's or master's degree programs or specialized short courses. For application information write to the Minnesota Nurses' Association, 1821 University Avenue, St. Paul, Minnesota 55104.

TRAINEESHIPS FOR GRADUATE STUDENTS

Application forms and a description of qualifications necessary for traineeship benefits under programs of the Department of Health, Education, and Welfare are mailed to new graduate students after they have been admitted. Funding varies from year to year. The school apportions the money available to qualified applicants; priority is given to students who are within 3 quarters of completing their programs.

OTHER SOURCES OF FINANCIAL AID

In many communities, some financial aid is available to students through churches, clubs, medical and medical auxiliary groups, the American Legion, and service groups such as the Rotary, Kiwanis, and Zonta. Many district and state nursing associations have established scholarship and loan funds for registered nurses interested in further education. Students should explore these resources.

The ROTC program on campus provides another source of financial aid. For information about its benefits and obligations, consult the ROTC office in the Armory Building.

As additional sources of financial aid become available, information will be published in the *Student Newsletter* of the School of Nursing.

Student Welfare and Services

ORIENTATION

The School of Nursing offers orientation activities for new undergraduate and graduate students. Several 1-day programs are scheduled during late summer, and every new student is expected to attend one of them. For information about all-University orientation activities, see the *General Information Bulletin*.

HEALTH

After acceptance for admission and before enrollment, new students must provide evidence that they have completed the following health requirements:

1. A physical examination including Mantoux test or chest X-ray to provide a basic health assessment. Examinations may be performed by the Boynton Health Service at the student's expense, or by the student's private physician with review by Boynton Health Service personnel.

2. Immunizations to include:
   a. Diptheria-tetanus booster every 10 years.
   b. Oral poliomyelitis—basic series if not taken previously.
   c. Measles and mumps vaccine if need indicated by student's history.
   d. Rubella titre with immunization if indicated.

An annual Mantoux test and/or chest X-ray is required. Those with positive reactions will be evaluated for treatment.

During the course of enrollment, the faculty believes that students should assume responsibility for their own health surveillance, and additional documentation of health status is required only when a clinical agency requires it or when a problem situation arises.

Although not required, it is highly recommended that students have a physical examination prior to graduation.

The health service portion of the student services fee does not provide for any hospitalization benefits. The Board of Regents requires that students who pay the student services fee have hospital insurance. For information about hospital insurance and University health services, refer to the *General Information Bulletin*.

GRIEVANCES

The Grievance Committee of the School of Nursing handles grievances within the school according to policies and procedures adopted by the faculty. The school's policies and procedures conform to those adopted by the University Senate. Faculty members, staff members, and students are elected to the Grievance Committee by the groups they represent. A grievance officer, appointed by the dean, is also available for consultation.

ALL-UNIVERSITY SERVICES FOR STUDENTS

A variety of specialized student services are provided by the University. Among them are the following:

Urgent Problems—See listings in the introductory pages of *Student-Staff Directory*. Some offices answer telephones 24 hours a day.

Activities—Student Activities Centers: 350 Coffman Memorial Union; also CHIP, 1-425 Health Sciences Unit A

Bookstores—2-554 Health Sciences Unit A (Health Sciences); Williamson Hall; and others

Cafeterias—Health Sciences Unit A, 1st and 5th floors; Powell Hall, 2nd floor; Coffman Memorial Union

Counseling—University Student Counseling Bureau, 101 Eddy Hall; Campus Assistance Service, 209 Eddy; University Mental Health Clinic, 400 Boynton Health Service

Employment—Student Employment Service, 6 Morrill Hall; University Hospitals Personnel Office, 4005 Powell Hall

Financial Aid—Office of Student Financial Aid, 107 Armory

Health—Boynton Health Service; also see "Urgent Problems" above

Housing—Housing Office (on-campus and off-campus housing), Comstock Hall

Library—Biomedical Library, Diehl Hall; Health Sciences Learning Resources Center, 544 Diehl Hall; Wilson Library

Placement—Health Sciences Placement (careers), 16-212 Health Sciences Unit A

Women's Center—306 Walter Library

Organizations

SCHOOL OF NURSING

The Nursing College Board (NCB) is the official student organization within the School of Nursing. All students majoring in nursing are members of the organization. The purposes of the board are to promote unity among nursing students and to increase communication between nursing students and the faculty and administration of the School of Nursing and between nursing students and other members of the University community. Activities of the board include student representation on school committees, planning of recognition and graduation ceremonies, publication of the *Student Newsletter*, and planning and involvement in orientation and registration for new students. The Nursing College Board is a part of the Twin Cities Student Association.

CHIP

The Council on Health Interdisciplinary Participation (CHIP), is an active student group whose membership is open to individuals in any of the health science fields.

ALPHA TAU DELTA

This professional nursing fraternity was founded in 1921 on the campus of the University of California at Berkeley. The Beta Chapter at the University of Minnesota was chartered in 1927. Alpha Tau Delta is dedicated to developing leadership, maintaining high professional educational standards, providing service to the community, and encouraging mutual helpfulness and understanding among students in the profession. Membership is open to all students in the School of Nursing who meet eligibility requirements.

SIGMA THETA TAU

The national honor society of nursing, Sigma Theta Tau, has a chapter at the University of Minnesota. Installed in 1934, Zeta Chapter is one of the oldest chapters in the country. The purposes of the society are to recognize superior achievement and leadership qualities, foster high professional standards, encourage creative work, and strengthen commitment to the ideals and purposes of the profession. Zeta Chapter sponsors an annual research seminar, provides scholarships to University nursing students, and presents a variety of programs of interest to its members. New members are selected by current members from among the undergraduate and graduate nursing students at the University of Minnesota and professional nurses in the community who meet eligibility criteria.

UNIVERSITY

There are many student organizations devoted to social, cultural, social service, recreational, and religious interests that are open to University-wide participation. For information about these organizations, see the *General Information Bulletin*.

SCHOOL OF NURSING ALUMNI ASSOCIATION

All graduates of the School of Nursing are encouraged to become members of the School of Nursing Alumni Association. The purposes of the association are:

1. To stimulate the continued interest of graduates and other nurses in the community in the University of Minnesota School of Nursing;
2. To assist in the interpretation of the School of Nursing legislative needs.
3. To promote the continued emphasis on high standards in the education, research, and service functions of the school;
4. To promote the professional interests of nurses and to cooperate with other professional nursing organizations in promoting a high standard of professional practice through such means as newsletters, educational functions, and social functions; and
5. To provide an opportunity for communication between alumni, faculty members, and students of the School of Nursing about educational trends and developments in nursing.

Access to Student Educational Records

In accordance with regents' policy on access to student records, information about a student generally may not be released to a third party without the student's permission. The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information—name, address, telephone number, dates of attendance, college and class, major, adviser, and degrees earned—is considered public or directory information. To prevent release of such information outside the University while in attendance at the University, a student must notify the records office on his or her campus.

Students are notified annually of their right to review their educational records. The regents' policy, including a directory of students records, is available for review at the information booth in Williamson Hall, Minneapolis campus, and at the records offices on other campuses of the University. Questions may be directed to the Office of the Coordinator of Student Support Services, 260E Williamson Hall, (612) 373-2106.

Students may inspect their nursing program records in the Nursing Student Records Office, 3320 Powell Hall. When students want to review their records, they should arrange for a faculty or staff member to be present.

Letters of Reference

Students who anticipate the need for letters of reference for future applications for employment, graduate study, or similar uses should secure such letters from the instructors who know them best. Each letter must bear the student's signature authorizing the school to send it when references are requested. These letters will be kept in the student's file for future use.

II. EDUCATIONAL PROGRAMS

Program Leading to the Bachelor of Science Degree in Nursing

The baccalaureate program of the University of Minnesota School of Nursing was initiated in 1919. The undergraduate curriculum in its present form was introduced in 1973. The program is approved by the Minnesota Board of Nursing and is accredited by the National League for Nursing. Students complete 1 year of prenursing college work and then enroll in the School of Nursing for 3 additional years of professional study. Upon satisfactory completion of all requirements, they are awarded the bachelor of science in nursing degree and are then eligible to take the registered nurse licensure examination. The nurse who completes the baccalaureate program is a generalist, prepared for professional nursing practice in entry-level positions in hospitals, clinics, community health organizations, and other agencies in the health care delivery system. The baccalaureate degree in nursing is the recommended academic preparation for those interested in graduate study in nursing.

School of Nursing faculty members who teach courses in the baccalaureate program represent a wide spectrum of clinical experience and areas of professional knowledge and interest. Each brings to the teaching of nursing theory and practice understanding and expertise in selected areas of scholarship, research, and leadership as well as a background of service to the profession, the University, and the community. Students who major in nursing also take courses in basic sciences taught by faculty members in other health science areas (medicine, public health, dentistry, pharmacy). Students also select elective (nonrequired) courses from among the many liberal arts courses offered by the large and distinguished faculty of the University.

OBJECTIVES OF THE PROGRAM

The purpose of the baccalaureate program is to provide opportunities for the student to learn the skills of professional nursing so that upon completion of the program the student will have achieved the following objectives:

1. An ability to apply synthesized principles and theoretical concepts from the natural and behavioral sciences to nursing.
2. An ability to utilize an adaptation frame of reference as a basis for interpreting and influencing human behavior in health care situations.
3. An ability to think critically and analytically in the formulation of nursing judgments.
4. An ability to effectively implement the various dimensions of the systematic process—assessment, planning, intervention, and evaluation—in providing nursing care to individuals and groups.
5. An ability to establish, maintain, and terminate collaborative and/or helping interpersonal relationships with a variety of individuals and groups to accomplish the goals of nursing.
6. Competence in utilizing selected technical and other tools to accomplish the goals of nursing.
7. An ability to carry out clinical study to answer questions arising from nursing practice and to determine implications for nursing practice and further study.
8. An ability and commitment to influence health care through utilization of principles of change, leadership, and teaching.

9. A commitment to development of her or his potential as an individual and as a responsible member of society.

Through utilization of adaptation theory, a systematic process, selected tools, and knowledge of helping relationship processes, the student learns to assess the health status of the patient/client, to establish a nursing diagnosis, and to formulate, implement, and evaluate a plan of nursing intervention based on the unique health requirements of the patient/client. The program is designed to help students develop the skills and the degree of competence in their application to enable them, upon completion of the program, to function in entry-level positions in nursing.

Throughout the program, the student has the opportunity to pursue and develop individual interests and potentials through elective study in behavioral and natural sciences and nursing. Studies of progressive complexity are planned, and they provide a good foundation for graduate study.

The requirements of the program include general as well as professional education course work. It is the student's responsibility, in consultation with a faculty adviser, to choose courses to satisfy the liberal arts distribution requirements that will complement his or her interests and abilities. The total credit requirement maintains a balance between courses in general education and courses in the nursing major and in related areas.

COURSE OF STUDY

Overview—The conceptual framework of the program is based, in part, on the assumption that nursing has something in common with all helping professions and, at the same time, something that is uniquely its own. The areas of knowledge identified as common to all helping professions are:

1. Knowledge about human beings
2. Knowledge about interpersonal relationships
3. Knowledge about tools
4. Knowledge about process

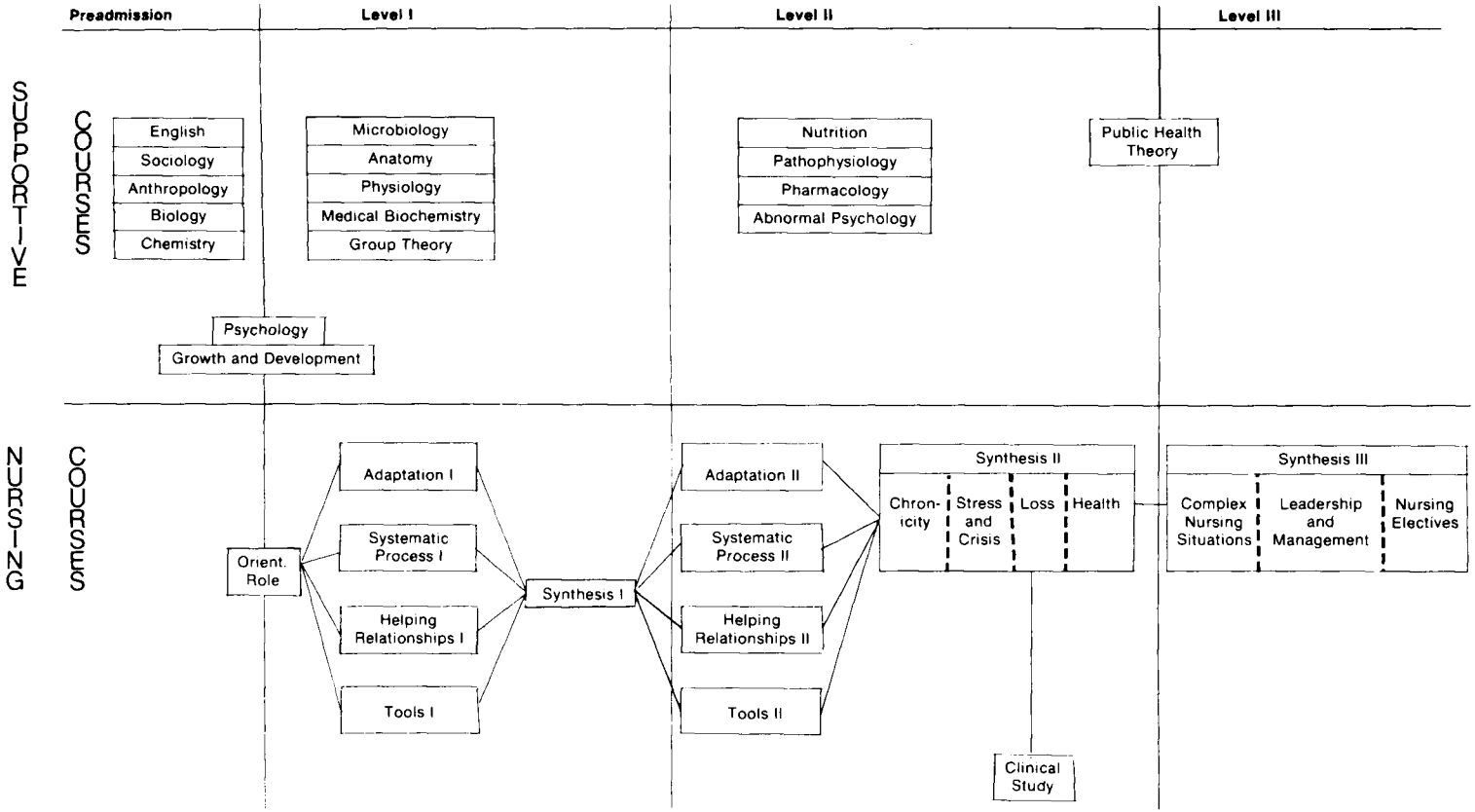
The goal of nursing as defined by the faculty is based on the assumption that the human being is an integrated whole and on the belief that the nurse must have a holistic perspective in viewing the human being. Adaptation theories provide this holistic perspective. Process is seen as a systematic, conscious way of achieving a goal. The establishment of a helping relationship is seen as a way of using oneself to assist others. Tools are viewed as instruments utilized to perform nursing assessments, interventions, and evaluations, and are exclusive of those skills that are primarily relationship oriented or cognitive.

These areas of knowledge are synthesized in a unique way so that the resultant product is identified as the practice of nursing, as differentiated from other helping professions.

Level I—The first nursing course, Role of Nursing Within Health Care, provides an overview of health, the philosophy of nursing, the conceptual framework, and health care delivery systems. The student then takes four courses, each of which deals with one of the four major areas of knowledge. At this level, the courses deal with adaptation to normal life events, tools used to assess healthy individuals, use of systematic process, and helping relationships with people who have no communication barriers. During Level I, students also take anatomy, physiology, medical biochemistry, microbiology, psychology, and group theory.

After completing these courses the student takes the first-level synthesis course. This is the first "clinical" course. Its purpose is to have the student synthesize the specific learnings from each of the four major areas of knowledge and apply that synthesis to a patient/client situation. In this way the student begins to achieve the goal of nursing.

UNDERGRADUATE CURRICULUM PLAN



Level II—After completing the first synthesis course, the student takes a Level II course on each of the four major areas of knowledge. These courses deal with adaptation to disruptive life events, helping relationships with patient/clients who have communication barriers, tools used to assess and intervene with patient/clients experiencing health problems, utilization of research findings, and an introduction to research process. During Level II, students also take courses in pharmacology, abnormal psychology, pathophysiology, and nutritional therapy.

Students take four Level II synthesis courses in which they apply knowledge previously gained in order to assist patient/clients experiencing loss, stress and crisis, and chronic health problems as well as to assist patient/clients who have no identified health problems.

Level III—Upon completion of the Level II synthesis courses, students begin taking synthesis courses offered at Level III. All of the Level II and Level III synthesis courses include large time blocks of clinical experiences. Students may spend 9 to 15 hours weekly in clinical settings for a single course. At least one clinical assignment is in a community health setting.

In Level III, the patient/client situation is more complex, and the student is expected to incorporate more variables and set priorities for goals and interventions. The student learns how to use the systematic process as it relates to leadership/management and to use helping relationship skills as they relate to health team personnel.

Nursing electives provide the student with the opportunity to gain additional depth and breadth in an area of interest. The student has a variety of nursing electives from which to choose but must complete at least one elective that has a clinical component.

Freshman Year—Qualified students are admitted to the baccalaureate program after completing the first-year prenursing requirements. The minimum quarter-credit requirement for the freshman year is 45. For information about admission requirements and a list of the courses required, see the Admission Requirements section that follows.

Sophomore, Junior, and Senior Years—Levels I, II, and III approximate the sophomore, junior, and senior years. The required courses, with the minimum credits in parentheses, are as follows:

General Psychology (4)

Human Growth and Development (3)

Abnormal Psychology (4)

Elementary Anatomy (4)

Microbiology (4)

Human Physiology (4)

MdBc 3050—Physiological Chemistry (4)

Phcl 1009—Pharmacology (3)

Group Theory (3)

FScN 3602—Nutrition in Professional Health Care (4)

LaMP 5170-5171—Pathophysiology: Disease I-II (6)

PubH 5006—Introduction to Community Health (5)

Nurs 5201—Role of Nursing Within Health Care (2)

Nurs 5202—Systematic Process I (2)

Nurs 5203—Adaptation I (2)

Nurs 5204—Helping Relationships I (2)

Nurs 5205-5206—Tools I (2)

Nurs 5207—Synthesis (2)
Nurs 5404-5405—Tools II (3)
Nurs 5407—Systematic Process II (2)
Nurs 5408—Adaptation II (2)
Nurs 5409—Helping Relationships II (2)
Nurs 5611—Synthesis Incorporating Concepts of Chronicity (4)
Nurs 5612—Synthesis Incorporating Concepts of Stress and Crisis (4)
Nurs 5613—Synthesis Incorporating Concepts of Loss (3)
Nurs 5614—Synthesis Incorporating Concepts of Health (3)
Nurs 5615—Synthesis in Complex Nursing Situations (4)
Nurs 5816—Leadership, Management (6)
Nurs 57xx—Electives in Nursing (10)
Nurs 5999—Clinical Study (1)

LIBERAL EDUCATION DISTRIBUTION REQUIREMENTS

The University of Minnesota believes that all students, whatever their areas of specialization or vocational goals, should hold in common the search for a liberal education. A liberal education asks of us that we seek control over the general intellectual instruments for acquiring and communicating knowledge, primarily the instruments of language and number; that we seek understanding of the ways in which scientists contribute to knowledge of human beings and their environment; that we seek historical and philosophical perspective on the nature of our own lives and of the world in which we live; and that we seek appreciation of the creative insights into life and nature provided by literature and the arts.

To help students achieve the goals of a liberal education, the School of Nursing expects every undergraduate to complete course work in areas of study outside of nursing. All undergraduate students must complete the following requirements:

1. English Composition—6 credits minimum
2. 48 elective CLA credits distributed as indicated among the following four groups:

   Group A. Communication, Language, Symbolic Systems—8 to 10 credits (normally two courses)

   Group B. Physical and Biological Sciences—12 to 15 credits (normally three courses)

   Group C. The Individual and Society—16 to 20 credits (normally four courses)

   Group D. Literary and Artistic Expression—12 to 15 credits (normally three courses)
3. 20 elective liberal arts credits in upper division courses (3000 or 5000 level)

A 3000- or 5000-level course may be used to fulfill both the distribution requirements for a specific group and the upper division elective credit requirement. Exceptions to this rule are those CLA courses required by the School of Nursing for the baccalaureate degree. Those required courses may be used to fulfill the appropriate group distribution credit requirement but not the upper division elective credit requirement.

The *College of Liberal Arts Bulletin* provides an extensive listing of courses that may be used to fulfill requirements for each of the four group distribution areas. Any course accepted by the College of Liberal Arts to meet the group distribution or upper division elective credit requirement is accepted by the School of Nursing.

DEGREE REQUIREMENTS

Degrees from the University of Minnesota are granted by the Board of Regents on recommendation of the faculty. The degree of bachelor of science in nursing will be recommended for students who have satisfactorily completed all required courses, have fulfilled the group distribution and upper division elective requirements, and have completed a mimimum of 180 credits.

Undergraduate students must present 45 credits awarded by the University of Minnesota. Of the last 45 credits earned prior to graduation, 30 must be awarded by this University. All acceptable credits awarded by this University, including those earned through Continuing Education and Extension and special examination, will count toward the total credit requirement for the degree.

Credits for Equivalent Courses—Credits for courses in excess of the 45-credit minimum required for admission may be applied toward fulfillment of requirements for the baccalaureate degree. When such credits have been taken elsewhere, the Office of Admissions and Records determines their transferability after applicants have been accepted for admission by the School of Nursing. In general, credits for liberal arts courses taken at other schools are accepted for transfer, but credits for nursing courses generally are not accepted for transfer and must be evaluated individually for suitability to this program.

Any courses accepted by the College of Liberal Arts to satisfy group distribution requirements are accepted by the School of Nursing for credit toward the baccalaureate degree in nursing. General College courses will be accepted only if taken before enrollment in CLA or the School of Nursing. Credits earned through extension classes (evening school) or independent study (correspondence) at this University, CLEP examinations, special departmental examinations, or challenge examinations will also be accepted.

The equivalency of a course taken elsewhere to a course required for the degree in nursing is determined by the instructor in the appropriate department. The student must secure a statement of equivalency, which is submitted to the Nursing Student Records Office. The School of Nursing notifies the University Office of Admissions and Records of acceptance of equivalent courses.

To request approval to use courses not listed in the *CLA Bulletin* to satisfy group distribution or upper division requirements, a student must petition the progression committee. Exceptions to this policy are Phar 5210/HSU 5210, Terminology of Health Sciences; these courses may not be used to meet group distribution or upper division requirements, although they may be applied toward the total credit requirement.

If the student has completed the required 48 credits of liberal education group distribution course work, 20 credits of upper division liberal arts elective course work, and supportive and nursing course work and has not earned 180 credits, the remaining credits may be completed by taking any courses carrying degree credit.

ADMISSION TO THE BACCALAUREATE PROGRAM

Admission Requirements

Before entering the School of Nursing, students must complete 45 quarter credits of acceptable liberal arts courses. Usually this requirement can be fulfilled during the first year of study at any accredited institution of higher education (including community or junior colleges). Those who attend the University of Minne-

sota for the freshman year usually enroll in the College of Liberal Arts as prenursing majors.

Prerequisites for admission include the following:

English Composition	6 quarter credits
General Chemistry	8 quarter credits
General Biology	4 quarter credits
Introduction to Sociology	3 quarter credits
Cultural Anthropology	3 quarter credits

The remaining required credits must be chosen from liberal arts elective courses. Particularly recommended are courses in groups A and D (see "Liberal Education Distribution Plan" in this section of the bulletin). Credits for courses in general psychology, growth and development, and abnormal psychology may be included in the required 45 credits if they fall in one of the grade point average computation categories. (see "Selection for Admission" below). Credits will not be computed in the grade point average for admission for certain courses required as part of the School of Nursing curriculum (anatomy, physiology, microbiology, medical biochemistry, pharmacology, pathophysiology, nutrition, group theory, and PubH 5006) and courses that focus on studies in another professional or vocational major.

All required prenursing courses must be completed by June 30 to enter the nursing program the following fall.

Selection for Admission

The baccalaureate program serves two populations. For admission purposes they are considered as separate groups:

1. Students in their first year of college and advanced students with more than the minimum 45 credits.
2. Registered nurses.

Selection is competitive because enrollment is limited. When the number of qualified applicants exceeds the number that can be admitted, preference is given to applicants according to their residency status, as follows:

1. Minnesota residents and residents of states with tuition reciprocity agreements.
2. Non-Minnesota residents enrolled at University of Minnesota campuses.
3. Others.

Within each residency category, preference is given to those applicants with the highest combination of GPA and score on the ACT examination. To be considered for admission an applicant must have a minimum grade point average of 2.50. The grade point average will be computed as follows:

1. For applicants in their first year of college: The GPA calculation will include all required prenursing and liberal arts elective credits presented. Admission will be granted pending completion of all requirements. Two-thirds of all credits must be completed on an A-N grading basis. A GPA of at least 2.50 must be maintained through spring quarter.
2. For applicants presenting 45 or more credits at the time of application who have completed all prenursing requirements: The GPA calculation will include all required courses and the most recently completed liberal arts elective credits to meet the total of 45 credits. Two-thirds of these credits must be completed on an A-N grading basis. The admission decision is final, since these applicants have completed all requirements for admission.
3. For applicants presenting 45 or more credits at the time of application who have *not* completed all prenursing requirements: The GPA calculation will

include all required courses completed and the most recently completed liberal arts elective credits to meet the total of 45 credits. Admission is granted pending completion of all requirements. Two-thirds of these credits must be completed on an A-N grading basis. A GPA of at least 2.50 must be maintained through spring quarter.

In determining the most recently completed 45 credits, if the number 45 is reached within a quarter or semester, the GPA for that quarter or semester will be assigned to the exact number of credits needed to reach 45.

Grades from only those General College courses that are accepted by CLA and taken before enrollment in CLA may be included in the calculation of the GPA. The following grade point system will be used to evaluate these courses: the C range will be assigned 2.00 grade points, the B range will be assigned 3.00 grade points, the A range will be assigned 4.00 grade points. No grade below a C7 will be acceptable.

Application Procedures

Application forms are available at the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Applicants enrolled in other educational institutions must complete an Application for Admission With Advanced Standing form and return it to the above office, together with one transcript from each college previously attended and the $10 credentials examination fee.

Students currently enrolled in another unit of the University of Minnesota should complete a Change of College form and file it at the above office. The form should indicate that transfer to the School of Nursing is to be effective fall quarter.

The application deadline is March 1.

After initial processing of applications, applicants receive memoranda to acknowledge receipt of their applications by the School of Nursing, explain admission criteria and selection procedures, and solicit information on their progress in completing courses required for admission. Applicants who have any deficiencies in their background must notify the school to explain how they plan to remove them. All entrance requirements must be met by June 30.

Evaluation of applicants by the admissions committee begins about April 15, following receipt by the School of Nursing of winter quarter or fall semester grades from applicants. Each applicant is responsible for ensuring that all materials required for her or his application are received by the School of Nursing.

Acceptance

The School of Nursing will notify applicants of the admission decision as soon as all records are processed. A decision of acceptance is provisional, pending satisfactory completion of all entrance requirements.

Registration materials for fall quarter will be sent to admitted students during the summer by the Office of Admissions and Records. Students must register during the scheduled orientation-registration period, or they must secure permission in writing before that date to register later.

Placement in the Program

Tracking—In order to provide the most appropriate sequence of progression, students are assigned to predetermined tracks at the time of entry. The track assignment for non-RN students is based on the number of credits earned and whether or not the student has completed general psychology prior to admission. For RN

students the track assignment is based on the number of credits presented, the individual's preference for an accelerated or regularly paced program, and successful completion of challenge examinations in specified nursing and supportive courses.

Generic (Non-RN) Students—Two tracks are designed to allow students to complete nursing courses within a 9-quarter program plan.

RN Students—Two tracks designed to accommodate the expressed special needs of RN students have been developed. One track provides an accelerated program in which nursing courses can be completed in 6 quarters. Students must meet certain prerequisites to be assigned to this track. The other track follows the nonaccelerated program plan of the non-RN students. For information regarding these tracks, contact the appropriate faculty adviser in the School of Nursing.

Alternative Ways to Acquire Credits or Advanced Status in the Program

Each person accepted for admission to the School of Nursing baccalaureate program is classified initially as a sophomore.

There are six ways for incoming students to reduce the number of credits they must complete while enrolled in the school. These may or may not reduce the total length of time needed to complete the degree, but they will lighten the credit load during some quarters of registration.

1. **Elective Credits in Excess of Those Needed for Admission**—Credits earned in liberal arts courses in excess of the total needed for admission can be applied toward fulfillment of the group distribution and upper division elective requirements for the nursing degree. After having been accepted for admission by the School of Nursing, the student's transcript is evaluated by the Office of Advanced Standing in Williamson Hall to determine which courses may transfer for credit; the student receives a copy of that evaluation.
2. **Credit by Examination**—Students can earn credit by examination for many of the prerequisite freshman year courses, for several elective courses, and for some of the required courses in the baccalaureate program through examinations offered by the appropriate departments. These examinations may make it possible for students to gain college credit for past noncollegiate study or experiences. Examinations for the following basic science courses are usually offered during the summer:

   Anat 1004—Elementary Anatomy (4 cr)
   FScN 3602—Nutrition in Professional Health Care (4 cr)
   LaMP 5170-5171—Pathophysiology: Disease I-II (6 cr)
   Phsl 3051—Human Physiology (5 cr)
3. **CLEP Examinations**—The College Level Examination Program (CLEP) sponsored by the College Entrance Examination Board is a national program that offers the opportunity to obtain recognition for college level achievement no matter when, where, or how material was learned. CLEP offers general examinations in five liberal arts areas and subject examinations in chemistry, biology, psychology, sociology, and human growth and development. Credits earned through the general examinations may be used to meet group distribution requirements. Credits earned through the subject examinations may be used to gain exemption from taking specified required courses. One need not be a student at the University to take these examinations.

4. **Courses Normally Required of Nursing Students in Their Sophomore Year That Have Been Completed Prior to Admission to the School**—When the student has already satisfactorily completed a required course at the University of Minnesota prior to admission to the School of Nursing, the course will satisfy the school's degree requirement. If a similar course was taken at the University or at another school, it may not satisfy the degree requirement. However, the following courses usually are accepted for transfer: General Psychology, Abnormal Psychology, Child Psychology, Anatomy.

5. **Nursing Challenge Exams**—Challenge exams provide a means for students admitted to the School of Nursing to demonstrate that they already have a knowledge of the material covered in a specific course and to gain credit for that course without enrolling in it. Many students pass challenge exams based on knowledge gained through work experience, reading or self-study, or noncredit course work. While the exams are available to anyone, they are most suitable for students who are already RNs or who have taken some courses in nursing elsewhere. Students without prior experience or education in nursing are advised to consider carefully the value of enrolling in the nursing courses rather than seeking exemption from them, since the beginning courses provide the foundation upon which the more advanced courses are built.

   Although challenge exams may be scheduled throughout the year, exams for the following nursing courses are usually offered during the summer so that students admitted for enrollment in the fall may better plan their programs:

   Nurs 5201—Role of Nursing Within Health Care (2 cr)
   Nurs 5202—Systematic Process I (2 cr)
   Nurs 5203—Adaptation I (2 cr)
   Nurs 5204—Helping Relationships I (2 cr)
   Nurs 5205—Tools I (1 cr)
   Nurs 5206—Tools I (1 cr)
   Nurs 5404—Tools II (2 cr)
   Nurs 5405—Tools II (1 cr)

   All of these exams are at least the equivalent of a final exam in a course. Challenge exams may become available for additional courses. Current information will be available from advisers.

6. **Junior Year Status**—Those who have completed at least 84 quarter credits at an accredited college or university *may* qualify for placement in the junior year of the program if they have completed both the prerequisite courses for admission to the School of Nursing and the required courses for the sophomore year. After being accepted for admission to the school, such students should inquire about how they can acquire junior year status. This option for advanced placement is available only when faculty and clinical resources are adequate to accommodate additional students in the junior-level courses.

Optional Registrations

Adult Special Status—Selected individuals may be admitted to the School of Nursing as adult special students, a category reserved for those who have particular professional needs that cannot be met through one of the regular program offerings. Generally, adult special students are not permitted to complete major course sequences.

Applicants should consult the School of Nursing about special needs prior to submitting their applications. Applicants will be considered individually on the basis of their academic records and work experience.

Summer Session—The School of Nursing usually offers some required nursing courses during both terms of the summer session. The school may also offer courses of special interest to practicing nurses that are not usually available during the academic year. A special summer bulletin describing these courses is available upon request to the Summer Session Office, 135 Johnston Hall, 101 Pleasant St. S.E., University of Minnesota, Minneapolis, Minnesota 55455. Course offerings during the summer terms are contingent upon availability of resources, scheduling requirements, and sufficient student interest.

Many courses required by the school that are offered by other departments within the University and courses that meet liberal arts elective requirements are offered during the summer. Since summer offerings change from year to year, the appropriate departments should be consulted regarding the availability of particular courses.

Students in the School of Nursing are encouraged to seek the counsel of faculty advisers if they plan to take summer study as a means of meeting degree requirements for any of the school's programs.

Preparation for entry-level positions in public health nursing may be offered during the summer when sufficient resources are available within the School of Nursing and when student demand warrants. (See Nurs 5635-5636 in this bulletin and PubH 5006 in the *School of Pubic Health Bulletin*.) For further information, write to the School of Nursing.

Continuing Education and Extension—Sophomore-level nursing courses and selected nursing elective courses are offered through Continuing Education and Extension. For information about these courses, see the *Extension Classes Bulletin* and the *Extension Independent Study Bulletin*.

International Students

Applicants who are neither citizens of the United States nor permanent resident aliens should secure an application form from the Office of Admissions (see "Application Procedures") and return the completed form to that office, together with required credentials, transcripts of college course work completed, and the credentials examination fee of $10.

International students must complete the same prerequisite courses and credits as other students. They are reminded that selection criteria give priority to Minnesota residents and to students transferring to the School of Nursing from another unit of the University of Minnesota.

