

Twin Cities

UNIVERSITY OF MINNESOTA

BULLETIN

1995 - 1997



Medical School



On the cover

Top: Dr. Laura Hoyt, assistant professor of pediatrics, with first-year medical students Alec Thundercloud and Edris Sahar.

Middle: The University of Minnesota Hospital and Clinic.

Bottom: Casey Thran, a patient from Grand Rapids, Minn., with Alec Thundercloud.

This page

Dr. James H. House, professor of orthopaedic surgery (center), with medical students (left to right) Billy Haug, Christopher Warlick, and Mari Daniels.



Medical School

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Policies

Bulletin Use—The information in this bulletin and other University bulletins, publications, or announcements is subject to change without notice. University offices can provide current information about possible changes.

This publication is available in alternative formats upon request. Please contact the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008; e-mail: admissions@tc.umn.edu).

This bulletin also is available in electronic format on Internet and may be accessed via Gopher.

Equal Opportunity—The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

In adhering to this policy, the University abides by the Minnesota Human Rights Act, Minnesota Statute Ch. 363; by the Federal Civil Rights Act, 42 U.S.C. 2000e; by the requirements of Title IX of the Education Amendments of 1972; by Sections 503 and 504 of the Rehabilitation Act of 1973; by the Americans With Disabilities Act of 1990; by Executive Order 11246, as amended; by 38 U.S.C. 2012, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

Inquiries regarding compliance may be directed to Patricia A. Mullen, Director, Office of Equal Opportunity and Affirmative Action, University of Minnesota, 419 Morrill Hall, 100 Church Street S.E., Minneapolis, MN 55455 (612/624-9547).

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. (Exceptions under the law include state and federal educational and financial aid institutions.) The policy also permits students to review their

educational records and to challenge the contents of those records.

Some student information—name, address, electronic (e-mail) address, telephone number, dates of enrollment and enrollment status (full time, part time, not enrolled, withdrawn and date of withdrawal), college and class, major, adviser, academic awards and honors received, and degrees earned—is considered public or directory information. Students may prevent the release of public information only during their terms of enrollment. To do so, they must notify the records office on their campus.

Students have the right to review their educational records. The regents' policy, including a directory of student records, is available for review at 150 Williamson Hall, Minneapolis, and at records offices on other campuses of the University. Questions may be directed to the Office of the Registrar, 150 Williamson Hall (612/625-5333).

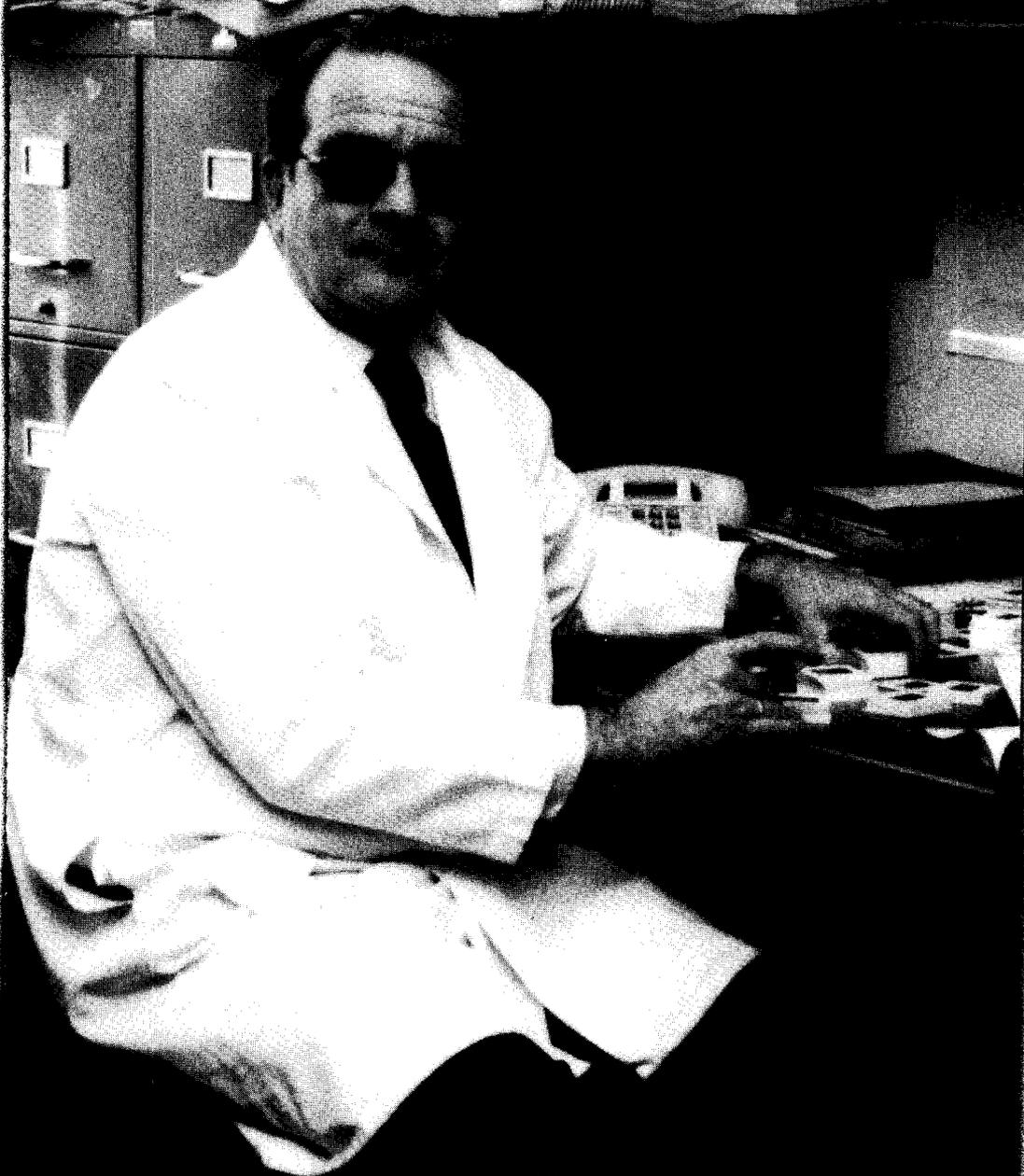
Immunization—Students born after 1956 who take more than one University class are required under Minnesota law to submit an Immunization Record form.

The form, which is sent along with the official University admission letter, must be filled out and returned to Boynton Health Service within 45 days of the first term of enrollment in order for students to continue registering for classes at the University. Complete instructions accompany the form.

Extracurricular Events—No extracurricular events requiring student participation may be scheduled from the beginning of study day to the end of finals week. Exceptions to this policy may be granted by the Senate Committee on Educational Policy. The Senate advises all faculty that any exemption granted pursuant to this policy shall be honored and that students who are unable to complete course requirements during finals week shall be provided an alternative and timely opportunity to do so.

Smoke-Free Campus Policy—Smoking is prohibited in all facilities of the University of Minnesota, Twin Cities campus except for designated private residence hall rooms.

General Information



Donald W. Robertson, Ph.D., is associate dean of admissions in the Medical School.



Medical students from 1898 pose outside the University's free dispensary.

Resources

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

The department 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 undergraduate or graduate degree programs, consult the appropriate University of Minnesota bulletins. Most may be obtained by visiting the Office of Admissions, 240 Williamson Hall, or by calling (612) 625-2008.

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 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

two-year medical basic science program at the University of Minnesota, Duluth, and in 1971 provided additional support for development of the Duluth school. The charter class in Duluth's Medical School began in 1973.

In 1905 money for the construction of a hospital was offered to the University by the estate of Augustus F. Elliot. After various delays, 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 controlled by the University regents. The legislature provided funds for the building of the Institute of Anatomy (Jackson Hall) and Millard Hall, both completed in 1912. Additional hospital and Medical School buildings have been built with private gifts, supplemented by legislative appropriations. These include the Todd Hospital and Christian Hospitals (1925), Eustis Hospital (1929), Variety Club Heart Hospital (1950), Mayo Memorial Building (1954), Masonic Cancer Center and Veterans of Foreign Wars Cancer Research Center (1958), Diehl Hall (1960), Children's Rehabilitation Center, Dwan

Variety Club Cardiovascular Research Center (1975), and the Phillips-Wangenstein Building, (1978)—all designated collectively as the University Hospital and Clinic.

The Medical School at Minnesota has a rich tradition of research and clinical achievements. The excellence of the Medical School's programs can be traced to the early development of strong departments in the basic medical sciences closely linked to the laboratory of the State Board of Health, and to the emergence in the 1920s of clinical departments active in clinical investigation. The pursuit of research in all departments has infused the whole school with a spirit of scientific inquiry.