Selection of international students is based on (a) evidence of superior previous academic achievement; (b) the ability to read, write, speak, and understand English; (c) a certificate of good health; and (d) possession of a student or other appropriate visa.

Students from other countries may find it necessary to spend more than the minimum time in residence in order to complete degree requirements.

PROGRESSION IN THE BACCALAUREATE PROGRAM

Registration

All students entering the School of Nursing for the first time are requested to attend the orientation-registration program scheduled early in August. The program includes an overview of the curriculum, tours of facilities, and assistance from faculty advisers with program planning for the fall quarter.

Each quarter the schedule of registration dates for students in the School of Nursing is published in the "Official Daily Bulletin" column of the *Minnesota Daily*. Registration instructions appear in the quarterly *Class Schedule*. Additional information is distributed to students via the *Student Newsletter* of the School of Nursing.

Registration dates are assigned on a schedule that rotates alphabetically by last name, giving first choice for classes to a different group of students each quarter.

Students enrolled in the school are responsible for making an appointment with their faculty adviser to complete registration during the scheduled registration period.

Change of Registration—The Cancel/Add form is used to add or drop courses and to change grading systems. Courses may be added through the first week of a quarter. Cancellations of courses or changes in grading system must be approved by an adviser. No change in grading system is allowed after the second week of a course. To drop a course after the second week, the instructor's permission is required before the adviser's approval.

To cancel, add, or change a section in a nursing course, it is necessary to have both the instructor and adviser sign the Cancel/Add form. The change must be made before the end of the first week of the course.

Cancel/Add forms are available at the Nursing Student Records Office. After the necessary signatures have been secured, students should take the form to the Nursing Student Records Office.

Advisement

Academic advising is carried out by a core group of faculty advisers who assist students in planning their academic program. The names and office hours of these advisers are available in the Nursing Student Records Office, 3320 Powell Hall. Advisers help students with academic concerns as well as with decisions concerning nursing careers and graduate study. They also assist students in orientation to the school and in determining how to apply their credits to meet the requirements for graduation from the school.

Counseling from persons specifically trained and experienced in the areas of educational, psychological, or career advisement is available through campus and community resources. Students who have problems in these areas may be referred to specific resources.

ACADEMIC REGULATIONS AND REQUIREMENTS

Grading

The student has a choice of two grading systems: A-B-C-D-No Credit (A-N) or Satisfactory-No Credit (S-N). Students may elect to take up to 40 percent of their nursing course credits and up to 50 percent of their total credits on an S-N basis. All nursing courses are offered on both the A-N and S-N grading systems.

Achievement Symbols—The following achievement symbols are used in the School of Nursing:

A Represents achievement considered outstanding relative to course standards.

B Represents achievement significantly above the necessary level.

C Represents achievement that fully meets but does not exceed minimum course standards.

D No D grade is given in professional nursing courses.

S Represents accomplishment of the objectives of a course and the ability to implement them in practice. In nursing courses, A, B, C grades are equivalent to S.

N Represents no credit, signifying that the objectives of a course have not been accomplished; assigned when a student does not earn an S, a C, or a higher grade.

A student who receives an N in a course may proceed in nursing, but the course in which the N was received must be satisfactorily completed before courses for which it is prerequisite may be taken. A student who receives an N in a nursing course may retake the course only once. If the student again receives an N (and if the course is required), the student must withdraw from the school.

I Incomplete, a temporary grade assigned when the instructor has reasonable expectation that a student can successfully complete unfinished work in a course. If the course is not completed by the end of the student's next quarter in the school, the I becomes an N. The instructor may require a written contract with the student specifiying work remaining to be completed and a required completion date. An incomplete in a prerequisite course must be completed by the end of the third week of the quarter of registration in the course for which it is prerequisite.

For all achievement symbols, instructors are expected to define to a class in its early meetings the performance standards necessary to earn each symbol.

Additional Symbols

V Represents registration as a visitor or an auditor. No credit or grade is earned.

T Represents a grade transferred from another institution or from one college to another within the University and is posted on the transcript as a preceding supplement to the original grade.

W Recorded when a student officially withdraws from a course in accordance with procedures established by the School of Nursing.

X Recorded in continuation courses in which grades are not assigned until the entire sequence is completed. The instructor submits a grade for each course when the student has completed the sequence.

Grade Point Average—A student's grade point average (GPA) is determined by adding all grade points earned and dividing by the sum of all credits for which the grade points were earned. Grade points are not granted for courses in which a grade of I or N was received. Grade points are awarded according to the following system:

A = 4 grade points per credit
B = 3 grade points per credit
C = 2 grade points per credit
D = 1 grade point per credit

$$\text{GPA} = \frac{\text{Total Grade Points}}{\text{Total Credits}}$$

Repeating a Course—If a student is permitted to repeat a course for which credit was already earned, both grades are reported on the official transcript in the quarter earned.

Attendance

School of Nursing instructors determine and inform students of their own policies and procedures regarding absence from class, laboratory, and examinations. They also determine whether or not a student may make up work missed because of

absence. Instructors are required to provide makeup opportunities only in cases where absence is due to the following circumstances: (a) participation in formally approved and scheduled University activities; (b) performance of military or civil duty (such as jury duty) that cannot be deferred; (c) illness or family emergency for which acceptable evidence is available. Instructors are not required to permit makeup of laboratory experiences or examinations to suit a student's personal convenience.

Satisfactory Progress

A student must maintan a minimum grade point average of 2.00 in (a) all courses completed, (b) all courses in nursing, and (c) each quarter of study.

All courses prerequisite to nursing courses must be successfully completed before the student can proceed in the program. Students may not take nursing courses out of sequence.

It is the responsibility of students to be aware of their academic standing and to see their instructor or adviser immediately if problems arise.

When an undergraduate student's grade point average (overall, in nursing courses, or in a given quarter) falls below 2.00, or when the student receives an N grade in a required course, the individual's case is referred to the progression committee for appropriate action.

Credit Loads

Classification of Students—Students who have completed all prenursing requirements on entering the School of Nursing are classified as sophomores. Students who have completed all first-level nursing courses are classified as juniors. Students who have completed second-level synthesis courses are classified as seniors.

Ratio of Credits to Work—The amount of work expected for a course is expressed in credits. Each credit demands an average of 3 hours per week of a student's time; e.g., 1 class hour with 2 hours of preparation, or 3 hours of laboratory work.

Credit Limitations—The usual number of credits taken per quarter is 16. If a student wishes to register for more than 19 credits in a given quarter, she or he must consult the faculty adviser and must file a petition with the progression committee in sufficient time to be acted upon prior to registration for that quarter.

Petitions

The faculty has established certain regulations to assist students in acquiring a sound professional education in nursing and to facilitate the operations of the school. These rules are believed to be in the best interests of the majority of students, but occasionally they may be disadvantageous to the educational needs of a particular individual. In this event, students may ask for exemption from a regulation through petition to the progression committee.

Petitions concerned with exceptions to course and school regulations should be submitted in the quarter preceding the quarter for which the action is needed. Petitions concerning a course to be taken should be submitted before registering for the course. Petitions from seniors regarding a graduation requirement must be submitted at least 4 months before graduation.

Regular petition blanks are available in the Nursing Student Records Office. A petition should be reviewed and signed by the student's faculty adviser and addressed and routed through the records office to the chairperson of the progression

committee. If the student desires, an opportunity to discuss the request with a committee representative will be made available. When the committee has taken action, the student and the student's adviser will be informed of the decision.

Withdrawal or Leave of Absence

To withdraw from a single course, a student follows the change of registration procedure already described.

Students who want to drop all of their courses after having registered should:

1. Complete a Cancel/Add form.
2. Have an adviser sign the form.
3. File at the Nursing Student Records Office a written statement of the reasons for the withdrawal and plans, if any, for continuing their education.
4. Petition for a leave of absence if they plan to return the following quarter.

Students who officially cancel during a quarter receive withdrawal (W) grades for all courses identified on the Cancel/Add form. Students who do not register for the following quarter will be considered to have withdrawn from the School of Nursing.

Students in good standing who voluntarily withdraw may later apply for reentry to the School of Nursing. The decision on granting permission to reenter will depend upon several factors (see "Reentry" below).

Students may be required to withdraw from the School of Nursing under one of the following categories:

1. *Academic*—Students who fail to make satisfactory progress may not continue in the program. Students who receive a second N after repeating a nursing course will be required to withdraw from the school.
2. *Nonacademic*—The nature of a nurse's responsibilities to patients and others requires certain personal and behavioral characteristics suitable to the discharge of these responsibilities. Students who do not display these characteristics may be required to withdraw from the School of Nursing. If progress is handicapped by conditions other than scholastic ability (ill health, personal or family circumstances, etc.), the student may be required to withdraw.

Unsatisfactory Progress

Probation—Students are expected to complete 50 percent or more of the credits for which they register each quarter and 75 percent or more of the credits for which they register each year with grades of A, B, C, or S. These percentages apply to credits for which students are registered after the tenth day of classes each quarter.

Students who fail to complete the required percentages of courses, or students whose grades fall below the acceptable level described earlier, are subject to probation—the signal that academic progress is not satisfactory. Students on probation who do not improve their academic record the following quarter may be required to adjust their program plans, withdraw from the school, or take other appropriate action.

Students are taken off probation when academic work has improved enough to indicate potential for continuous progress toward the degree. Notation of probationary status is removed from the official transcript when a student is taken off probation.

Reentry

Students who have withdrawn from the nursing program, for whatever reason, and later wish to reenter must seek prior authorization from the school. A letter requesting permission to reenter the baccalaureate program must be submitted to the chairperson of the progression committee *at least 3 months* in advance of the quarter for which registration is desired. Each applicant must provide information necessary to support the request.

Committee action is required on reentry petitions from individuals who previously withdrew in good standing, were required to withdraw, or voluntarily withdrew because of limited academic progress. The decision on reentry will take into account current availability of needed learning opportunities and of the school's resources for serving additional students. Placement upon reentry will be determined by the assistant dean for undergraduate studies.

In view of possible changes in the curriculum, students must understand that they may be asked to update their knowledge in some areas to meet new requirements, and this may result in additional course work.

Graduation and Recognition

Students may complete degree requirements in any term of the academic year or summer session. Prospective graduates must submit a report of progress toward completion of degree requirements at the Nursing Student Records Office and file an application for degree in the Office of Admissions and Records 2 quarters prior to the expected graduation date. The graduation and diploma fee should be paid 1 quarter prior to graduation.

School of Nursing commencement programs are scheduled in accordance with the University commencement schedule at the end of fall and spring quarters. Recognition ceremonies or social events may mark the event at other times of the year.

Graduation with honors is conferred upon eligible students on recommendation of the faculty.

Two Baccalaureate Degrees

Students may earn the B.S. degree in nursing and a bachelor's degree from another University unit concurrently. To do so, it is necessary to meet all requirements for both degrees, which may involve additional time for study. Students wishing to complete two baccalaureate degrees should consult with an adviser in the other unit as well as in the School of Nursing.

Program Leading to the Master of Science Degree

The faculty of the school believes that nursing is a developing scholarly discipline. Therefore, a major purpose of graduate education is to identify and develop the theoretical body of knowledge upon which the practice must rest as well as to prepare second-level practitioners in nursing.

The faculty believes that learners must further develop the cognitive processes of analysis, synthesis, and evaluation in order to explore and manipulate the conceptual structures of nursing and to examine their own value system. To be able to engage in second-level practice, learners must formulate a frame of reference for practice, which provides a conscious base for making judgments.

The faculty believes that second-level practitioners determine and test their own practice, add to the body of nursing knowledge, and are able to predict future problems and directions for nursing. Second-level practitioners are consistently person centered, goal directed, and flexible, and provide a direct service that is responsive to complexities and uncertainties.

The master of science degree with a major in nursing is offered under two program plans: Plan A, involving a thesis; and Plan B, involving additional course work and a special project instead of a thesis. The requirements for the two programs are detailed below.

PLAN A: MASTER'S DEGREE WITH THESIS

1. **Major Courses**—A minimum of 20 credits of graduate nursing courses (selected with the guidance of the program adviser); Nurs 8014, Research in Nursing, or its equivalent; course work in advanced statistics (selected with the guidance of the program adviser).
2. **Related Field or Minor**—For a related field, a minimum of 8 credits in one or more related fields outside of nursing or public health nursing (selected with the guidance of the program adviser). For a minor, a minimum of 9 credits in a single field (requires the approval of the director of graduate studies in the minor field).
3. **Master's Thesis**—Must meet the specifications of the Graduate School.
4. **Final Examination**—Oral defense of the thesis.
5. **Minimum Credit Requirement**—28 credits for programs including a related field; 29 credits for programs including a designated minor.

PLAN B: MASTER'S DEGREE WITHOUT THESIS

1. **Major Courses**—20 credits in Nurs 8010, 8011, 8012, 8014, and 8030; at least one Nursing Focus I course and one Nursing Focus II course in clinical or functional areas of the discipline, such as childbearing-childrearing nursing, medical-surgical nursing, nurse midwifery, psychiatric mental health nursing, nursing education, or nursing management.
2. **Related Field or Minor**—For a related field, a minimum of 8 credits in one or more related fields outside of nursing or public health nursing (selected with the guidance of the program adviser). For a minor, a minimum of 9 credits in a single field (requires the approval of the director of graduate studies in the minor field).
3. **Plan B Project and Related Course Work**—Through the Plan B project, students must demonstrate specific competencies identified as part of a Plan B project agreement with a faculty member who guides and evaluates the project. Related course work includes a required research course (Nurs 8014, Research in Nursing, or its equivalent) and a course in statistics that involves study of inferential statistics.
4. **Other**—Some focus areas require specified prerequisite and supportive courses.
5. **Final Examination**—Oral.
6. **Minimum Credit Requirement**—44.

ADMISSION TO THE MASTER'S PROGRAM

Admission Requirements

Prospective master's degree students apply for admission to the Graduate School and designate their intended major area of study as "nursing." Requirements for admission are a baccalaureate degree with a strong scholastic record (a minimum 3.00 or B average) from a recognized college or university and licensure as a registered nurse. Students who submit transcripts without grades will be required to take the aptitude portion of the Graduate Record Examination and must earn a minimum score at the 50th percentile. Applicants with a baccalaureate degree in a discipline other than nursing must have completed approximately 48 quarter credits of liberal education course work that meet the University's distribution requirements for groups A, B, C, and D.

Three letters of reference are required. If the applicant has been employed as a registered nurse, at least one reference should be from a nurse from a work situation. If the applicant has not been employed as a registered nurse, at least one reference should be from a nursing instructor the applicant had in a clinical nursing course.

Each applicant is requested to submit a goal statement. The form for this statement will be sent after the application is received.

Application Procedures

Application forms may be obtained from the Graduate School, 322 Johnston Hall, 101 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455. The completed application forms, together with official transcripts of all post-high school course work and the credentials examination fee of $15, should be filed with the Graduate School.

Students may apply for admission for any quarter of the year. Prospective students are encouraged to submit their applications well in advance of the desired date of entrance. The application deadline is June 15 for fall quarter, August 15 for winter quarter, November 25 for spring quarter, and February 25 for either summer term. All materials, including transcripts, goal statement, and letters of reference, must be in by the application deadline. Applications will not be acted on until all materials are received.

Application materials are reviewed initially by the Graduate School and are then forwarded to the School of Nursing. Then, the School of Nursing graduate admissions committee evaluates the candidate and makes its recommendation to the Graduate School. The Graduate School notifies the applicant of the final action taken on the application.

Transfer Credits

A limited number of previously earned graduate credits may be transferred and applied toward meeting the requirements for the master's degree. See the *Graduate School Bulletin* for policies concerning graduate courses completed prior to admission to a graduate program.

Optional Registration

Adult Special Status—Selected individuals may be admitted to the School of Nursing as adult special students to enroll in specific graduate courses related to

particular professional needs that cannot be met through regular program offerings. A limited amount of work may be completed through this type of admission. Interested individuals should consult the School of Nursing about their needs prior to submitting an application for adult special status.

International Students

Application procedures for international students are the same as for others applying for the master's program. Selection of international students is based on (a) evidence of superior previous academic achievement and nursing performance; (b) the ability to read, write, speak, and understand English; (c) a certificate of good health; and (d) possession of a student or other appropriate visa.

Students from other countries may find it necessary to spend more than the minimum time in residence in order to complete graduate program requirements.

PROGRESSION IN THE MASTER'S PROGRAM

Registration

An orientation-registration program is provided for students newly admitted to the master's degree program. Nursing program advisers are available to help students with registration at this time. Assigned faculty advisers help students with subsequent program planning and registration.

ACADEMIC REGULATIONS AND REQUIREMENTS

Grading and Credits

All School of Nursing graduate courses are offered on both the S-N and A-N grading systems. Students in the master of science program must maintain a B average. Graduate credit is not allowed for course work of D quality. At least two-thirds of the credits for a student's official degree program must be earned on an A-N basis.

For policies regarding credit requirements and distribution, transfer of credits, satisfactory progression, adult special and summer special admission, filing the program, changes in the approved program, grading, and similar matters, see the *Graduate School Bulletin.*

Petitions

Petitions for exemption from or modification of School of Nursing requirements must be approved by the school's graduate progression committee. Petitions regarding requirements of the Graduate School must be presented directly to the Graduate School.

Degree Requirements

For requirements regarding continuance in and graduation from this program, see the Plan A and Plan B program descriptions in the *Graduate School Bulletin* and the nursing program description in the *Graduate Programs in the Health Sciences Bulletin.*

Minor in Nursing for Doctoral Students

Nurses who are doctoral students majoring in another discipline may choose nursing either as a minor or as a part of a supporting field. Further information may be obtained from the Director of Graduate Studies, School of Nursing, 3313 Powell Hall, 500 Essex Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Continuing Education

Continuing education course work in nursing is designed to foster intellectual curiosity and growth. A progression of contemporary, challenging, and flexible learning experiences that make use of a wide variety of academic, professional, and community resources is offered. The courses are presented throughout the state to help maintain and improve the quality of professional practice throughout the state, a mission of the school and of the University Health Sciences. The emphasis of these offerings is on the further development of professional practice.

Continuing education offerings of the School of Nursing presently include:

1. Degree credit courses offered through Continuing Education and Extension in evening school, off campus, or through independent study.
2. Seminars, workshops, and conferences offered through the Department of Continuing Nursing Education, for which continuing education units (CEUs) are granted.
3. Offerings through cooperative efforts with other University divisions or departments or with professional organizations, institutions, or groups.

For information about these offerings, contact the director of continuing education of the School of Nursing.

Some courses that are prerequisites for admission to School of Nursing programs may be offered by Continuing Education and Extension through evening classes or correspondence study. Prospective undergraduate and graduate students who plan to take such courses are urged to consult with the prenursing adviser in CLA or with a graduate adviser in the School of Nursing. See the *Continuing Education and Extension Bulletin* and the *Extension Independent Study Bulletin* for course offerings.

III. COURSES IN NURSING

The following courses are taught by members of the School of Nursing faculty or by cooperating faculty members from other educational units of the University. Meeting hours, days, and rooms for these courses are listed in the quarterly *Class Schedule* or are announced to students by the School of Nursing faculty. For the summer class schedule, see the *Summer Session Bulletin.*

Descriptions of the required and elective courses for the various curricula that are taught by other educational units of the University are found in the bulletins of those units.

Course Numbering—A course is designated by an abbreviated departmental prefix and a number. Each course bears the same number regardless of the quarter in which it is offered. Minimum class standing required for registration, unless otherwise noted, is indicated by the course number as follows:

0000 to 0998—noncredit courses
1000 to 1998—for lower division students
3000 to 3998—for upper division students
5000 to 5998—for upper division, graduate, or professional students
8000 to 8998—for graduate students only

Course Symbols—The following standard symbols are used throughout the course descriptions in lieu of page footnotes:

† All the courses preceding the dagger must be completed before credit will be granted for any quarter of the sequence.

§ Credit will not be granted if the equivalent course listed after the section mark has been taken for credit.

¶ Concurrent registration is allowed (or required) in the course listed after the paragraph mark.

Consent of the instructor is required prior to registration.

△ Consent of the division, department, or school offering the course is required prior to registration.

A hyphen between course numbers (e.g., 3142-3143-3144) indicates a sequence of courses that must be taken in the order listed.

A comma between course numbers (e.g., 1234, 1235, 1236) indicates a series of courses that may be entered any quarter.

Nursing (Nurs)

FOR BACCALAUREATE STUDENTS

5201. ROLE OF NURSING WITHIN HEALTH CARE. (2 cr; 5 wks)
Introduction to nursing within the context of health and health care delivery systems. Philosophies of nursing and their implications for nursing practice and nursing education.

5202. SYSTEMATIC PROCESS I. (2 cr; 5 wks; prereq 5201)
Introduction to the basic concepts essential to understanding the systematic process utilized in achieving the goal of nursing.

5203. ADAPTATION I. (2 cr; 10 wks; prereq 5201)
Introduction to basic concepts about human adaptation and views of humankind that can be utilized in achieving the goal of nursing. Factors influencing adaptation, adaptive responses, levels of adaptation, components of adaptation and their relationship to concepts of holism and health.

5204. HELPING RELATIONSHIPS I. (2 cr; 10 wks; prereq 5201, psychology, growth and development or ¶growth and development)
Introduces factors related to interpersonal relationships and is designed to increase students' competence in utilizing such relationships to help patient/clients. Includes study of the contractual agreement and its use in interpersonal relationships.

5205-5206. TOOLS I. (1 cr each; 10 wks each; prereq admission to nursing, 5201, microbiology, physiology or ¶physiology for 5205...5205, anatomy or ¶anatomy for 5206)
Focuses on selected principles from the biological, physiological, and behavioral sciences that contribute to the development of knowledge and skills related to tools of assessment and maintenance of health. Opportunity for students to begin to develop skill in utilizing selected tools.

5207. SYNTHESIS. (2 cr; 5 wks; prereq 5202, 5203, 5204, growth and development, and 5206 or ¶5206)
Clinical course that focuses on the synthesis of first-level systematic process, adaptation, helping relationships, and tools to provide nursing care for healthy patient/clients.

5208. SMALL GROUP ANALYSIS, NURSING PRACTICE. (3 cr)
Analysis and experiential application of basic concepts related to dynamics of task-oriented groups. Potential applications to nursing.

5404-5405. TOOLS II. (2/1 cr; 10 wks each; prereq 5206, LaMP 5170 or ¶LaMP 5170, anatomy, MdBc 3050, Phcl 1009 or ¶Phcl 1009 for 5404...5404, LaMP 5171 or ¶LaMP 5171 for 5405)
Designed to prepare students to correctly practice skills required to care for patient/clients with health problems. Builds on Tools I and incorporates principles from the biological, physiological, and physical sciences.

5407. SYSTEMATIC PROCESS II. (2 cr; 5 wks; prereq 5207)
Compares the problem-solving process utilized in Systematic Process I with the systematic process used in research. Opportunity to develop confidence in using problem solving and research as tools for working toward nursing care goals and conducting clinical studies.

5408. ADAPTATION II. (2 cr; 5 wks; prereq 5207, LaMP 5170 or ¶LaMP 5170)
The adaptive process of humankind in the context of disruptive life events. Incorporates concepts of stress, crisis, loss, chronicity, and health to identify generalizations about the human adaptive process. The influence of this knowledge and data on the selection of possible nursing interventions.

5409. HELPING RELATIONSHIPS II. (2 cr; 10 wks; prereq group theory or 5208 or ¶5208, 5207, abnormal psychology or ¶abnormal psychology)
Designed to increase students' competence in utilizing interpersonal skills in relating to individuals who have difficulty in communication or relationships.

5611. SYNTHESIS INCORPORATING CONCEPTS OF CHRONICITY. (4 cr; 10 wks; prereq 5407, 5408, 5409, 5404, 5405 or ¶5405, abnormal psychology, Phcl 1009, LaMP 5171 or ¶LaMP 5171)
Clinical course that focuses on the synthesis of systematic process, adaptation, helping relationships, and tools in nursing care of patient/clients experiencing conditions of long-term nature.

5612. SYNTHESIS INCORPORATING CONCEPTS OF STRESS AND CRISIS. (4 cr; 10 wks; prereq 5407, 5408, 5409, 5404, 5405 or ¶5405, abnormal psychology, Phcl 1009, LaMP 5171 or ¶LaMP 5171)
Clinical course that focuses on the synthesis of systematic process, adaptation, helping relationships, and tools in care of patient/clients experiencing stress or crisis. Examines dimensions of the stress experience exemplified in patient/clients experiencing various types of crises. Emphasizes priority setting and nursing interventions for acute situations.

5613. SYNTHESIS INCORPORATING CONCEPTS OF LOSS. (3 cr; 10 wks; prereq 5407, 5408, 5409, 5404, 5405 or ¶5405, abnormal psychology, Phcl 1009, LaMP 5171 or ¶LaMP 5171)
Clinical course that focuses on the synthesis of systematic process, adaptation, helping relationships, and tools in care of patient/clients experiencing loss. The experience of loss from the perspective of both the patient/client and the student and coping mechanisms employed to deal with loss.

5614. SYNTHESIS INCORPORATING CONCEPTS OF HEALTH. (3 cr; 10 wks; prereq 5404, 5405 or ¶5405, 5407, 5408, 5409, abnormal psychology, Phcl 1009, LaMP 5171 or ¶LaMP 5171)
Clinical course that focuses on the synthesis of systematic process, adaptation, helping relationships, and tools in the care of patient/clients who are not experiencing any major disruptive life event. Some constructs used in conceptualizing health and their relationship to individual and family development. Emphasis on goals and nursing interventions aimed at promotion of health and prevention of disease.

5615. SYNTHESIS IN COMPLEX NURSING SITUATIONS. (4 cr; 10 wks; prereq 5611, 5612, 5613, 5614, FScN 3602)
Clinical course designed to allow students to synthesize the knowledge and skills acquired in the four prerequisite synthesis courses into comprehensive and effective care of individuals and groups experiencing complex disruptive life events.

5620. INDEPENDENT STUDY IN NURSING TOPICS. (1-9 cr; prereq #)
Opportunity for students to develop and engage in learning experiences beyond those required in the program. A contract with a faculty adviser is required.

5635-5636. INSTRUCTION AND SUPERVISED EXPERIENCE IN COMMUNITY HEALTH NURSING. (3 cr each; prereq RN with BS degree, △)
Offering of course contingent on sufficient need and availability of resources. Family-oriented care with focus on nursing assessments and intervention, community health care, and promotion of health.

5816. LEADERSHIP MANAGEMENT. (6 cr; 10 wks; prereq 5611, 5612, 5613, 5614, FScN 3602)
Clinical course introducing basic management and change theory and practice. Provides students with experience in functioning as a first-level manager within a peer group in a clinical setting.

5999. CLINICAL STUDY. (1 cr; prereq any two of the following: 5611, 5612, 5613, 5614)
Opportunity to utilize the research process in the design and implementation of a limited study that focuses on implications for nursing practice.

The following are nursing elective courses that are currently offered. Due to the uniqueness of these courses and the resources required to offer them, others may be added and some of those now offered dropped.

5700. CRITICAL CARE NURSING. (5 cr; prereq 5611, 5612, 5613, 5614)
Group presentations and discussions, individualized instruction, and supervised clinical experience focusing on care of acutely ill patient/clients at the primary nurse level.

5701. NURSING CARE OF THE EXPANDING FAMILY. (6 cr; prereq 5611, 5612, 5613, 5614)
Application of previous studies and the concept of primary prevention in the nursing care of families during the reproductive process. Opportunity to work with families both within and outside of the hospital.

5702. NURSING AND THE CHANGING ROLES OF WOMEN AND MEN. (3 cr; prereq any two of the following: 5611, 5612, 5613, 5614)
Comparison of the historical and current nature of the nursing profession with that of the women's movement. Application of the nursing process to problem solving in the area of changing male-female roles.

5703. THE FUTURE IS NOW. (2-3 cr; prereq any two of the following: 5611, 5612, 5613, 5614)
Designed to increase students' awareness of controversial views regarding the future. Interrelationships of the individual with the environment with emphasis on aspects that will influence health care needs in the next quarter century.

5704. HUMAN SEXUALITY: SIGNIFICANCE FOR NURSING. (2 cr; prereq any two of the following: 5611, 5612, 5613, 5614)
The meaning of sexuality. Sexuality throughout the life cycle and the impact of hospitalization and effects of the disease process on sexuality. Alternate forms of sexual expression.

5705. CORONARY CARE NURSING. (6 cr; prereq 5615 or 5816)
Designed to increase the student's ability to assume responsibility for the nursing care of a patient/client who has experienced a recent cardiac problem.

5706. NURSING OF THE PERSON WITH CANCER. (5 cr; prereq 5611, 5612, 5613, 5614)
Designed to enable the student to gain added knowledge and experience in facilitating both the individual's and family's adaptation to cancer.

5707. ORGANIZATIONAL CHANGE. (5 cr; prereq 5611, 5612, 5613, 5614, RN student)
Major forces affecting the nature of an organization as well as the phenomenon of change and the role of power. Includes a planned change project in an organization.

5708. PHILOSOPHY AND VALUES AS APPLIED TO NURSING PRACTICE. (2 cr; prereq any two of the following: 5611, 5612, 5613, 5614)
Seminar course designed to assist students in clarifying their values as a prelude to defining and articulating a personal philosophy and recognizing its impact on nursing care. Values/philosophies held by individuals and groups such as existentialists, Easterners, and various nursing leaders. Exercises in value clarification.

5709. NURSING CARE OF THE PERSON IN PAIN. (5 cr; prereq 5611, 5612, 5613, 5614)
Factors involved in an individual's adaptation to pain. Analysis of nursing interventions that facilitate alleviation of pain for the individual and promote health for the individual, his or her family, and the community. Clinical experience in providing nursing care to individuals experiencing pain.

5710. CONTINUITY OF NURSING CARE DURING HOSPITALIZATION AND AFTER. (6 cr; prereq 5611, 5612, 5613, 5614)
Utilizing the conceptual framework, students provide nursing care to individuals and their families during hospitalization and, after discharge, in their homes. Emphasis is on discharge preparation, understanding how present health problems affect the patient/client's meaning in life, and facilitation of the patient/client's transition back into her or his home life. Includes evaluation of the effectiveness of nursing care provided during hospitalization.

5711. MAN AS A SPIRITUAL BEING. (2-3 cr; prereq any two of the following: 5611, 5612, 5613, 5614)
Designed to focus on the individual as a spiritual being and the relationship of this quality to the nursing process.

5712. NURSING THE PERSON WITH NEUROLOGICAL PROBLEMS. (5 cr; prereq 5611, 5612, 5613, 5614)
Analysis of and experience in providing nursing care to patient/clients who are in the acute and chronic phases of complex neurological and neurosurgical conditions.

5713. PHYSIOLOGICAL ADAPTATION. (2 cr; prereq LaMP 5171, any two of the following: 5611, 5612, 5613, 5614)
Utilizing a systematic approach, students identify subjective and objective data that indicate physiological disruptions of adaptation. Focus is on the relationship of physiological data to the patient/client's total stimulus configuration and the development of nursing diagnoses and interventions. Emphasizes the phenomena of hydration, ventilation, elimination, sleep patterns, pain, mobility, skin integrity, and temperature regulation.

5715. PRIMARY NURSING. (7 cr; prereq 5611, 5612, 5613, 5614, 5816)
Primary nursing as a system of nursing care delivery. The student will function as a primary agent and will assess, plan, implement or delegate, evaluate, and coordinate care for patient/clients over a 24-hour period throughout their stay in the hospital. The nursing care plan will focus on an adaptation framework with the components of energy, perception, and integration leading to a nursing summary statement. Identification of problems and their priorities will be based on an assessment of the stimulus configuration.

5716. SYNTHESIS—NURSING PHILOSOPHY, PROCESS, AND ROLE. (3 cr; prereq 5611, 5612, 5613, 5614 or RN in practice)
Designed to build upon participants' knowledge and beliefs about nursing and its clinical practice. The major concepts to be explored, individually defined, and synthesized are: nursing philosophy, nursing process, nursing roles, future directions of nursing, and patient/clients receiving nursing services.

5717. HEALTH ASSESSMENT. (5-6 cr; prereq 5611, 5612, 5613, 5614, or RN and 5716, #)
Preparation for systematic collection of subjective and objective data in a nursing assessment. Emphasis on normal health to distinguish abnormal from normal findings, and on incorporation of assessment skills into the student's nursing conceptual framework.

5718. CONTEMPORARY PUBLIC HEALTH NURSING. (6 cr; prereq 5611, 5612, 5613, 5614, PubH 5006 or ¶PubH 5006)
Opportunity for student to refine and broaden skills in meeting identified health needs of a specified community. Focus on health promotion concepts, family-centered nursing, community assessment skills, helping relationship skills and peer review.

5719. SYNTHESIS OF NURSING CONCEPTS IN METROPOLITAN MEDICAL CENTER EMERGENCY ROOM. (5 cr; prereq 5611, 5612, 5613, 5614)
Emergency nursing interventions for the patient/client experiencing acute stress and/or crisis. Practice making rapid and accurate physical and psychological assessments. Referral of patient/client to appropriate health team member. Experience with community agencies providing continuity of care.

5720. NURSING CARE IN AN EMERGENCY SETTING. (4 cr; prereq 5612 or RN)
Focus on the nurse's role of assessment and intervention with patient/clients with a life-threatening condition and patient/clients requiring immediate nursing intervention.

5721. NURSING CHALLENGES IN GERONTOLOGY. (5 cr; 10 wks; prereq 5611, 5612, 5613, 5614)
Clinical course designed to enable the student to gain added knowledge about and experience in providing health care to elderly patient/clients. Emphasis on assessment of needs of elderly, interventions that facilitate adaptation, and evaluation.

5722. AN INTRODUCTION TO THE NURSE AS A LEADER FOR CHANGE THROUGH PARTICIPATION IN THE LEGISLATIVE PROCESS. (5 cr; 10 wks; prereq any two of the following: 5611, 5612, 5613, 5614...or #)
Participation in the legislative process through attending committee and subcommittee hearings on specific health bills of major concern to nurses. Contact with legislators and other key people in state government.

5799. SELF-DIRECTED STUDY. (Cr ar; prereq any two of the following: 5611, 5612, 5613, 5614...written contract with instructor, #; may be used to meet any portion of nursing elective cr requirement)
Opportunity for students to engage in learning experiences not provided for in established nursing elective courses.