Administration

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Warren C. Larson, Bagley
H. Bryan Neel III, Rochester
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Stanley D. Sahlstrom, St. Cloud
Patricia B. Spence, Rice

University Administrators

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Robert O. Erickson, Senior Vice President for Finance and Operations
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Mark L. Brenner, Acting Vice President for Research and Acting Dean of the Graduate School
Melvin George, Vice President for Institutional Relations
Mark B. Rotenberg, General Counsel

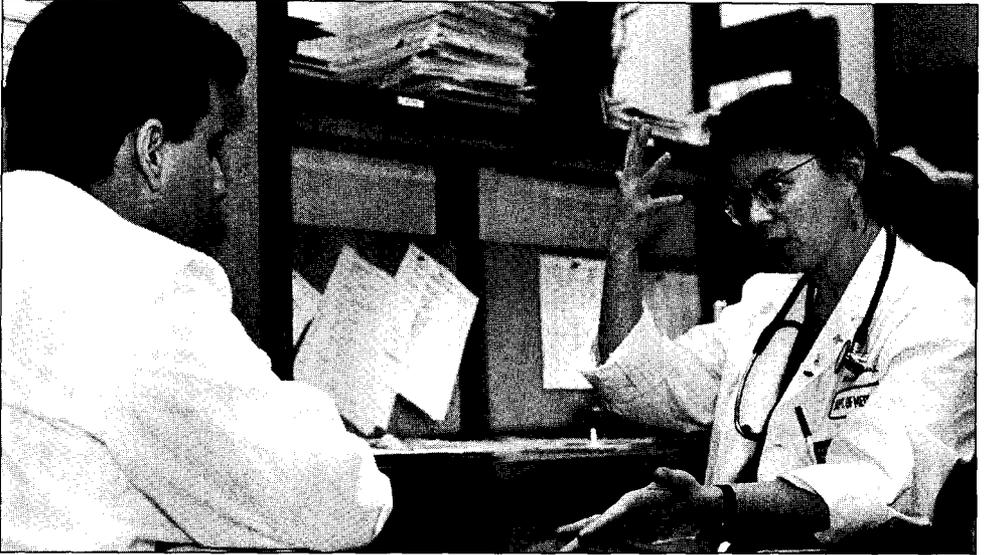
Medical School Administrators

Frank B. Cerra, M.D., Dean of the Medical School
E. Wayne Drehmel, Ph.D., Associate Dean
Helene M. Horwitz, Ph.D., Associate Dean
Robert B. Howe, M.D., Associate Dean
Robert J. McCollister, M.D., Associate Dean
Donald W. Robertson, Ph.D., Associate Dean
James G. White, M.D., Associate Dean
Robert A. Petzel, M.D., Assistant Dean
Paul G. Quie, M.D., Associate to the Dean
Cassius M. C. Ellis, M.D., Assistant to the Dean
Barton W. Galle, Ph.D., Director of Continuing Medical Education

The Medical School is one of several health science units organized through the office of the provost for health sciences. The other units are the School of Dentistry; School of Nursing; College of Pharmacy; School of Public Health; College of Veterinary Medicine; University of Minnesota, Duluth School of Medicine; and the University Hospital. 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 Minneapolis campus.

The dean's office is responsible for general administration of the Medical School, administration of selected aspects of graduate education programs, and school budget and fiscal matters. Those involved in these activities include Dean Frank B. Cerra, Associate Dean E. Wayne Drehmel, and Associate Dean Robert B. Howe. Special administrative support is provided for the Rural Physician Associate Program, Program on the History of Medicine, Program in Emergency Medicine, Center of American Indian and Minority Health, M.D./Ph.D. Program, and other special programs. Assistant Dean Robert A. Petzel serves as administrative liaison with the Veterans Affairs Medical Center.

The Student Affairs and Admissions office is concerned with admissions, student counseling, student records, and student progress toward graduation. Those responsible for these activities include Associate Dean



Dr. Kathleen Watson, an associate professor in the Department of Medicine, discusses a question with medical student Lazardo Diaz.

Helene M. Horwitz, Associate Dean Donald W. Robertson, Associate to the Dean Paul G. Quie, and Assistant to the Dean Cassius M. C. 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 Robert J. McCollister.

The Continuing Education office develops a variety of educational programs for physicians of the state. It is supervised by Barton W. Galle, Director of Continuing Medical Education.

Faculty

The Medical School full-time faculty numbers about 1,100. The executive faculty, consisting of full-time and associate professors, is the governing body responsible for education policy making on education matters. The executive faculty has delegated to its appropriate committees the responsibility for determining student qualifications for admission and readmission, decisions pertaining to student scholastic standing and

dismissal from the Medical School, and reviewing the Medical School curriculum.

The Medical School Admissions Committee selects each year's entering class and considers 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. The committee reviews each student's academic record for satisfactory completion of all required and elective coursework 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 or reviews and evaluates components of the program leading to the M.D. degree 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.

Research

Throughout its history the Medical School has emphasized basic biomedical research and its translation into clinical advances. That emphasis has nurtured research pioneers whose efforts continue to advance medical science. In this environment of discovery and innovation, medical students are exposed to the work of internationally renowned researchers in a variety of fields. These include:

Biomedical Engineering—The Biomedical Engineering Center includes staff from the Medical School and Institute of Technology, who join with Minnesota's leading biomedical technology firms to develop, test, and generate biomedical products. To date, such products have included pacemakers, nerve stimulators, and hearing and visual aids.

Biomedical Ethics—New technology, spiraling health care costs, and judgments about when life begins and ends pose ethical concerns to the medical community. To prepare for such challenges, medical students take courses through the school's Center for Biomedical Ethics.

Cancer—Bone marrow transplantation, tumor-focused radiology, and monoclonal antibody-enhanced chemotherapy have improved cancer recovery rates dramatically. These treatments are also the result of coordinated basic and applied research efforts at the Medical School. The new Cancer Center promises to accelerate these developments.

Diabetes—Heart disease, blindness, kidney disease, circulatory problems, and disorders of the nervous system are among the risks associated with diabetes. At the Diabetes Center, patients receive care and participate in a wide variety of research programs, including the 10-year Diabetes Control and Complications Trial. The center is also a magnet for researchers pursuing cures and improved treatments for the various types of diabetes.

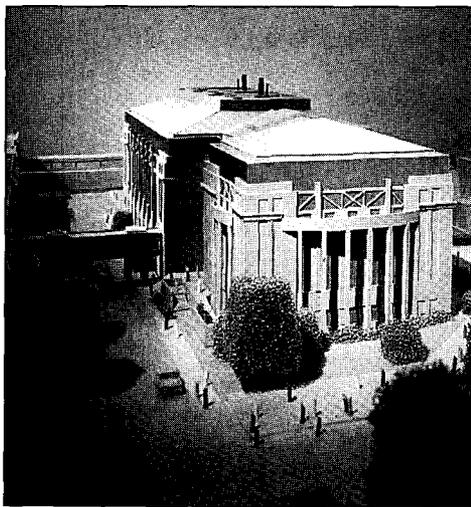
Human Genetics—As both a research center and resource for scientists throughout the University, the school's Institute of Human Genetics brings together students, scientists, and clinicians to investigate the molecular basis for genetic disorders and apply findings to the diagnosis and management of disease.

Minnesota Heart and Lung Institute—Building on decades of progress as a world leader in cardiovascular disease research and treatment, the Minnesota Heart and Lung Institute studies circulatory diseases, emphysema, hypertension, emergency care, and congestive heart failure. New treatment methods include lung and heart-lung transplantation.

Neurosciences—The cellular and biochemical bases for learning disorders, multiple sclerosis, Alzheimer's disease, schizophrenia, stroke, and many other dysfunctions are among the areas of research in this cross-disciplinary approach to the study of the nervous system.

Nutrition—The role of diet in the prevention and treatment of disease is the focus of joint research efforts by the Medical School and the colleges of agriculture and human ecology. Efforts also are underway to combine with statewide agencies to promote healthful living through wise eating choices.

Osteoarthritis—Of the 36 million Americans who have disorders of the joint and connective tissue, about 16 million have osteoarthritis, the most common form of arthritis. Searching for the causes and treatments for osteoarthritis, scientists study spinal arthritis, the role of joint damage on muscles, and threshold injury in joints.



A new Basic Sciences/Biomedical Engineering Building is under construction on the Minneapolis campus.

Transplantation—The Medical School's transplantation program has achieved some of the world's highest one-year and five-year survival records for kidney, liver, and pancreas transplantation patients.

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, Moos Health Sciences Tower, and Phillips-Wangensteen Building. A new Basic Sciences/Biomedical Engineering Building is under construction. In 1986 a new building for the University Hospital was opened. Within Moos Health Sciences Tower are health sciences classrooms and seminar rooms, health sciences student areas, Sostanza Cafeteria, some basic medical science laboratories, as well as Medical School, School of Public Health, and School of Dentistry department space. In the Phillips-Wangensteen Building are medical center outpatient clinics, a large clinical amphitheater, the Health Sciences Learning Center, Outside-Inn Cafeteria, audiovisual support units, as well as several Medical School clinical department offices and laboratories. Other units, each close to and connected with the complex, include the several buildings of University Hospital and Clinic, Variety Club Heart and Research Center, Masonic Cancer Center, Veterans of Foreign Wars Cancer Research Center, Children's Rehabilitation Center, and Paul F. Dwan Cardiovascular Research Center.

The close physical relationship of the Medical School and its associated units facilitates professional and scientific communication across department 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.

Bio-Medical Library—The Bio-Medical Library, located in Diehl Hall, supports the teaching, research, and service programs of the health sciences. The library is one of the major

units within the University Libraries and serves as a resource library for the Greater Midwest Region of the National Network of Libraries of Medicine.

The Bio-Medical Library contains materials covering medicine, nursing, dentistry, public health, pharmacy, mortuary science, allied health, and the basic life sciences. The collection contains more than 419,000 volumes, 4,500 current journal subscriptions, and 1,000 audiovisual and computer programs. More than 40,000 rare and historical books and journals dating from the 15th century to 1920 can be found in the Wangenstein Historical Library of Biology and Medicine. The Learning Resources Center includes a variety of curriculum-related and self-instructional media and computer software. A Novell network provides access to tutorial materials as well as the Internet and e-mail.

LUMINA (Libraries of the University Integrated Network Access) is the computer-based system that contains the automated catalog of the University Libraries. LUMINA and other databases, including MEDLINE, are accessible from terminals in the Bio-Medical Library and across campus, as well as via personal computer from homes, offices, and laboratories. In addition to MEDLINE, other databases offered at the Bio-Medical Library for end-user searching include Current Contents, Health Planning and Administration, Cumulative Index to Nursing and Allied Health, Science Citation Index, PsycInfo, Biological Abstracts, CancerLit, Excerpta Medica, Dissertation Abstracts, ENTREZ: Sequences, and International Pharmaceutical Abstracts. Full textbooks and journals include AskRx (USP DI), Merck Manual, Stein's Internal Medicine, and the Online Journal of Current Clinical Trials.

Bio-Medical Library staff provide instruction in library use, database searching, information access and management, and the InternetReference assistance may be requested at the Reference Desk or by telephone or e-mail. The Library maintains a Gopher server that features information about the library, electronic forms for requesting services, and links to other Internet resources. Photoduplication, word processing facilities, and interlibrary loan services are available.



Kim Koffler, a fourth-year student, at work in a lab.

Minnesota Medical Foundation

David R. Teslow, President and Chief
Executive Officer

Lowell A. Weber, Vice President, Development

David W. Johnson, Ph.D., Vice President,
Programs

Mission—The Minnesota Medical Foundation (MMF) is an independent organization formed in 1939 to encourage private support of medical research and education at the University of Minnesota. The foundation raises, manages, and distributes private funds for our tax-assisted Medical Schools at Minneapolis and Duluth.

Medical students obtain critical financial help from the foundation's extensive program of student loans and scholarships.

Medical scientists have access to more than \$800,000 granted annually by MMF for medical research aimed at new and better knowledge about disease and health.

Alumni receive news of the Medical School through the *University of Minnesota Medical Bulletin*, published by the foundation, which also sponsors a variety of events linking graduates, students, parents, faculty, and the administration.

To underwrite this work, the foundation solicits contributions from friends of medicine

everywhere, particularly alumni of the Medical School. MMF receives and acknowledges gifts, manages special purpose donations, and generally serves as a link between people and medicine at the University.

MMF policies are set by a 40-member Board of Trustees. The foundation is located at 535 Diehl Hall (612/625-1440).

Student Aid—MMF's student aid program is coordinated with the Medical School's financial aid program.

MMF provides extended term loans to qualified students that are repayable within the first five years after graduation at 6 percent simple annual interest. The average loan is \$2,500.

Interim loans from the foundation afford medical students an opportunity to obtain ready cash on brief notice, without interest charges, for educational expenses. Interim loans are limited to \$600 and must be repaid within 90 days.

MMF awards more than \$300,000 in scholarships annually. Recipients are chosen on the basis of their qualifications for a particular scholarship and are encouraged to pledge restoration of the funds by future gifts.

Awards—Medical Student Achievement Awards of \$1,000 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 biomedical research. Distinguished Teaching Awards are bestowed on faculty members whose teaching ability has been recognized by the student body or the medical school community.

Research Opportunities—For students with a serious interest in biomedical research and potential for the field of academic medicine, the foundation offers \$1,800 stipends for full-time twelve-week research endeavors that are conducted during free or elective periods. Both basic and clinical research projects are supported. Research is done under the supervision of Medical School faculty.

Publications—The foundation is publisher of the *University of Minnesota Medical Bulletin*, a quarterly magazine circulated to alumni of the

GENERAL INFORMATION

Medical School, donors, students, faculty, and parents. An annual report of MMF activities is published, as well as a *Directory of Medical Students*.

Fund Raising—The foundation coordinates extensive fund-raising programs on behalf of the Medical School, encouraging alumni gifts to the annual fund of the Medical School, and broadly promotes the cause of private support. A full range of development activities are conducted, including annual giving, planned giving, deferred giving, memorial giving, and capital campaigns.

Outreach Programs—The foundation promotes public understanding and support of medicine by sponsoring several events at the Medical School: a welcome day for entering students, Parents' Day, a graduation day reception, and other informal gatherings. Medical School alumni reunions at the University and in other states are also supported in concert with the Medical Alumni Society.

Continuing Medical Education

Earning a degree in any profession is only one milestone in a continuum of education. Physicians faced with rapid advances in medical science and 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 physicians and lifelong students of medicine through its annual series of programs taught by faculty in various disciplines in the Health Sciences Center and guest faculty from around the world.

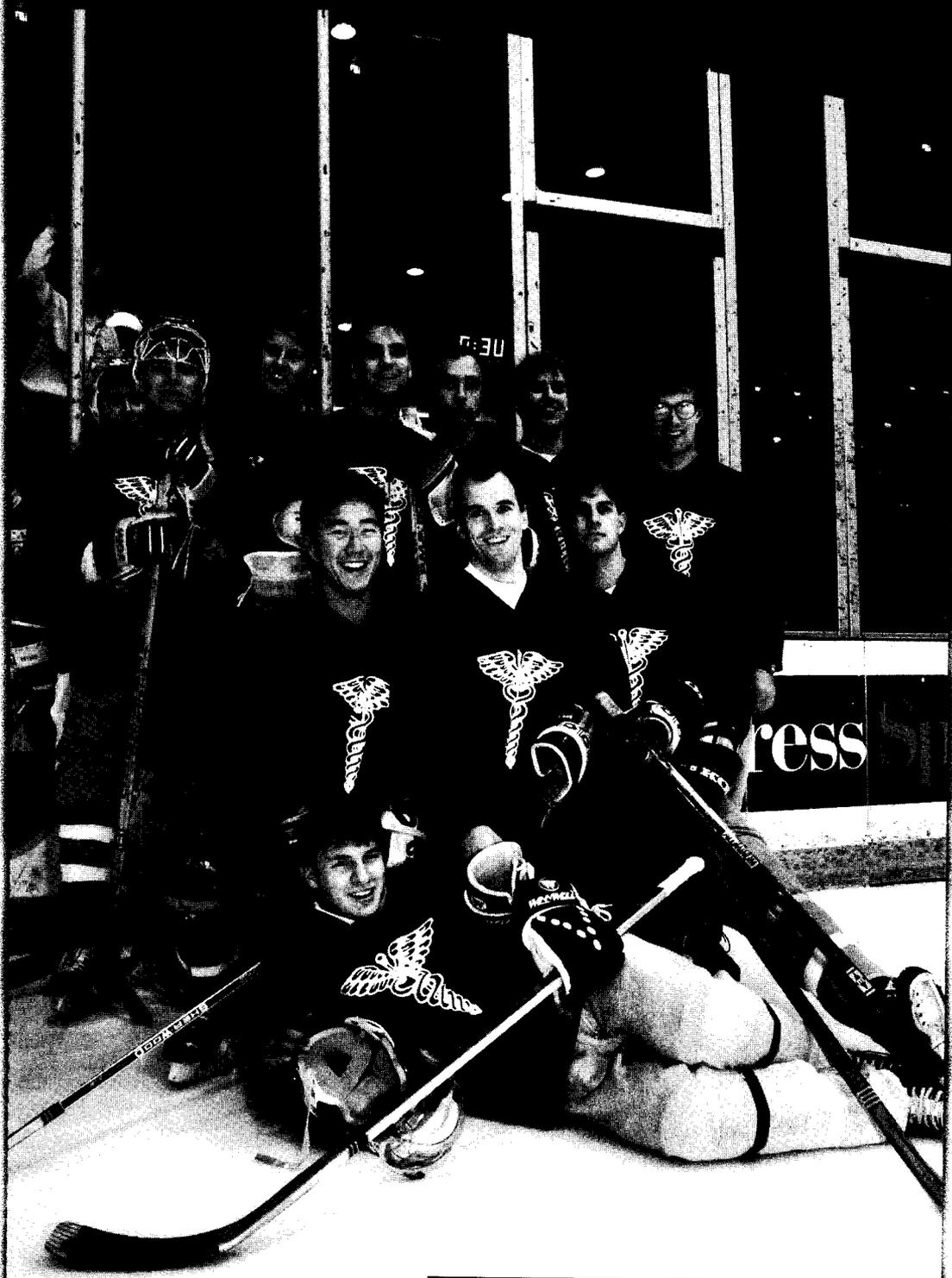
Each year about 90 individual courses are conducted for more than 10,000 physicians. Sixty percent of the physicians come from Minnesota but many courses attract national or international audiences. Instructional methods include lectures, workshops, laboratories, live cases, panels, seminars, and individual instruction. Innovative programs are being developed to meet the changing needs of members of the medical profession and use technological advances in educational media. Overall emphasis is on high-quality education and practical, up-to-date content.

Close liaison with other medical organizations and health care facilities in the state and region 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.



Dr. Mark Yeazel, assistant professor in the Department of Family Practice, examines patient Joeffre Kolosky. Observing are students Jeff Lisko, Negar Beheshti, and Linda Daghestani.

Admission and Student Life



The University of Minnesota Medical School even has its own hockey team.

Information Sources

Office of Admissions and Student Affairs staff are prepared to discuss premedical programs with students, college teachers, and advisers, either in person or through correspondence.

Medical School Admission Requirements (MSAR), published by the Association of American Medical Colleges and revised each year in April, is a useful reference booklet that provides general information about applying to medical schools and summarizes the admission requirements of each of the medical schools in the United States and Canada. For a personal copy, send \$14.00 (includes shipping and handling), to the Association of American Medical Colleges, 2450 N. Street N.W., Suite 201, Washington, DC 20037-1131. It is also available in most college reference libraries.

For more information about the Medical School, contact the Office of Admissions and Student Affairs, University of Minnesota Medical School, 3-100 Owre Hall, Box 293 UMHC, 420 Delaware Street S.E., Minneapolis, MN 55455 (612/624-1122; fax 612/626-6800).

Academic Requirements

Although academic excellence is necessary to complete studies in the Medical School, neither high grades nor high MCAT scores alone are sufficient to gain admission. In selecting applicants, the Admissions Committee emphasizes those qualities of motivation, intellect, and character essential to the physician. Consideration is given to candidates who possess personal integrity, high ethical standards, motivation, intellectual curiosity, enthusiasm, and the ability to work with other professionals. Because physicians must be able to offer care to those who are sick, applicants should give evidence of their capacity to deal effectively with those people who may be ill. They must also be able to organize their activities, set priorities, accept responsibility, and function under stress.

Students *must* earn a bachelor's degree before entering the Medical School.