FOR GRADUATE STUDENTS

CORE COURSES

8010. STRUCTURE OF THE DISCIPLINE OF NURSING

8011. MORAL AND ETHICAL POSITIONS IN NURSING

8012. CONCEPTUAL FRAMEWORK FOR NURSING PRACTICE

8014. RESEARCH IN NURSING

8030. NURSING INTERVENTION MODELS

FOCUS I COURSES

8314. NURSE-MIDWIFERY MANAGEMENT DURING CHILDBEARING
8411. KNOWLEDGE DEVELOPMENT UNDERLYING NURSING THERAPY
8421. PSYCHIATRIC-MENTAL HEALTH NURSING: GROUP DYNAMICS AND LEADERSHIP
8422. PSYCHIATRIC-MENTAL HEALTH NURSING: FAMILY DYNAMICS AND THERAPY
8431. CHILDBEARING-CHILDREARING FAMILY NURSING I
8451. TEACHING LEARNING PROCESS IN NURSING
8701. NURSING ADMINISTRATION I

FOCUS II COURSES

8315. NURSE MIDWIFERY MANAGEMENT: INTRAPARTAL; POSTPARTAL
8415. NURSE CLINICIAN ROLE DEVELOPMENT
8425. PSYCHIATRIC-MENTAL HEALTH NURSING: ROLE DEVELOPMENT
8435. CHILDBEARING-CHILDREARING FAMILY NURSING II
8455. NURSE EDUCATOR IN HIGHER EDUCATION
8702. NURSING ADMINISTRATION II

OTHER NURSING COURSES

8001. SPECIAL EDUCATIONAL EXPERIENCES IN NURSING
8003. HEALTH ASSESSMENT
8009. SPECIAL TOPICS IN NURSING
8050. PROBLEMS IN NURSING
8051. SPECIAL TOPICS IN NURSING RESEARCH
8060. ADVANCED CLINICAL NURSING
8063. NURSING CONSULTATION
8313. CARE OF THE CHILDBEARING FAMILY IN RISK
8509. SPECIAL TOPICS IN NURSING EDUCATION
8600. HEALTH CARE INSTITUTIONS AND NURSING LEADERSHIP
8601. CLINICAL NURSING LEADERSHIP I
8609. SPECIAL TOPICS IN NURSING SUPERVISION

IV. FACULTY

School of Nursing

Professor

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M. Isabel Harris, Ph.D.
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Elaine R. Mansfield, D.N.Sc.

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Mitzi L. Duxbury, Ph.D., *assistant dean for graduate studies*
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Eugenia E. Taylor, M.A.

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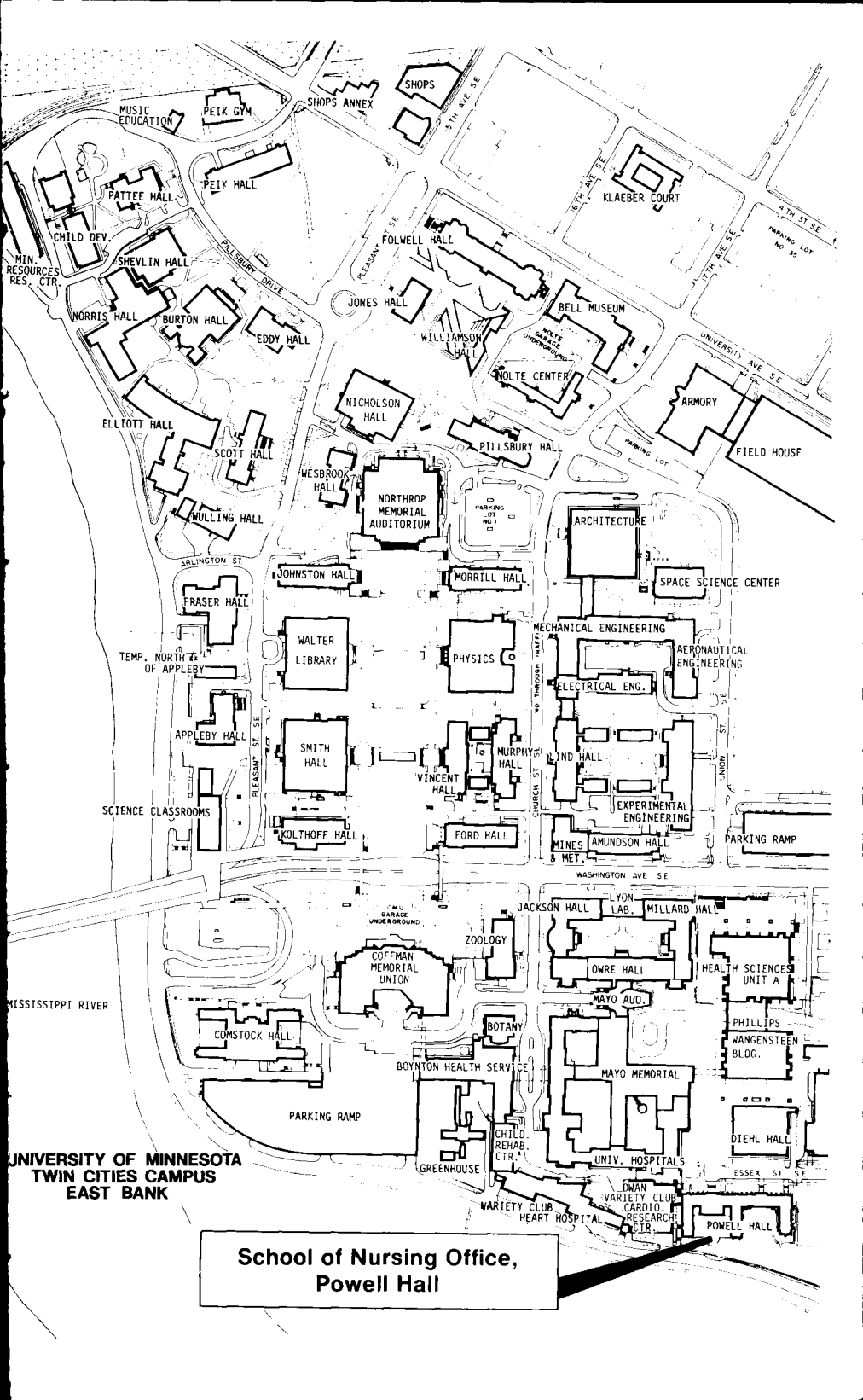
INDEX



UNIVERSITY OF MINNESOTA
TWIN CITIES CAMPUS
EAST BANK

School of Nursing Office, Powell Hall

1979-81 UNIVERSITY OF MINNESOTA BULLETIN

MEDICAL TECHNOLOGY

UNIVERSITY OF MINNESOTA

Board of Regents

Administrative Officers

Medical Technology Administration

Cover: A phagocytic cell with ingested particles. Design by Gadbois Art Works.

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Medical Technology

UNIVERSITY OF MINNESOTA

How to Use This Bulletin

This bulletin is divided into four major sections:

I. **General Information**—All current and prospective students should read this section carefully. It contains information relating to the following topics:

Admission Requirements
Registration Procedures and Advisers
Academic Regulations
Graduation
Professional Certification
Placement
Tuition and Fees
Financial Aids
Housing Facilities
Health Service
Student Organizations
Access to Student Educational Records

II. **Curricular Descriptions and Requirements**—This section contains specific course requirements and suggested quarterly programs for the bachelor of science program in medical technology. It also contains basic information about the master of science program in medical technology.

III. **Course Listings**—This section gives a brief description of required courses.

IV. **Faculty and Staff**

All current and prospective students will need to refer to the *General Information Bulletin* and the *College of Liberal Arts Bulletin*. These bulletins are available at the information booth in Williamson Hall or may be obtained by writing to the Office of Admissions and Records, 110 Williamson Hall, 231 Pillsbury Drive S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Days and hours when classes meet and the places of meeting are published in the *Class Schedule*, which is distributed just before the registration period each quarter.

Information about classes offered during the summer is published in the *Summer Session Bulletin*. This bulletin can be obtained by writing the Summer Session Office, 135 Johnston Hall, 101 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Medical Technology

I. GENERAL INFORMATION

The course in medical technology was established at the University of Minnesota in 1923 to prepare men and women for professional work in clinical laboratory procedures and for advanced study in the basic sciences and in medical technology. This course attempts to provide both a strong foundation in basic sciences and experience in the clinical laboratory.

A medical technologist performs various diagnostic procedures used by physicians. The work requires a background in hematology, urinalysis, bacteriology, serology, parasitology, blood group serology, and the chemical analysis of body fluids. As a general rule, a student who has excelled in scientific subjects in high school will succeed in medical technology.

The broad training obtained in these fields enables the graduate to qualify for positions requiring general or specialized laboratory experience in hospital laboratories, clinics, and physicians' offices. In larger hospitals where there are several technologists, one may be occupied principally or entirely with work in hematology, bacteriology, or chemistry. There are opportunities for qualified graduates to work in research and teaching laboratories associated with larger clinics, foundations, and universities.

Admission Requirements

The curriculum in medical technology consists of the preprofessional program in the College of Liberal Arts and the professional program in the Division of Medical Technology, which is part of the Department of Laboratory Medicine and Pathology of the Medical School.

Admission to the Preprofessional Program—The student in the preprofessional program must meet the admission criteria and is subject to the academic regulations of the College of Liberal Arts. For complete information, consult the *General Information Bulletin* and the *College of Liberal Arts Bulletin*.

Qualified applicants may enter at the beginning of any quarter, but the sequence outlined is based on entrance in the fall quarter. If a student enters after fall quarter, summer session attendance may be necessary to make up program deficiencies.

Admission to the preprofessional program does not assure admission to the professional program.

It is recommended that prospective students take mathematics, physics, chemistry, and biology in high school.

Admission to the Professional Program—For admission to the Division of Medical Technology, the student must have completed 90 credits, including the required courses. The major criterion for admission is satisfactory academic performance as judged by the student's grade point average in required courses. Students are admitted only once a year for the fall quarter. Admission to the professional program is competitive due to the limited number of students that can be accommodated in the teaching and clinical facilities.

Students in residence at the University of Minnesota who expect to complete the requirements for admission to the professional program must file an application for change of college with the Office of Admissions by April 15. Those who have sufficient credits but have course deficiencies should consult with advisers in the Medical Technology Office regarding their status.

Students from other accredited colleges and universities may transfer to the University of Minnesota to complete the program in medical technology. Courses completed that are equivalent to those offered at the University of Minnesota are

accepted to satisfy the requirements for admission to the Division of Medical Technology. Students transferring from other colleges may obtain the application for admission with advanced standing from the Office of Admissions. These applications must be filed with the Office of Admissions by April 15. It is strongly advised that transfer students ascertain their status by writing to the Director, Division of Medical Technology, 5307 Powell Hall, 500 Essex Street S.E., University of Minnesota, Minneapolis, Minnesota 55455, so that, if necessary, they may complete required courses during the summer session.

Registration Procedures and Advisers

Students registering for the first time in the University of Minnesota, as new freshmen in the preprofessional program or as transfer students with less than 2 full years of previous college work, are expected to participate in a special 2-day orientation-registration program. (See the *General Information Bulletin* for a description of this program.) As part of this 2-day program, students consult with an adviser in the Medical Technology Office for selection of courses and approval of their registration.

Students admitted to the professional program will receive instructions and information about registration procedures from the Medical Technology Office in advance of the fall quarter registration period.

All students, whether in the preprofessional curriculum in the College of Liberal Arts or in the professional curriculum in the Division of Medical Technology, are expected to plan their class schedule each quarter with an adviser in the Medical Technology Office. Students should consult the *General Information Bulletin* for information about other counseling services available on campus.

Academic Regulations

Students in the professional program are subject to the regulations established by the Division of Medical Technology.

Students are expected to maintain satisfactory academic progress in the medical technology program. Any student not making satisfactory progress may be placed on scholastic probation upon recommendation of the Student Affairs Committee. This committee is composed of members of the faculty of the Division of Medical Technology and student representatives.

Students who fail to earn satisfactory grades after being on probation for 1 quarter may be dropped from the program. If a student fails to maintain satisfactory performance in any course or in any laboratory area while registered in this division, the student's record will be reviewed by the Student Affairs Committee for recommendation for action. If, after investigation and conference with the student, the committee judges it inadvisable for the student to continue in the curriculum, the student will be discontinued.

A student's work is considered unsatisfactory when she or he earns less than a C grade average (2.00 grade points for each credit) for all credits earned in a given year or a given quarter. In addition, a student must earn a minimum grade of C in selected courses in the curriculum in order to enroll in related clinical practice.

If a student receives an unsatisfactory grade in one course, remedial work in the course may be provided, if possible; if not, the student must repeat the course the next time it is offered. If a student receives unsatisfactory grades in more than one course, either concurrently or in different quarters, the matter will be referred to the Student Affairs Committee for investigation and action. Ordinarily, unsatisfactory grades in two courses will be sufficient basis for discontinuation.

Satisfactory performance is considered to be not only a passing level in technical skill and theoretical knowledge, but also complete personal integrity and honesty.

Graduation

The minimum requirements for graduation are completion of the curriculum requirements and a total of 180 credits with 360 grade points, an average of 2.00 grade points per credit.

Upon satisfactory completion of the prescribed course of study, the bachelor of science degree will be conferred by the Board of Regents. Students completing the courses in the professional program with a grade point average of 3.00 may graduate "with distinction," and those with a grade point average of 3.50 may graduate "with high distinction."

Application for a degree must be filed with the Office of Registration and Student Records 3 quarters before the time of graduation. Students completing the hospital clinical courses any time after the June graduation date and before the December graduation date will be eligible to apply for June graduation. Students completing requirements at other times will be eligible for graduation in December or August, as determined by the date they complete the requirements.

Professional Certification

Graduates from the Division of Medical Technology of the University of Minnesota are eligible to take national examinations for certification as a medical technologist conducted by national certifying agencies. Many hospitals require this certification for employment.

Placement

Graduates of this program are assisted in finding employment by advisers in the Medical Technology Office. Notices of employment opportunities in the field are received from all parts of the United States and are posted in this office as an aid to students. The Health Sciences Placement Service also offers help to graduates of this program.

Tuition and Fees

For complete information about fees and expenses, consult the *General Information Bulletin.*

The approximate cost of tuition and fees for the professional program is $1,250 per year for residents and $3,125 for nonresidents. Tuition is subject to change without notice.

Financial Aids

The University of Minnesota offers many opportunities to students in need of financial assistance to help meet the expenses of their education. Complete information about obtaining financial assistance is available from the Office of Student Financial Aid, 107 Armory Building, 15 Church Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

For students needing part-time employment to meet school expenses, the Student Employment Service, 6 Morrill Hall, 100 Church Street S.E., maintains a referral service. Because the curriculum in the Division of Medical Technology includes several courses that require many hours of work in the laboratory, students are advised to restrict their number of hours of employment.

Housing Facilities

Information about residence halls or private off-campus housing may be obtained from the Housing Office, Comstock Hall, 210 Delaware Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Health Service

Facilities for general medical care are provided for students by the Boynton Health Service. A description of these services and of other health and hospital benefits appears in the *General Information Bulletin.*

All students in the medical technology program are expected to arrange for appointments at the Boynton Health Service for necessary immunizations before assignment to the clinical courses of the professional program. This procedure is required as a protection for the student.

Student Organizations

For information on the various student organizations and activities available for all students, consult the *General Information Bulletin.* In addition, certain student organizations are open only to students in medical technology or to students in health sciences fields.

Students in the professional or preprofessional program are represented on the Medical Technology Council by elected members from each class. The purpose of the Medical Technology Council is to promote student-faculty relationships, to stimulate social and educational activities, and to consider matters affecting students in this course.

Orbs is the honorary scholastic association for seniors in medical technology who have earned a B average in the professional program. The purpose of this organization is to stimulate and promote a high level of scholarship among the students in medical technology.

Students in the undergraduate program in medical technology are eligible for student membership in the American Society for Medical Technology.

Students in medical technology are eligible to participate in the activities of the Council for Health Interdisciplinary Participation (CHIP). This organization includes students from programs in all the health sciences. It sponsors a varied program of seminars and community projects.

Access to Student Educational Records

In accordance with regents' policy on access to student records, information about a student generally may not be released to a third party without the student's permission. The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information—name, address, telephone number, dates of attendance, college and class, major, adviser, and degrees earned—is considered public or directory information. To prevent release of such information outside the University while in attendance at the University, a student must notify the records office on his or her campus.

Students are notified annually of their right to review their educational records. The regents' policy, including a directory of student records, is available for review at the information booth in Williamson Hall, Minneapolis campus, and at the records offices on other campuses of the University. Questions may be directed to the Office of the Coordinator of Student Support Services, 260E Williamson Hall, (612) 373-2106.

II. CURRICULAR DESCRIPTIONS AND REQUIREMENTS

Bachelor of Science Program

The University of Minnesota believes that all of its students, whatever their area of specialization or vocational goals, should hold in common the search for a liberal education. To help students achieve the goals of a liberal education, the Division of Medical Technology expects each student to distribute some part of his or her course work in areas of study outside of the major or other related areas of study.

To achieve the goals of both a liberal and a professional education appropriate to a baccalaureate curriculum in medical technology, the program stresses vigorous training in the physical and biological sciences, with special emphasis on acquiring a knowledge of chemistry that is basic to all facets of laboratory medicine. The program is designed to include not only factual information but also thorough instruction in scientific attitudes and methods. Finally, training in technical skills is added to a broad base of knowledge in both general and specific areas of the natural sciences.

In addition to required courses, general education requirements include a minimum of 8 to 10 credits in two courses in different departments selected from each of the three distribution categories listed below. The distribution requirements may be fulfilled at any time before graduation. They do not have to be completed during the preprofessional years. Consult the *College of Liberal Arts Bulletin* for a complete listing of courses commonly used to meet distribution requirements.

Students should be aware that they must take elective credits in addition to the minimum distribution requirements to complete the 180 credits required for graduation.

Communication, Language, and Symbolic Systems

Foreign Language	Mathematics
Linguistics	Speech

The Individual and Society

Anthropology	Humanities
Classics	Philosophy
Economics	Psychology
History	Sociology

Literary and Artistic Expression

Art History	Humanities
Arts, Studio	Music
English Literature	Theatre Arts

Preprofessional Program—Students register in the College of Liberal Arts for the preprofessional program. The following courses or their equivalents must be completed before admission to the professional program. (Quarter credits are indicated in parentheses.)

Anat 1004—Elementary Anatomy (4)
Biol 1011—General Biology (5)
Biol 1106—General Zoology (5)
Chem 1004-1005—General Principles (10)
Chem 1006—Principles of Solution Chemistry (4)
Chem 3100—Quantitative Analysis (3)
Chem 3101—Quantitative Analysis Laboratory (2)
Chem 3301-3302—Organic Chemistry (8)
Chem 3305-3306—Organic Chemistry Laboratory (4)
Comm 1001-1002—Communication (8)
(or) Comp 1001-1002—Introductory Composition (8)
(or) exemption from requirement

Math 1111 or Math 1201—College Algebra or Pre-Calculus (5)
MedT 1010—Orientation in Medical Technology (1)
MedT 1030-1031-1032—Introduction to Clinical Medicine (3)
Phys 1031-1032—Introductory Physics (8)
Phys 1035-1036—Physics Laboratory (2)

Electives satisfying distribution requirements to make a total of 90 credits.

Other courses that are equivalent or more comprehensive may be substituted for the required courses. Students planning to pursue graduate programs should take Math 1211, 1221, 1231 and Phys 1104, 1105, 1106 or Phys 1271, 1281, 1291.

Students who transfer into the preprofessional program after the freshman year are exempted from the MedT 1010 requirement. Students who transfer into the medical technology program after the sophomore year are exempted from both the MedT 1010 and 1030-1031-1032 requirements. These credits do not count toward a B.S. degree.

The following program schedule is suggested for the preprofessional years:

FIRST YEAR

Fall	*Winter*	*Spring*
Comp 1001 or Comm 1001	Comp 1002 or Comm 1002	Biol 1106
Math 1111 or Math 1201	Biol 1011	Chem 1006
Chem 1004	Chem 1005	Electives
MedT 1010	Electives	

SECOND YEAR

Fall	*Winter*	*Spring*
Chem 3301	Chem 3302	Chem 3100
Chem 3305	Chem 3306	Chem 3101
Phys 1031	Phys 1032	Anat 1004
Phys 1035	Phys 1036	MedT 1032
MedT 1030	MedT 1031	Electives
Electives	Electives	

Professional Program—Students register in the Division of Medical Technology for the professional program. The following courses must be completed to satisfy requirements for graduation. (Quarter credits are indicated in parentheses.)

Anat 5765—Hematology (4)
LaMP 5173—Pathology and Clinical Medicine (5)
MdBc 5300, 5301—Biochemistry (9)
MedT 5063—Introduction to Urinalysis (3)
MedT 5065—Clinical Hematology; Methodology (5)
MedT 5066—Introduction to Clinical Immunohematology (5)
MedT 5067—Hemostasis (2)
MedT 5082—Applied Clinical Chemistry (4)
MedT 5085—Applied Clinical Hematology (4)
MedT 5086—Applied Clinical Immunohematology (4)
MedT 5088—Applied Diagnostic Microbiology (4)
MedT 5095—Professional Aspects of Medical Technology (1)
MedT 5102—Diagnostic Microbiology (4)
MedT 5108—Clinical Chemistry (10)
MicB 5233—Microorganisms and Disease (7)

In addition to the above courses, an upper division course in biological sciences is required. Courses suggested to fulfill this requirement are:

Anat 5766—Hematology (4)
EBB 5116—Introduction to Animal Parasitology (5)

GCB 3022—Genetics (4)
GCB 5015—Histology (5)
Phsl 3051—Human Physiology (5)

Elective courses:

MedT 5070—Laboratory Instrumentation (3)
MedT 5090—Special Laboratory Methods (2)
MedT 5092—Honors Program in Laboratory Methods (5)

The clinical courses (MedT 5082, 5085, 5086, and 5088) consist of application of basic methods and techniques in chemistry, hematology, immunohematology, and microbiology in the clinical laboratories of the University of Minnesota Hospitals and other affiliated institutions. These courses are offered each quarter and each summer term. Assignment to these courses is made on an individual basis and is contingent upon the availability of space in the clinical facilities as well as satisfactory completion of prerequisite course work and elective course work required for graduation.

A minimum grade of C is required in each introductory course in order to enroll in each related clinical course. The introductory and related clinical courses are:

Introductory Courses	*Related Clinical Courses*
MedT 5063, MedT 5108	MedT 5082
Anat 5765, MedT 5065, MedT 5067	MedT 5085
MedT 5066	MedT 5086
MicB 5233, MedT 5102	MedT 5088

Registration in courses in Continuing Education and Extension (CEE) concurrently with registration in clinical courses requires the consent of the director of the Division of Medical Technology. A maximum of 5 quarter/semester credits may be taken in CEE concurrently with the clinical courses.

The following program schedule is suggested for the professional years:

THIRD YEAR

Fall	*Winter*	*Spring*
MdBc 5300	MdBc 5301	MedT 5108
MedT 5065	MedT 5063	Electives
MedT 5095	MedT 5066	
MicB 5233	MedT 5102	

FOURTH YEAR

Fall	*Winter*	*Spring*	*Summer*
Anat 5765	Clinical courses	Clinical courses	Clinical courses
Biological science	(or) Electives	(or) Electives	
LaMP 5173			
MedT 5067			

Master of Science Program With Major in Medical Technology

Graduate work in the field of medical technology is available for the qualified candidate who wishes to prepare for a career of investigation and teaching in the area of clinical laboratory methods. A master of science degree program with a major in medical technology is offered by the Graduate School. The program is offered only under Graduate School Plan A (master's degree with thesis). Each student is required to complete a thesis involving independent research in one of the subareas of this field under the direction of the adviser.

Admission Requirements—Admission requirements include certification as a medical technologist or eligibility for such certification, and a bachelor's degree

from an accredited institution of higher learning with sufficient scholarly attainment in chemistry and the biological sciences to justify graduate work in these areas. Previous experience in a clinical laboratory is required.

Application forms for admission to the Graduate School are available upon request from the Graduate School Office, 316 Johnston Hall, 101 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455. The application should be filed with the dean of the Graduate School at least 6 weeks before the opening of the quarter of matriculation and must be accompanied by official transcripts of undergraduate and graduate work that has been completed.

Three letters of reference from employers or teachers are also required; these should be sent to the Director of Graduate Study, Division of Medical Technology, 5307 Powell Hall, 500 Essex Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Minor—It is suggested that students who major in medical technology complete a minor in one of the following fields: hematology, chemistry, microbiology, immunohematology, or immunology.

Residency Requirements—Candidates for advanced degrees must complete a minimum of 3 quarters in residence at the University of Minnesota to be eligible for the degree. Registrations need not be in consecutive quarters.

At a customary rate of progress, the completion of a master's program ordinarily requires 6 quarters in residence. If students must support themselves, complete prerequisite course work, or devote considerable time to other special concerns, they should plan to enroll for a longer period. An interrupted program of graduate study generally proves unsatisfactory.

Academic Requirements—The work leading to a master's degree includes (a) 3 quarter credits in MedT 5120 in addition to a minimum of 20 quarter credits in graduate-level courses in the major department with grades not lower than B, (b) a minimum of 9 quarter credits in graduate-level courses in the field relating to the thesis problem with grades not lower than B, (c) a substantial thesis based upon independent research, and (d) a final oral examination. There is no foreign language requirement.

The thesis should be on a topic within the minor or related field: chemistry, microbiology, hematology, or immunohematology. The thesis must demonstrate ability to work independently and power of independent thought both in perceiving problems and in making satisfactory progress toward their solution. Familiarity with the bibliography of the special area and correct citation of authorities are expected. The thesis must be finished and registered in the Office of the Graduate School at least 9 weeks before the end of the quarter in which the student earns the degree.

In addition to the usual course examinations, the candidate must pass a final oral examination that will cover the exposition of the thesis problem and subject matter or theory fundamental to the thesis topic. This examination must be held at least 5 weeks before the end of the quarter in which the student earns the degree. This examination will be conducted by a committee (which the student's adviser chairs) appointed by the Graduate School to examine the thesis.

The student's progress is reviewed at regular intervals by the graduate faculty in medical technology. Continuance in the program is dependent upon maintaining a satisfactory scholastic average in required courses and satisfactory progress in developing the thesis problem. Failure to maintain satisfactory progress and levels of achievement may be cause for recommendation for discontinuance in this program.

Detailed information about Graduate School procedures, regulations, programs of study, and courses can be found in the *Graduate School Bulletin*, available upon request to the Graduate School Office. All inquiries concerning admission should be addressed to the Dean of the Graduate School, 316 Johnston Hall, 101 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

III. COURSE LISTINGS

Medical Technology (MedT)

1010. ORIENTATION IN MEDICAL TECHNOLOGY. (1 cr [no cr toward degree]; prereq fr only)
Orientation to the principles and practices of medical technology.

1030-1031-1032. INTRODUCTION TO CLINICAL MEDICINE. (1 cr per qtr [no cr toward degree]; prereq soph only)
Survey of the basic anatomy, physiology, and pathology of selected disease states, with illustrative clinical material.

5063. INTRODUCTION TO URINALYSIS. (3 cr)
Lectures and laboratory exercises in basic techniques in the chemical and microscopic study of urine.

5065. CLINICAL HEMATOLOGY: METHODOLOGY. (5 cr)
Fundamental techniques in hematology.

5066. INTRODUCTION TO CLINICAL IMMUNOHEMATOLOGY. (5 cr; prereq MicB 5233)
Fundamental principles and laboratory techniques in blood grouping, compatibility testing, and immunologic procedures.

5067. HEMOSTASIS. (2 cr)
Lectures and laboratory exercises in basic theory and techniques of hemostasis, including platelet function and disorders, plasma coagulation system, inherited and acquired hemostatic disorders.

5070. LABORATORY INSTRUMENTATION. (3 cr; prereq Phys 1031-1032)
Lectures and laboratory exercises in fundamentals of instrumentation utilized in the clinical laboratory.

5082. APPLIED CLINICAL CHEMISTRY. (4 cr; prereq 5108)
Application of basic methods and techniques in chemistry in the clinical laboratory.

5085. APPLIED CLINICAL HEMATOLOGY. (4 cr; prereq 5065, 5067)
Application of basic methods and techniques in hematology in the clinical laboratory, morphology of blood cells, application of techniques in hemostasis.

5086. APPLIED CLINICAL IMMUNOHEMATOLOGY. (4 cr; prereq 5066)
Application of basic techniques and methods in serology and immunology in the clinical laboratory. Blood grouping, compatibility testing, and immunologic procedures.

5088. APPLIED DIAGNOSTIC MICROBIOLOGY. (4 cr; prereq 5102)
Identification of bacteria by microscopic techniques. Correlation with clinical cases. Identification of parasites and fungi.

5090. SPECIAL LABORATORY METHODS. (2 cr)
Assignment on an individual basis to one of a wide variety of special areas of experience in the clinical laboratory; field experience.

5092. HONORS PROGRAM IN LABORATORY METHODS. (5 cr)
Individual assignment to special projects or research with more intensive treatment in theory in one of the clinical areas of chemistry, hematology, immunohematology, or microbiology.

5095. PROFESSIONAL ASPECTS OF MEDICAL TECHNOLOGY. (1 cr)
Overview of the profession of medical technology, history, current status, certification, and accreditation. Demonstration of the interrelationships of medical technology with patients and other health professionals.

5102. PRINCIPLES OF DIAGNOSTIC MICROBIOLOGY. (4 cr; prereq MicB 5233)
An independent study course covering current techniques used in the laboratory diagnosis of infectious disease; isolation and identification of bacteria and yeast; antibiotic sensitivity testing.

5108. INTRODUCTION TO CLINICAL CHEMISTRY. (10 cr; prereq MdBc 5300-5301, Chem 3100-3101)
Lecture and laboratory course in basic techniques and methods in clinical chemistry. Topics include spectrophotometry, electrolytes, proteins, enzymes, toxicology, and quality control. Both manual and instrumental methods presented.

Graduate Courses in Medical Technology (MedT)

5120. SEMINAR: MEDICAL TECHNOLOGY. (3 cr)
Review and discussion of current literature; presentation and discussion of research being carried on in the department.

5125. PRACTICUM: TEACHING. (Cr ar [max 3 cr])
Supervised experience in teaching; development of skills in effective use of instructional materials, tests, and measurements.

5128. ELEMENTS OF LABORATORY ADMINISTRATION. (3 cr)
An introductory course in laboratory administration. Topics include leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, product evaluation, laboratory safety, labor relations, and governmental regulations.

5130. PRACTICUM IN LABORATORY ADMINISTRATION. (3 cr)
Supervised experience in and assignment of specific problems related to laboratory service and management in hospitals.

5133. MEDICAL MYCOLOGY. (3 cr)
Laboratory diagnosis of infections caused by yeasts, dermatophytes, and systemic fungi.

5135. ADVANCED CLINICAL MICROBIOLOGY. (5 cr)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical microbiology.

5136. ANAEROBIC BACTERIOLOGY. (4 cr)
Anaerobic respiration in bacteria; methods of anaerobic culture; taxonomy and classification of anaerobes; biochemical and gas chromatographic differentiation of anaerobes; the role of anaerobes in disease.

5138. CLINICAL MICROBIOLOGY SEMINAR. (1 cr)

5140-5141. TECHNIQUES FOR TEACHING. (3 cr per qtr; prereq consent of dept)
Development of objectives, classroom activities, and measurement parameters for medical technology education.

5145. DEVELOPMENT OF MEDICAL TECHNOLOGY. (Cr ar)
Current problems; topics and research.

5155. ADVANCED CLINICAL HEMATOLOGY. (5 cr)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical hematology.

5165. ADVANCED CLINICAL IMMUNOHEMATOLOGY. (5 cr)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical immunohematology.

5173. ANALYTIC TECHNIQUES IN LABORATORY MEDICINE. (2 cr)

5175. ADVANCED CLINICAL CHEMISTRY. (5 cr)
Observation, study, and practice in special problems, advanced techniques, and methodology in clinical chemistry.

5179. CHEMISTRY SEMINAR. (1 cr)

8176. ADVANCED TOPICS IN CLINICAL CHEMISTRY. (3 cr)
External and internal factors that affect the clinical chemistry laboratory. External factors examined include the use of statistics, predictive value of tests, and effect of biological and analytical factors on laboratory results. Internal factors examined include new concepts in clinical chemistry methodology and automation such as chromatography and immunoassay techniques. Principles and advantages of kinetic and equilibrium assays.

8178. PRINCIPLES OF DIAGNOSTIC ENZYMOLOGY. (3 cr)
Enzymes of diagnostic interest; their biological and biochemical aspects, and their usefulness in understanding the etiology of disease and its diagnosis, treatment, and prevention. Emphasis on factors that affect the interpretation of enzyme results, including the localization of enzymes or isoenzymes in various tissues and subcellular organelles, kinetics of enzyme release from damaged tissues, biological half-lives of enzymes in plasma, and induction of enzyme synthesis.

8230. ADVANCED MEDICAL BACTERIOLOGY. (3 cr)
Unusual bacteria of medical importance including nonfermentative gram-negative bacilli, and gram-positive bacilli that may cause human disease. Metabolism, biochemical characteristics, disease states, treatment.

Required and Elective Courses Offered by Other Departments

Anatomy (Anat)

1004. ELEMENTARY ANATOMY. (4 cr; prereq Biol 1011)
Elementary human anatomy.

5765. HEMATOLOGY. (4 cr)
Blood and blood-forming organs; emphasis on blood and bone marrow from standpoint of diagnosis and prognosis.

5766. HEMATOLOGY. (4 cr; prereq Anat 5765)
Blood and bone marrow from standpoint of diagnosis and prognosis.

Biochemistry (MdBc)

5300, 5301. BIOCHEMISTRY. (5, 4 cr; prereq organic chemistry and physics)

Biology (Biol)

1011. GENERAL BIOLOGY. (5 cr)
Introduction to the principles of biology. The cell, metabolism, heredity, reproduction, ecology, and evolution.

1106. GENERAL ZOOLOGY. (5 cr; prereq Biol 1011)
Survey of animal phyla: considerations of structure, function, behavior, adaptation, and evolutionary relationships.

Chemistry (Chem)

1004-1005. GENERAL PRINCIPLES OF CHEMISTRY. (5 cr per qtr; prereq satisfactory mathematics placement score, Math 0009 or college course in algebra, 4 yrs high school mathematics)
Introduction to chemistry from standpoint of atomic structure; periodic properties of elements and compounds derivable from structural considerations; laws governing behavior of matter, theories of solutions, acids, bases, and equilibrium.

1006. PRINCIPLES OF SOLUTION CHEMISTRY. (4 cr; prereq Chem 1005 or 1032)
Lecture and laboratory work related to chemistry of selected cations and anions. Detection methods: spectrophotometric, potentiometric, and chromatographic procedures. Metal ion studies, including systematics; acid-base principles; influence on the environment; importance in biological systems; formation and stereochemistry of complexes.

3100. QUANTITATIVE ANALYSIS. (3 cr; prereq Chem 1005 or 1032)
(Lecture) Introduction to the theory of quantitative chemical analysis. Modern quantitative methods of analysis.

3101. QUANTITATIVE ANALYSIS. (2 cr; prereq Chem 3100)
(Laboratory) Introduction to quantitative chemical analysis.

3301-3302. ELEMENTARY ORGANIC CHEMISTRY. (4 cr per qtr; prereq Chem 1005 or 1032 or equiv)
Important classes of organic compounds, both aliphatic and aromatic, together with some heterocyclic compounds. Laboratory work includes the preparation of typical substances.

3305-3306. ELEMENTARY ORGANIC CHEMISTRY LABORATORY. (2 cr per qtr)

Ecology and Behavioral Biology (EBB)

5116. INTRODUCTION TO ANIMAL PARASITOLOGY. (5 cr; prereq Biol 1106 or 3011)
Elementary course dealing with parasitic protozoa, worms, and arthropods and their relation to diseases of humans and animals.

English

Comp 1001-1002. INTRODUCTORY COMPOSITION. (4 cr per qtr; prereq assignment to Category 3 or 5 for 1001, assignment to Category 2 or Comp 1001 for 1002)
1001: Fundamentals of structure and style in expository writing. Organizing ideas, constructing sentences, and using detail in short essays. 1002: Writing longer essays. Style and addressing the needs of a given audience.

Comm 1001-1002. COMMUNICATION. (4 cr per qtr; prereq assignment to Category 2, 3 or 5 for 1001)
1001: Communication, language, and nonverbal means of communicating; clarity and appropriateness in expository discourse; writing and speaking under direction and criticism. 1002: Deliberation, reasoning, nonlogical appeals, and ethical concerns in problem solving and persuasive discourse; writing and speaking under direction and criticism.

Genetics and Cell Biology (GCB)

3022. GENETICS. (4 cr; prereq Biol 1011)
Mechanisms of heredity, their implications for biological populations and applications to practical problems.

Laboratory Medicine and Pathology (LaMP)

5173. PATHOLOGY AND CLINICAL MEDICINE. (5 cr)
General and system pathology with clinical correlations using audiovisual material and tutorial sessions.

Mathematics (Math)

1111. COLLEGE ALGEBRA AND ANALYTIC GEOMETRY. (5 cr; prereq high school higher algebra and mathematics placement score)
Functions and graphs, quadratic equations, progressions, inequalities, complex numbers, theory of equations, permutations and combinations, probability, systems of equations, determinants, conics and standard position, logarithms.

1201. PRE-CALCULUS. (5 cr; prereq high school higher algebra, high school trigonometry or Math 1008, mathematics placement score)
Inequalities, analytical geometry; complex numbers, binomial theorem; mathematical induction; functions and graphs; trigonometric, exponential, and logarithmic functions.

Microbiology (MicB)

5233. MICROORGANISMS AND DISEASE. (7 cr; prereq 10 cr in chemistry and 5 cr in biological sciences)
The nature of microorganisms, immunology, medical bacteriology, virology, mycology, parasitology, and principles of disease control. Laboratory.

Physics (Phys)

1031-1032. INTRODUCTORY PHYSICS: MEASUREMENT AND APPLICATIONS. (4 cr per qtr; prereq high school algebra and plane geometry)
Lectures, problem sessions. Applications of physics: mechanics, random processes, gases and fluids, electric circuits, waves, light, optical instruments, atoms and spectra, nuclei, radioactivity.

1035-1036. INTRODUCTORY PHYSICS LABORATORY. (1 cr per qtr; prereq Phys 1031 for 1035, Phys 1032 for 1036)
Laboratory experiments offered in conjunction with Phys 1031-1032.

Physiology (Phsl)

3051. HUMAN PHYSIOLOGY. (5 cr; prereq 1 yr chemistry, biology)

IV. FACULTY AND STAFF

Faculty

Donna Blazevic, M.P.H., Professor, Microbiology
Larry Bowers, Ph.D., Assistant Professor, Chemistry
Sandra Carter, M.S., Assistant Professor, Immunohematology
Grace Mary Ederer, M.P.H., Professor, Microbiology
Esther Freier, M.S., Professor, Chemistry
Ben Hallaway, M.S., Associate Professor, Chemistry
Helen Hallgren, M.S., Assistant Professor, Immunology
Jessie Hansen, M.S., Assistant Professor, Chemistry
Naomi Hanson, M.S., Assistant Professor, Chemistry
Dolores Harvey, B.S., Assistant Professor, Chemistry
Louise Hofherr, M.A., M.P.H., Assistant Professor, Microbiology
Karen Lofsness, M.S., Assistant Professor, Hematology
Lorraine Stewart, M.S., Associate Professor, Immunochemistry
Karen Viskochil, M.S., Assistant Professor, Hematology
Kathryn Zieske, M.S., Assistant Professor, Hematology

Teaching Specialists

Margaret Borene, B.S.
Sally Clysdale, B.S.
Stella Cook, B.S.
Joan Feichert, B.S.
Marilyn Koenst, B.S.
Marilyn Koepke, B.S.
Maureen Scaglia, B.A.
Regina Vijums, B.S.
Lila Wengler, M.S.

Laboratory Directors

Henry Balfour, M.D., Associate Professor, Medical Microbiology
G. Mary Bradley, M.D., Associate Professor, Medical Microscopy
David M. Brown, M.D., Professor, Clinical Laboratories
Richard Brunning, M.D., Professor, Hematology
J. Roger Edson, M.D., Professor, Coagulation
Jeffrey McCullough, M.D., Professor, Immunohematology
Michael Steffes, M.D., Ph.D., Associate Professor, Clinical Chemistry
R. Dorothy Sundberg, M.D., Ph.D., Professor, Hematology

Clinical Staff

Frances Anderson, B.S., Fairview Hospital
Miguel Azar, M.D., Veterans Administration Hospital
Diane Benz, B.S., Fairview Hospital
Nancy Blyler, B.A., S.B.B., Red Cross Blood Center
Michael Burke, M.D., Mt. Sinai Hospital
Irven Dahl, B.S., Veterans Administration Hospital
Agustin Dalmasso, M.D., Veterans Administration Hospital
Gerald Davies, B.S., Veterans Administration Hospital
Margaret Gabrink, B.S., Veterans Administration Hospital
Seymour Handler, M.D., North Memorial Hospital
Norman Horns, M.D., Fairview-Southdale Hospital

Charles Horwitz, M.D., Mt. Sinai Hospital
Oscar Jones, B.S., Veterans Administration Hospital
William Kline, M.S., S.B.B., Red Cross Blood Center
Donovan Peterson, B.S., Lufkin Laboratories
Dorothy Peterson, B.S., Fairview-Southdale Hospital
Herbert Polesky, M.D., War Memorial Blood Bank
John Raich, M.D., Fairview-Southdale Hospital
Donna H. Ripley, B.S., Veterans Administration Hospital
Edward Segal, M.D., Methodist Hospital
Martin Segal, M.D., Methodist Hospital
Doris Serstock, B.A., Veterans Administration Hospital
Patrick Ward, M.D., Mt. Sinai Hospital
Robert Wilfer, B.S., St. John's Hospital

Laboratory Staff: Principal and Senior Medical Technologists

Patricia Brennecke, B.S., Teaching Laboratories Manager
Donna Wieb, B.S., Hospital Laboratories Manager

Administration

Terence Duffy, M.S.
Susan Preston, B.S.

Blood Bank Laboratory

Clareyse Nelson, B.S., S.B.B.
Marylee Rogers, B.S.
Kathleen White, B.S.

Chemistry Laboratory

Mary Berry, B.S.
Priscilla Bormann, B.S.
E. Mary Damron, B.S.
Catherine Foster, B.S.
Mary Fowler, B.S.
Cheryl Hall, B.S.
Kathleen Hansen, B.S.
Mavis Hawkinson, B.S.
Bonnie Hultman, B.S.
Cora Lueben, B.S.
Arlene Meadows, B.S.
Kay Nelson, B.S.
Carol Pesek, B.S.
Alice Reinecke, B.S.
Christine Senn, B.S.

Coagulation Laboratory

Ardella Bennett, B.S.
Cheryl Swinehart, M.S.

Data Division

Philip St. Louis, B.S.

ECG

Glenn Hamberg, M.A.

Heart Catheterization Laboratory

Frank Gams, B.S.

Hematology

Audrey Christenson, B.S.
David Mundschenk, B.S.
Ruth Rosendahl, B.S.
Ella Spanjers, B.S.
Elizabeth Stone, B.S.
Aija Vikmanis, B.S.
Betty Weisel, B.S.

Immunology

Harriet Noreen, B.S.
Nancy Reinsmoen, B.A.

Medical Genetics

Judith Isaacson, B.S.
Leanna Lindquist, B.S.

Microbiology

Evelyn Busch, B.S.
Billie Juni, B.S.
Karen Libby, B.S.
Nettie Warwood, B.S.
Marcia Weber, M.S.

Serology

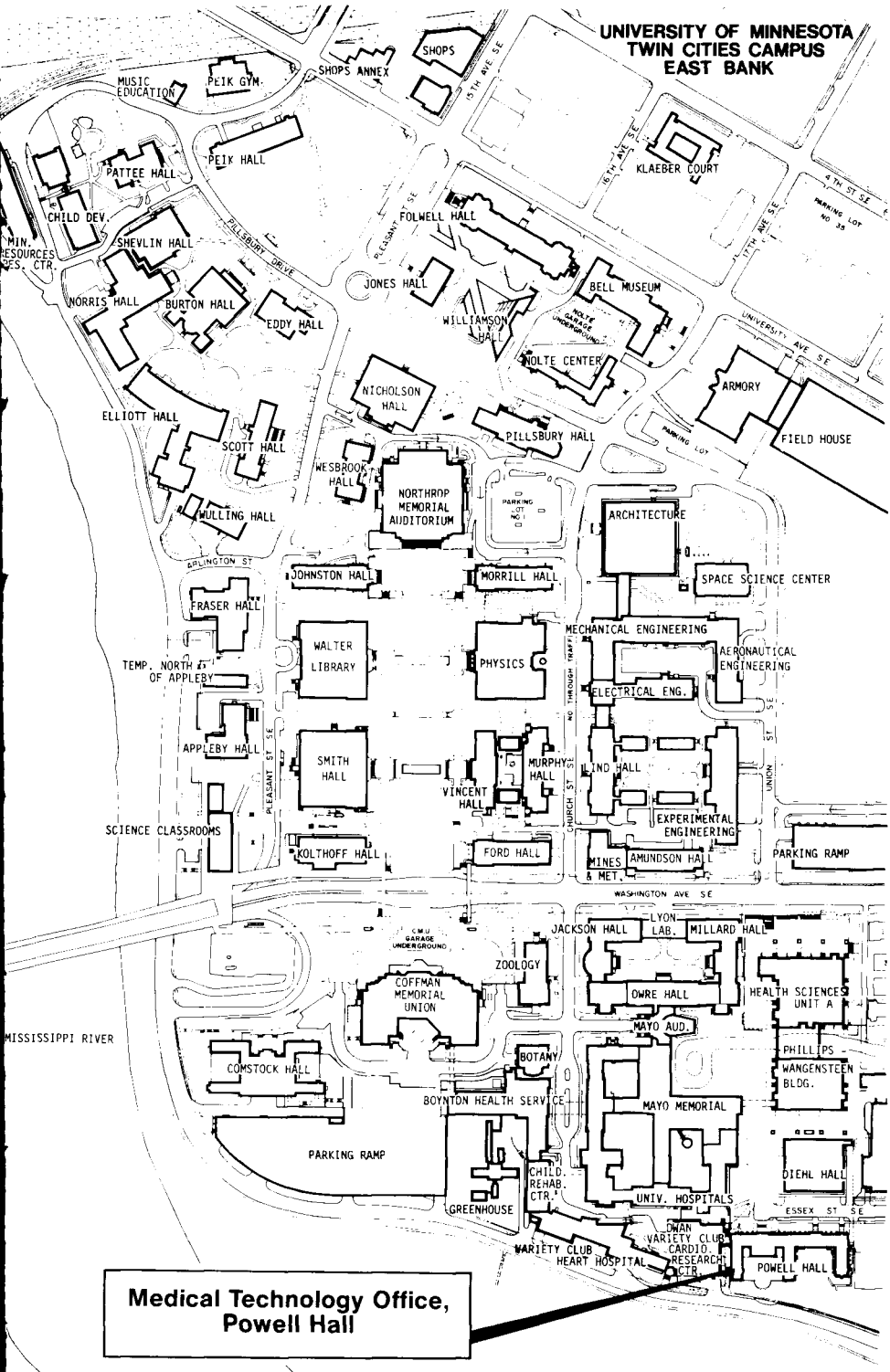
Linda Hanson, B.S.

Surgical Pathology

Kathleen Nadreau, B.S.
Joanne Samuelson, B.S.

Virology

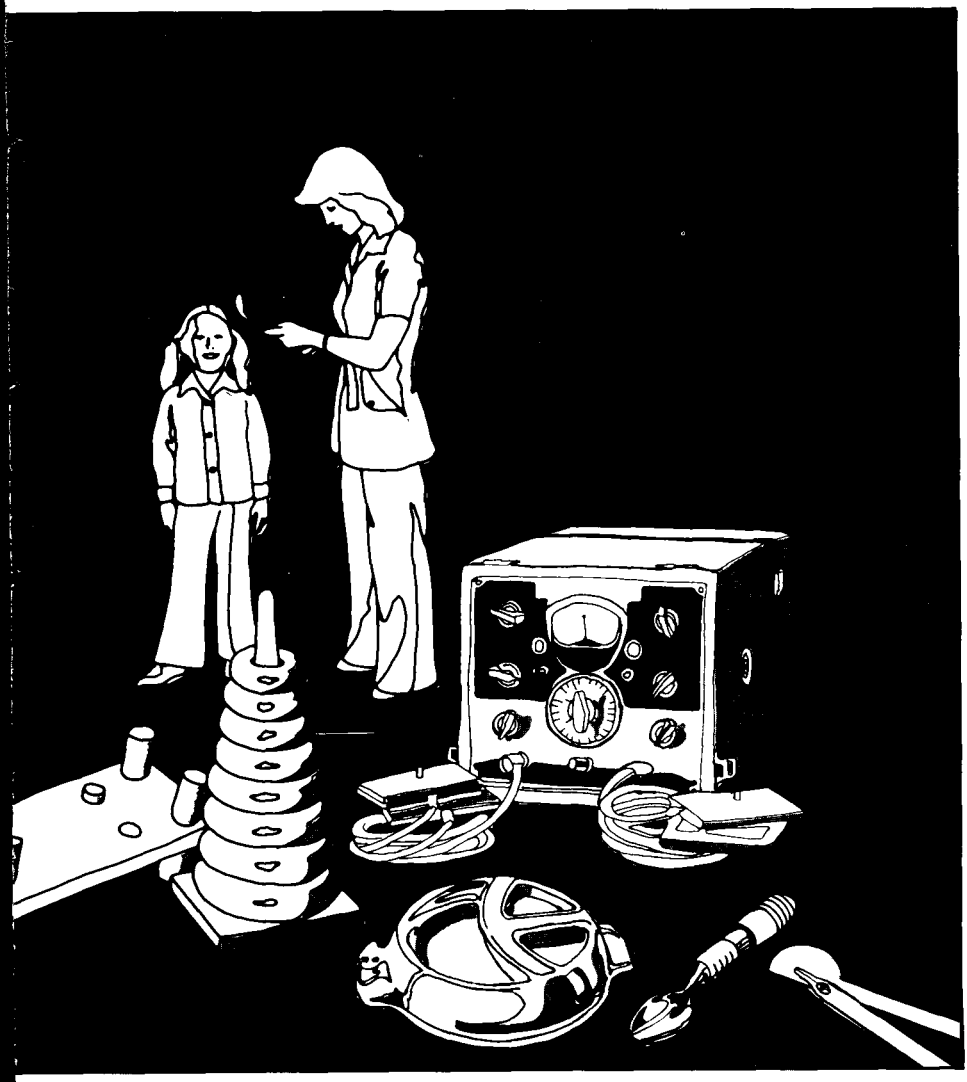
Charlene Edelman, B.A.



Medical Technology Office, Powell Hall

1979-81 UNIVERSITY OF MINNESOTA BULLETIN

OCCUPATIONAL THERAPY
PHYSICAL THERAPY



UNIVERSITY OF MINNESOTA

Administration for Occupational and Physical Therapy

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Frederic J. Kottke, M.D., Ph.D., Head, Department of Physical Medicine and Rehabilitation
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Occupational Therapy
Physical Therapy

UNIVERSITY OF MINNESOTA

CONTENTS

Occupational Therapy
Physical Therapy

I. GENERAL INFORMATION

Objectives of the Program

The University of Minnesota believes that all of its students, whatever their area of specialization or vocational goals, should hold in common the search for a liberal education. The programs in occupational therapy and physical therapy offered by the Department of Physical Medicine and Rehabilitation, a part of the Medical School, provide students with a strong foundation in biological and physical sciences as well as an opportunity to take liberal arts and other courses that serve to develop individual interests and abilities. All students are expected to distribute some part of their course work in areas of study outside of occupational therapy or physical therapy.

Because the nation's health care needs can be met only through multidisciplinary teams of specialists, it is essential that the training of students in occupational therapy and physical therapy includes an integrated approach to comprehensive health care. The Department of Physical Medicine and Rehabilitation offers its students the opportunity to learn to work with other health professionals.

Occupational therapy and physical therapy students must have a knowledge of medical conditions and must understand psychology, physiological processes, and social theories. With this background they can acquire the skills and develop the ability to make the decisions required in the treatment process.

Upon completion of the professional program the student should be able to:

Determine the stage of growth and development at which the patient or client is functioning and make adjustments that demonstrate an awareness of the physical and psychological effects of an interruption of the normal process.

Select, administer, and interpret the tests and procedures necessary to evaluate the physical and emotional problems that forms of therapy may remedy.

Develop a plan of therapy and select and administer the treatment procedures indicated by the physical, emotional, economic, and social needs of the patient or client.

Evaluate the effectiveness of a treatment regimen and make appropriate adjustments in the treatment plan.

Effectively communicate, orally or in writing, with patients or clients, the health care team, the family, and others responsible for and interested in the patient's or client's welfare.

Respond professionally to the patient's or client's illness, disability, and problems.

Use the scientific method for solving treatment problems.

Work closely with other people, and be aware of his or her own feelings and sensitive to the impact of his or her behavior on others.

Determine her or his individual need for personal and professional growth and accept the responsibility for continuing to improve her or his abilities.

The therapist in rehabilitation provides specialized services that require high moral standards, optimum mental and physical well-being, and an understanding of the nature of the therapist's own life and the world in which he or she lives.

Admission

Two years of preprofessional study in liberal arts are required before applying for admission to the professional programs, which begin in the junior year. Requirements for preprofessional curricula are detailed in sections II and III of this bulletin.

For detailed information about application procedures for the courses in occupational therapy and physical therapy, refer to sections II and III. Because enrollment in both of these professional programs is limited, it is suggested that all students intending to pursue these majors consider applying to other universities and colleges as well as to the University of Minnesota.

New Students—Students who have not completed any college work should apply for admission to the College of Liberal Arts and declare a major in occupational or physical therapy. Students already enrolled at the University of Minnesota who wish to change majors should see an adviser as early as possible (refer to the section on advisers).

Students With Advanced Standing—Students transferring from other colleges or universities may be admitted with advanced standing by applying to the University and having their credits evaluated. Students who have satisfied all preprofessional requirements (see sections II and III) may apply directly to the Course in Occupational Therapy or Physical Therapy. Advanced standing students who have not satisfied preprofessional requirements will usually enroll in the College of Liberal Arts until they are eligible to apply for the professional curriculum. Those who transfer to the University of Minnesota to make up deficiencies in their educational background cannot be assured of being admitted to one of the professional programs and should always consider alternate goals. Students with degrees in other majors may seek admission to one of the professional programs on the same basis as other students, or they may want to consider one of the programs offered at other universities that offer basic professional preparation at the graduate level.

Facilities

Most of the professional courses are taught in the classrooms located on the second floor of the Children's Rehabilitation Center, 426 Church Street S.E., Minneapolis. The offices of the occupational and physical therapy advisers are on the second and third floors. The secretaries are in room 271; call them at 373-9024 to make appointments. The directors of the two courses have their offices in the Children's Rehabilitation Center and may be reached at 373-9034. The directors and their offices are:

Occupational Therapy—Marvin Lepley, room 378

Physical Therapy—John Allison, room 377

Seminars, lectures, recitations, group discussions, and group assignments are used for studying concepts appropriately taught by these methods. Professional skills are taught in laboratory sessions. Videotape and many other audiovisual aids are used in classroom teaching, and in some courses programmed textbooks are used. Free communication between students and teachers is encouraged.

As part of an outstanding health sciences center, the teaching programs of the Department of Physical Medicine and Rehabilitation can call upon faculty members from other health sciences areas to assist in preparing students with a broad medical knowledge. Patients volunteer to assist faculty members in clinical teaching so that students may witness firsthand the application of classroom studies to a clinical setting.

Advisers

Preprofessional Program—College of Liberal Arts students should seek assistance in program planning at the Health Sciences Premajor Advising Office, 30 Johnston Hall. Advisers in this office are also able to provide information about other health science programs.

Freshman and sophomore students attending other colleges or universities should contact the appropriate health sciences adviser on their campus or write to the occupational therapy or physical therapy program director for advice on program planning.

Professional Program—Students in the professional programs will be assigned to a faculty adviser in the Department of Physical Medicine and Rehabilitation. These advisers are available to assist students in professional development as well as in scholastic or personal matters. Advisers also can direct students to other sources of assistance.

Expenses

Fees—Tuition and incidental fees are subject to change; refer to the *General Information Bulletin* for current information.

Locker Fee—$10

Laboratory Fee—$2 (charged for those laboratory courses where expendable materials are used for classwork)

Other Expenses—The following is an estimate of special school expenses for the professional programs:

Uniforms—$50

Books and Laboratory Manuals—$400 (Books may be purchased at the Health Sciences Bookstore, 2-554 Health Sciences Unit A.)

Clinical Education—Some additional travel expenses may be incurred during clinical education; these expenses will vary according to individual plans. Students do not have to leave the Twin Cities area. Some fieldwork education centers for occupational therapy provide students with small stipends or maintenance expenses, but these cannot be guaranteed, and students should not make plans that depend on such support. Occupational therapy students are required to pay the same tuition fees during the summer session as they do during the academic year because summer fieldwork in occupational therapy involves a full 12-week period. Physical therapy students pay regular tuition and fees during clinical education.

Financial Aid

Students needing financial assistance for the following academic year should apply as soon as possible after January 1 but before March 1 for priority consideration. Applications should be filed with the Office of Student Financial Aid, 107 Armory.

Some financial assistance is available for students in the junior and senior years of professional school. For information about any of the following awards, students should see an adviser or the director of the Course in Occupational Therapy or Physical Therapy.

Crippled Child Relief, Inc., Loan Fund—Short-term loans are provided without interest in emergency situations.

Crippled Child Relief, Inc., Scholarship

Sponsor: Members of Crippled Child Relief, Inc., Minneapolis, Minnesota.

Basis of Award: For a student in the field of physical medicine and rehabilitation who shows scholarly excellence and dedication and a special interest in helping crippled children.

Eleanore Funk Memorial Scholarship

Sponsor: Mrs. Clarice N. Lundby, Ventura, California.

Basis for Award: Awarded annually to a senior occupational therapy student who demonstrates professional promise and high academic standing.

Borghild Hansen Memorial Scholarship

Sponsor: Students, colleagues, and friends of the late Borghild Hansen, first director of the University of Minnesota Course in Occupational Therapy.

Basis of Award: For a junior or senior occupational therapy student selected on the basis of academic standing and professional promise.

Mary McMillan Scholarship

Sponsor: McMillan Scholarship Program.

Basis of Award: Scholarships of $500 for outstanding physical therapy students. Only one candidate may be recommended by an institution. Awards are made on a competitive basis; consideration is given to superior scholastic ability and evidence of potential for professional contributions.

Minnesota Chapter, APTA, Scholarship

Sponsor: Minnesota Chapter, American Physical Therapy Association.

Basis of Award: An annual award of $150 made to an outstanding University of Minnesota physical therapy student on the basis of academic standing and professional promise.

Minnesota Occupational Therapy Association Scholarship

Sponsor: Members of the state professional association for occupational therapists.

Basis of Award: Awarded annually to a junior or senior in occupational therapy on the basis of scholastic standing, financial need, and professional promise.

Rehabilitation Services Administration Traineeship—For 1 or 2 years. For information, write or call one of the program directors.

In addition, the armed services have professional programs that offer academic preparation. Information may be obtained from local Air Force, Army, and Navy recruiting offices.

Academic Regulations

A-N Grading System—According to University regulations, four permanent passing grades are used to evaluate student adademic work and to compute the student's grade point average. A is the highest grade and indicates superior work, B indicates above-average work, C indicates average work, and D indicates substandard work and is the lowest passing grade. The grade N indicates that the student did not successfully complete the course.

S-N Grading System—A student may elect to take courses outside of the major field on the S-N (Satisfactory-No Credit) grading system. The credits earned in this manner are not used in computing the student's grade point average. During the first 2 years, certain prerequisite courses for the professional programs may not be taken S-N. The student should be very selective in deciding which courses to take S-N since it is often advantageous to take courses A-N when good grades can raise the grade point average. Certain professional level courses may be taken S-N.

Symbols—A temporary symbol I (incomplete) is assigned when the instructor has insufficient information to assign a permanent grade. To remove an incomplete the student must complete the course work by the end of the next quarter, unless special permission is obtained from the instructor. If course work is not completed within the specified time limit, the permanent grade becomes an N and is subject to review by the Scholastic Standing Committee.

If a student officially cancels a course prior to the end of the second week of a quarter, no record of registration will appear on the student's record. If a course is officially canceled after the second week, a registration symbol W (withdrawal) will appear on the student's record.

A registration symbol V indicates registration as an auditor or visitor. No grade or credit is awarded for such registrations.

The symbol X is used to indicate that the work is still in progress for a sequence course. When the sequence is completed, the X is changed to a permanent grade.

Grade Points—Students earn grade points according to the quality of work and the number of credits involved. Grade points are assigned to course grades according to the following system:

1 credit of A carries 4 grade points

1 credit of B carries 3 grade points

1 credit of C carries 2 grade points

1 credit of D carries 1 grade point

An N carries no credit or grade points.

Grade Point Average—The grade point average is computed by dividing the number of grade points earned by the total number of credits for which grades (A, B, C, D) have been recorded.

Attendance—Students are expected to be regular and punctual in class attendance and in clinical work. They are asked to notify instructors in advance, whenever possible, if they do not expect to be present. It is the student's responsibility to take the initiative in making up any work missed. Students who fail to appear for an examination without previous permission from the instructor will usually not be allowed to make up the examination.

Satisfactory Progress and Probation—Students are expected to maintain satisfactory progress in the professional programs. They must maintain a quarterly grade point average of at least 2.00 and earn no grade lower than C. Failure to maintain this standard may result in probation or dismissal from the program. Students will be placed on probation if they earn a quarterly grade point average below 2.00 and will be required to petition for continuation in the program.

Students should see their instructors or advisers early for help in courses in which they are having difficulty.

During the junior and senior years, the scholastic committee reviews the progress of each student at the end of each quarter. Students who are placed on probation will be notified initially through their grade report; an official letter may also be sent. After the student completes the next quarter's work, the scholastic committee

may take the student off probationary status, continue the probation for an additional quarter, or dismiss the student from the program, depending on her or his progress.

A student with a grade lower than a C in any departmental course must repeat the course or do supplemental work to satisfactorily complete the basic requirements of the course. A student receiving a grade below a C in a nondepartmental course may, at the discretion of the instructor, be required to do supplemental work or to repeat the course. The later grade will be recorded on the official transcript and can be no higher than a C. Required supplemental work generally must be completed by the end of the quarter following that in which the original grade was received. Extension of this time limit may be granted by the instructor.

Unsatisfactory professional conduct may also be considered grounds for placing students on probation or for dismissal. Disregard for patients' welfare, disinterest in studies as demonstrated by frequent tardiness or absence, and failure to cooperate in class assignments and discussions are violations of the Conduct Code for occupational and physical therapy students. Among other things, the code of conduct also prohibits scholastic dishonesty such as submitting false records of academic achievement, cheating on assignments or examinations, plagiarizing (misrepresenting any part of another's work as one's own work), or acquiring or usng test materials without faculty permission. Students must also comply with the policies of the Campus Committee on Student Behavior.

Dismissal—Students may be dismissed from the courses in occupational and physical therapy if they have made no improvement after being placed on probation. Students may appeal any policies or decisions made by following the appeals procedure as outlined by the University Senate and available to all students through the University appeals committees.

Discontinuation—Students whose academic progress is hampered by poor health or personal or family problems may be asked to discontinue their academic work until these conditions have improved.

Canceling Out—Students who are considering canceling out of school should discuss these plans with their adviser or with the course director.

Readmission—Students who have left the program in good standing and wish to return to school should discuss their plans with the course director during the quarter before that in which they wish to return.

Graduation—The bachelor of science degree will be recommended for students who have successfully completed their course of study with a minimum grade point average of 2.00 overall and in the courses of the professional curriculum. In addition, they must have satisfied the liberal education distribution requirements as established by the Council on Liberal Education.

In compliance with University guidelines, graduation with honors is limited to 10 percent of the graduating class. Honors graduates are screened and selected by the Scholastic Standing Committee, with final approval by the faculty. Criteria include grade point average in the professional program and quality of performance during the full-time clinical placement. To graduate "with distinction," students must earn a grade point average of 3.50 to 3.75. To graduate "with high distinction," students must earn a grade point average of 3.76 to 4.00.

It is the responsibility of the student to file an application for graduation at the Registration Center, 202 Fraser Hall (for mobility impaired students, the Office of Registration and Student Records, 150 Williamson Hall), during the fall quarter of the senior year.

Access to Student Educational Records

In accordance with regents' policy on access to student records, information about a student generally may not be released to a third party without the student's permission. The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information—name, address, telephone number, dates of attendance, college and class, major, adviser, and degrees earned—is considered public or directory information. To prevent release of such information outside the University while in attendance at the University, a student must notify the records office on his or her campus.

Students are notified annually of their right to review their educational records. The regents' policy, including a directory of student records, is available for review at the information booth in Williamson Hall, Minneapolis campus, and at the records offices on other campuses of the University. Questions may be directed to the office of the Coordinator of Student Support Services, 260E Williamson Hall, (612) 373-2106.

Student Services

The following University agencies are available to help students. They may be consulted directly or through referral from a faculty adviser.

Admissions Information—240 Williamson Hall

CHIP Office—1-425 Health Sciences Unit A

Health Sciences Minority Program—2-194 Frontier Hall

Health Sciences Student Personnel Services—W-42 Centennial Hall

Health Service and Mental Hygiene Clinic—Boynton Health Service

Housing Office—Comstock Hall

Reading and Study Skills Center—101 Eddy Hall

Records and Registration Information—150 Williamson Hall

Student Activities Center—350 Coffman Memorial Union

Student Counseling Bureau—101 Eddy Hall

Student Employment Service—6 Morrill Hall

Veterans Assistance and Outreach—240 Williamson Hall

For information about these and other student services, see the *General Information Bulletin.*

Student Activities

In addition to social events available to all students at the University, there are many informal activities arranged by students and faculty members in the occupational and physical therapy professional programs.

Occupational and physical therapy students are encouraged to participate in program planning and decision making. For example, students serve on the occupational therapy and physical therapy curriculum committees.

Students are also encouraged to become members of professional organizations. Student memberships are available in the American Occupational Therapy Association, the American Physical Therapy Association, and the Minnesota Occupational Therapy Association.

There is a Student Occupational Therapy Association as well as a Council for Health Interdisciplinary Participation (CHIP) at the University. CHIP is an organization for health science students that promotes interdisciplinary involvement in service, education, and social activities. The organization encourages students from the various health sciences programs to get together and explore the potentials of a team approach to health care delivery. For information about CHIP, call 373-8969.

Continuing Education and Graduate Study

Graduates in occupational and physical therapy, and others with proper educational qualifications, may be allowed to take professional courses to update their knowledge and skills. Those interested must receive permission from the course director, who determines student eligibility and availability of space. Occupational therapy graduates are encouraged to request the Continuing Education Policy Statement, which is available from the Director's Office, 378 Children's Rehabilitation Center, 426 Church Street S.E., University of Minnesota, Minneapolis, Minnesota 55455. Some continuing education courses are offered through the Department of Extension Classes. The Health Sciences Continuing Education brochure, published twice each year, lists all of the continuing education offerings of the University of Minnesota health sciences units. Information about continuing education offerings may be obtained from the coordinators of these activities: for occupational therapy, Judy Reisman, OTR, 373-7686; for physical therapy, Margie Gardner, RPT, 373-8390.

Graduate study for physical therapists and occupational therapists interested in a professional career in public health is provided by the School of Public Health. The course of study leads to a master of public health or master of science degree. See the *School of Public Health Bulletin* for information.