The undergraduate years provide a unique educational opportunity and those who are planning a career in medicine are encouraged to

choose courses and independent study according to their interests. The Admissions Committee has no preference regarding the area of concentration—whether it be in the natural sciences, social and behavioral sciences, humanities, or the arts. Students should approach their chosen field in a scholarly fashion and demonstrate excellence in whatever course of study they pursue.

Medicine depends on scientific knowledge. Therefore, applicants must be capable of and comfortable working in the sciences and to be familiar with the basic principles of biology, chemistry, physics, and mathematics. Because physicians have an increasing responsibility to understand and deal with social, cultural, and psychological forces that may adversely affect their patients, studies in the humanities, social and behavioral sciences, and English language and literature are required for admission, in addition to preparation in the physical and biological sciences.

Applicants must have competence in writing, speaking, and reading the English language such that they have the ability to write intelligent, expository prose that is clearly organized and free of major errors in grammar, punctuation, and spelling. They should be able to present material orally with appropriate fluency and be able to read critically and appraise general and technical writing. Basic familiarity with computers is advised because of the importance of computer science in essentially all areas of medicine.

Because physicians take on special responsibilities as community leaders, applicants should acquire an education that leads to continuing lifelong learning—not only in their professional field, but also in those things that will assure well-informed contributions to the general society in which we live.

The table on page 13 lists minimum course and credit 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 coursework in the sciences in preparation for entering Medical School.

Because of the Medical School's obligation to ensure patients receive the best medical care possible, candidates for admission and the M.D. degree must meet the following technical standards.

Medical School Technical Standards

Candidates for the M.D. degree must have abilities and skills of five varieties, including observation; communication; motor; conceptual, integrative, and quantitative; and behavioral and social. Technological compensation can be made for some handicaps in some of these areas, but candidates should be able to perform in a reasonably independent manner. The use of a trained intermediary means that candidates' judgment must be mediated by someone else's power of selection and observation.

I. Observation: Candidates must be able to observe demonstrations and experiments in the basic sciences, including but not limited to physiologic and pharmacologic demonstrations

in animals, microbiologic cultures, and microscopic studies of microorganisms and tissues in normal and pathologic states. Candidates must be able to observe a patient accurately at a distance and close at hand. Observation necessitates the functional use of vision and somatic sensation. It is enhanced by the functional use of smell.

II. Communication: This skill includes speech, reading, and writing. Candidates should be able to speak to, hear, and observe patients in order to elicit information, describe changes in mood, activity, and posture, and perceive nonverbal communications. Candidates must be able to communicate effectively and sensitively with patients and communicate with all members of the health care team in both oral and written form.

III. Motor: Candidates should have sufficient motor function to elicit information from patients by palpation, auscultation, percussion, and other diagnostic maneuvers. Candidates should be able to do basic laboratory tests (e.g., urinalysis, CBC), carry out diagnostic

Course Requirements

	Semester Credits	Quarter Credits
General Biology or Zoology Must include laboratory exercises	7	10
Chemistry General or inorganic and organic required (must include lab exercises). (While not required to, applicants are urged to take a course in physical chemistry, quantitative analysis, or biochemistry.)	14	20
English and Literature (one year) Exemption from freshman composition does not fulfill requirement		
Mathematics Introductory calculus or upper level statistics required		
Physics Must include lab exercises	8	12
Social and Behavioral Sciences and Humanities Examples: psychology, anthropology, history, sociology, economics, philosophy, or a modern or classical language	18	27
Additional academic courses to complete degree requirements		

procedures (e.g., proctoscopy, paracentesis), and read EKGs and X-rays. Candidates should be able to execute motor movements reasonably required to provide general care and emergency treatment to patients. Examples of emergency treatment reasonably required of physicians are cardiopulmonary resuscitation, administration of pressure to stop bleeding, opening obstructed airways, suturing simple wounds, and the performance of simple obstetrical maneuvers. Such actions require coordination of both gross and fine muscular movements, equilibrium, and functional use of touch and vision.

IV. Intellectual, Conceptual, Integrative, and Quantitative Abilities: These abilities include measurement, calculation, reasoning analysis, and synthesis. Problem solving, the critical skill demanded of physicians, requires all of these intellectual abilities. In addition, candidates should be able to comprehend three-dimensional relationships and to understand the spatial relationships of structures.

V. Behavioral and Social Attributes: Candidates must possess the emotional health required for full use of their intellectual abilities, the exercise of good judgment, the prompt completion of all responsibilities attendant to the diagnosis and care of patients, and the development of mature, sensitive, and effective relationships with patients. Candidates must be able to tolerate physically taxing workloads and function effectively under stress. They must be able to adapt to changing environments, display flexibility, and learn to function in the face of uncertainties inherent in the clinical problems of many patients. Compassion, integrity, concern for others, interpersonal skills, interest, and motivation are all personal qualities that are assessed during the admissions and education processes.

Residence and Reciprocity

Residence—Because the University is a state institution, Minnesota residents pay lower tuition than nonresidents and, in many programs, receive priority consideration for admission. To qualify for resident status, students must reside in Minnesota for at least one calendar year before the first day of class

attendance. For more information, contact the Resident Classification and Reciprocity Office, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-6330), or the residency office on your campus.

Reciprocity—The University has reciprocity agreements with North Dakota and South Dakota, which includes the medical school. If you are a resident of one of these states, you may qualify for reciprocity tuition rates, which are lower than nonresident tuition rates and, in some cases, comparable to resident rates. There are some exceptions: Wisconsin students enrolled in the School of Dentistry, Medical School, College of Veterinary Medicine, or School of Medicine, Duluth are not eligible for reciprocity. For more information, contact the Resident Classification and Reciprocity Office, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-6330), or the residency office on your campus.

Policy for Foreign Citizens* Applying to Medical School

1. To be eligible to apply to the University of Minnesota Medical School, foreign citizens must:
 - a. Have a baccalaureate degree from their country of origin, plus two or more years of postbaccalaureate education in an accredited U.S. school;
or
Have a baccalaureate degree from an accredited U.S. school located in the continental United States, Hawaii, or Alaska.
 - b. Have taken the Medical College Admission Test (MCAT).
 - c. Be able to demonstrate proficiency (spoken and written) in the English language.
2. Only U.S. citizens and immigrants are eligible for the Advanced Admissions Program. Foreign citizens may apply either through the Early Decision Program or the regular admission process.
3. Foreign citizen applicants are responsible for obtaining appropriate visa status in the United States.

4. Foreign citizen applicants are expected to assume total responsibility for financing their medical education. They should be prepared to present detailed financial plans of how they will meet expenses, including tuition at the nonresident rate.

* "Foreign citizen," for the purpose of this policy, is defined as one who does not have U.S. citizenship or permanent residence or other immigrant status.

Application Procedures

The University of Minnesota Medical School participates 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 can be obtained from AMCAS, 2450 N. Street N.W., Suite 201, Washington, DC 20037-1131. 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 will be provided to applicants *after* the completed application forms have been sent to the school by AMCAS. There is an application fee of \$50.00 for all applicants who are sent supplemental material.

All regular applicants for the freshman class are required to take the Medical College Admission Test (MCAT). This test measures candidates' factual knowledge of the sciences, their reading skills, and their ability to solve problems. It also helps the Admissions Committee learn more about an individual's aptitudes and suitability for a career in medicine.

Premedical students must make their own 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, IA 52240. This booklet is also

available from college premedical advisers. The test is given throughout the country at many colleges in the spring and fall of each year. It is strongly suggested that applicants take the MCAT in the spring before 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 Admissions Committee's decision between October 15 and May 15 before matriculation. Applicants participating in the Early Decision Program will be notified by October 1.

Early Decision Program

The Medical School participates in the Early Decision Program (EDP) sponsored by the Association of American Medical Colleges, in which early acceptance is granted to students choosing to apply *only* to this medical school. Both Minnesotans and nonresidents are encouraged to apply for EDP. Applicants must have exceptional academic and nonacademic qualifications, including a grade point average (GPA) of 3.50 or above and MCAT scores of 10 or above, and must follow the rules set forth for application to this program. Information about EDP application procedures is available from the American Medical College Application Service and the Medical School Office of Admissions and Student Affairs.

Advanced Admission Program

Until June 1, 1996, students who have a GPA of 3.75 or above may apply for admission to the University of Minnesota Medical School between March 1 and June 1 of their sophomore year. Accepted students will be assigned a medical school faculty member as a mentor to work with the student's college adviser to plan the last two years of the student's college career. The Advanced Admission Program enables students to maximize their undergraduate opportunities without the constant concern and competition

that is often part of the medical school admission process. Mentors work with students by introducing them to the world of medicine. When possible, the mentor involves the student in educational programs and conferences, research possibilities compatible with the student's interests and abilities, and assists the student in finding available work and study opportunities.

Accepted students must graduate from college, complete the basic requirements for medical school, maintain at least a B average, and have regularly scheduled contact with their mentor. Successful completion of these requirements leads to a full acceptance to the Medical School without a lengthy admission process and without taking the MCAT. Interested students may contact the Medical School Office of Admissions and Student Affairs.

Transfers

The Medical School in Minneapolis accepts all students from the accredited two-year branch of the University of Minnesota, Duluth School of Medicine who have successfully completed their curriculum and passed Step 1 of the United States Medical Licensing Examination (USMLE).

Transfers from other four-year Liaison Committee on Medical Education-accredited medical schools in the United States are considered on a very limited basis and only after they have satisfactorily completed their first two years of medical school and Step 1 of the United States Medical Licensing Examination (USMLE).

Tuition and Fees

For up-to-date information on tuition and fees, contact the Medical School Financial Aid Office, 535 Diehl Hall (612/625-4998).