A master of science degree program for physical therapists is offered by the Graduate School. Requirements for admission include a bachelor's degree and completion of a course in physical therapy accredited by the Council on Medical Education of the American Medical Association and by the American Physical Therapy Association. The student's record should provide evidence of academic ability and potential to pursue advanced study. Previous clinical experience in the practice of physical therapy is required. For the M.S. program the student may select either Plan A (with thesis) or Plan B (without thesis) curriculum. Further details regarding the program and application procedures are available in the *Graduate School Bulletin* and the *Graduate Programs in the Health Sciences Bulletin*. Information about the graduate program in physical therapy may also be obtained from Helen Skowlund, director of graduate study in physical therapy, 373-9026.

II. OCCUPATIONAL THERAPY

Professor

Frederic J. Kottke, M.D., Ph.D., *head, Department of Physical Medicine and Rehabilitation*

Associate Professor

Marvin G. Lepley, B.S., *director*
Dortha L. Esch, B.S., *assistant director*
Helen M. Dahlstrom, B.S.
A. Joy Huss, M.S.

Assistant Professor

Louvain G. Arndts, B.S., M.P.H.
Robert L. Bollinger, B.S.
Marian L. Eliason, B.S.
Clarence A. Sicard, B.S.

Instructor

Judith Reisman, M.A., *coordinator, continuing education*
Rondell S. Berkeland, B.S., M.P.H.

Clinical Instructor

Terry K. Bergstrom, B.S.
Mary I. Brambilla, B.S.
Catherine C. Brennan, B.S.
Marion A. Calph, B.S.
Kathryn N. Dole, B.S.
Anita A. Folch, B.S.
Karen L. Kendrick, B.S.
Vernette E. McCombs, B.S.
Nancy D. Parker, B.S., M.P.H.
Sandra L. Peterson, B.S.
Elizabeth Rivers, B.S.
Donna M. Rodel, B.S., M.Ed.
Karen Rudeen, B.S.
Jacqueline V. Zschokke, B.S., M.P.H.

History—During World War I, the University of Minnesota offered a short training course for what were then called "reconstruction aides." These people, mostly artists, were given instruction in activities that were thought to be useful in the rehabilitation of soldiers returning from the front. In 1924 the College of Education organized a course in occupational therapy, but it was discontinued during the early 1930s. In 1946, because of a renewed interest in occupational therapy following World War II, the present Course in Occupational Therapy was established in the College of Medical Sciences. Borghild Hansen was appointed director and remained in that position until her death in 1966. Marvin G. Lepley has been director of the program since that time. The Course in Occupational Therapy is approved by the Council on Medical Education of the American Medical Association and by the American Occupational Therapy Association.

Philosophy and Objectives — Occupational therapy is a human service profession that focuses on individual needs and goals. The occupational therapist assesses needs, establishes goals, and develops treatment programs for individuals whose abilities to cope with the tasks of living are threatened or impaired by congenital or develpmental disability, the aging process, physical injury or illness, or psychological and social disability. An occupational therapist uses task-oriented activities to prevent, minimize, or correct disabling emotional, behavioral, or physical handicaps.

Specific occupational therapy services include providing evalution of and training in performance of life tasks (including activities of daily living and homemaking); use of adapted equipment and hand splints; use of therapeutic activities to enhance physical, emotional, perceptual-motor, and sensory integrative skills; development of prevocational skills; and removal of architectural barriers. Occupational therapists serve as vital members of a treatment team, consulting with physicians, physical and speech therapists, nurses, social workers, psychologists, vocational counselors, teachers, and other specialists.

Professional Employment — There is a wide variety of employment opportunities for qualified therapists. Graduates are employed in rehabilitation centers, hospitals and outpatient clinics, psychiatric facilities, sheltered workshops, public and special schools, nursing homes, home health programs, day care centers, and community health agencies. Therapists may receive commissions in the armed forces or may find employment with the U.S. Public Health Service.

Program of Study—The first 2 years of study are spent in the College of Liberal Arts at the University of Minnesota or at any other approved college or university. During this time course emphasis is on the biological sciences, behavioral sciences, and artistic expression. Although there are prerequisite courses, the first 2 years provide reasonable flexibility for students to use elective courses to broaden their education. At the end of the sophomore year, students apply on a competitive basis for admission to the professional program. The last 2¼ years include academic work combined with part-time fieldwork and a minimum of 6 months of full-time fieldwork. Upon completion of the prescribed course of study, students receive the bachelor of science degree. Graduates are eligible to become registered occupational therapists by successfully completing the national certification examination of the American Occupational Therapy Association.

Admission Requirements—Students applying for admission to the professional program must satisfy the residency regulations of the University of Minnesota (see the *General Information Bulletin*) or must be a resident of a state bordering Minnesota that does not have an occupational therapy program. Only those students with a grade point average of C+ or higher overall and in the required biological sciences and psychology courses will be considered. Applicants must have completed some successful work or volunteer experience. It is highly desirable that part of this experience has been in a health care or related facility that provided the applicant an opportunity to evaluate his or her potential for working with persons who are sick or who have physical disabilities or psychosocial dysfunctions. Applicants should assess their interest in the profession by visiting or doing volunteer work in an occupational therapy department. They should be in good health and have the physical capacity to do the work of a therapist. Sincere interest in and the necessary maturity for working closely with people and dealing with their problems are also important. Because of limitations in space and facilities, admission is currently restricted to 30 students each year. Selection is made on a competitive basis. It is expected that students entering the course intend to complete the program.

Admission Procedure—University students who have satisfactorily completed the prerequisite courses and have accumulated 85 to 90 credits may apply in 240 Williamson Hall for transfer to the Course in Occupational Therapy. Students attending other colleges may request an Application for Admission With Advanced Standing from the Admissions Office, 240 Williamson Hall. Applications and related materials should be submitted as soon as possible after January 1 and no later than April 1 for the professional program that begins each fall quarter. Additional materials that should be submitted to the director of the occupational therapy program are:

Personal Data form

Check list of course requirements and grade point averages

Evaluations of work and volunteer experience

Profile of Minnesota Multiphasic Personality Inventory

Profile of Strong-Campbell Interest Inventory

Transcript that includes sophomore fall quarter grades

Transcript or grade report of winter quarter grades (as soon as available)

List of courses to be taken during spring quarter and the summer session (if applicable)

Forms for and information regarding the above items are available from the Course in Occupational Therapy, 382 Children's Rehabilitation Center, 426 Church Street S.E., University of Minnesota, Minneapolis, Minnesota 55455.

Qualified applicants will be requested to attend a group interview. A notice of the interview date is mailed to applicants after materials have been received and processed.

American Occupational Therapy Association—For further information regarding other universities and colleges offering courses in occupational therapy, career opportunities, and sources of financial aid, write to the American Occupational Therapy Association, Inc., 6000 Executive Boulevard, Suite 200, Rockville, Maryland 20852.

Preprofessional Curriculum

The preprofessional program is continuously being reviewed and is subject to change. For current program information, contact the Health Sciences Premajor Advising Office, 30 Johnston Hall, 373-2912.

Liberal Education Group Distribution Requirements—The prerequisite courses are listed below under the liberal education group distribution categories along with the *minimum* number of credits required for each category. The required courses are listed by name and number. In most categories some additional credits are required. Students should use the group distribution course list in the *College of Liberal Arts Bulletin* for selection of these additional courses. Courses may be taken S-N unless otherwise indicated. See the Credit and Grade Standards section of the *College of Liberal Arts Bulletin* regarding S-N registration restrictions. A total of 85 to 90 credits are required.

Communication, Language, and Symbolic Systems—14 credits

Comp 1001, 1002—Introductory Composition (8)
(or) Comm 1001-1002—Communication (8)
Phar 5210—Terminology of Health Sciences (2)
Additional courses (4-6)

If students have not had a good public speaking course before entering the University, a speech course is highly recommended.

Physical and Biological Sciences—17 credits (All required courses in this category must be taken A-N.)

Biol 1011—General Biology (5)
MdBc 1030—Physiological Chemistry (4)
(or) Chem 1004—General Principles of Chemistry (5)
Anat 1004—Elementary Anatomy (4)
Phsl 1002—Human Physiology (4)

The Individual and Society—21 credits (All required psychology courses must be taken A-N.)

Psy 1001—General Psychology (5)
Psy 3604—Introduction to Abnormal Psychology (4)
CPsy 1301—Introductory Child Psychology (4)
Additional courses (8) (These additional credits should be in anthropology, psychology, sociology, or a combination of these fields.)

Literary and Artistic Expression—12 credits

A course in weaving with a loom is required. A course in ceramics is highly recommended. The majority of credits should be taken in studio or applied arts.

ArEd 3010—Introduction to Weaving (3)
ArEd 3020—Contemporary Crafts (3)
ArtS 1101—Drawing I (4)
ArtS 1801—Ceramic Processes (4)
GC 1481—Art Lab: Experiences in the Media (3)
GC 3616—Creativity: Crafts (4)

Ind 1490—Elementary Handcrafts (3)

Any additional applied arts courses taken outside of a college or university are considered advantageous but will not apply to the 12-credit requirement. Such courses, however, will be considered during the admission process.

Public Health—5 credits (Must be taken A-N.)

PubH 3004—Basic Concepts in Personal and Community Health (5)

SUGGESTED PROGRAM

Students attending the University of Minnesota should plan their quarterly registration carefully because some courses are offered only once during the academic year.

Students attending other colleges should select equivalent courses carrying comparable credit.

FRESHMAN YEAR

	Approx. Qtr. Cr.
Composition or Communication	8
Biology	5
Public Health	5
Elementary Anatomy	4
Chemistry	5
General Psychology	5
Art courses	6
Orientation to Occupational Therapy[1]	2
Electives	5
	45

SOPHOMORE YEAR

	Approx. Qtr. Cr.
Human Physiology	4
Child Psychology or Human Development	4
Abnormal Psychology	4
Additional Individual and Society Course	8
Speech or Language	4
Art courses	6
Medical Terminology[2]	2
Electives	13
	45

Professional Curriculum

JUNIOR YEAR

Fall	Credits	Winter	Credits	Spring	Credits
PMed 5100	3	PMed 5161	2	PMed 5162	3
PMed 5330	6	LaMP 1171	1	PMed 5393	3
PMed 5340	4	PMed 5182	5	PMed 5312[3]	3
LaMP 1170	3	AdPy 5121	2	PMed 5342[3]	5
		PMed 5311	4	Neur 5121	2
		AdPy 5122	1		

SENIOR YEAR

PMed 5370	4	PMed 5344	3	PMed 5396	ar
PMed 5392	4	PMed 5375	4		
PMed 5343[3]	7	PMed 5380	3		
PMed 5360[3]	3	PMed 5391	1		
		PMed 5394	4		

SUMMER SESSION (BOTH TERMS) OR FALL QUARTER

PMed 5397 ..... ar

[1]PMed 1003, Orientation to Occupational Therapy, is highly recommended for students attending the University of Minnesota, Twin Cities campus.

[2]A medical terminology course may not be available at other colleges. Students admitted to the professional program will be able to complete this requirement during the junior year.

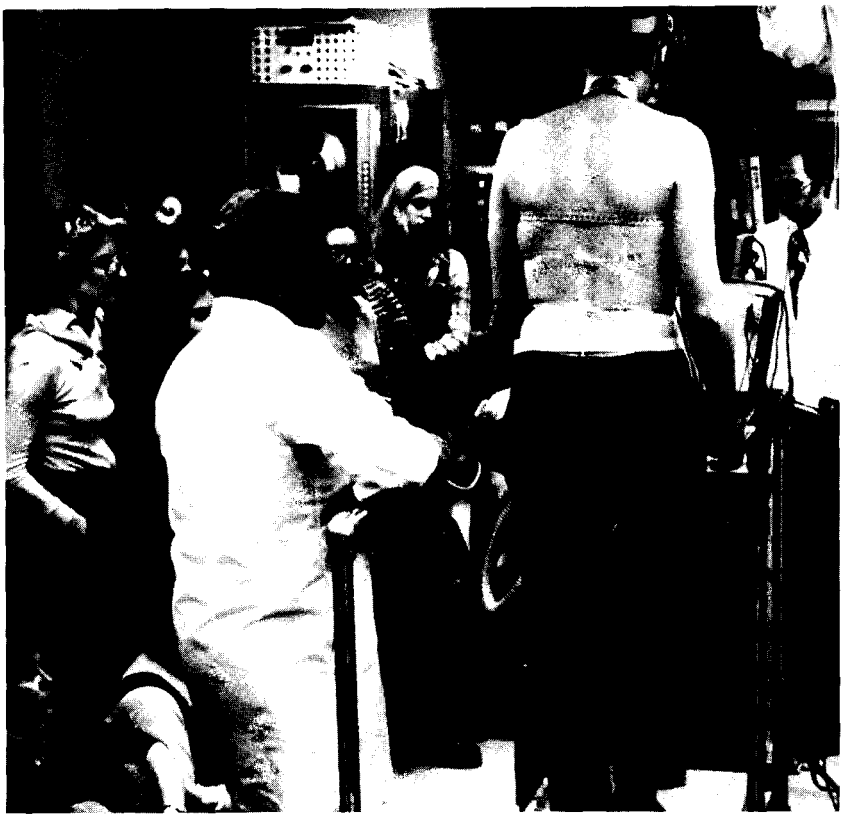
[3]These courses are offered spring and fall quarters with half of the class taking PMed 5312 and PMed 5342 spring quarter and the other half taking PMed 5343 and PMed 5360. The sequence is reversed fall quarter.

FIELDWORK EDUCATION

(PMed 5396-5397)

A minimum of 6 months of fieldwork is required. During this period the student works with patients with both physical and psychosocial dysfunctions; some students may elect optional experience in a community setting.

Students are individually assigned to cooperating hospitals and community agencies within the limitations of available openings. There is a signed agreement between the University and the cooperating center as well as between the student and the center. Students must agree to abide by the center's code of conduct and to dress in accordance with its rules.



Junior occupational therapy students observe a cardiac stress test.

III. PHYSICAL THERAPY

Professor

Frederic J. Kottke, M.D., Ph.D., *head, Department of Physical Medicine and Rehabilitation*

Associate Professor

John D. Allison, M.S., *director*
Helen V. Skowlund, M.S., *director of graduate study*
Martin O. Mundale, M.S.
James F. Pohtilla, M.S.

Assistant Professor

Glenn N. Scudder, M.S., *assistant director*
Corinne T. Ellingham, M.S.
Donna L. Pauley, B.S.

Adjunct Instructor

Cornelia A. Burrill, B.S.

Instructor

Marguerite Gardner, M.S., *coordinator, continuing education*
Ann Charness, M.S.

Clinical Instructor

JoAnn Battaglia, B.S.
Nancy Belshner, B.S.
Eugene Connolly, B.S.
Thomas Coplin, B.S.
Jan Gauger, B.S.
James Gealow, B.S.
Donabelle Hansen, B.S.
Kathleen Janikula, B.S.
Joyce Jensen, B.S.
Barbara Linderman, B.S.
Ruth Nevels, B.S.
Peter Polga, B.S.
Virginia Peulen, B.S.
Dale Schibonski, B.S.
Martha Talmage, B.S.
Henry Tamminen, B.S.
Diane Twedt, B.S.

History—The Course in Physical Therapy at the University of Minnesota began in 1942 as a 12-month certificate program under the direction of Miland E. Knapp, M.D. In 1948 it became a 4-year degree program and was placed under the direction of Ruby Green Overmann, education director, and Frederic J. Kottke, M.D., medical director. After Ruby Green Overmann's retirement in 1957, Wilbur L. Moen became educational director. In 1978 John D. Allison became educational director.

Throughout its history, the Course in Physical Therapy has been approved by the American Physical Therapy Association and by the Council on Medical Education of the American Medical Association.

Philosophy and Objectives — Physical therapy is concerned with the prevention of disability and the restoration of function following disease, injury, or loss of bodily part. Its goal is to help patients reach their maximum performance potentials and asssume their places in society while learning to live within the limits of their capabilities. Physical therapy involves interpretation of orders from physicians, evaluation, treatment planning, performance of tests and measurements, traction instruction, consultative services, and supervision of support personnel. The therapeutic properties of exercise, heat, cold, electricity, ultrasound, massage, and other rehabilitative procedures are used during treatment. In order to adapt treatment to the patient's reactions, the therapist must have a thorough background in the biological and physical sciences and pathology.

Program of Study—The educational program in physical therapy requires 4 years of study and leads to a bachelor of science degree with a major in physical therapy. A minimum of 180 quarter credits are required for the degree. The student spends the first 2 years in a pre-physical therapy program that emphasizes liberal education studies and includes a foundation in the behavioral, biological, and physical sciences. At the end of the sophomore year, students apply for admission to the professional program, which takes 2 academic years and one summer term to complete. Graduates of the program are eligible for state registration or licensure according to the laws of various states.

Admission Requirements—A student planning to enter a health profession such as physical therapy should seriously consider whether she or he has the necessary personal qualifications for working closely with people and for dealing with their problems. Exposure to the health care delivery system through employment or

volunteer work is considered an essential prerequisite. The student must be in good physical and mental health to achieve success in physical therapy; a physical examination by a physician is required prior to beginning the professional program.

Because of limitations in space and facilities, enrollment is restricted. Applicants are selected on a competitive basis. To be eligible for admission, the student should complete a minimum of 86 quarter credits including the required courses or their equivalents. A grade point average above 2.50 (C+) in course work in the physical, biological, and behavioral sciences is required as an indication of probable success in the program. In selecting students, Minnesota residents are given first priority. Nonresidents with outstanding credentials will be considered if they reside in a state that does not have a physical therapy school.

Admission Procedure—Applicants are requested to take the Minnesota Multiphasic Personality Inventory and the Strong-Campbell Interest Inventory. The Student Counseling Bureau (101 Eddy Hall, 373-4193) charges a fee for administering these tests.

Once the application is reviewed applicants are sent guidelines for submitting a résumé of their background, training, experience, and accomplishments—especially examples that contributed or demonstrate their knowledge and understanding of physical therapy. A personal interview may be requested by the Admissions Committee.

Deadline for application is March 1 for the class beginning professional study in September. To allow ample time for review of applications, students are urged to file their applications in January or upon completion of the fall quarter.

American Physical Therapy Association—For further information regarding admission to other colleges and universities offering professional programs in physical therapy career opportunities and other sources of financial aid, write to the American Physical Therapy Association, 1156 15th Street N.W., Washington, D.C. 20005.

Preprofessional Curriculum

Required and elective courses to be taken in the first 2 years are listed below. Courses may be taken S-N unless otherwise indicated. Courses are listed under the liberal education group distribution categories along with the *minimum* number of quarter credits required for each category.

Communication, Language, and Symbolic Systems—16 credits
- Comp 1001,1002—Introductory Composition (8)
- (or) Comm 1001-1002—Communication (8)
- (or) exemption from requirement
- Elective courses from foreign language, philosophy (logic), mathematics, speech, or statistics (8)
- Phar 5210—Terminology of Health Sciences (2)
- (or) Clas 1048—Technical Terms of the Medical and Biological Sciences (2) (offered through extension classes or independent study)

Physical and Biological Sciences—38 credits (All courses in this category must be taken A-N.)
- Biol 1011— General Biology (5)
- Biol 1106—General Zoology (4)
- Anat 1004—Elementary Anatomy (4)
- Phsl 3051—Human Physiology (5)

Chem 1001-1002—Chemical Principles and Covalent Systems (10)[1]
(or) Chem 1004-1005—General Principles of Chemistry (10)[1]
Phys 1031-1032—Introductory Physics: Measurement and Applications (10)[2]
(or) Phys 1014-1024—Introductory Physics: Concepts in Physics (8)[2]

The Individual and Society—8 credits (Required courses listed below must be taken A-N.)
Psy 1001—General Psychology (5)
Psy 3604—Introduction to Abnormal Psychology (4)

Literary and Artistic Expression—8 credits
Elective courses from art, music, theatre arts, literature, classics, humanities (8)

Since the professional program in physical therapy has a heavy concentration in science and medical courses, the prospective applicant is encouraged to select electives in the Communication, Language, and Symbolic Systems; Individual and Society; and Literary and Artistic Expression categories to complete the 86 to 90 credits required for admission.

SUGGESTED PROGRAM

Students attending other colleges should select equivalent courses carrying comparable credit.

FRESHMAN YEAR

	Approx. Qtr. Cr.
Composition or Communication	8
General Biology	9
Elementary Anatomy	4
General Chemistry	10
Electives	14
	45

SOPHOMORE YEAR

	Approx. Qtr. Cr.
Introductory Physics	8-10
General Psychology	5
Abnormal Psychology	4
Human Physiology	5
Medical Terminology	2
Electives	21-23
	45-49

Students at the University of Minnesota are encouraged to take PMed 1002, Orientation to Physical Therapy, in the freshman year. It is offered fall and winter quarters only.

All required physical, biological, and behavioral science courses must be completed before the student enters the professional program. If more than one course (maximum of 5 quarter credits) remains to be completed after the spring term of the sophomore year, the student will usually be asked to wait until the following year to apply for admission. Professional courses are offered only once a year and must be completed in sequence. It is very difficult to complete additional courses or group distribution requirements during the junior and senior years.

[1]Students at the University of Minnesota may elect to substitute MdBc 1030, Medical Biochemistry (5), if they have had high school chemistry. This substitution is generally not accepted by other programs in physical therapy.

[2]Students at the University of Minnesota may elect to substitute GC 1163, Physical Science: Principles of Physics (5). This substitution is generally not accepted by other programs in physical therapy.

Professional Curriculum

A Mantoux test or chest X-ray, or both, is required during each year of the professional program.

JUNIOR YEAR

Fall	Credits	Winter	Credits	Spring	Credits
LaMP 5170	3	LaMP 5171	1	PMed 5162	3
Anat 3058	5	PMed 5161	2	PMed 5222	4
PMed 5100	2	PMed 5221	4	Neur 5121	2
PMed 5215	1	PMed 5230	5	PMed 5281	4
PMed 5220	3	PMed 5182	5	PMed 5283	4
PMed 5340	4			PMed 5292	2

SUMMER SESSION

PMed 5255	3

SENIOR YEAR

PMed 5275	3	PMed 5270	3	PMed 5295	15
PMed 5282	4	PMed 5289	3		
PMed 5288	4	PMed 5290	ar		
PMed 5255	2	PMed 5293	3		
PMed 5284	4	AdPy 5121	2		

CLINICAL EDUCATION

(PMed 5215, 5255, 5295)

Each student in physical therapy is required to complete a minimum of 15 weeks of clinical education. Clinical experience is divided into three periods of 5 weeks each, chosen from the following areas: general (hospital acute care), pediatrics, geriatrics, and rehabilitation. Clinical experience is scheduled in conjunction with selected laboratory courses.

Within the limits of availability of assignments, students are allowed some choice in planning their clinical education experiences. Assignments are arranged by the coordinator for clinical education and the supervisor of the clinical center. Once a student has accepted an assignment, she or he agrees to abide by the policies, procedures, and regulations of the center; a center's primary purpose is to provide health care services, not to educate students. Written agreements of affiliation between the University and the clinical training center are reviewed by the student before the clinical assignment begins. Individual centers may have special requirements such as liability insurance or specific physical examinations.

Requirements of the clinical centers include compliance with a dress code. Generally, students will be expected to wear a white opaque top, navy blue slacks, and white duty or dress shoes. Blue jeans, cords, and tennis shoes are not acceptable, unless stipulated otherwise.

During clinical education students will be responsible for their own insurance, transportation, board and room, unless stated otherwise by the clinical center.

A student may miss one full day of clinical education for a legitimate reason without having to make it up; any additional absence, for whatever reason, must be made up. The clinical instructor at the center will decide what constitutes a legitimate absence. Physical therapy departments may be open 7 days per week and 10 to 12 hours per day. Thus students may be required to work extended hours or weekends, and they should plan accordingly to avoid scheduling conflicts and absences.

Clinical education courses (PMed 5215, 5255, and 5295) carry academic credit and are graded S-N. Students pay regular tuition and fees during clinical education. They may, however, be exempted from paying the student services fee if their clinical assignment is outside the nine-county Twin Cities metropolitan area (Hennepin,

Ramsey, Dakota, Washington, Scott, Carver, Chisago, Anoka, and Wright counties). If the exemption is allowed, students will be expected to pay for their own health care and arrange for their own insurance. Some clinical facilities require that students have health coverage before starting their clinical education. They may elect to purchase University-sponsored Blue Cross-Blue Shield coverage directly from the Boynton Health Service. Further information about the fee exemption and health coverage is available from the director of the program.

Clinical practice performance is reviewed and evaluated by the student and the clinical instructor. Students are responsible for keeping records of the variety and number of patients treated. Unsatisfactory performance in the clinical setting may be grounds for academic probation or dismissal from the program. Students who receive a grade of N in a clinical education course are required to repeat the course before graduation.

Students may appeal any policies or decisions made by a clinical center or the University by following the appeals procedure outlined by the University Senate and available to all students through the University appeals committees.

A physical therapy student evaluates knee motion in a tests and measurements class.

IV. COURSE LISTINGS

Physical Medicine and Rehabilitation (PMed)

1002. ORIENTATION TO PHYSICAL THERAPY. (1 cr, offered fall and winter only; S-N only)
An overview of the profession through lectures, demonstrations, films, and tours. Designed to provide factual information and guidance for students planning to enter professional training in physical therapy.

1003. ORIENTATION TO OCCUPATIONAL THERAPY. (2 cr; for fr and soph; offered fall and spring only)
Survey of the profession through lectures, films, and tours. Methods of treatment including demonstrations. Observation in clinics.

5100. ORIENTATION TO REHABILITATION. (Cr ar; prereq regis OT or PT)
Orientation to health care and members of the health care team; medical communications, scientific literature, professional attitudes and behavior. Introduction to hospital organization and environment.

5161w-5162s. MEDICAL SCIENCE LECTURES. (2 cr for 5161, 3 cr for 5162; prereq regis OT or PT)
Subjects include related fields of surgery, orthopedics, pediatrics, dermatology, medicine, neurology, and speech. Correlated clinic includes presentation of patients and discussion of treatment problems.

5182. FUNCTIONAL NEUROANATOMY AND NEUROPHYSIOLOGY. (5 cr; prereq regis OT or PT)
Neuroanatomic structures as functional systems and basic neurophysiologic concepts with emphasis on applications for understanding and treating physical dysfunctions.

5215. INTRODUCTION TO PHYSICAL THERAPY CLINICAL EDUCATION. (1 cr; prereq regis PT)
An attitudinal approach to health care using exposure to the affective domain of patient care. Development of communication and observational skills. Periods of supervised clinical education followed by group discussion. Tours, lectures, and discussions used to develop professional attitudes toward death and dying, the aging process, and medical ethics.

5220. THERAPEUTIC PROCEDURES I. (3 cr; prereq regis PT)
Basic principles of body mechanics and skills for positioning and draping patients in preparation for treatment. Theory and techniques of asepsis and isolation, thermotherapy, hydrotherapy, and cryotherapy. The physiologic bases for treatment with heat, cold, diathermy, and ultrasound. Includes four half-days of practical work with patients in the clinic.

5221. THERAPEUTIC PROCEDURES II. (3 cr; prereq regis PT)
The theory, rationale, physiologic effects, and technique of application of therapeutic massage. Application of ultraviolet radiation. Theory and techniques of medical and athletic bandaging. Introduction to Mennell's techniques of small joint manipulation. Application of Jobst intermittent compression units, measurement of Jobst compression garments, and volumetric measurement of the extremities. Includes four half-days of practical work with patients in the clinic.

5222. THERAPEUTIC PROCEDURES III. (4 cr; prereq regis PT)
Theory and technique of electrotherapy. Methodology used in measuring patients' responses to treatment. Utilization of goniometry, sensory testing, and muscle testing procedures with patients. Problems in evaluation, introduction to quantitative muscle testing, and ambulation training.

5230. THEORY AND TECHNIQUE OF MUSCLE FUNCTION, TESTS, AND MEASUREMENTS. (5 cr; prereq regis PT)
Review of muscles and joints with regard to anatomical and physiological functions; analysis of body mechanics, coordinated movement, and strength. Procedures in assessment of body function.

5255. CLINICAL EDUCATION IN PHYSICAL THERAPY. (Cr ar; prereq regis PT; offered either summer term)
Supervised clinical practice at affiliated hospitals.

5270. REHABILITATION PROCEDURES. (3 cr; prereq regis PT)
Theoretical and practical application of principles used in activities of daily living, ambulation, and functional activities as they relate to the patient and his or her disability.

5275. APPLIED ANATOMY. (3 cr; prereq regis PT)
Review of joint structures, muscles, nerves, and function. Diseases and injuries causing impairment of function and deformities.

5281-5282. THEORY OF THERAPEUTIC EXERCISE. (4 cr per qtr; prereq regis PT)
Fundamental principles of physiology, physics, and neurology as a basis for therapeutic exercise.

5283-5284. TECHNIQUES OF THERAPEUTIC EXERCISE. (4 cr per qtr; prereq regis PT)
Application of the principles and techniques of therapeutic exercise.

5288. EVALUATION PROCEDURES II. (4 cr; prereq regis PT)
Techniques of electrodiagnosis, gait analysis. Principles of orthotics, posture and circulation evaluation.

5289. PATIENT ASSESSMENT. (3 cr; prereq regis PT)
Assessment of clinical patients and rationale of treatment to attain rehabilitation goals.

5290. ADMINISTRATION. (2 cr; prereq regis PT)
Physical therapy administration and management. Field experience with physical therapy consultants, teaching practicum, individual student projects, and pilot research studies designed to illustrate the role of the practicing physical therapist in the areas of education, research, and consultation with professional colleagues.

5292. INTRODUCTION TO RESEARCH. (2 cr; prereq regis PT)
Fundamentals of research design; elementary statistical concepts; techniques of scientific writing.

5293. INTRODUCTION TO RESEARCH DESIGN. (3 cr; prereq 5292, regis PT)
Elements of research design, sources of invalidity; appraisal of designs.

5295. CLINICAL EDUCATION IN PHYSICAL THERAPY. (15 cr; prereq regis PT)
Supervised clinical practice at affiliated hospitals.

5311. THERAPEUTIC ACTIVITIES. (4 cr; prereq regis OT)
Laboratory instruction in craft skills; adaptation of these to specific disabilities.

5312. WOOD PROCESSING. (3 cr; prereq regis OT)
Laboratory instruction in the use of hand tools and power woodworking equipment, safety precautions, and maintenance of tools and equipment.

5330. FUNCTIONAL ANATOMY. (6 cr; prereq regis OT)
Structure and function of the musculoskeletal, peripheral nervous, and vascular systems. Analysis of body mechanics and coordinated movement. Includes anatomy laboratory, kinesiology laboratory, lecture, and demonstration.

5340. HUMAN DEVELOPMENT. (4 cr; prereq regis OT or PT)
Human physiological, psychological, and social development. A basis for understanding future study of evaluation procedures and treatment.

5342. THEORY: PSYCHOSOCIAL DYSFUNCTION. (5 cr; prereq regis OT)
Evaluation and treatment techniques for the psychiatric patient. Application of theory through task group, classroom participation, and clinical experience.

5343. THEORY: PHYSICAL DYSFUNCTION. (7 cr; prereq regis OT)
Techniques of evaluation and treatment of patients with physical disabilities. Lecture, laboratory, and clinical experience.

5344. SEMINAR: THEORY OF TREATMENT FOR THE GENERAL MEDICAL AND SURGERY PATIENT. (3 cr; prereq regis OT)
Discussion and observation of specialized treatment programs. Application of theory through patient assessment, problem solving, treatment planning and administration.

5360. GROUP PROCESS SEMINAR. (3 cr; prereq regis OT)
Experience in group development; analysis of group behavior and member roles.

5370. REHABILITATION PROCEDURES. (4 cr; prereq regis OT)
Theoretical and practical knowledge of activities of daily living as they apply to occupational therapy. Lectures, demonstrations, and practice.

5375. COMMUNITY RESOURCES AND HEALTH CARE ISSUES. (4 cr; prereq regis OT)
The role of community agencies, legislation, and related health care issues in the rehabilitation process. Introduction to the concepts of prevention and intervention in the well community.

5380. ADMINISTRATION AND SUPERVISION. (3 cr; prereq regis OT)
Principles of administration, supervision, and organization of the occupational therapy department. Interdepartmental relationships.

5391. ORIENTATION TO WORK EVALUATION. (1 cr; prereq regis OT)
Lecture and slide presentation of types and systems of work evaluation used in vocational rehabilitation settings. Brief practicum in the Tower System of Vocational Assessment.

5392. METHODS OF SCIENTIFIC RESEARCH. (4 cr; prereq regis OT)
Fundamentals of research design; evaluation and presentation of data; preparation of manuscript.

5393. EVALUATION TECHNIQUES. (3 cr; prereq regis OT)
Application of evaluative procedures in physical and psychosocial dysfunction. Techniques of joint measurement and muscle testing.

5394. EVALUATION AND TREATMENT OF SENSORY INTEGRATIVE DYSFUNCTION. (4 cr; prereq regis OT)
Theories of sensory integration and identification of dysfunction; practice in assessment procedures and program planning.

5395. INDEPENDENT STUDY IN OCCUPATIONAL THERAPY. (Cr ar; prereq regis OT)
Individual study in areas related to occupational therapy.

5396-5397. FIELDWORK EDUCATION IN OCCUPATIONAL THERAPY. (Cr ar; prereq regis OT)
A total of 6 to 8 months of supervised training in affiliated hospitals and community agencies.

Required Courses Offered by Other Departments

AdPy 5121. DESCRIPTIVE PSYCHIATRY. (2 cr; prereq regis OT or PT)
Etiology and nature of mental illness including dynamic concepts, personality development, symptom formation, classification of mental illness, treatment philosophies. Case presentation.

AdPy 5122. MANAGEMENT OF THE PSYCHIATRIC PATIENT. (1 cr; prereq regis OT)
Seminar and case presentations.

Anat 3058. ANATOMY OF THE EXTREMITIES. (5 cr; prereq regis PT)
A regional approach to gross human anatomy emphasizing the skeletal, muscular, circulatory, and peripheral nervous systems of the extremities and trunk. Includes lecture, prosection, and laboratory with dissection of cadavers by students.

LaMP 5170. PATHOPHYSIOLOGY OF DISEASE I. (3 cr; prereq regis nursing, OT or PT)
The basic pathologic disease process, terminology.

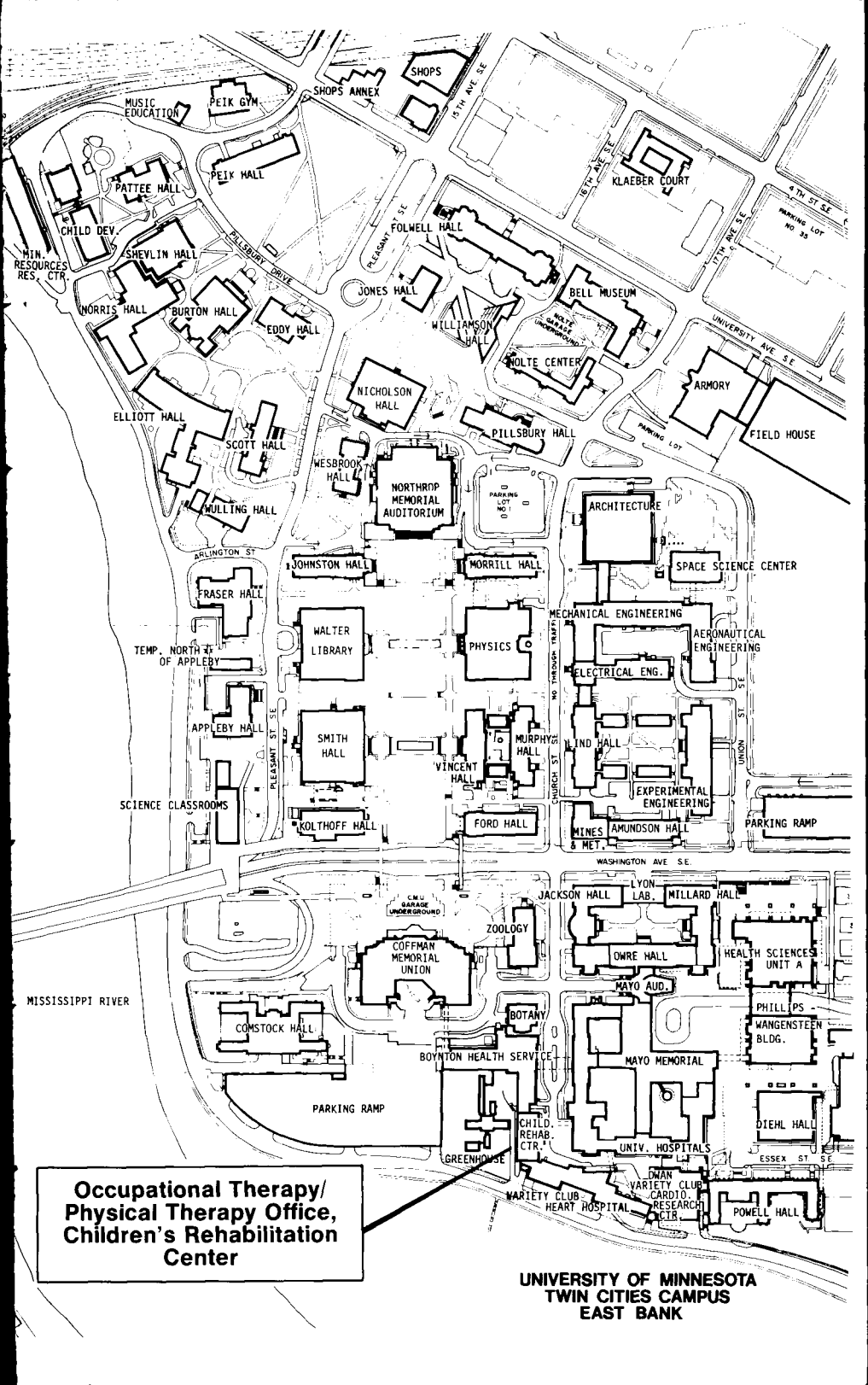
LaMP 5171. PATHOPHYSIOLOGY OF DISEASE II. (1 cr; prereq 5170)
Diseases by organ system, clinical and laboratory manifestations.

Neur 5121. DESCRIPTIVE NEUROLOGY. (2 cr; prereq regis OT or PT)
The central and peripheral nervous system. Correlation of neuroanatomy, neurophysiology, clinical neurology, and pathology of the nervous system.

An occupational therapist and a physiatrist evaluate a child's physical problems.

Senior occupational therapy students perform an activity analysis.

Physical therapy students discuss the structure and function of the ankle.


MUSIC EDUCATION
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PATTEE HALL
CHILD DEV.
SHEVLIN HALL
MIN. RESOURCES RES. CTR.
PILLSBURY DRIVE
NORRIS HALL
BURTON HALL
EDDY HALL
PLEASANT SE
FOLWELL HALL
JONES HALL
WILLIAMSON HALL
NOLTE GARAGE UNDERGROUND
NOLTE CENTER
BELL MUSEUM
16TH AVE SE
KLAEBER COURT
4TH ST SE
PARKING LOT NO 33
17TH AVE SE
UNIVERSITY AVE SE
ARMORY
FIELD HOUSE
PARKING LOT
NICHOLSON HALL
PILLSBURY HALL
ELLIOTT HALL
SCOTT HALL
WESBROOK HALL
NORTHROP MEMORIAL AUDITORIUM
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MECHANICAL ENGINEERING
AERONAUTICAL ENGINEERING
TEMP. NORTH OF APPLEBY
NO THROUGH TRAFFIC
ELECTRICAL ENG.
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SMITH HALL
MURPHY HALL
LIND HALL
UNION ST SE
VINCENT HALL
CHURCH ST SE
EXPERIMENTAL ENGINEERING
SCIENCE CLASSROOMS
KOLTHOFF HALL
FORD HALL
MINES & MET.
AMUNDSON HALL
PARKING RAMP
WASHINGTON AVE SE
LYON LAB.
MILLARD HALL
JACKSON HALL
C.M.U. GARAGE UNDERGROUND
ZOOLOGY
COFFMAN MEMORIAL UNION
OWRE HALL
HEALTH SCIENCES UNIT A
MAYO AUD.
MISSISSIPPI RIVER
PHILLIPS - WANGENSTEEN BLDG.
BOTANY
COMSTOCK HALL
BOYNTON HEALTH SERVICE
MAYO MEMORIAL
PARKING RAMP
DIEHL HALL
CHILD. REHAB. CTR.
UNIV. HOSPITALS
GREENHOUSE
ESSEX ST SE
DWAN VARIETY CLUB CARDIO. RESEARCH CTR.
VARIETY CLUB HEART HOSPITAL
POWELL HALL
Occupational Therapy/ Physical Therapy Office, Children's Rehabilitation Center
UNIVERSITY OF MINNESOTA
TWIN CITIES CAMPUS
EAST BANK

1979-81 UNIVERSITY OF MINNESOTA BULLETIN

COLLEGE OF VETERINARY MEDICINE

UNIVERSITY OF MINNESOTA

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College of Veterinary Medicine Administration

Robert H. Dunlop, D.V.M., Ph.D., Professor and Dean effective January 1, 1980 (256 Veterinary Science Building; 373-1134)

Benjamin S. Pomeroy, D.V.M., Ph.D., Professor; Coordinator, Alumni and Public Affairs; and Acting Dean until December 31, 1979 (300 Veterinary Science Building; 373-1117)

Carl R. Jessen, D.V.M., Ph.D., Professor and Associate Dean for Veterinary Medical Services (A318 Veterinary Hospitals; 373-1800)

To be appointed, Professor and Associate Dean for Academic Affairs and Research (301 Veterinary Science Building; 376-3890)

Wendell J. DeBoer, Ph.D., Associate Professor and Coordinator, Student Affairs (301 Veterinary Science Building; 376-3891)

James O. Hanson, D.V.M., Professor; Director, Continuing Education; and Project Leader, Veterinary Extension (243 Veterinary Science Building; 373-1156)

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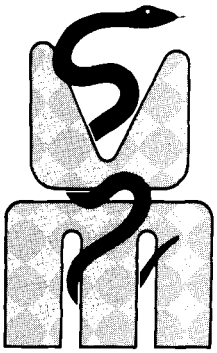

College of Veterinary Medicine

UNIVERSITY OF MINNESOTA

How to Use This Bulletin

This bulletin describes College of Veterinary Medicine programs, learning opportunities, procedures, degree and other requirements, and courses. Students are expected to be familiar with all information that is pertinent to the D.V.M. degree program.

The *Class Schedule*, distributed with registration materials just before the registration period each quarter, lists course offerings with prerequisites and class hours, rooms, and instructors. It includes registration instructions, final exam schedules, and other useful information.

All current and prospective students should also refer to the *General Information Bulletin*. Information about evening courses and summer offerings is contained in the *Extension Classes Bulletin* and the *Summer Session Bulletin* respectively.

The Official Daily Bulletin, a *Minnesota Daily* column, publishes announcements about University courses, study opportunities, meetings, and activities. Students are expected to be aware of any information printed in the column that affects them.

CONTENTS

College of Veterinary Medicine

I. GENERAL INFORMATION

History

Veterinary medicine is concerned with the prevention, cure, and alleviation of diseases of animals. Legal documents and other records from about 2250 B.C. found in China, Egypt, and India contain the earliest references to veterinary medical practice. In India, where veterinary hospitals were established by the state, the practice of veterinary medicine became very sophisticated.

After several false starts, veterinary medical education in the United States originated with the Veterinary College of Philadelphia's charter, granted in 1852. During the next 75 years, 55 veterinary schools opened in this country, and 34 of them closed. The veterinary school at Cornell University, established in 1868, is the oldest one still in existence in the United States. Currently there are 24 veterinary schools in the United States and Canada, and several more are planned.

Veterinary Medical Education at the University

The College of Veterinary Medicine at the University of Minnesota was established in 1947 in response to the need for veterinary medical services in the livestock industry and for pets, the need for research in animal diseases, and growing student interest in the study of veterinary medicine. Since its establishment, the college has grown from an initial class of 21 students to 80 students in 1977-78.

The College of Veterinary Medicine at the University of Minnesota is accredited by the Council of Education of the American Veterinary Medical Association.

Career Opportunities

Career opportunities for veterinarians are available in a wide variety of work settings and involve diverse activities. Most veterinarians are engaged in private clinical practice, in either a general or a specialized area. Veterinarians in general practice care for farm and companion animals, both large and small. Those in specialized practice may care primarily for a single species, or they may concentrate in clinical disciplines such as animal reproduction, surgery, or diseases of specific systems. Others pursue careers in education, research, and industry. Government agencies such as the Department of Health, Education, and Welfare; Department of Agriculture; armed forces; Atomic Energy Commission; and National Aeronautics and Space Administration offer challenging career opportunities. Careers in laboratory animal medicine, zoo animal practice, public health, and food inspection also are available. New opportunities for research and service exist in such areas as comparative medical research and aquatic and wildlife animal medicine.

In a study of U.S. veterinary medical employment needs in 1977, the consulting firm of Arthur D. Little, Inc., found that the supply and demand for veterinarians in private practice (75 percent of all veterinarians are in private practice) was balanced nationally; shortages existed in educational institutions and industry. All students graduating from this college in recent years have found employment or pursued further education in the veterinary medical profession. Demand for the services of veterinarians is likely to continue.

Although veterinary medicine traditionally has been viewed as a man's field, women are now entering the profession in increasing numbers and are employed in all fields.

Programs

The College of Veterinary Medicine awards two degrees, the bachelor of science (B.S.) in veterinary science and the doctor of veterinary medicine (D.V.M.).

The primary goal of the veterinary medical curriculum is to provide the education and training necessary for the general practice of veterinary medicine. Secondary to this goal, the curriculum is designed to allow the student to pursue some degree of specialized training. Graduates of the program should be prepared to enter veterinary medical practice or residency or graduate education programs.

The curriculum focuses on providing students with a sound foundation of training in the basic biomedical sciences to enable them to understand the causes and control of animal diseases and the maintenance of animal health. Students develop clinical skills in the diagnosis, treatment, and prevention of disease. Students can obtain additional education or training in areas of special interest. Studies are designed to nurture the student's professional identity, including their commitment to lifelong learning and service to clients and the community. Studies should provide the necessary background for evaluating and assimilating new information in the biomedical sciences, and should facilitate development of the future veterinarian's ability to apply useful new information in the practice of veterinary medicine.

A substantial portion of the veterinary training takes place in the teaching hospital, where students apply knowledge of the basic sciences to solving clinical problems. By working directly with clients' animals and hospital equipment under the supervision of clinical faculty members, students gain the experience necessary to integrate classroom knowledge with veterinary medical practice.

In the first year of the veterinary medicine program, students examine the structure and function of normal animals and begin to study the pathogenesis of diseases and pathophysiologic concepts. In the second year, emphasis is on the pathogenesis and therapy of infectious diseases. The third year of the program is devoted chiefly to the study of the prevention, alleviation, and clinical therapy of diseases. In the fourth year, students learn methods of care and develop administrative skills needed for professional practice by dealing with clients and caring for and managing patients.

The M.S. and Ph.D. degrees may be earned in the following disciplines: veterinary anatomy; veterinary medicine; veterinary microbiology; veterinary parasitology; veterinary pathology; veterinary physiology and pharmacology; veterinary surgery, radiology, and anesthesiology; and theriogenology. The School of Public Health offers a specialization in veterinary public health for its master of public health (M.P.H.) degree. The M.S. and Ph.D. programs are administered by the Graduate School. For more information, see the *Graduate School Bulletin* or write to the Associate Dean for Academic Affairs and Research, College of Veterinary Medicine, 301 Veterinary Science Building, 1971 Commonwealth Avenue, University of Minnesota, St. Paul, Minnesota 55108.

The college regularly schedules continuing education programs for members of the veterinary medical profession to bring them up to date on advances in the field. Innovative clinical procedures, new concepts, and recent developments in research are presented. Veterinary medical associations may arrange for specific courses. Sessions include 1- or 2-day conferences, seminars, and laboratory workshops.

Facilities

The College of Veterinary Medicine is housed primarily in three buildings. The Animal Science-Veterinary Medicine and the Veterinary Science buildings contain most of the classrooms and laboratories students use during their first 2 years in the professional curriculum. Extensive research facilities, including the college library,

are also located in these buildings. In the Veterinary Hospitals, space and facilities are provided for various diagnostic and therapeutic procedures. Clinical laboratories for hematology, chemistry, pathology, toxicology, parasitology, and microbiology, and radiological and animal holding facilities, are housed here too. In addition, the State Veterinary Diagnostic Laboratory, which is part of the college, is located in the hospital.

The off-campus facilities of the Minneapolis and St. Paul Health Departments, Minnesota Livestock Sanitary Board, veterinary services of the State Department of Agriculture, and food industries in the state are also used in teaching the public health aspects of veterinary medicine.

High School Preparation

Both high school and college students interested in entering the College of Veterinary Medicine are assisted in planning appropriate educational programs through the Office of the Associate Dean for Academic Affairs and Research. In addition, meetings to discuss selection criteria and admission to the college are held for applicant and prospective applicants each fall prior to the November 15 application deadline. A meeting is held in each of the four states from which applicants are accepted—Minnesota, Nebraska, North Dakota, and Wisconsin. High school counselors and college advisers should contact the Office of the Associate Dean for Academic Affairs and Research for current information about admission requirements.

Prospective students are urged to take as many mathematics and science courses as possible in high school. Students who have taken trigonometry in high school are exempted from trigonometry at the college level.

Preprofessional Curriculum

To qualify for admission to the College of Veterinary Medicine students must complete specified courses at an accredited college not later than the end of the winter quarter (or fall semester) of the academic year in which they apply. Application to the professional curriculum must be made nearly 1 year in advance or not later than November 15 prior to the fall quarter that admission is desired.

All course work used to meet the preprofessional requirements should be evaluated with the A-N letter grading system, except when a college does not offer a required course under that grading system or when advanced placement (exemption) is granted.

Distribution requirements in liberal arts studies have been established by the all-University Council on Liberal Education for all programs leading to a bachelor's degree conferred by the University of Minnesota. Students entering the College of Veterinary Medicine fulfill these requirements prior to admission unless they have completed a bachelor's degree prior to entrance.

The required areas of study, including the number of quarter credits required for admission to the College of Veterinary Medicine, are:

1. Communication, Language, Symbolic Systems

Freshman English, Communication (8-12 credits)

Normally the student must satisfy the requirement for graduation of the college he or she is attending.

Mathematics (5-15 credits)

Trigonometry (high school course is acceptable); college algebra (with prerequisite high school higher algebra) or precalculus or calculus.

Public Speaking (3-5 credits)

Introductory speech.

2. The Physical and Biological Sciences

Chemistry (25-30 credits)

To include general inorganic, qualitative analysis (solution), analytic (quantitative analysis), and organic, nonterminal. All courses must include laboratory.

Physics (10-15 credits)

To include mechanics, heat, sound, light, electricity, magnetism, and atomic physics, topics normally covered in an introductory sequence with laboratory.

Biology (10-12 credits)

To include an introductory sequence in general biology and animal biology or animal biology and plant biology.

Genetics (4-5 credits)

To include the mechanics of heredity and their applications.

Biochemistry (4-5 credits)

To include metabolic pathways, cellular energetics, and biosynthesis of cellular constituents; either a 4-credit lecture course or a 5-credit lecture and laboratory course with an organic chemistry prerequisite.

Microbiology (4-5 credits)

An introductory course with laboratory to include taxonomy, morphology, physiology, and ecology of microbes.

3. The Individual and Society (8 or more credits)

Economics

An introductory macro or micro course (3-5 credits).

Other

Introductory courses chosen from anthropology, economics, geography, history, political science, psychology, social science, and sociology.

4. Literary and Artistic Expression (8 or more credits)

Courses chosen from art, literature, music, and many humanities, theater, and foreign-language literature courses.

5. Electives

Electives may be selected on the basis of the student's interests to make up a broad educational program. Students planning careers in veterinary medical practice may wish to elect courses in animal sciences and business management. Students planning academic or research careers should consider additional science and mathematics courses.

Applicants who have not earned the baccalaureate degree prior to entering the College of Veterinary Medicine must have completed the minimum credit requirements in The Individual and Society and the Literary and Artistic Expression categories. Those entering with a degree must have completed introductory economics and may meet the remaining credit requirements in the two above-mentioned categories by completing 16 credits of courses in either or both areas. In calculating the grade point average for courses required for admission, all applicants must include the grade earned in introductory economics, and may include additional grades for 16 credits of courses completed in either or both categories.

Examples of courses offered on the Twin Cities campus that meet the admission requirements follow.

1. Communication, Language, Symbolic Systems

Freshman English, Communication—The student must satisfy the requirement for graduation of the college he or she is attending.

Math 1008—Trigonometry and Math 1111—College Algebra, Analytic Geometry

(or) Math 1142—Introduction to Calculus
(or) Math 120—Pre-Calculus
Rhetoric 1222—Public Speaking
(or) Spch 1101—Fundamentals: Oral Communications

2. The Physical and Biological Sciences

Biol 1011—General Biology
Biol 1106—General Zoology
Biol 5001—Biochemistry
Chem 1004-1005—General Principles of Chemistry
Chem 1006—Principles of Solution Chemistry
Chem 3100-3101—Quantitative Analysis
Chem 3301/3305, 3302/3306—Elementary Organic Chemistry
GCB 3022—Genetics
Phys 1031/1035-1032/1036—Introductory Physics
VPB 3103—General Microbiology
(or) MicB 3103—General Microbiology

3. The Individual and Society

AgEc 1020—Principles: Macroeconomics
(or) Econ 1001—Principles: Macroeconomics
(or) Econ 1002—Principles: Microeconomics

For additional courses to complete the required 8 or more credits, see the group distribution and course lists in the *College of Liberal Arts Bulletin.*

4. Literary and Artistic Expression

See the group distribution and course lists in the *College of Liberal Arts Bulletin* for selection of courses to total 8 or more credits.

5. Electives

For additional courses, see suggestions listed above.

Admission Procedures for the Professional Curriculum

Enrollment in the professional curriculum of the College of Veterinary Medicine is limited; many applicants cannot be accepted. A first-year class enters the program in the fall quarter of each year, and applicants must satisfy the admission requirements by the end of the preceding winter quarter (or fall semester). To apply, prospective students should request the College of Veterinary Medicine application packet, which is available *only* from the Office of Admissions and Records, 130 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, Minnesota 55108. Neither Graduate School nor Advanced Standing applications may be used to apply to the College of Veterinary Medicine. First priority is given to residents of Minnesota and of states with which reciprocity or contractual agreements exist (currently Nebraska, North Dakota, and Wisconsin).

Applicants are encouraged to read carefully and follow all directions in the packet since failure to provide all information requested delays admission decisions.

The completed application form should be returned to the Office of Admissions and Records as soon as possible and *not later than November 15 prior to the fall quarter the applicant wishes to start the program.* Applications must be accompanied by a credentials examination fee, without which no application is considered.

Applicants for fall 1980 will be rated according to a 100-point scale based on the following areas of evaluation.[1]

[1]Selection criteria are subject to change.

A. Objective Measures of Educational Background (70 points)
   1. Grade point average in required courses (30 points)
   2. Cumulative grade point average for most recent terms, starting with the fall the student applies and going back to include a minimum of 60 quarter (45 semester) credits of letter-graded undergraduate or graduate courses (15 points)
   3. Graduate Record Examination (10 points)
   4. Veterinary Aptitude Test (10 points)
   5. Amount of education. Applicants who have completed elective course work or bachelor's degrees in areas of study related to veterinary medicine are not given priority for admission. (5 points)

B. Subjective Measures of Personal Experience (30 points)
   1. Knowledge of and interest in the veterinary medical profession and animals —experiences with veterinarians and experiences with and responsibility for the care and management of animals (15 points)
   2. Maturity and reliability—employment experience and responsibilities, ability to communicate with others, experience demonstrating leadership, extracurricular activities, credit load, and amount of time devoted to employment and other activities while enrolled in college (15 points)

All correspondence concerning application should be sent to the Office of Admissions and Records, 130 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, Minnesota 55108. Applicants who are accepted receive a preliminary fee statement of $50; payment is applied to the first quarter's tuition and confirms the applicant's intention to enroll.

Estimated Yearly Expenses

Students will pay the following fees and expenses for the 1979-80 academic year. These fees and expenses are subject to change.

Tuition, Student Services, and Laboratory Fees:	
Resident ($808 per quarter)	$2,424
Nonresident ($2,101 per quarter)	$6,303
Microscope	$400-900
Books, Laboratory Equipment, Notes, Dissecting Set, and Supplies	$400-500

The above expenses do not include room and board, laundry and clothing, required health insurance, recreation, travel, and other incidental expenses. For more information about expenses, see the current University of Minnesota *General Information Bulletin*.

Financial Aids

Students in the College of Veterinary Medicine are eligible to compete for awards and scholarships designated specifically for veterinary medical students as well as for scholarships available to all University students. In general, it is the responsibility of the interested student to obtain, complete, and submit appropriate application forms for loans and financial aids.

For additional information concerning awards and scholarships, contact either the Associate Dean for Academic Affairs and Research, College of Veterinary Medi-

cine, 301 Veterinary Science Building, 1971 Commonwealth Avenue, University of Minnesota, St. Paul, Minnesota 55108, or the Office of Student Financial Aid, 190 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, Minnesota 55108.

Awards and scholarships that are limited to veterinary medical students include the following.[1]

AAHA (American Animal Hospital Association) Award—This award is given to a senior with clinical proficiency in small animal medicine and surgery. ($100 and plaque)

Allen Products Scholarship—This award is given to assist a needy and deserving sophomore student through his or her veterinary medical education. ($1,000 per year)

Alpha Zeta Traveling Scholarship—This award is given to help defray the expenses of sending the president of the student chapter to the annual meeting of the American Veterinary Medical Association.

Diamond Service Award—This award is given annually to a senior student based on contributions to the Student Chapter of the AVMA, contributions to the College of Veterinary Medicine, and attainment of academic objectives through presistence, tenacity, and perseverance. ($200 and plaque)

Caleb Dorr—Cash awards are presented annually to the individuals with the highest cumulative grade point average in the freshman, sophomore, and junior classes. The highest-ranking individual in the graduating class is awarded a gold medal. ($50-200)

Caleb Dorr Certificates—For high scholastic achievement.

Duluth Kennel Club Award—Awards are given to two outstanding senior students who show promise and interest in small animal medicine. (two $150 awards)

Greater Fairmont Kennel Club Award—A scholarship is awarded to a Martin County resident on the basis of scholarship and financial need. ($150)

Harvey H. Hoyt Memorial Scholarship Award—A scholarship is given annually in memory of Dr. Harvey H. Hoyt to an outstanding senior student in the College of Veterinary Medicine on the basis of scholarship and intent to pursue a career in teaching and research in veterinary medicine. Preference is given to students with interests in clinical veterinary medicine. ($75)

Indianhead Kennel Club—This award is given to a resident of northwest Wisconsin who is specializing in small animal medicine and who demonstrates clinical proficiency and financial need. ($450)

H. C. H. Kernkamp Student Award—This fund, provided through the generosity of the alumni of the college, makes an award to a senior in recognition of student contributions to the profession of veterinary medicine. (plaque)

R. Steven Kufrin Memorial Award in Veterinary Surgery—This award is given to an outstanding junior student in the field of large animal surgery. ($50)

Lee McDonald Memorial Award in Feline Medicine—A cash award is given to a senior student with expertise in feline medicine. ($400)

Merck Veterinary Medicine Award—*Merck Veterinary Manuals* are awarded to two senior students in the College of Veterinary Medicine on the basis of their scholastic records and dedication to clinical veterinary medicine.

Minneapolis Kennel Club Scholarship in Veterinary Medicine—This scholarship was established to provide recognition for and financial assistance to qualified students in veterinary medicine at the University of Minnesota. Preference is given to residents of Minnesota with special interest in the treatment of small animals. (several $150 awards)

Minnesota Veterinary Medical Association—Two awards are given annually by this state association. A plaque is awarded to an outstanding senior student in clinical veterinary medicine, and a cash award based on need and scholarship is made. ($300)

Dr. Mohr's Veterinary Grip—This award is given to a senior student who demonstrates outstanding capabilities, knowledge, and sincerity in clinical large animal medicine.

Bob Monico Memorial Awards—Awards are made to two senior students for excellence in equine medicine in memory of Bob Monico, a senior student who was fatally injured in the summer of 1970 while vacationing in Norway. (plaques)

Nelson Laboratories Scholarships—These awards are given annually to deserving students on the basis of financial need and scholarship. ($2,500)

Margaret K. Nolz Memorial Scholarship—This award is granted to a veterinary student based on scholarship and need. ($100)

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[1]Most awards are available only to students in the second, third, and fourth years of the veterinary medical program.

Ned E. Olson Memorial Scholarship Award—This award is granted annually in memory of Dr. Ned E. Olson to a senior student in the College of Veterinary Medicine who demonstrates great proficiency and professional promise in the field of large animal medicine. ($50)

Clifton A. Paulson Memorial Scholarship—This award is given to a junior student who shows high interest and is active in furthering professional veterinary medicine and is active in the Student Chapter of the American Veterinary Medical Association. ($75)

Pfizer Award—This cash award is presented to a junior student on the basis of scholarship, leadership, and financial need. ($400)

Carl Schlotthauer Memorial Surgery Award—This award is made to a senior veterinary student who demonstrates outstanding ability in veterinary surgery. ($25)

Robert Stukel Memorial Scholarship—This scholarship is given to a junior student selected on the basis of financial need, sincerity, and willingness to work. ($250)

Upjohn Awards—Cash awards are presented to two senior students, one for proficiency in large animal clinical medicine and one for proficiency in small animal clinical medicine. (two $100 awards)

Veterinary Medicine General Award Fund—This award is given to a College of Veterinary Medicine student for outstanding scholarship. ($100)

Veterinary Medicine Student Council Award—This award is granted to a deserving sophomore student who has been active in extracurricular activities and service to the University, the college, and the community. ($100)

Laura K. Westerman Award—This award is given to a College of Veterinary Medicine student who demonstrates outstanding proficiency in small animal surgery. ($150)

Auxiliary to the American Veterinary Medical Association—A cash award is given annually to a senior student who makes an outstanding contribution to campus activities. ($100)

Auxiliary to the Minnesota Veterinary Medical Association—A cash award is made annually to a junior student in the College of Veterinary Medicine selected on the basis of need and scholarship. ($100)

Auxiliary to the Wisconsin Veterinary Medical Association—A scholarship is awarded to a Wisconsin resident who is a junior veterinary medicine student. Selection is based on grade point average. ($100)

Loans and scholarships administered by the Office of Student Financial Aid of the University of Minnesota or by the Auxiliary to the American Veterinary Medical Association include:

Federally Insured Student Loans or Guaranteed Student Loans—Loans of up to $5,000 per year are available from some local lending institutions and from various state lending programs; actual amounts are governed by an estimate of expenses at a particular school. Many lending agencies limit these loans to regular customers and their dependents, and not all agencies participate in the program. The federal government pays 7 percent simple interest while the student is in school. Repayment installments and 7 percent simple interest are paid by the student beginning 9 months after graduation or termination of study. Application forms are available from the Office of Student Financial Aid at 210 Fraser Hall, 106 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455, or 190 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, Minnesota 55108.

Reuel Fenstermacher Student Loan Fund for Veterinary Medicine—This fund provides loans to needy students in the College of Veterinary Medicine who are making satisfactory progress toward a degree and who indicate a sincere intention of completing the requirements for the degree.

Health Professions Student Loan and Scholarship Program—Congress enacted a Federal Health Professions Scholarship program effective October 1, 1977, for first-year students who show "exceptional financial need." Priority is given to students enrolled in schools of medicine, osteopathy, and dentistry. Each award includes the basic educational costs, plus a monthly stipend for living costs for the freshman year only. It is expected to offer aid to one or two students per year.

The Federal Health Professions Student Loan program specifies a maximum yearly loan of the cost of tuition plus $2,500; most students receive considerably less. "Exceptional financial need" must be demonstrated. The interest rate during the repayment period is 7 percent (interest is not charged while the student is still in school). Cancellation provisions for practice in an area with a shortage of professionals are offered subject to availability of cancellation funds. Funding for this loan program has been diminishing, and applicants are advised to check on the availability of funds from year to year.

Information and application forms are available from the Office of Student Financial Aid, 210 Fraser Hall, 106 Pleasant Street S.E., University of Minnesota, Minneapolis, Minnesota 55455, or 190 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, Minnesota 55108.

Auxiliary to the American Veterinary Medical Association—Loans are available to junior, senior, and graduate students in veterinary medicine. The limit of indebtedness is $2,500.

Auxiliary to the Minnesota Veterinary Medical Association—Loans of up to $500 can be arranged on short notice.

Student Services

The agencies listed below provide student services directly or on referral from a faculty adviser. Services are available in 190 Coffey Hall on the St. Paul campus unless otherwise noted.

Admissions and Records—130 Coffey Hall. Information about courses, student records, graduation, and University regulations.

Bailey Hall Dormitory—The only residence hall on the St. Paul campus. For further information write to the Head Resident Director, Bailey Hall, 1458 North Cleveland Avenue, University of Minnesota, St. Paul, Minnesota 55108.

Financial Aid—Counseling and assistance for students with financial difficulties.

Health Service—Treatment of routine health problems in facilities on the St. Paul campus. Hospitalization facilities and specialized health services are available at the Boynton Health Service on the Minneapolis campus.

International Student Adviser—Counseling for international students is available 2 days a week.

OASIS—Counseling services to help students through the maze of courses, majors, University procedures, and community programs.

Off-Campus Housing—Assistance for students making living arrangements. In addition, this office provides information on landlord-renter rights and assistance in pursuing them.

Religious Activities—Offered through the St. Paul Campus Ministry Center, 1407 North Cleveland Avenue. The Lutheran Campus Ministry-University Lutheran Center, Newman Center, and United Ministries in Higher Education are located on the Minneapolis campus.

St. Paul Gymnasium—Sports and recreational facilities; intramural teams sign up here. Facilities open to students and their families include a swimming pool, tennis courts, basketball courts, handball courts, and equipment for many other sports.

Speech and Hearing Clinics—Free speech and hearing evaluations and consultations for students with speech or hearing difficulties are offered at the Speech and Hearing Clinic in 115 Shevlin Hall (Minneapolis campus). Additional clinical services in the areas of voice, articulation, stuttering, foreign accent, and hearing are available for a fee of $5 per quarter.

Student Activities—Information for students interested in participation in organizations, clubs, and other activities.

Student Counseling Bureau—Counseling for students with academic difficulties and relationship problems and help with vocational choice and reading and study skill problems.

Student Employment Service—Part-time jobs on and off campus are listed with the Student Employment Service, 6 Morrill Hall (Minneapolis campus). On-campus jobs and some off-campus jobs are also posted in 190 Coffey Hall in St. Paul.

Student Legal Services—Legal aid staff members are available on a part-time basis. Students who need legal advice make an initial contact in 190 Coffey Hall.

Veterans Assistance—Assistance for veterans (students and nonstudents) with veterans benefits, admission problems, financial advice, and similar matters.

Student Activities

The College of Veterinary Medicine Student Council advises and makes recommendations to the dean on matters of student concern, elects members to several faculty committees, and coordinates its activities with the St. Paul Board of Colleges and the Twin Cities Student Assembly. Members are elected to represent each of the four undergraduate classes and graduate students. Nine students serve as representatives on other units of student government in the college.

The Student Chapter of the American Veterinary Medical Association sponsors a variety of activities including the annual College of Veterinary Medicine Open House (held on a Sunday in April), a booth at the Minnesota State Fair, a speakers' bureau that provides speakers for groups located within 60 miles of the campus, the semiannual publication *Minnesota Veterinarian*, lectures by prominent scientists, and a variety of social events. Most activities of the chapter are joint efforts with the college, its alumni, and the Minnesota Veterinary Medical Association.

The national honor society of veterinary medicine, Phi Zeta, recognizes and promotes scholarship and research in matters pertaining to the welfare and diseases of animals. The local chapter sponsors lectures by outstanding scientists in fields related to veterinary medicine.

The St. Paul Board of Colleges directs and coordinates student activities on the St. Paul campus and encourages student leadership. Its membership is drawn from the five colleges located on the campus. The board cooperates with the Twin Cities Student Assembly, brings questions from the student body to the attention of the colleges, and discusses matters of general interest to students and faculty.

The Student Center Board of Governors (SCBG) guides the activities of the St. Paul Campus Student Center, the focal point of social activities on the St. Paul campus. A varied recreational program that enables students to exercise, improve special skills, and cultivate hobbies is provided. Membership is drawn from the five colleges on the campus, including graduate students and faculty.