Estimated tuition per quarter for the academic year 1995-96 for students enrolled in the Medical School in Minneapolis was as follows:

Residents	Nonresidents
\$3,787	\$7,574

Estimated student service fees of \$147 per quarter is required of both residents and

nonresidents. *Tuition and fees are subject to change by the Board of Regents.* Students who complete the four-year Medical School curriculum and make satisfactory progress may arrange two free or vacation quarters during the third and fourth years. During this eight-quarter continuum, tuition will be charged for the first six quarters, regardless of the number of actual credits in which the student is enrolled. Student services fees will be charged for all quarters students are enrolled.

Books, instruments, and other necessary equipment must be provided by the student. Information about required items and microscope rental is sent to all entering students during the summer before Medical School begins.

Financial Aid

Financial aid is available to medical students in health professions in the form of federal, state, and institutional loan and grant programs. A number of scholarships are available to entering as well as continuing students based on merit or a combination of academic excellence and need. The Medical School financial aid office coordinates the programs administered by the University's Office of Student Financial Aid with those of the Minnesota Medical Foundation. For further information, contact the Medical School Financial Aid Office (612) 625-4998.

The grants are given for full-time research over a 12-week period.

Minority Student Information

The University of Minnesota is committed to providing equal opportunity to students from minority groups and educationally disadvantaged backgrounds. The Medical School encourages members of professionally underrepresented minority groups to seek admission to its programs.

Financial Aid—The Medical School offers students a combined loan/grant package. Grants are available to meet 15 to 20 percent of financial need (for underrepresented minority students) depending on funding availability. Nonresident students of color, with an

undergraduate GPA of 3.00 or above, receive tuition waiver for the nonresident portion of the Medical School tuition.

Center of American Indian and Minority Health Center of Excellence—This center provides culturally sensitive support services with the goal of increasing the number of American Indian/Alaska Native physicians practicing in Native American communities. Native American medical students participate in the Indian Health Pathway Program, which addresses Indian-specific health issues.

Health Sciences Minority Program—A variety of services are available to minority medical students through this program. These include tutoring, study skills assistance, and help in preparing for the United States Medical Licensing Examination (USMLE) Steps 1 and 2. A small medical book library and study space are also available.

Research Grants

A number of student research grants are available for vacation or free-time work in several Medical School departments or under the auspices of the Minnesota Medical Foundation. 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.

Honors and Awards

American Red Cross Transfusion Sciences Research Award—Recognizes exceptional research in transfusion medicine.

Wallace D. Armstrong Award—Memorializes Dr. Armstrong, former chair of the Department of Biochemistry, by recognizing outstanding achievement in first-year biochemistry.

Bacaner Awards—Memorialize Jacob and Minnie Bacaner by recognizing creative research in the basic sciences.

Cyrus P. Barnum Memorial Teaching Fellowships—Recognize outstanding teaching by graduate students in biochemistry.

Leonard P. Burke Memorial Award—Memorializes Dr. Burke by honoring an outstanding graduate resident in the Department of Family Practice and Community Health.

Daniel A. Coyle Award—Recognizes an outstanding woman medical student in obstetrics and gynecology.

Kenneth F. Ernst Award—Honors Dr. Ernst, a 1930 graduate of the University of Minnesota Medical School, by providing an annual award for research by an outstanding resident in anatomical pathology.

Richard C. Horns Memorial Award—Memorializes Dr. Horns, former professor of ophthalmology, by recognizing a senior medical student who has shown outstanding clinical promise.

J. Jacob Kaplan Research Awards—Established by Dr. Kaplan to recognize, on an annual rotating basis, the best research papers in cardiology, gastroenterology, and immunology in the diagnosis and treatment of cancer.

Lifson/Johnson Memorial Award—Memorializes Drs. Nathan Lifson and John A. Johnson by recognizing outstanding teaching by a graduate student in the Department of Physiology.

J. Thomas Livermore Award—Recognizes outstanding original research in hematology.

Medical Student Achievement Awards—Minnesota Medical Foundation-funded awards that recognize graduating seniors who have excelled in student leadership, community service, academic achievement, and research.

Medical Student International Study Fellowships—Established by Drs. Sarah J. and N.L. Gault, Jr. to help medical students enrich their education through international clinical experiences.

Metropolitan-Mount Sinai Outstanding Medical Student Awards—Recognize students who show promise of becoming superior physicians and clinicians.

Mary Biral Peterson Memorial Award—Established by Dr. Edward Peterson in honor of his wife, the award recognizes a meritorious student starting a first-year residency in neurology at the University of Minnesota Medical School.

Undergraduate Research Award—Minnesota Medical Foundation-funded award that recognizes the most meritorious research paper written by a graduating senior.

Cecil J. Watson Award—Established in honor of Dr. Watson, Regents' Professor of Medicine, the award recognizes outstanding research by a resident in clinical medicine.

Zagaria Research Award—Recognizes original research in cardiology and oncology by an undergraduate.

Scholarship Funds

The following funds are awarded to students who demonstrate superior academic achievement and/or financial need. Some funds have additional selection criteria.

Alpha Epsilon Iota Scholarships—Established by Alpha Epsilon Iota, which since 1901 has served as a support organization for women medical students and alumni.

Alpha Omega Alpha Scholarships—Established by the Minneapolis Chapter of Alpha Omega Alpha, an honorary medical society.

American Cancer Society Scholarships—Provided by annual grants from the American Cancer Society.

Fritjof H. Arestad Scholarship—Established by bequest of Dr. Arestad, a Medical School alumnus, Class of 1924.

Charles and Ruth Bagley Scholarships—Established by Dr. and Mrs. Bagley to benefit second-year medical students at the University of Minnesota, Duluth.

Dr. A.B. Baker Memorial Scholarships—Established in memory of Dr. Baker, a leading educator in neurology and a Medical School alumnus, Class of 1931.

Russell L. Baker, M.D. and Harry R. Baker, M.D. Scholarship—Established by Dr. Russell Baker, a Medical School alumnus Class of 1934, in memory of his father.

Dr. Henry H. and Pauline E. Blaustone Scholarship—Established by bequest of Dr. Blaustone, a Medical School alumnus, Class of 1920, and his wife, Pauline.

Ruth Boynton Scholarships—Honor Dr. Boynton, former director of the University of Minnesota Health Service and a Medical School alumna, Class of 1920.

Dr. Richard and Mari Carlson Scholarship—Established by Dr. Carlson, a Medical School alumnus, Class of 1972, and his wife, Mari.

Dr. H. Mead and June S. Cavert Scholarship—Established in recognition of Dr. Cavert's many years of service to the Medical School and the University.

Centennial Scholarships—Established in commemoration of the Medical School's 100th anniversary.

Class of 1931 Scholarship—Established by the Class of 1931 in commemoration of their 50th reunion.

Class of 1937 Scholarship—Established by the Class of 1937 in commemoration of their 50th reunion.

Class of 1942 Scholarship—Established by the Class of 1942 in commemoration of their 50th reunion.

Class of 1943 (March) Scholarship—Established by the Class of 1943 (March) in commemoration of their 50th reunion.

Class of 1943 (December) Scholarship—Established by the Class of 1943 (December) in commemoration of their 50th reunion.

Class of 1944 Scholarship—Established by the Class of 1944 in commemoration of their 50th reunion.

Thomas P. Cook Scholarship—Honors Mr. Cook, long-time executive director of the Hennepin County Medical Association Foundation.

Dr. Robert W. Cranston Scholarship—Recognizes Dr. Cranston's appreciation for the medical education he received at the University.

Dr. and Mrs. Stanley B. Crosbie Scholarship—Established in honor of the University of Minnesota Medical School, Dr. Crosbie's alma mater.

Dr. Luther Forest Davis Memorial Scholarship—Established in memory of Dr. Davis, a Wadena general practitioner.

Roger Dell Memorial Scholarship—Funded by the Roger L. and Agnes C. Dell Charitable Trust.

Margaret Dowell-Gravatt Scholarship—Established by Dr. Dowell-Gravatt, a 1944 graduate of the University of Minnesota Medical School.

H.E. "Tiny" and Violet C. Drill Scholarships—Established by Dr. Drill, past president of the Minnesota Medical Foundation and a Medical School alumnus, Class of 1929.

Duluth Clinic Scholarships—Established by physicians at the Duluth Clinic to benefit University of Minnesota, Duluth medical students.

Eunice L. Dwan Scholarship—A gift from the Eunice L. Dwan 1991 Irrevocable Trust.

Robert Dyar Scholarship—Established by bequest of Dr. Dyar, a Medical School alumnus, Class of 1934.

Dan Gall Human Spirit Scholarship—Established in memory of Dr. Gall, a Medical School alumnus, Class of 1989.

N.L. Gault, Jr., M.D. Scholarship—Established by bequest of Royal C. Gray, M.D., a Medical School alumnus, Class of 1923, in honor of Dr. Gault, a Medical School alumnus, Class of 1950, and former Dean.

Sarah J. Gault Scholarship—Established by N.L. Gault, Jr., M.D., in memory of his wife, Sarah, a Medical School alumna, Class of 1950.

Dr. Bob and Mary Giebink Scholarship—Established by Dr. Giebink, a Medical School alumnus, Class of 1942.

Royal C. and Mary H. Gray Scholarship—Established by bequest of Dr. Gray.

Barry E. Greimann Memorial Scholarship—Established to benefit medical students at the University of Minnesota, Duluth.

Half-Century Club Scholarship—Established by members of the Half-Century Club in recognition of their Medical School training.

Dr. Harry B. Hall Scholarship—Established to honor Dr. and Mrs. Hall and to recognize his contribution to the medical profession.

Allan Hemingway Scholarship—Established in memory of Dr. Hemingway, long-time member of the Medical School Department of Physiology.

Delia Tenille Hobbs Scholarship—Established by John Hobbs, M.D., a Medical School alumnus, Class of 1975, in honor of his daughter.

James T. Housewright U.F.C.W. Scholarship—Established by the United Food and Commercial Workers International Union.