Senior veterinary students examine a throat problem in a cow under the direction of Dr. Linda Clemedtson.

II. CURRICULUM AND ACADEMIC POLICIES

Areas of Study Within the Curriculum

Following are brief descriptions of areas of study in the College of Veterinary Medicine. Students in veterinary medicine take courses in each of these areas. In addition, third- and fourth-year students learn through various field experiences described under Clinic Rotation on page 15.

Anatomy—Professors R. Barnes, Cox, Czarnecki, Fletcher, Hammer, Weber, Wilsman. Anatomy is divided into four related areas: gross anatomy, histology, embryology, and neuroanatomy. In gross anatomy, students first learn the normal structure and function of the anatomy of domestic animals, using the dog as a concept model and dissection subject. Next they study comparative anatomy by dissecting the horse and cow and contrasting them with the pig, sheep, and goat. Clinical anatomy emphasizes gross structures of special clinical significance. In histology and embryology, students discover normal and abnormal developmental processes as they relate to adult structures; again, both macro and micro features are delineated. Avian morphology is covered during the first year of histology. The focus in neuroanatomy is on identification and definition of structural units and function in the central nervous system. The relationships between these anatomical features and behavior are also studied. Histology of nervous tissue is taught concurrently.

Anesthesiology—Professor McGrath. Anesthesiology lectures cover the pharmacology of anesthetic agents, cardiopulmonary physiology, and the use of anesthetic agents and equipment for various types of patients and surgical procedures. Students also learn to deal with shock, the traumatized or critically ill patient, and various methods of monitoring the surgical patient. Techniques are practiced in special anesthesiology laboratories, in the surgery teaching laboratory, and on patients in the Veterinary Hospitals.

Biochemistry—Professors Jorgensen, Louis. The functioning of biological systems at the molecular level is the subject of study in this field. Students learn the ways in which animals digest and absorb nutrients, how they use the absorbed molecules to maintain normal physiological processes, and how the end products, broken down by metabolic processes, are eliminated. Carbohydrates, lipids, proteins, and nucleic acids are explored in depth. After learning about the nature of enzymes, the ways in which they affect biological reactions, and how they are affected by environmental factors, students examine how metabolic processes are regulated. Study of the metabolic role of different tissues in the body and the molecular basis for some metabolic abnormalities provides the foundation for understanding disease.

Clinical Pathology—Professors Perman, Stevens. Clinical pathology is a broad area of laboratory medicine that crosses several disciplines including hematology, cytology, surgical pathology, serology, clinical chemistry, and urine analysis. Students learn to evaluate laboratory results and to decide when such results may be interpreted with confidence and when they must be applied with reservations. The important aspects of statistical assessment—precision, accuracy, reliability, and interpretability—are presented.

Epidemiology and Public Health—Professors Diesch, Pullen, Robinson. By studying epidemiology and public health, veterinary students learn the principles of epidemic diseases, food hygiene, environmental health, and zoonoses. These principles are then applied to solve problems encountered in the practice of preventive medicine for all animal species, in herd health management for food animals, in clinical epidemiology, in food protection and hygiene maintenance throughout food production, in transmission of diseases from animals to humans, and in management of environmental factors affecting the health of animals and humans.

Microbiology—Professors Bey, Loken, Maheswaran, Newman, Pomeroy, Shope, Ward. In microbiology students learn about the taxonomy and metabolic characteristics of bacteria, fungi, and viruses and their role in both normal and disease processes. Students also study disease-producing microorganisms that are indigenous to other countries because they pose a possible threat to our susceptible animal population. Mastery of the basic principles of microbiology is essential to the study of infectious diseases, medicine, surgery, pharmacology, and public health—disciplines that constitute the bulk of the last 2 years of the professional curriculum. Immunology, the study of how animals react to foreign substances, is an important area that is studied concurrently with microbiology and in other courses as well. With the present ease and frequency of long-distance transport of animals, the rapid detection, treatment, and control of infectious animal diseases—requiring knowledge of microbiology and immunology—take on great economic significance.

Parasitology—Professors Bemrick, Schlotthauer, Stromberg. Parasitology deals with the protozoa, arthropods, and helminths that infest animals. Students learn about life cycles of parasites, the effect of parasites on the health of animals, and parasite control. Both internal and external parasites are studied. Special attention is given to identifying and classifying parasites, procedures commonly used to detect and identify them, and drugs and management procedures used to control them.

Pathology—Professors D. Barnes, Hayden, Higbee, K. Johnson, Kurtz, Nelson, O'Leary, Ruth, Sautter, Walser, Werdin. Courses in this field explain how cells and tissues react to injury and relate morphologic changes to functional changes. Cell degeneration, cell death, inflammation, immunopathology, and neoplastic and non-neoplastic growth abnormalities are some of the topics examined. Students are expected to differentiate abnormal from normal cells or tissues at the gross and microscopic levels, identify abnormalities using appropriate terminology, and understand mechanisms (pathogenesis) involved in the development of the abnormalities.

Pharmacology—Professors Gray, Larson, Stowe. The goals for students in this course are twofold: to understand the general principles underlying drug action and use, thus building the conceptual framework within which they will be able to integrate subsequent training in veterinary therapeutics; and to acquire adequate knowledge of drugs used therapeutically through consideration of prototypes from major drug groups. The following general topics are examined: the chemical nature of drugs, the relationship between the structure of a drug and its biological activity, the ways in which drugs are absorbed and distributed in the body, how drug action is terminated and how a drug is eliminated from the body, biological variability in response of animals to drugs, dose-response and time-response relationships, drug interactions, toxicity and abuse, and regulation of drugs.

Physiology—Professors Duke, Dziuk, Good, Jankus. This discipline, which is closely related to both anatomy and biochemistry, focuses on the function of all the major body organs and organ systems, such as the circulatory, digestive, renal, reproductive, and respiratory systems. Since clinical problems frequently involve digestion and reproduction, these areas are emphasized. The endocrine organs are studied in endocrinology. The structure of hormones, their principal effects and target organs, and their regulation are studied, with emphasis on reproductive endocrinology. Students also learn about interrelationships among hormones and the consequences of secretion of abnormal quantities of hormones.

Radiology—Professors Hanlon, Jessen. Radiology concentrates on the properties and production of X-rays: their use in diagnosis and therapy; safety factors, including the major safety regulations; and processing film. Interpretation of radiograms and basic principles of radiation therapy and nuclear medicine are also highlighted.

Theriogenology—Professors Seguin, Spurrell, Whitmore, Zemjanis. In theriogenology students learn the parameters of normal fertility and reproductive efficiency for most species of domestic animals. The roles of environment, nutrition, genetics, management, and other factors influencing normal body function are studied, as well as the relationship between these factors and anatomic abnormalities, physiologic alterations, and diseases that result in lower fertility. Students develop skills in recognizing clinical signs that may indicate lower reproductive efficiency, and they make clinical examinations. Training is provided in laboratories, on hospital cases, and at farms served by the ambulatory clinic (see Clinic Rotation below).

Large Animal Medicine—Professors Anderson, Farnsworth, D. Johnson, V. Larson, Leman, Olson, Sorensen. This field includes work with food- and fiber-producing animals, horses, and zoo animals. Students learn how to approach a clinical case, do a thorough physical examination, reach a diagnosis, carry out a course of therapy, give a prognosis, and recommend methods to control and prevent a disease. Field investigations of disease problems are a valuable part of the learning experience. Students also participate in establishing and conducting herd health programs and in handling diseases in herds of animals. Zoo animal medicine is presented in lectures and learned by experience at the Como Zoo or with zoo animals brought to the Veterinary Hospitals. Externships (see Clinic Rotation below) enable fourth-year students to work with animal health problems in veterinary medical practices throughout the country.

Small Animal Medicine—Professors Bistner, Hardy, Klausner, McKeever, Ogburn, Osborne. Current information about all aspects of diseases of pet animals is presented. Techniques and procedures used in the diagnosis, therapy, and management of such diseases are demonstrated and practiced. Courses in diagnostic and therapeutic techniques and physical diagnosis prepare students for active participation in small animal clinical care. In the clinics, students integrate and use information obtained in both basic science and clinical courses to solve pet animal health problems.

Large Animal Surgery—Professors Booth, Usenik. Theories and techniques of veterinary surgery are applied to large animals in this disciplinary area. Additional important areas of study are the etiology and pathophysiology of diseases that require surgical intervention. Students learn to correlate information from both preclinical and clinical courses in making decisions about surgery and in managing the surgical patient. Course work includes basic principles of veterinary surgery, surgical diagnosis, therapeutic techniques, and aftercare of specific disease entities. Surgery laboratory courses afford firsthand experience in certain surgical procedures: casting, splinting, and bandaging techniques; patient care; and large animal anesthesia.

Small Animal Surgery—Professors Brasmer, Lipowitz, Wallace. The small animal surgery program provides students with a broad basic education in principles, theories, and techniques of veterinary surgery and anesthesiology. The program includes study of the etiology and pathophysiology of diseases that require surgical intervention. Knowledge of the other clinical sciences and of the basic sciences is brought to bear in developing sound programs for the management and therapy of surgical patients.

Clinic Rotation—Direct experience with veterinary medical problems and patients forms the major part of the fourth-year curriculum. Field, clinic, and laboratory assignments that last from 1 to 6 weeks are offered both on and off campus. They include assignments in the clinical areas described above as well as in ambulatory clinics and elective work.

Students electing externships work off campus for 2 weeks with practicing

veterinarians who are selected by but not associated with the college. Location and type of animal cared for cover a broad range. In recent years, for instance, students have worked in an equine practice in Kentucky, at the San Diego Zoo, in a mixed practice in Jamaica, and in cattle practices in North and South Dakota.

Ambulatory clinics are mobile units dispatched on request to deliver on-site veterinary medical care to animals on University farms and on farms within reasonable distance from the St. Paul campus. By accompanying staff members on these calls, students supplement the training received in the Veterinary Hospitals and learn to manage cases under farm conditions.

Production animals and their farm environments are examined and tested on a regular basis by students and staff members who are concentrating on preventive medicine. Herd health programs are provided for beef cattle, dairy cattle, horses, poultry, and swine.

Professional Curriculum

The college's 4-year curriculum is based on standards established by the Council on Education of the American Veterinary Medical Association. Course requirements for the first 3 years are similar for all members of a class. Although basic science courses (anatomy, biochemistry, pharmacology) predominate in the first year of the curriculum, some clinical sciences (radiology, diagnostic and therapeutic techniques) are also presented. The second year begins with emphasis on pathobiology and ends with emphasis on animal disease prevention and management. Third-year courses deal largely with medicine, surgery, reproduction, and other subjects directly used in the practice of veterinary medicine. All required course work is completed by the beginning of the fourth year, which lasts for 4 quarters and is devoted chiefly to clinical training. Students may pursue special interests through optional clinical assignments and elective course work. A breakdown of the program by year and term follows.

FIRST YEAR

	Fall	**Credits**
CVM 5100	Introduction to Veterinary Medicine	3
CVM 5150	Diagnostic and Therapeutic Techniques	1
SACS 5450	Veterinary Radiology: Introduction and Fundamentals	1
VB 5100	Veterinary Anatomy I	6
VB 5103	Veterinary Prenatal Development	3
VB 5104	Microscopic Anatomy of Domestic Animals	5
VB 5210	Veterinary Biochemistry	4
	Total	23
	Winter	
CVM 5271	Interpersonal Communication and the Problem-Oriented Medical Record System	2
VB 5102	Veterinary Neurobiology	3
VB 5105	Microscopic Anatomy of Domestic Animals	4
VB 5211	Veterinary Biochemistry Laboratory	1
VB 5212	Veterinary Biochemistry and Nutrition	4
VB 5306	Animal Physiology	5
	Total	19
	Spring	
AnSc 5404	Ruminant Nutrition	3
LACS 5650	Veterinary Epidemiology	3
VB 5308	Animal Physiology	5
VPB 5501	Basic Veterinary Pathology	5
VPB 5701	Advanced Veterinary Microbiology, Immunology	3
	Total	19

SECOND YEAR

	Fall	Credits
VB 5310	Animal Physiology	3
VB 5400	Veterinary Pharmacology	4
VPB 5502	Systemic Veterinary Pathology	5
VPB 5601	Veterinary Parasitology I	4
VPB 5703	Veterinary Virology	4
	Total	20

	Winter	
LACS 5151	Diagnostic and Therapeutics I	1
VB 5401	Veterinary Pharmacology	4
VPB 5504	Veterinary Clinical Pathology	3
VPB 5602	Veterinary Parasitology II	4
VPB 5702	Pathogenic Bacteria and Fungi	5
VPB 5704	Avian Diseases	3
	Total	20

	Spring	
LACS 5160	Large Animal Medicine	6
LACS 5550	Obstetrics and Diagnostic Procedures in Theriogenology	2
LACS 5551	Diagnostic Procedures in Theriogenology Laboratory	1
SACS 5170	Small Animal Medicine	4
SACS 5451	Veterinary Radiology	1
VB 5126	Veterinary Anatomy II	5
VB 5402	Veterinary Pharmacology	2
	Total	21

THIRD YEAR

	Fall	
CVM 5350	Principles of Veterinary Surgery	5
CVM 5400	Laboratory Animal Medicine	3
LACS 5161	Large Animal Medicine	5
LACS 5560	Laboratory Procedures in Theriogenology	2
SACS 5171	Small Animal Medicine	5
SACS 5380	Anesthesiology and Traumatology	2
	Total	22

	Winter	
CVM 5180	Applied Immunology	1
LACS 5162	Large Animal Medicine	6
LACS 5570	Reproductive Diseases of Domestic Animals	5
SACS 5152	Diagnostic and Therapeutic Techniques	2
SACS 5172	Small Animal Medicine	4
SACS 5351	Veterinary Surgery	4
	Total	22

	Spring	
CVM 5270	Economics, Ethics, and Law	4
CVM 5750	Clinics	1
LACS 5153	Diagnostic and Therapeutic Techniques II	1
LACS 5165	Veterinary Toxicology	3
LACS 5352	Veterinary Surgery	4
LACS 5651	Veterinary Community Medicine	3
SACS 5452	Veterinary Radiology	1
VPB 5503	Diagnostic Pathology	3
	Total	20

FOURTH YEAR

A 4-quarter series of clinics: CVM 5760 (summer), 5761 (fall), 5762 (winter), and 5763 (spring). Each course carries 16 credits. In addition, the student must complete at least 8 credits in elective courses.

Academic Policies

Registration—Students admitted to the first-year class receive complete registration information from the Office of Academic Affairs and Research.

Each student is required to purchase a microscope that meets the minimum specifications announced at the time of acceptance. Secondhand microscopes must be examined and approved by designated staff members before they are purchased and used. In addition to a microscope and textbooks, the student will be expected to purchase certain special items of clothing and some instruments.

Degree Requirements—The bachelor of science (B.S.) degree with a major in veterinary science is granted upon satisfactory completion of the first 2 years of the program of studies with a grade point average of 2.00 or above. Students earning the B.S. degree must also satisfy the distribution requirements in liberal studies established by the all-University Council on Liberal Education.

Students in the upper 6 to 10 percent of their class are awarded baccalaureate degrees with distinction and those in the upper 5 percent of their class receive degrees with high distinction.

The doctor of veterinary medicine (D.V.M.) degree is awarded following the satisfactory completion of the 4-year professional curriculum with a grade point average of 2.00 or above and completion of a minimum of 258 credits.

Honor System—The students of the College of Veterinary Medicine, rather than the faculty, monitor examinations. An honor system operates on the assumption that students are honest. Students are trusted not to give or receive aid during examinations and are responsible for their own honesty.

The Honor Case Commission, composed of students elected from the four classes, confidentially considers reports of suspected acts of dishonesty during examinations. The commission may request that a hearing be held to determine if scholastic dishonesty has occurred. In such case, four faculty representatives are selected by the dean and the Faculty Council to form a Student-Faculty Honor Case Commission that will participate in the hearing. If they determine that the student involved is guilty, an appropriate penalty will be determined and referred to the dean for implementation.

The honor system is a preventive rather than a punitive system. New students receive a brochure on the honor system, and it is also explained to them by a member of the Honor Case Commission during the course Introduction to Veterinary Medicine.

All students have a responsibility to inform the instructor if they must miss a scheduled examination, quiz, or deadline for any course assignment that will count toward their grade.

Grades—For courses entitled Clinics and Special Clinics there are two permanent grades: O, representing achievement that is outstanding relative to the level necessary to satisfy course requirements, and S, representing achievement that is satisfactory to the instructors. An N is assigned when the student does not earn an O or an S and is not assigned an incomplete.

Doctor of veterinary medicine degree candidates are evaluated under the A-B-C-D-N grading system for most other courses offered by the college. Under this system there are four permanent passing grades: A, representing achievement that is outstanding relative to the level necessary to meet course requirements; B, representing achievement that is significantly above the level necessary to satisfy course requirements; C, representing achievement that meets the basic course requirements in every respect; and D, representing achievement that is worthy of credit though it does not fully meet the basic course requirements in every respect.

An instructor is obligated to define to a class in its early meetings, as explicitly as possible, the performance that will be necessary to earn each grade. An N (no credit)

is assigned when a student does not earn an S or a D or a higher grade and is not assigned an incomplete.

The symbol I is assigned to indicate an incomplete when in the instructor's opinion there is a reasonable expectation that a student can complete successfully any course work left unfinished at the end of a quarter. An I that is not made up by the end of the quarter break following the next quarter in residence becomes an N. When an I is changed to a permanent grade, the I is removed from the record.

The symbol W is entered by the recorder when a student officially withdraws from a course. This symbol is assigned in all cases of official cancellation during the first 6 weeks of classes and requires the approval of the instructor, the class adviser, and the chair of the Admissions and Scholastic Standing Committee. After the sixth calendar week, a W is recorded only if the student is doing at least D- or S-level work at the time of official cancellation; students who are not achieving at this level receive a grade of N.

The symbol X is reported in a continuing course in which a grade cannot be determined until the full sequence of quarters is completed. The instructor submits a grade for each X when the student completes the sequence.

The symbol V indicates registration as an auditor or visitor, a noncredit, non-grade registration.

Scholastic Requirements—Each student must maintain a grade point average of 1.50 or higher for any single quarter and must earn a passing grade in each course. Students failing to achieve a grade point average of at least 1.50 or receiving a grade of N (no credit) in any single quarter may be dropped from the professional curriculum. Those having a cumulative grade point average lower than 2.00 are placed on probation. A grade point average of 2.00 must be maintained each year to continue in the professional curriculum and to earn the D.V.M. degree.

The Admissions and Scholastic Standing Committee may grant permission for repeating course work. A grade point average of 2.50 or higher is required for repeated course work. Substitute courses will be considered as repeat courses; prior approval of the Admissions and Scholastic Standing Committee must be obtained to take such courses. To request this and other exemptions, students must petition the committee. Forms for this purpose are available in the Office of Academic Affairs and Research, 301 Veterinary Science.

Readmission—If a student is dropped from the program, he or she may not be reinstated without the permission of the Admissions and Scholastic Standing Committee. Credits earned at other institutions during the period of suspension will not apply toward graduation from the University of Minnesota unless permission was given in advance by the Admissions and Scholastic Standing Committee. If permitted to return, the student will be placed on probation and may be dropped again at any time his or her work is unsatisfactory.

Grievance Procedures—Persons who wish to file grievances or appeals within the college may do so through procedures that conform to the principles of fairness, and accessibility defined in the University Senate Statement on Academic Freedom and Responsibility adopted April 18, 1974. The Student Conduct Code is published annually in the *Minnesota Daily*. Grievances must be presented in accordance with the regulations of the University Senate and the procedures established by the college.

Access to Student Educational Records—In accordance with regents' policy on access to student records, information about a student generally may not be released to a third party without the student's permission. The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information—name, address, telephone number, dates of attendance, college and class, major, adviser, and degrees earned—is considered public

or directory information. To prevent release of such information outside the University while in attendance at the University, a student must notify the records office on his or her campus.

Students are notified annually of their right to review their educational records. The regents' policy, including a directory of student records, is available for review at the information booth in Williamson Hall, Minneapolis campus, and at the records offices on other campuses of the University. Questions may be directed to the Office of the Coordinator of Student Support Services, 260E Williamson Hall, (612) 373-2106.

A student conducts an eye examination in a small animal clinical class under the watchful eye of Dr. Robert Hardy.

III. COURSE DESCRIPTIONS

Symbols—The following symbols are used throughout the course descriptions in lieu of page footnotes:

Consent of the instructor is required prior to registration.

△ Consent of the department, division, or school offering the course is required prior to registration.

f,w,s,su Following course number indicate fall, winter, spring, or summer quarters.

A hyphen between courses numbers (e.g., 3142-3143-3144) indicates a sequence of courses that must be taken in the order listed.

A comma between course numbers (e.g., 1234, 1235, 1236) indicates a series of courses that may be entered any quarter.

Elective courses available to fourth-year students are identified in groupings entitled "Other Courses" and are listed by departments.

College of Veterinary Medicine (CVM)

REQUIRED COURSES

5100. INTRODUCTION TO VETERINARY MEDICINE. (3 cr; prereq regis vet med, 1st yr)
Lectures and laboratory on career opportunities, academic policies, student support services, curriculum, student government, personal health and safety, and legal issues related to the D.V.M. program.

5150. DIAGNOSTIC AND THERAPEUTIC TECHNIQUES. (1 cr; prereq #)
Demonstration and application of diagnostic techniques and procedures and restraint of animals. Discussion of therapeutic regimens and demonstration of therapeutic procedures.

5180. APPLIED IMMUNOLOGY. (1 cr; prereq regis vet med, grad student or #)
Review of the principles of immunology and their clinical application.

5270. LAW, ECONOMICS, AND ETHICS IN VETERINARY MEDICINE. (4 cr; prereq regis vet med or #)
Basic economic concepts and terminology, relationship of animal health to productivity, cost-benefit relationships for disease control programs, financial return and economic analysis of livestock operations, economics of practice management, trends in livestock production, and ethical and legal issues in veterinary medicine.

5271. INTERPERSONAL COMMUNICATION AND THE PROBLEM-ORIENTED MEDICAL RECORD SYSTEM. (2 cr; prereq #)
Effective interpersonal behavior and communication, and introduction to the problem-oriented system.

5350. PRINCIPLES OF VETERINARY SURGERY. (5 cr; prereq VB 5126 or #)
Introduction to the science and art of veterinary surgery. Basic materials necessary for the clinical management of the large and small animal surgical patient. Aseptic technique, patient evaluation, physiologic responses of body systems to surgery, the repair and healing of tissue, and surgical anatomy emphasized.

5400. LABORATORY ANIMAL MEDICINE. (3 cr; prereq #)
Lectures, discussions, and demonstrations concerning care and management of laboratory animals. Diseases, nutrition, zoonoses, gnotobiotics, restraint, anesthesia, and environmental practices. Tours of laboratory animal colonies, both commercial and institutional.

5750. CLINICS. (1 cr; prereq #)
An introduction to the medical, obstetrical, radiological, surgical, and laboratory examination of animals.

5760, 5761, 5762, 5763. CLINICS. (16 cr per qtr; prereq #)
Laboratories devoted to the application of principles and techniques of the basic and clinical medical sciences to the diagnosis, prognosis, treatment, prevention, and eradication of disease in domestic animals.

Large Animal Clinical Sciences (LACS)

REQUIRED COURSES

5151. DIAGNOSTIC AND THERAPEUTIC TECHNIQUES I. (1 cr; prereq CVM 5150 or #)
Application of general physical examination procedures, special diagnostic techniques, and therapeutic procedures to large animals.

5153. DIAGNOSTIC AND THERAPEUTIC TECHNIQUES II. (1 cr; prereq #)
Demonstration and practice of restraint of and diagnostic and therapeutic techniques for large animals.

5160. LARGE ANIMAL MEDICINE. (6 cr; prereq 5151 or #)
Diseases of ruminants covered on a system basis.

5161. LARGE ANIMAL MEDICINE. (5 cr, prereq 5160 or #)
Continuation of study of ruminant diseases and equine diseases covered on a system basis.

5162. LARGE ANIMAL MEDICINE. (6 cr; prereq 5161 or #)
Nutritional, metabolic, and infectious diseases of large domestic animals.

5165. VETERINARY TOXICOLOGY. (3 cr; prereq VB 5401 or equiv or #)
Toxicology of minerals, pesticides, herbicides, poisonous plants, venoms, and miscellaneous toxicants.

5352. LARGE ANIMAL SURGERY. (4 cr; prereq #)
Common surgical procedures applied to large animals.

5550. OBSTETRICS AND DIAGNOSTIC PROCEDURES IN THERIOGENOLOGY. (2 cr; prereq 5151 or #)
Lectures covering the physiology and pathology of pregnancy and obstetrics and the diagnostic techniques used to evaluate normal reproductive changes in domestic animals.

5551. DIAGNOSTIC PROCEDURES IN THERIOGENOLOGY LABORATORY. (1 cr; prereq 5151 or #)
Laboratory practices in manipulative obstetrics.

5560. LABORATORY PROCEDURES IN THERIOGENOLOGY. (2 cr; prereq 5550 or #)
Demonstrations and laboratory practices dealing with animal reproduction diagnostic techniques and obstetrics.

5570. REPRODUCTIVE MANAGEMENT AND DISEASES OF DOMESTIC ANIMALS. (5 cr; prereq CVM 5150 or #)
Lectures covering the physiology and pathology of reproduction, artificial insemination, abortive diseases, postpartum injuries, and breeding management in domestic animals.

5650. VETERINARY EPIDEMIOLOGY. (3 cr; prereq 10 cr biology, 12 cr chemistry or #)
Principles of epidemiology, ecology, and veterinary public health. Biostatistics applied to the measurement of health and disease in populations.

5651. VETERINARY COMMUNITY MEDICINE. (3 cr; prereq VPB 5503, VPB 5703 or equiv or #)
Principles and practices of environmental health and food hygiene; includes meat, poultry, milk, and other foods as they are important for animal and human health. Diseases transmitted between animals and humans.

OTHER COURSES

3502. ANIMAL HEALTH AND DISEASE. (5 cr)
Designed for nonveterinary students to give a broad understanding of veterinary science as it applies to the health and diseases of domestic animals. Emphasis on basic concepts of disease and common animal diseases that demonstrate these concepts. How stress and management practices aggravate and create new disease conditions.

5180. INTRODUCTION TO HERD HEALTH MANAGEMENT. (0.5 cr; prereq regis vet med, 4th yr or grad student or #)
Herd health management, general epidemiology, disease surveillance, and economics of farming.

5181. BEEF HERD HEALTH MANAGEMENT. (2 cr; prereq regis vet med, 4th yr or grad student or #)
Beef cattle breeds and breeding, reproduction, applied nutrition, housing, preventive medicine programs, and management practices.

5182. SHEEP AND GOAT HERD HEALTH MANAGEMENT. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Sheep and goat breeds and breeding, reproduction, applied nutrition, housing, preventive medicine programs, and management practices.

5183. EQUINE HERD HEALTH MANAGEMENT. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Equine breeding, reproduction, applied nutrition, housing, preventive medicine programs, and management practices.

5184. DAIRY HERD HEALTH MANAGEMENT. (2 cr; prereq regis vet med, 4th yr or grad student or #)
Dairy cattle genetics and breeding, reproduction, applied nutrition, housing, preventive medicine programs, and management practices.

5185. SWINE HERD HEALTH MANAGEMENT I. (Cr ar; prereq regis vet med, 4th yr or grad student or #)
Swine genetics and breeding, reproduction, applied nutrition, housing, preventive medicine programs, and management practices.

5186. PREVENTION AND CONTROL OF BOVINE MASTITIS. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Principles and procedures used to prevent and control mastitis in dairy cattle. The role of the milking machine and laboratory procedures in solving herd problems.

5187. SWINE HERD HEALTH MANAGEMENT II. (1 cr; prereq 5185, regis vet med, 4th yr or grad student or #)
Continuation of 5185.

5273. ECONOMICS OF VETERINARY MEDICINE. (1 cr; prereq vet med major)
Designed for senior veterinary students to demonstrate important economic concepts through practical examples. Introduction to basic economic concepts, terminology, relationship of animal health to animal productivity, and financial return and analysis of the cost and returns of actual beef cattle, dairy cattle, and hog farms. Economic issues facing veterinarians in practice management and the client in livestock production. Trends and outlooks in livestock production.

5275. DISEASES OF ZOO ANIMALS AND EXOTIC PETS. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Diseases of and management procedures for zoo animals and exotic pets, restraint procedures, medication, and diagnosis.

5280. SEMINAR: WORLD FOOD SUPPLY PROBLEMS. (4 cr, limited enrollment; prereq major in agriculture, veterinary medicine, nutritional sciences, social science field or #...grad students by △ only)
(Same as AgEc 5790, FScN 5643, PlPa 5220, and Soc 5675) A multidisciplinary approach to the social, economic, and technical problems of feeding the world's growing population. Principles sought from the social and economic, plant, animal, and nutritional sciences for their application to food problems.

5364. EQUINE LAMENESS. (2 cr; prereq regis vet med, 4th yr, 5352 or #)
All major musculoskeletal diseases affecting the horse that contribute to lameness.

5366. LARGE ANIMAL ABDOMINAL SURGERY. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Abdominal procedures in the bovine and equine species.

5562. INFERTILITY CLINICS. (Cr ar; prereq 5560, 5570 or #)
Investigation of hospital cases and field problems involving infertility in domestic animals. Clinical examination, discussion of diagnosis, prognosis, and therapy. Assignment of special study of certain reproductive disorders.

5571. REPRODUCTION AND INFERTILITY IN THE HORSE. (1 cr; prereq 5570, regis vet med, 4th yr or grad student or #)
Lectures and demonstrations dealing with reproductive patterns, breeding practices, management, artificial insemination, economics of reproductive performance, and infertility in horses.

5572. REPRODUCTIVE PATTERNS AND INFERTILITY IN THE DOG AND CAT. (1 cr, prereq 5570, regis vet med, 4th yr or grad student or #)
Lectures on reproductive patterns, breeding management, artificial insemination, and infertility in dogs and cats.

5573. REPRODUCTIVE DISEASES OF DAIRY CATTLE. (2 cr; prereq 5570 or #)
Lectures covering the pathology of reproduction, artificial insemination, and abortive diseases of dairy cattle. Evaluation of applied research on fertility, herd health problems, and management programs.

5574. REPRODUCTION AND INFERTILITY IN THE BULL. (1 cr; prereq 5570, regis vet med, 4th yr or grad student or #)
Lectures and demonstrations covering reproductive patterns, management, fertility, and infertility of the bull. Emphasis on a clinical approach to diagnosis, prognosis, and treatment.

5575. REPRODUCTION AND INFERTILITY IN SWINE. (1 cr, prereq 5570, regis vet med, 4th yr or grad student or #)
Lectures and demonstrations concerning reproductive patterns, breeding practices, management, artificial insemination, synchronization of estrus, economics of reproductive performance, and infertility in swine.

5660. EPIDEMIOLOGY OF ZOONOSES I. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Zoonotic diseases of companion animals. Reservoirs, sources, transmission, and specific prevention and control programs emphasized.

5661. EPIDEMIOLOGY OF ZOONOSES II. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Zoonotic diseases of food-producing animals. Reservoirs, sources, transmission, and specific prevention and control programs emphasized.

5665. MONITORING OF ANIMAL DISEASE. (Cr ar; prereq #)
Seminars and discussions on techniques used to monitor disease in animal populations.

5670. COMPARATIVE MEDICINE AND PUBLIC HEALTH. (2 cr; prereq PubH 5002 or #)
Human relationship to the biologic environment. Interrelationships of animal and human health, occurrence of animal diseases, ecology of zoonoses, food production and hygiene, laboratory animal medicine.

5671. BIOHAZARDS IN VETERINARY MEDICINE. (Cr ar; prereq #)
Seminars and discussions on microbiological, toxicological, drug, and other hazards in veterinary medicine.

5672. PERSPECTIVES: ANIMAL-HUMAN RELATIONSHIPS AND COMMUNITY HEALTH. (2 or 3 cr; prereq #)
(Same as PubH 5303) Perspectives on cultural, psychological, ethological, and environmental aspects of the interrelationships of people and animals as they affect individual and community health.

5680. PROBLEMS IN VETERINARY EPIDEMIOLOGY AND PUBLIC HEALTH. (Cr ar; prereq 5650 or equiv or #)
Individual study arranged with a faculty member.

5681. VETERINARY SCIENCE. (3 cr; prereq pharmacy sr or Phsl 3070, Phcl 5102 or equiv or #)
(Same as Phar 5520) Professional interrelationships between pharmacists and veterinarians; disease problems of domestic animals; veterinary pharmacotherapeutics.

5785. EXTERNSHIP SEMINAR. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Discussion of clinical problems experienced by students in their externships with veterinarians in private practice. Emphasis on diseases of food-producing animals and horses.

GRADUATE COURSES

(See the *Graduate School Bulletin* for course descriptions)

5951. DIRECTED STUDIES

8193. ADVANCES IN CLINICAL IMMUNOBIOLOGY

8194. PROBLEMS IN DIAGNOSTIC VIROLOGY, SEROLOGY, AND IMMUNOLOGY

8195. PREVENTIVE VETERINARY MEDICINE

8199. PROBLEMS IN ECONOMICS OF ANIMAL HEALTH

8290. ADVANCED VETERINARY MEDICINE

8291. ADVANCED DIAGNOSIS AND THERAPEUTICS OF ANIMAL DISEASES

8292. SEMINAR: VETERINARY MEDICINE

8293. MEDICAL CONFERENCE

8294. ADVANCED COMPARATIVE IMMUNOCHEMISTRY AND IMMUNOBIOLOGY

8299. RESEARCH IN VETERINARY MEDICINE

8390. SEMINAR: VETERINARY SURGERY

8392. ADVANCED LARGE ANIMAL SURGERY

8393. PROBLEMS IN LARGE ANIMAL ORTHOPEDICS

8395. SURGICAL DISEASES OF THE MAMMARY GLAND OF DOMESTIC ANIMALS

8397. LARGE ANIMAL ANESTHESIA

8590. ADVANCED DIAGNOSTIC METHODS IN REPRODUCTIVE DISEASES

8591, 8592, 8593. ADVANCED ENDOCRINOLOGY OF REPRODUCTION

8594. SPECIAL PROBLEMS IN ANIMAL REPRODUCTION

8595. SEMINAR: VETERINARY OBSTETRICS

8596. HEREDITY IN ANIMAL DISEASE

8690. ZOONOSES AND COMPARATIVE MEDICINE

8790. PROBLEMS IN VETERINARY CLINICAL PHARMACOLOGY AND THERAPEUTICS

8791. SEMINAR IN CLINICAL PHARMACOLOGY AND THERAPEUTICS

8792. SEMINAR IN VETERINARY TOXICOLOGY

Small Animal Clinical Sciences (SACS)

REQUIRED COURSES

5152. DIAGNOSTIC AND THERAPEUTIC TECHNIQUES. (2 cr; prereq #)
Demonstration and application of diagnostic procedures for and restraint of animals. Discussion of therapeutic regimens and demonstration of therapeutic procedures.