Ludolf J. Hoyer Memorial Scholarship—Established in memory of Dr. Hoyer, a Medical School alumnus, Class of 1932, by his son Leon, an alumnus of the Class of 1962.

Chester and Charlotte Johanson Scholarships—Established in memory of Mr. Johanson's parents, Christine and Per Johanson, who were Traverse County, Minnesota pioneer homesteaders.

Robert Wood Johnson Scholarships—Provided by funds from the Robert Wood Johnson Foundation.

Dr. Thomas J. Kinsella Scholarship—Established by bequest of Thomas J. Kinsella, M.D., a Medical School alumnus, Class of 1919.

Knobloch Scholarships—Established by William H. Knobloch, M.D., and his wife, Donna.

James Lillehei, M.D. Scholarship—Established by the Aspen Medical Group of St. Paul to honor the professional contributions of their colleague.

Walter and Elva Lovell Scholarships—Established by a gift from Elva Lovell.

Medical Alley Scholarship—Established by the Minnesota Medical Alley Association.

ADMISSION AND STUDENT LIFE

Metropolitan-Mount Sinai Scholarship—Established by the medical staff of the former Metropolitan-Mount Sinai Hospital in recognition and remembrance of its contributions.

Minority Higher Ability Scholarships—Awarded for academic achievement and financial need.

Mixer Family Scholarship—Established by Dr. Harry Mixer, a Medical School alumnus, Class of 1944, and his wife, Delores.

Lester W. and Lois P. Netz Scholarships—Established by Dr. Lester Netz, a Medical School alumnus, Class of 1926, and his wife, Lois.

Nicolette Norton Memorial Scholarship—Established by Mr. Thomas Grossman and the Metropolitan Corporation in memory of Nicolette Norton.

William A. O'Brien Scholarship—Honors the memory of Dr. O'Brien, a Minnesota public health physician and educator.

Ben and Jean Overman Scholarships—Established by the Ben and Jean Overman Charitable Trust to benefit medical students at the University of Minnesota, Duluth.

Parents' Scholarship—Established by Medical School parents in conjunction with the Centennial Scholarship Campaign.

Park Nicollet Medical Foundation's Nicollet Clinic Founders Scholarships—Established by the Park Nicollet Medical Center.

Malcolm and Ruth Pearson Scholarship—Established by Dr. and Mrs. Pearson.

Phi Delta Epsilon Jewish Medical Fraternity Scholarship—Made possible by a grant from the fraternity.

Samuel J. Ravitch Scholarship—Established by bequest of Samuel J. Ravitch, M.D., a Medical School alumnus, Class of 1926, and his wife, Louise.

Dr. Albert E. Ritt Endowed Scholarship—Made possible by the generosity of Dr. Ritt, a 1932 graduate of the University of Minnesota Medical School.

John George Ross Scholarship—Established by bequest of John George Ross.

Jean Covert Sauer and Carolyn Patrice Sauer Scholarship—Established by Dr. Jean Sauer, a Medical School alumna, Class of 1956, to honor Carolyn P. Sauer, her daughter.

Linda Shriro Schenck, M.D., Women Medical Student Scholarship—Established by Carlos H. Schenck, M.D., in memory of his wife, Linda, a Medical School alumna, Class of 1977.

Dr. Vernon D.E. Smith Scholarships—Given in memory of Dr. Smith, a St. Paul surgeon and founder of the Minnesota Medical Foundation.

Eugene S. Strout, M.D., Family Practice Scholarship—Established by Dr. Strout, a Medical School alumnus, Class of 1964.

Albert Sullivan Endowed Scholarship—Honors the memory of Dr. Sullivan, associate dean of the Medical School and faculty member for 34 years.

Luigi Taddeini Scholarship—Established in memory of Dr. Taddeini, who served as chairman and president of Ramsey Clinic in St. Paul.

Dr. Hulda Thelander Scholarships—Established by Dr. Thelander, a Medical School alumna, Class of 1924.

UMD Scholarship Fund—Established to benefit medical students at the University of Minnesota, Duluth.

Victor and Robert Vaughn Scholarship—Established by bequest of Victor Vaughn, M.D.

Vines Scholarships—Established in memory of Harold Thomas Vines by Lillian Vines.

Harold and Rhea Walder Memorial Scholarship—Established through a trust created by Harold Walder to benefit medical students at the University of Minnesota, Duluth.

George E. Williams Scholarships—Established in memory of Dr. Williams, former professor of psychiatry and assistant dean of student affairs.

George H. and Lillian K. Williams Scholarships—Established by George and Lillian Williams.

The following medical school scholarship funds are awarded on the basis of financial need: General Medical Student Scholarship, Schoberg Medical Student Scholarship, American Medical Association Education and Research Foundation (AMA-ERF) Scholarships, Wetzel Medical Fellowships, and Dr. Robert Christian Strand Scholarship.

Student Life

The Adytum and Other Facilities—A major center of medical student activities is the Medical Student Adytum. The word adytum is a transliteration of the Greek word meaning an innermost sanctuary; hence the Medical School Adytum is an area to be used *only* by medical students and their guests. This spacious, comfortable 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 recently remodeled. A center for medical students and other health sciences students is also located in Moos Health Sciences Tower, convenient to lockers, health sciences classrooms, and the cafeteria. Active exchange among students from a variety of health professions is fostered through the sharing of these facilities.

Living Arrangements—The residence halls also offer commuter meal contracts with a variety of options. Accommodations with meals are 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. Information about family/partnered housing is available from Commonwealth Terrace, 1250 Fifield Place, St. Paul, MN 55108-1102 (612/646-7526) and Como Student Community, 1024 27th Avenue S.E., Minneapolis, MN 55414-2702 (612/378-2434).

Housing with meals also is available to medical students on an annual contract basis in University-operated residence halls conveniently located near the medical center. Information about residence hall services and off-campus housing can be obtained by

contacting University Housing, Comstock Hall East, 210 Delaware Street S.E., Minneapolis, MN 55455-0307 (612/624-2994, fax 612/624-6987). The average cost of single room and board was \$1,391 per quarter for the 1994-95 school year.

Students may purchase meals in the University Hospital, Coffman Memorial Union, Sostanza Cafeteria in Moos Health Sciences Tower, or the Outside Inn in the Phillips-Wangensteen Building. The University Hospital offers the Bridges Cafeteria as well as sandwich and beverage vending machines in other convenient locations.

Boynton Health Service—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. Hospitalization insurance coverage is required for all students. Students desiring medical-surgical hospital insurance coverage through the University-sponsored Student Health Insurance Plan must purchase it each quarter at registration. The cost is added to the fee statement. Supplementary health care benefits, including hospital coverage during term breaks, extended outpatient benefits, and family coverage, can be purchased at the cashiers window at Boynton Health Service. For more information, contact Boynton Health Service (612/625-8400).

Employment—The Medical School undergraduate program is organized on a schedule that generally requires the student's full-time commitment to make the most of the coursework 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 primarily through personal savings, the help of parents, and loans when needed.

Graduate Assistantships—Medical students may hold graduate assistantships as either graduate research or teaching assistants. Students working a 25 percent, or 130 hours per quarter, assistantship are eligible for benefits. The first benefit reduces tuition costs to resident rates for nonresidents, the second reduces the remaining resident tuition rate by twice the percentage of time worked (e.g., a 25 percent appointment receives a 50 percent reduction of the resident tuition rate). If you receive an assistantship, read *The Handbook for Graduate Assistants* to ensure you know your rights and responsibilities under this job title. A copy may be obtained from your department or the Graduate Assistant Office, 1313 5th Street S.E., Suite 317, Minneapolis, MN 55414-1546 (612/627-1075).

Medical Student Government—The Medical Student Council, the student governing body, is composed of representatives from each class 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 faculty. The medical students, through the council, have adopted an honor code. Upon acceptance by the Medical School, students, after suitable briefing, sign a statement indicating that they are well acquainted with this honor code and agree to abide by it. The Peer Review Committee of the Medical Student Council is responsible for investigating reports of any suspected violations of the code.

Student Organizations—The breadth of groups and organizations available to medical students provides opportunities for support, socializing, and exploring health issues from various perspectives. Student organizations at the University of Minnesota Medical School include the following.

Alpha Omega Alpha (ΑΩΑ)—The National Honor Medical Society, selects a limited number of academically high-ranking students from the junior and senior classes for election to membership. In addition to scholastic excellence, integrity, compassion, leadership, and fairness are also used as selection criteria.

The group holds an annual spring banquet to recognize newly elected members.

American Medical Association-Medical Student Section (AMA-MSS)—Serving as the student arm of the nation's largest professional organization of physicians, members of this organization may attend two national conventions and one state convention each year. In addition, students may formulate community health care policy through two county medical societies. AMA-MSS also serves as the student wing of the Minnesota Medical Association, allowing students to interact with peers from other Minnesota medical schools and become a strong voice in the state legislature.

American Medical Student Association (AMSA)—The largest independent medical student organization in the nation dedicated to fostering communication among medical students. AMSA members receive quarterly and bimonthly publications and are entitled to low interest loans, discounts on a medical publications, auto/health insurance, and credit cards. AMSA holds a national convention annually and has 18 national task forces focused on a variety of areas of interest and concern. Projects of the Minneapolis chapter include AIDS Awareness and a University Blood Drive.

Christian Medical and Dental Society (CMDS)—An interdenominational Christian fellowship group seeking to provide social interaction and spiritual encouragement. An international organization of physicians, dentists, and allied health professionals with the goal of incorporating faith into lives and practices. Weekly lunch meetings, quarterly outings, a Christmas party, spring retreat, summer barbecue, monthly journal, overseas mission trips.

Committee on Health, Peace, and Understanding—A newly-formed Council for Health Interdisciplinary Participation (CHIP) committee devoted to nonviolence, providing educational opportunities to future health care workers about such issues as domestic abuse, sexual violence, and emotional abuse. May provide volunteer opportunities in environments such as domestic abuse shelters, law enforcement, emergency rooms, and child protection.