5170. SMALL ANIMAL MEDICINE. (4 cr; prereq #)
Introductory to breeds, care, feeding, nutritional problems, and management of companion animals. Diseases of the cutaneous, musculoskeletal, respiratory, and cardiovascular systems of companion animals.

5171. SMALL ANIMAL MEDICINE. (5 cr; prereq 5170 or #)
Diseases of the hemic, lymphatic, digestive, urinary, genital, endocrine, and nervous systems of companion animals.

5172. SMALL ANIMAL MEDICINE. (4 cr; prereq 5171 or #)
Diseases of the organs of special sense and infectious and toxic diseases of companion animals, and diseases affecting pet birds and laboratory animals.

5351. VETERINARY SURGERY. (4 cr; prereq CVM 5350 or #)
Common surgical procedures applied to small animals.

5380. ANESTHESIOLOGY AND TRAUMATOLOGY. (2 cr; prereq 5170 or #)
Principles and application of anesthesia. Management of the severely injured patient.

5450. VETERINARY RADIOLOGY: INTRODUCTION AND FUNDAMENTALS. (1 cr; prereq #)
Basic concepts of radiation physics, radiation safety and environmental health hazards, and radiography.

5451. VETERINARY RADIOLOGY. (1 cr; prereq 5450 or #)
Radiographic interpretation of normal systems.

5452. VETERINARY RADIOLOGY. (1 cr; prereq 5451 or #)
Continuation of 5451.

OTHER COURSES

5250. SMALL ANIMAL DERMATOLOGY. (2 cr; prereq regis vet med, 4th yr or grad student or #)
The pathogenesis, clinical features, diagnosis, and therapy of skin diseases of dogs and cats.

5255. DISEASES OF THE URINARY SYSTEM. (2 cr; prereq regis vet med, 4th yr or grad student or #)
The etiology, pathophysiology, clinical and laboratory findings, diagnosis, prognosis, and treatment of disorders of the urinary system. A case-oriented format with student participation in discussion emphasized.

5256. DISEASES OF THE LIVER AND PANCREAS. (2 cr; prereq regis vet med, 4th yr or grad student or #)
The etiopathogenesis, diagnosis, and treatment of hepatic and pancreatic diseases in companion animals.

5265. COMPARATIVE CARDIOLOGY. (2 cr; prereq 4th yr or grad student or #)
Designed to help students develop skills in recognition, definition, and resolution of problems involving the cardiovascular system.

5271. HOSPITAL MANAGEMENT. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Lectures on management of a small animal hospital. Zoning restrictions, employee supervision, drug purchases, facilities, fees, and other information pertinent to the operation of a modern veterinary medical hospital.

5285. CANINE CLINICAL NEUROLOGY. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Anatomic and physiologic bases for neurological examination of the dog. Emphasis on a clinical approach to neurology, well illustrated with case materials.

5352. ABDOMINAL AND THORACIC SURGERY OF SMALL ANIMALS. (2 cr; prereq #)
Lectures on the pathophysiology, diagnosis, and surgical-medical management of selected diseases of abdominal and thoracic viscera.

5360. SMALL ANIMAL ORTHOPEDICS. (2-3 cr; prereq regis vet med, 4th yr or grad or #)
Small animal orthopedic problems and surgical procedures to correct them.

5453. SPECIAL PROCEDURES IN VETERINARY RADIOLOGY. (1 cr; prereq regis vet med, 4th yr or grad or #)
Contrast agents and procedures to better utilize certain systems or anatomical areas.

5454. ROENTGENOLOGY BONE — LARGE ANIMALS. (1 cr; prereq regis vet med, 4th yr or grad or #)
Roentgen signs of common bone diseases of large animals. Primary emphasis on the horse.

5455. ROENTGENOLOGY BONE — SMALL ANIMALS. (1 cr; prereq 4th yr or grad or #)
Roentgen signs of common bone diseases of small animals.

GRADUATE COURSES

(See the *Graduate School Bulletin* for course descriptions)

8180. ADVANCED CLINICAL NEUROLOGY

8190. COMPARATIVE CARDIOVASCULAR DISEASES

8191. ADVANCED COMPARATIVE ELECTROCARDIOLOGY

8192. SPECIAL CARDIOLOGY CLINICS

8196. INTERNAL MEDICINE IN SMALL COMPANION ANIMALS

8197. ADVANCED DERMATOLOGIC CLINICS

8198. PROBLEMS IN VETERINARY COMPARATIVE DERMATOLOGY

8290. ADVANCED VETERINARY MEDICINE

8291. ADVANCED DIAGNOSIS AND THERAPEUTICS OF ANIMAL DISEASES

8292. SEMINAR: VETERINARY MEDICINE

8293. MEDICAL CONFERENCE

8295. COMPARATIVE VETERINARY MEDICAL OPHTHALMOLOGY

8296. COMPARATIVE VETERINARY SURGICAL OPHTHALMOLOGY

8297. ADVANCED CLINICAL VETERINARY OPHTHALMOLOGY

8298. RESEARCH IN VETERINARY OPHTHALMOLOGY

8299. RESEARCH IN VETERINARY MEDICINE

8390. SEMINAR: VETERINARY SURGERY

8391. ADVANCED SMALL ANIMAL SURGERY

8394. SURGERY OF THE GASTROINTESTINAL SYSTEM

8396. ADVANCED VETERINARY ANESTHESIA

8410. SURGICAL PHYSIOLOGY

8420. NEUROSURGERY

8430. THORACIC AND CARDIOVASCULAR SURGERY

8471. THERAPEUTIC RADIOLOGY

8480. SEMINAR: VETERINARY RADIOLOGY

8483. ABDOMINAL ROENTGENOLOGY

8484. UROLOGIC AND GYNECOLOGIC ROENTGENOLOGY

8485. THORACIC ROENTGENOLOGY

8490. ADVANCED VETERINARY RADIOLOGY

8491. FUNDAMENTALS OF NUCLEAR MEDICINE

8492. RADIATION BIOLOGY

Veterinary Biology (VB)

REQUIRED COURSES

5100. VETERINARY ANATOMY I. (6 cr; prereq #)
Gross anatomic structure and function. The dog is used as a type species to introduce nomenclature and principles of mammalian gross anatomy. Cervical, thoracic, and abdominal viscera — including those of the dog, cat, ruminant, horse, pig, and bird — examined from a comparative and radiological approach.

5102. VETERINARY NEUROBIOLOGY. (3 cr; prereq #)
Structural and functional organization of the central nervous system of domestic animals.

5103. VETERINARY PRENATAL DEVELOPMENT. (3 cr; prereq #)
Ontogenetic processes in organ systems of domestic animals and developmental anomalies of clinical significance.

5104. MICROSCOPIC ANATOMY OF DOMESTIC ANIMALS. (5 cr; prereq #)
Light microscopic and relevant ultrastructural studies of cells, tissues, and organ systems.

5105. MICROSCOPIC ANATOMY OF DOMESTIC ANIMALS. (4 cr; prereq #)
Continuation of 5104.

5126. VETERINARY ANATOMY II. (5 cr; prereq 5100 or #)
Comparative anatomy with emphasis on the pelvis, reproductive system, limbs, and head from a morphodynamic and radiographic approach. Species covered include the horse, domestic ruminants, swine, dog, cat, and chicken.

5210. VETERINARY BIOCHEMISTRY. (4 cr; prereq #)
The molecular nature of cells and tissues and the ways in which dietary carbohydrates, lipids, and proteins are metabolized to generate energy for growth and maintenance of the animal.

5211. VETERINARY BIOCHEMISTRY LABORATORY. (1 cr; prereq #)
Basic biochemical laboratory techniques and analyses of biological materials.

5212. VETERINARY BIOCHEMISTRY AND NUTRITION. (4 cr; prereq #)
Metabolism in specific body tissues; problems in metabolism. Requirements and functions of nutrients in large and small animals; sources of nutrients in animal feeds.

5306. ANIMAL PHYSIOLOGY. (5 cr; regis vet med or #)
Lectures and laboratory dealing with the physiology of the circulatory, respiratory, and renal systems of the animal body.

5308. ANIMAL PHYSIOLOGY. (5 cr; regis vet med or #)
Lectures and laboratory dealing with the physiology of the digestive systems of animals, and the mechanisms of temperature regulation and heat production.

5310. ANIMAL PHYSIOLOGY. (3 cr; prereq 5308 or #)
Lectures on the physiology of the endocrine and reproductive systems of domestic animals.

5400. VETERINARY PHARMACOLOGY. (4 cr; prereq 5308 or #)
General principles of drug action, drug disposition, and drug use in domestic animals. Pharmacology of autonomic drugs, inhaled anesthetic agents, narcotic analgesic drugs, tranquilizing agents, gastrointestinal drugs, inorganic ions, and preparations used in fluid and electrolyte therapy. Veterinary applications.

5401. VETERINARY PHARMACOLOGY (4 cr; prereq 5400 or #)
Pharmacology of neuromuscular blocking agents, cardiac glycosides, cardiac antiarrhythmic drugs, local anesthetics, parenteral general anesthetics, nonnarcotic analgesic drugs, adrenal corticosteroids, analeptic drugs, anticonvulsants, antihistamine drugs, and autacoids. Veterinary applications.

5402. VETERINARY PHARMACOLOGY. (2 cr; prereq 5401 or #)
Pharmacology of sulfonamides, nitrofurans, arsenicals, antibiotics, coccidiostats and other antiprotozoan drugs, antifungal agents, anthelmintics, and other chemotherapeutic drugs. Applications in the prevention and treatment of microbial and parasitic diseases of domestic animals.

OTHER COURSES

1120. COMPARATIVE VERTEBRATE MORPHOLOGY. (5 cr, not open to vet med students; prereq Biol 1106 or #)
Interpretation of vertebrate morphology, morphogenesis, and function with emphasis on phylogeny and adaptive significance.

3305. REPRODUCTIVE PHYSIOLOGY, ARTIFICIAL INSEMINATION, AND LACTATION. (5 cr; prereq #)
(Same as AnSc 3305) Functions of the reproductive organs, fertilization, the estrous cycle and its endocrine control, reproductive efficiency, and problems and principles of artificial insemination. Anatomy, physiology, and biochemistry of the mammary gland. Mammary growth, initiation and maintenance of lactation, milk synthesis, and factors influencing the lactation curve.

5110. CYTOGENETIC EVALUATION OF ANIMAL DISEASES. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Five lectures dealing with current information about the use of cytogenetics in animal disease diagnosis and current methods of laboratory preparation and analysis of chromosomes. Five laboratory periods devoted to preparing prophase spreads of chromosomes, staining and photographing them, and preparing karyograms for analysis.

5120. COMPARATIVE VERTEBRATE MORPHOLOGY
See 1120.

5140. VERTEBRATE MICROANATOMY. (6 cr; prereq 5120 or #)
The microscopic structure and cytochemical and functional aspects of cells, tissues, and organs of representative examples of vertebrates. Four units: basic tissues (2 cr); gastrointestinal tract (1 cr); respiratory and integumentary systems (1 cr); and excretory, reproductive, and endocrine systems (2 cr). Depending on background and interest, students may register for any or all units.

5314. BEHAVIORAL PHYSIOLOGY. (3 cr; prereq 6 cr systemic physiology, Biol 5051 or #)
(Same as AnSc 5314) Current concepts of neurological and neurochemical bases of animal behavior including reception, coding, transmission, and storage of information; levels of integration, central control of input and output; spontaneity, development, and learning.

5320w. AVIAN PHYSIOLOGY. (4 cr, prereq 6 cr systemic physiology or equiv, #, offered 1980 and alt yrs)
Circulatory, respiratory, digestive, metabolic, renal, endocrine, and reproductive physiology of various species of wild and domestic birds.

5321s. ADVANCED AVIAN PHYSIOLOGY. (1 cr; prereq 5320; offered 1980 and alt yrs)
Survey of the physiology of phenomena characteristic of nondomestic avian and mammalian species such as flying, diving, migration, annual reproductive cycles, circadian rhythms, hibernation, and torpidity.

5322. PHYSIOLOGY OF REPRODUCTION. (5 cr; prereq 6 cr systemic physiology)
(Same as AnSc 5322) Principles of reproductive physiology with emphasis on endocrinologic aspects.

5324s. SEMEN PRESERVATION AND ARTIFICIAL INSEMINATION. (4 cr; prereq 5322 or#; offered 1980 and alt yrs)
(Same as AnSc 5324) Chemistry of gametes and reproductive secretions; preservation of spermatozoa with emphasis on cryogenic methods; artificial insemination; factors influencing reproductive performance.

5325w. PHYSIOLOGY OF FERTILIZATION AND GESTATION. (4 cr; prereq 5322 or#; offered 1981 and alt yrs)
(Same as AnSc 5324) Physiological events occurring during gametogenesis, capacitation, fertilization, the period of embryo, the period of fetus, and parturition.

5326s. IMMUNOREPRODUCTION. (4 cr; prereq 5322 or #; offered 1981 and alt yrs)
(Same as AnSc 5326) Blood groups and polymorphic proteins affecting reproduction, immunoglobulin formation, antigens of semen, ova and genital secretions, immunopathology, maternal-fetal incompatibility, antibodies to hormones.

5330. WILD BIRD MEDICINE. (2 cr; prereq 4th year or grad student or #)
Brief summary of important aspects of avian anatomy and physiology. Survey of diseases common to wild birds and surgical repair of common injuries and fractures.

GRADUATE COURSES

(See the *Graduate School Bulletin* for course descriptions)

5149. TOPICS OF ORGANOLOGY

5920. INDEPENDENT RESEARCH IN VETERINARY BIOLOGY

5950. DIRECTED STUDIES

8109. FUNCTIONAL MORPHOLOGY AND ADAPTATION

8110. MORPHOLOGY OF ANIMAL CELLS AND INTERCELLULAR SUBSTANCES

8111. HISTOLOGIC AND ULTRAHISTOLOGIC TECHNIQUES

8112-8113-8114. RESEARCH PROPOSITIONS IN MORPHOLOGY

8134-8135. COMPARATIVE VETERINARY NEUROLOGY

8136. EXPERIMENTAL COMPARATIVE VETERINARY NEUROLOGY

8148. SEMINAR: VETERINARY ANATOMY

8149. RESEARCH IN VETERINARY ANATOMY

8150. PROBLEMS IN VETERINARY ANATOMY

8307. ANIMAL PHYSIOLOGY LABORATORY

8309. ANIMAL PHYSIOLOGY LABORATORY

8330. SEMINAR: PHYSIOLOGY AND/OR PHARMACOLOGY

8335. PHYSIOLOGICAL AND PHARMACOLOGICAL RESEARCH TECHNIQUES FOR LARGE ANIMALS

8349. RESEARCH IN PHYSIOLOGY

8448. PROBLEMS IN VETERINARY PHARMACOLOGY

Veterinary Pathobiology (VPB)

REQUIRED COURSES

5501. BASIC VETERINARY PATHOLOGY. (5 cr; prereq #)
Lecture and laboratory studies of basic mechanisms involved in reactions of cells/tissues to injury. Emphasis on retrogressive changes in cells, cell death, pigments, circulatory disturbances, inflammation, and alterations in cell growth and multiplication (including neoplasia). Laboratory exercises deal with the application of basic principles of pathology to evaluation of gross and microscopic tissue alterations.

5502. SYSTEMIC VETERINARY PATHOLOGY. (5 cr; prereq 5501 or #)
Reaction of specific systems to injury with emphasis on the basic response capabilities of the tissue or organ, with materials illustrating gross and microscopic changes.

5503. DIAGNOSTIC PATHOLOGY. (3 cr; prereq 5502 or #)
Gross and microscopic changes associated with specific infectious and noninfectious diseases of domestic animals.

5504. VETERINARY CLINICAL PATHOLOGY. (3 cr; prereq 5503 or #)
Technique, application, and interpretation of basic laboratory tests applied to clinical diagnosis.

5601. VETERINARY PARASITOLOGY I. (4 cr; prereq 5501 or #)
Systematic and biologic study of protozoan and arthropod parasites of animals. Emphasis on their relationships to diseases and principles of parasite control.

5602. VETERINARY PARASITOLOGY II. (4 cr; prereq 5601 or #)
Helminth parasites and parasitic diseases of animals with emphasis on principles of control.

5701. ADVANCED VETERINARY MICROBIOLOGY, IMMUNOLOGY. (3 cr; prereq 3103 1st yr vet med, #)
Lectures on humoral and cellular immune responses, hypersensitivity, bacterial genetics, and antimicrobial agents and their actions.

5702. PATHOGENIC BACTERIA AND FUNGI. (5 cr; prereq 5701 or equiv or #)
Lectures and laboratory dealing with animal pathogens with emphasis on basic mechanisms of infection.

5703. VETERINARY VIROLOGY. (4 cr; prereq 5701 or equiv or #)
Lectures and laboratory dealing with basic techniques of virology with emphasis on viral and rickettsial agents causing animal diseases.

5704. AVIAN DISEASES. (3 cr; prereq 5503, 5703 or #)
Lectures on diseases involving poultry and caged and aviary birds.

OTHER COURSES

3103. GENERAL MICROBIOLOGY. (5 cr; not open to vet med students; prereq 10 cr chemistry, 4 cr biological sciences)
Lectures and laboratory exercises on the morphology, taxonomy, genetics, physiology, and ecology of microorganisms. Practical application of fundamental principles of microbiology to other phases of science and industry.

5511. DISEASES OF THE PIG. (1-2 cr; prereq regis vet med, 4th yr or grad student or #)
Illustrated lectures on the pathogenesis and pathology of porcine diseases with emphasis on differential etiologic diagnosis of common clinical disease syndromes.

5513. DISEASES OF FUR-BEARING ANIMALS. (2 cr; prereq 5503, regis vet med, 4th yr or grad student or #)
Etiology, symptomatology, and treatment of diseases of fur-bearing animals.

5533. DIRECTED STUDIES IN VETERINARY PATHOBIOLOGY. (Cr ar; prereq regis vet med, 4th yr and #)
Principles, methods, and laboratory exercises in selected pathobiological research problems. Assigned research problems conducted under faculty direction.

5603s. PARASITES OF WILDLIFE. (3 cr; prereq #; offered 1981 and alt yrs)
Economic and biologic relationships of animal parasites and disease to regional wildlife.

5604s. DISEASES OF WILDLIFE. (3 cr; prereq #; offered 1980 and alt yrs)
Economic and biologic relationships of infectious and noninfectious diseases of wildlife.

5707. POULTRY DISEASE CONTROL. (3 cr; not open to vet med students; prereq Biol 1002 and AnSc 1100, MicB 3103 or equiv)
General anatomy; physiology of digestion and reproduction; prevention and control of important diseases affecting poultry.

5709. PREVENTIVE AVIAN MEDICINE. (1 cr; prereq regis vet med, 4th yr or grad student or #)
Preventive avian disease programs and management practices. Visits to poultry and aviary establishments.

5748. PROBLEMS IN VETERINARY MICROBIOLOGY AND PUBLIC HEALTH. (Cr ar; prereq 5703 or equiv, #)

GRADUATE COURSES

(See the *Graduate School Bulletin* for course descriptions)

5520. VETERINARY CLINICAL PATHOLOGY

5521. SURGICAL PATHOLOGY

5522. DIAGNOSTIC PATHOLOGY

5523. PATHOLOGY OF SPONTANEOUS DISEASES OF LABORATORY ANIMALS

5524. PATHOLOGY OF SPONTANEOUS DISEASES OF POULTRY

5720. CLINICAL MICROBIOLOGY

8500. SEMINAR: VETERINARY PATHOLOGY

8501. ADVANCED BASIC VETERINARY PATHOLOGY

8502. ADVANCED SPECIAL PATHOLOGY
8503. ADVANCED SPECIAL PATHOLOGY
8530. ONCOLOGY
8531. VETERINARY NECROPSIES
8532. COMPARATIVE NEUROPATHOLOGY
8533. PROBLEMS: PATHOLOGY
8534. PROBLEMS: CLINICAL PATHOLOGY
8600. ADVANCED VETERINARY PARASITOLOGY
8601. ADVANCED VETERINARY PARASITOLOGY
8602. ADVANCED VETERINARY PARASITOLOGY
8648. PROBLEMS IN VETERINARY PARASITOLOGY
8700. SEMINAR: VETERINARY MICROBIOLOGY
8720. ADVANCED VETERINARY MICROBIOLOGY
8721. ADVANCED POULTRY DISEASES
8722. ADVANCED COMPARATIVE IMMUNOCHEMISTRY AND IMMUNOBIOLOGY
8723. IMMUNOBIOLOGY OF THE LYMPHOCYTE
8724. ADVANCED VETERINARY DIAGNOSTIC MICROBIOLOGY
8725. CELL CULTURE TECHNIQUES
8726. COLLOQUIUM IN IMMUNOLOGY

Counselor Ralph Holcomb discusses with a freshman student his schedule for the coming year.

IV. FACULTY

DEPARTMENT OF LARGE ANIMAL CLINICAL SCIENCES

Professor

Robert H. Dunlop, D.V.M., Ph.D., *dean effective January 1, 1980*
James O. Hanson, D.V.M., *director, continuing education, and project leader, veterinary extension*
Dale K. Sorensen, D.V.M., Ph.D., *chairman*
John F. Anderson, D.V.M., M.S.
Stanley L. Diesch, D.V.M., M.P.H.
Donald W. Johnson, D.V.M., Ph.D.
Vaughn L. Larson, D.V.M., Ph.D.
Francis A. Spurrell, D.V.M., Ph.D.
Clarence M. Stowe, V.M.D., Ph.D.
Edward A. Usenik, D.V.M., Ph.D.
Howard L. Whitmore, D.V.M., Ph.D.
Raimunds Zemjanis, D.V.M., Ph.D.

Associate Professor

Melvyn L. Fahning, D.V.M., Ph.D.
Ralph J. Farnsworth, D.V.M., M.S.
Allen D. Leman, D.V.M., Ph.D.
Charles C. Muscoplat, Ph.D.
Michael M. Pullen, D.V.M., M.S.
Robert A. Robinson, B.VSc., Ph.D.
Bradley E. Sequin, D.V.M., Ph.D.
Robert A. Wescott, D.V.M.

Assistant Professor

Larry C. Booth, D.V.M., M.S.
Dale L. Haggard, D.V.M., M.S.
William G. Olson, D.V.M., Ph.D.
Raymond B. Solac, D.V.M.
Donna L. Stevens, V.M.D., M.S.

DEPARTMENT OF SMALL ANIMAL CLINICAL SCIENCES

Professor

Carl R. Jessen, D.V.M., Ph.D., *associate dean, veterinary medical services*
Carl A. Osborne, D.V.M., Ph.D., *chairman*
Timothy H. Brasmer, D.V.M., Ph.D.
Griselda F. Hanlon, D.V.M., M.S.
Larry J. Wallace, D.V.M., M.S.

Associate Professor

Stephen I. Bistner, D.V.M.
Robert M. Hardy, D.V.M., M.S.
Alan J. Lipowitz, D.V.M., M.S.
Patrick J. McKeever, D.V.M., M.S.
Philip N. Ogburn, D.V.M., Ph.D.

Assistant Professor

Dennis D. Caywood, D.V.M., M.S.
Daniel A. Feeney, D.V.M., M.S.
Gary R. Johnston, D.V.M., M.S.
Jeffrey S. Klausner, D.V.M., M.S.
Charles J. McGrath, D.V.M.

DEPARTMENT OF VETERINARY BIOLOGY

Professor

Harold E. Dziuk, D.V.M., Ph.D., *chairman*
Caroline Czarnecki, Ph.D.
Gary E. Duke, Ph.D.
Thomas F. Fletcher, D.V.M., Ph.D.
Archie L. Good, V.M.D., Ph.D.
Alvin F. Weber, D.V.M., Ph.D.

Associate Professor

Wendell J. DeBoer, Ph.D., *coordinator, student affairs*
Victor Cox, D.V.M., Ph.D.
Grace W. Gray, Ph.D.
Robert F. Hammer, D.V.M., Ph.D.
Edward F. Jankus, D.V.M., Ph.D.
Sally E. Jorgensen, Ph.D.
Charles F. Louis, D.Phil.
Norman J. Wilsman, D.V.M., Ph.D.

Assistant Professor

Raymond D. Barnes, Ph.D.
Alice A. Larson, Ph.D.

DEPARTMENT OF VETERINARY PATHOBIOLOGY

Professor

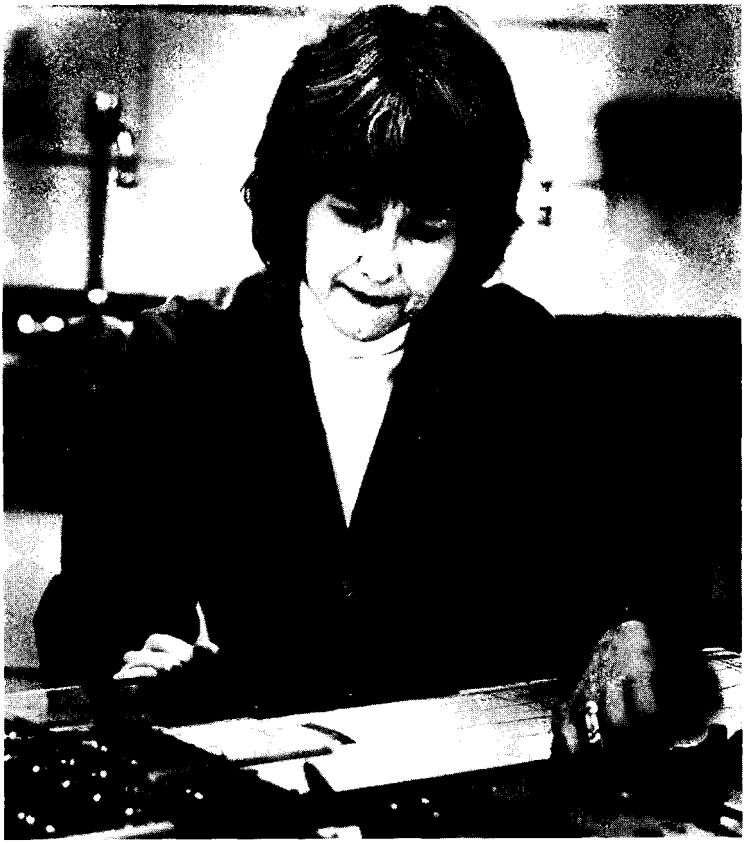
Benjamin S. Pomeroy, D.V.M., Ph.D., *coordinator, alumni and public affairs; acting dean until December 31, 1979*
Kenneth H. Johnson, D.V.M., Ph.D., *chairman*
Donald M. Barnes, D.V.M., Ph.D.
William J. Bemrick, Ph.D.
John M. Higbee, D.V.M.
Harold J. Kurtz, D.V.M., Ph.D.
Keith I. Loken, D.V.M., Ph.D.
Glen H. Nelson, D.V.M.
Victor Perman, D.V.M., Ph.D.
Jay H. Sautter, D.V.M., Ph.D.
Jerry B. Stevens, D.V.M., Ph.D.

Associate Professor

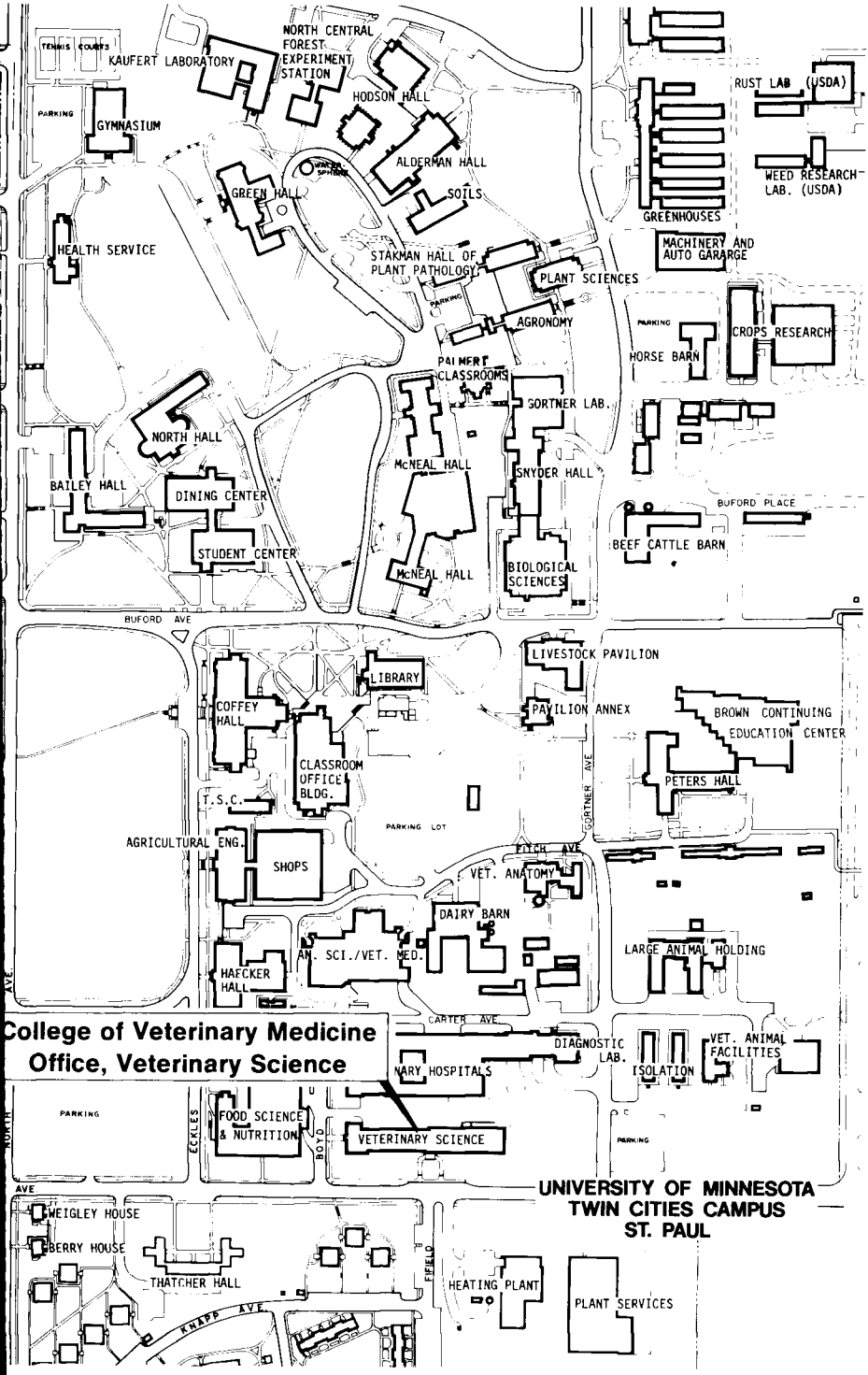
David A. Halvorson, D.V.M.
David W. Hayden, D.V.M., Ph.D.
S. K. Maheswaran, D.V.M., Ph.D.
John A. Newman, D.V.M., Ph.D.
George R. Ruth, D.V.M., Ph.D.
John C. Schlotthauer, D.V.M., Ph.D.
Richard E. Shope, Jr., D.V.M., Ph.D.
Bert E. Stromberg, Ph.D.
Gilbert E. Ward, D.V.M., Ph.D.
Ronald E. Werdin, D.V.M., Ph.D.

Assistant Professor

Russell R. Bey, B.A., Ph.D.
Terrance P. O'Leary, D.V.M., Ph.D.
Michael J. Tomlinson, D.V.M., Ph.D.
Mary M. Walser, V.M.D., Ph.D.



Laboratory attendant Lorraine Tompkins reads the results of an electrocardiogram on a physiograph recorder.


TENNIS COURTS
KAUFERT LABORATORY
NORTH CENTRAL FOREST EXPERIMENT STATION
HODSON HALL
PARKING
GYMNASIUM
ALDERMAN HALL
GREEN HALL
SOILS
HEALTH SERVICE
STAKMAN HALL OF PLANT PATHOLOGY
PLANT SCIENCES
PARKING
AGRONOMY
PALMER CLASSROOMS
GORTNER LAB.
NORTH HALL
McNEAL HALL
SNYDER HALL
BAILEY HALL
DINING CENTER
STUDENT CENTER
McNEAL HALL
BIOLOGICAL SCIENCES
BUFORD AVE
LIBRARY
COFFEY HALL
CLASSROOM OFFICE BLDG.
T.S.C.
AGRICULTURAL ENG.
SHOPS
PARKING LOT
LIVESTOCK PAVILION
PAVILION ANNEX
GORTNER AVE
FITCH AVE
VET. ANATOMY
DAIRY BARN
AN. SCI./VET. MED.
HAECKER HALL
CARTER AVE
DIAGNOSTIC LAB.
ISOLATION
VET. ANIMAL FACILITIES
PARKING
FOOD SCIENCE & NUTRITION
ECKLES
BOYD
VETERINARY SCIENCE
PARKING
NORTH AVE
WEIGLEY HOUSE
BERRY HOUSE
THATCHER HALL
KNAPP AVE
FIFIELD
HEATING PLANT
PLANT SERVICES
RUST LAB (USDA)
WEED RESEARCH LAB. (USDA)
GREENHOUSES
MACHINERY AND AUTO GARARGE
PARKING
CROPS RESEARCH
HORSE BARN
BUFORD PLACE
BEEF CATTLE BARN
LARGE ANIMAL HOLDING
College of Veterinary Medicine
Office, Veterinary Science
UNIVERSITY OF MINNESOTA
TWIN CITIES CAMPUS
ST. PAUL