The Confidential Peer Assistance Program (CPAP)—A peer-organized council, supported by faculty and staff, that provides support and resources to fellow medical students coping with the stresses of medical school.

The Council for Health Interdisciplinary Participation (C.H.I.P.)—An organization comprised of health sciences students dedicated to enhancing students' quality of life and education through various extracurricular activities, symposia, volunteer projects, and community service. The C.H.I.P. Student Center provides a comfortable meeting space and kitchen area, as well as telephone and typewriter use and free notary public services.

Doctors Ought to Care (DOC)—The University's branch of this national organization allows medical students to present talks at area schools. After training, medical students may participate by preparing presentations on topics such as drug abuse, tobacco use, drinking, sex, eating disorders, self-esteem, and steroid abuse.

Family Medicine Interest Group—This group serves as a forum for exploring careers and lifestyles of the primary care physician. Events sponsored by the group include a suture clinic, IV and intubation seminars, and review of the business aspects of a primary care clinic.

Gay, Lesbian, and Bisexual Medical Student Association—An association that provides a support network for gay/lesbian/bisexual medical students. Activities include socializing, political organizing, and participating in the annual Pride event.

Health Students for Choice—Part of the National Organization of Medical Students for Choice, this group includes student advocates and activists for reproductive rights. The group sponsors lectures and open panel discussions, runs a voter registration booth, holds birth control seminars, and is involved with community-based sex education programs.

Healthy Moms/Happy Babies—This program pairs first- and second-year students with pregnant patients to provide early clinical experiences for the students and additional support for the patients. Students attend all prenatal appointments and the deliveries and

are encouraged to follow up by going to infant checkups.

Humanistic Health Committee—An organization for health care students that serves as a resource for information and discussion to improve understanding of the complex interactions among physiological, psychological, spiritual, and social/cultural aspects of health and health care. Each year, the committee sponsors a symposium, fall retreat, and noon-hour lectures on issues such as alternative methods of health care, preventive medicine, and spiritualism in health care.

La RAMA—A Hispanic medical student club that gives students the opportunity to converse in Spanish, produces a Spanish-English translator booklet on the most commonly asked questions in the medical history, sets up trips to Hispanic plays and concerts, and organizes tutorials for underprivileged Latin American youth.

Marathon Training Club: Med School Running Club—Ten percent of the Medical School's students ran in Duluth's Grandma's Marathon their first year. This club helps students train, encourages exercise, and provides a break from academia.

Medical School Partners—A social group for partners of medical students and their families, providing support and tips on surviving medical school.

Mini-Osler Lecture Series—Named in honor of the broadly educated, pioneering clinician Sir William Osler, this student group sponsors a noon-hour lecture series to foster medical students' personal growth by allowing them to share their out-of-classroom adventures and learning experiences with each other.

Minority Mentorship Program—Minority medical students in this program volunteer as mentors to high school juniors and seniors. High school students are given an opportunity to explore medical school by taking tours, sitting in on lectures, and sometimes attending surgical procedures on small animals. This program strives to encourage education and provide high school students with positive role models.

ADMISSION AND STUDENT LIFE

Psychiatry Club—This group meets monthly to discuss issues related to psychiatry. The meetings are informal and typically focus on a speaker's presentation followed by question and answers.

Rural Observation Experience—This program pairs first- and second-year medical students with rural family physicians. The students spend three or four days observing such aspects as the doctor with patients, staff meetings, and nursing home or hospital rounds.

Student Committee on Bioethics—A student-run group that challenges health care professionals to think seriously about perplexing issues in medicine. The committee runs a popular weekly noon-hour lecture series, sponsors a spring forum focusing on a current topic of debate, and supports the Socrates Society in which students can gather less formally for discussion.

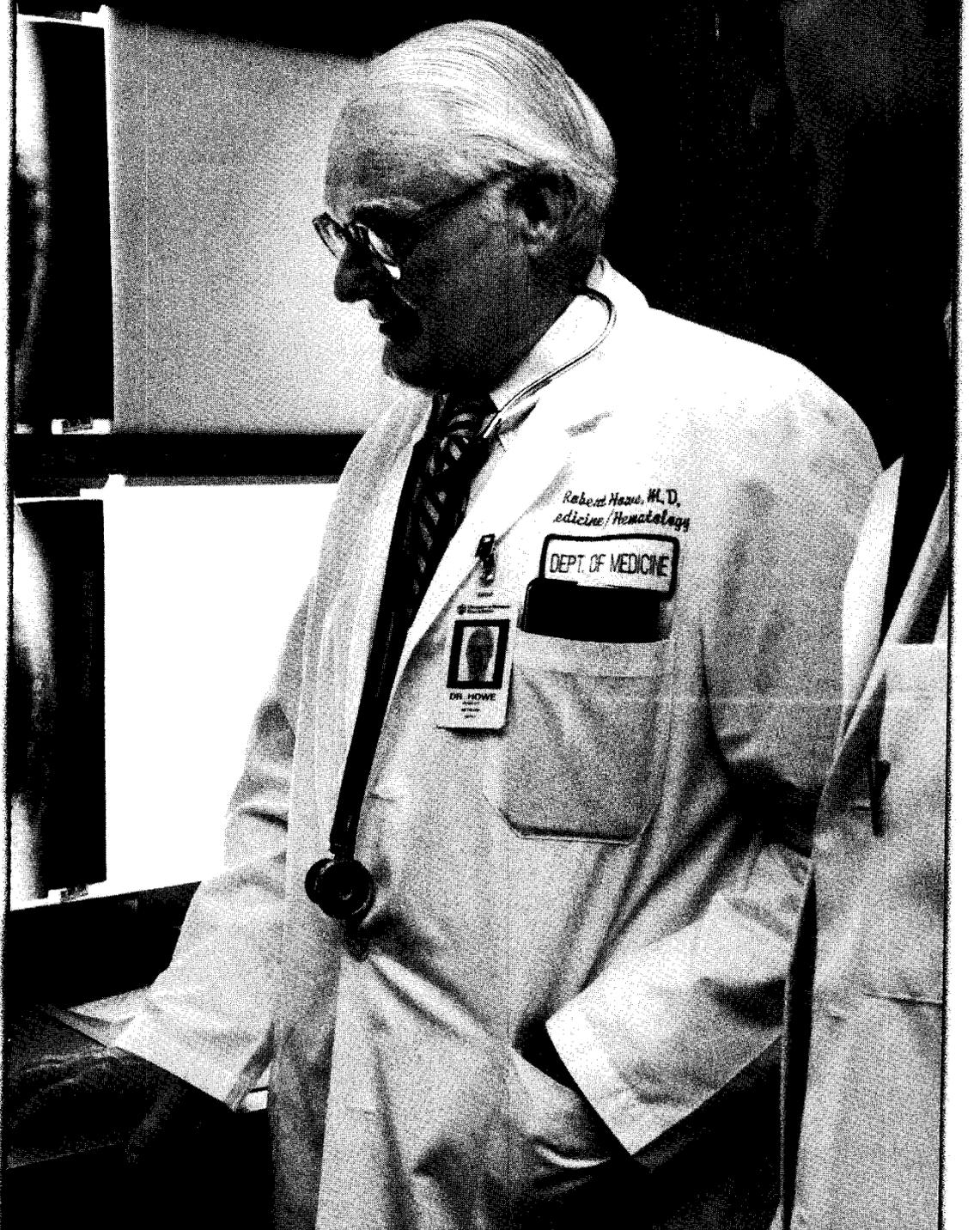
Student International Health Committee (SIHC)—This organization provides information about the different health care systems and, through speakers and libraries, keeps students informed of opportunities abroad. SIHC organizes a series of dinner discussions centered on international experiences and perspectives, sponsors noon-hour discussion groups, holds a book drive for needy libraries abroad, puts on a cross-cultural retreat, and coordinates an annual symposium.

Women in Medicine (WoMed)—A national organization for medical students associated with the American Medical Women's Association (AMWA) and Minnesota Women Physicians. The group is open to all medical students interested in women's health issues and the advancement of women in the medical profession. Activities include the annual, national AMWA convention, dessert and coffee socials, an informal group for medical moms, quarterly dinners, and a lecture series.

Medical Fraternities—There are three primary, active medical fraternities at the University, all of which offer medical student housing. These organizations play a major role in the social life of many medical students.

- Nu Sigma Nu (ΝΣΝ)—With housing for 21 male and female medical students, this house is a five-minute walk from the medical school. With six second-year medical students to provide support and advice, ΝΣΝ accommodates first-year students with planned social activities, a food co-op and a large, fully-equipped living room space.
- Phi Chi (ΦΧ)—This fraternity is a world-wide co-ed organization that was started by medical students to offer companionship and support during medical school. Located in a large, old, brick house situated in the heart of Stadium Village, Phi Chi has housing for 17 students, most of whom have their own rooms, and is open to out-of-house members.
- Phi Rho Sigma (ΠΡΣ)—Close to campus, this fraternity consists of four houses divided into one-, two- and three-bedroom apartments each with kitchen, bathroom, and living room. Each student has a separate bedroom. The fraternity is co-ed by apartments. Also available are off street parking, laundry facilities, and common areas for studying and meetings.

M . D . Program



Robert B. Howe, associate dean of the Medical School, and student Billy Haug examine X-rays.

M.D. Program

The Medical School provides the faculty and facilities for instruction of students in medicine. The primary goal of medical education is to produce physicians possessing sound training in quantitative human biology who have achieved mastery of the competencies requisite to entering graduate education in one of the primary care specialties. Beyond Medical School and awarding 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 in which individuals in practice must participate 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 requires completion of 13 quarters of academic work in the Medical School.

The number of quarters in each year and the approximate calendar location are:

Year 1	4 quarters	September—end of July
Year 2	3 quarters	September—early May
Years 3 & 4	8 quarters	June—June (76 weeks required)

The first four quarters, termed Year One, include coursework in basic medical sciences, behavioral science, and introductory experiences with patients. The next three academic quarters of the core program, termed Year Two, consist of both department and integrated interdepartmental courses organized and taught along organ system and topical lines. Years Three and Four comprise a total of 74 weeks of academic requirements. Before beginning the Years Three and Four program, the student selects a faculty adviser and develops a plan for the two calendar years. For most students this period begins in June following Year Two and ends in June of the senior year, with graduation and awarding of the M.D. degree. This two-year program

includes 52 weeks of required clinical courses: 12 weeks of internal medicine; 6 weeks each of surgery, obstetrics-gynecology, pediatrics, and psychiatry; 4 weeks of neurology, 4 weeks in one of the surgical specialties, and an 8-week outpatient clinical experience with 4 weeks in family practice and 4 weeks in general medicine, general pediatrics, or geriatrics. The balance of the program includes two quarters (24 weeks) of electives and 20 weeks of free time. The curriculum outlined in the chart on page 27 depicts one of many possible arrangements of this two-year Years Three and Four portion of the M.D. program. Students must pass Steps 1 and 2 of the United States Medical Licensing Examination (USMLE) as a requirement for graduation and the M.D. degree.

Year One

Year One study is focused on structure and function of the human body and includes an introduction to the emotional and psychological development of the individual. Instruction begins with normal structure in anatomy and histology courses together with an integrated course in biochemistry, molecular and cell biology that provides an in-depth study of modern concepts in this expanding field. In winter, spring, and summer quarters the focus shifts to the normal functions of body systems, reaction of the human organism to disease processes, and study of microorganisms and their relationships to humans and disease. These topics are presented in neuroscience, physiology, and microbiology courses, with clinical correlations as important components of each. Also in Year One there are courses in genetics, human sexuality, human behavior, and preventive medicine. In the summer, courses in pharmacology and pathology begin and continue through Year Two. A clinical medicine sequence extends throughout the entire year. It begins in fall quarter with an introduction to biomedical ethics, environmental medicine, and cultural diversity. In winter, spring, and summer quarters students learn communication skills needed to obtain a medical history and also physical diagnosis techniques.

The required courses in Year One are (quarter abbreviation follows in parentheses):

Gross Anatomy (F, W)
 Human Histology (F)
 Biochemistry, Molecular and Cell Biology (F)
 Human Nutrition (W)
 Medical Physiology (W, S)
 Neurosciences (W, S)
 Microbiology (W, S)
 Pathology (Su)
 Human Behavior (S)
 Human Sexuality (S)

Human Genetics (Su)
 Preventive Medicine (Su)
 Clinical Medicine I (F, W, S, Su)
 Pharmacology (Su)

Students can establish an informal adviser relationship with a faculty member. The Year One program ends in late July and is followed by a four- to five-week vacation before the Year Two program begins the following September.

Outline of Curriculum, 1995-1997

Year 1			
Fall - 14 weeks	Winter - 10 weeks	Spring - 9 weeks	Summer - 6 weeks
Gross Anatomy		Physiology	
Histology		Microbiology	
Biochemistry, Molecular and Cell Biology		Nutrition	Human Behavior
		Neuroscience	Human Sex
Clinical Medicine I			
Clinical Correlations			Prev. Med.

Year 2				
30 weeks				4 weeks
Pathology-Systemic				Board Review
Pharmacology				
Pathophysiology				
Cardiovascular Respiratory Neurology Psyche	Renal/Electrolytes Endo/Repro Lab Medicine	Gut Blood Bones-Joints Lab Medicine	Inf. Disease ENT Eye Skin	
Clin. Med. II	Clin. Med. III FP Tutorial	Clin. Med. III IM Tutorial	Clin. Med. III Neur Tutorial	Clin. Med III Peds Tutorial

USMLE 1996 Step 1 Examination: June 11-12 and September 24-25 (tentative)

Years 3 and 4								
12 weeks Summer		12 weeks Fall		12 weeks Winter		12 weeks (Spring)		
						4 weeks	4 weeks	4 weeks
* # Medicine	* # Ob/Gyn	* # Surgery	* Elective	* # Pediatrics	* # Psychiatry	* Free	* # Neurology	* # Surg Spec

Years 3 and 4							
8 weeks	4 weeks	12 weeks		12 weeks		12 weeks	
* # Clinical Med IV: Ambulatory Med.	* Free	* # Advanced Med.	* Elective	* Elective	* Free	* Elective	* Free

* The arrangement of courses, electives, and free time shown is only one example of many possibilities. # Required course.

Year Two

The three-quarter sequence of Year Two begins in the fall and consists of lectures and laboratories in organ system pathology, pharmacology, and interdisciplinary courses in pathophysiology and practice tutorials in clinical medicine. The pathophysiology course examines the basis of disease mechanisms, signs, and symptoms through lectures, small group discussions, and assigned readings. Topics in pharmacology and pathology run concurrently in sequence with organ system pathophysiology.

The clinical medicine tutorials begin with a continuation of the general principles of history taking and physical examination begun in Year One. It is followed by four six-week tutorials in internal medicine, family practice, pediatrics, and neurology in which the student begins to learn the diagnostic skills used in these disciplines. During these tutorials students spend a full day each week evaluating and discussing assigned patients with their tutors.

The required program in Year Two consists of (credits in parentheses):

Phcl 5111–Pharmacology (7)
 LaMP 5102, 5103, 5104–Organ System Pathology (10)
 InMD 5201–Pathophysiology I (13)
 InMD 5202–Pathophysiology II (10)
 InMD 5203–Pathophysiology III (11)
 InMD 5204–Pathophysiology IV (6)
 InMD 5290–Laboratory Medicine (1)
 InMD 5101–Clinical Medicine II (4)
 InMD 5102–Clinical Medicine: Internal Medicine (4)
 InMD 5103–Clinical Medicine: Family Practice (4)
 InMD 5104–Clinical Medicine: Pediatrics (4)
 InMD 5105–Clinical Medicine: Neurology (2)

Years Three and Four

The student in Years Three and Four works to extend knowledge of medicine through full-time clinical work, participating in the care of patients in hospitals, clinics, and office practice settings. The student has three short-term goals

during this period of clinical study: achieve competencies permitting entry to a specialty in primary care, select a specialty field for further and continued study beyond medical school, and prepare for the duties and responsibilities to be assumed in the first year of a residency program beginning after graduation from medical school.

The balance of the academic program required for the M.D. degree comprises 76 weeks of required work taken during the eight academic quarters in Years Three and Four. The schedule thus provides for 20 weeks of free time during Years Three and Four, which students may take as quarters or in smaller portions scattered throughout the two years. Planning the sequence of required courses and electives for the wisest possible uses of free time, while progressing toward long-term career goals, is an important activity, which requires the student to work closely with a faculty adviser and faculty in administrative positions in the Dean's Office, as well as those coordinators who are responsible for programs in specialty and serial career opportunity offices.

The required courses in Years Three and Four are:

Internal Medicine Externship I (6 weeks)
 Internal Medicine Externship II (6 weeks)
 Surgery Externship (6 weeks)
 Pediatrics Externship (6 weeks)
 Obstetrics and Gynecology Externship (6 weeks)
 Psychiatry Externship (6 weeks)
 Neurology (4 weeks)
 Surgical Specialty (4 weeks)
 Ambulatory Care Externship (8 weeks)

The remaining clinical work is individualized, relating specifically to personal interests and career goals. Courses are selected from an extensive list of elective courses offered by each Medical School department. With special permission, students may take a maximum of one quarter of credit in elective work at other medical schools in this country or abroad but must include at least 12 weeks of full-time elective clinical work in caring for patients in the affiliated metropolitan area hospitals and clinics as part of their total program. Students who have taken programs

with coursework away from the metropolitan teaching hospital units are permitted less of such elective experience. The flexibility of the elective program provides an opportunity for all students to pursue creative interests and to further their professional growth through diverse experiences.

Students are eligible to begin the program in Years Three and Four upon completion of work in Year Two and after taking and passing Step 1 of the United States Medical Licensing Examination (USMLE). Students with any remaining academic deficiencies or those who do not pass Step 1 are reviewed by the Student Scholastic Standing Committee for a decision regarding arrangement of their remaining academic program. Each student's Years Three and Four program is subject to review and approval by a student-selected adviser who will operate under general policy guidelines developed by the Years Three and Four faculty committee. Special programs, such as those combining the M.D. with the master's degree, and special requests will be reviewed for approval by this committee.

Rural Physician Associate Program

Each year through the Rural Physician Associate Program (RPAP) of the Medical School, up to 40 third-year medical students engage in primary health care in Minnesota communities under the experienced supervision of the RPAP staff and Medical School faculty, including many physician-preceptors who devote their time and resources to this unique medical/educational/community partnership.

These selected students, in several cases accompanied by their spouses and families, send November through July working closely with community health care professionals and learning through daily experiences the values, systems, and environment of patient care and medical practice in non-metropolitan settings throughout Minnesota. Since the inception of the RPAP in 1971, 748 medical students have participated in the program under the tutelage of experienced physician-preceptors in 101 Minnesota communities.

Evaluation and Academic Progress

Examinations and other methods, both subjective and objective, to evaluate performance of medical students, are administered by the various departments and interdepartmental teaching sections. All students will receive feedback regarding their performance on examinations. Each student has an opportunity for personal review of clinical work with a faculty supervisor. Written evaluations of each student's clinical performance are submitted so that students may be informed of their educational progress and may take steps to improve areas in which deficiencies may exist.

Grades are reported as O (outstanding), E (excellent), S (satisfactory), I (incomplete), and N (no credit, fail). Selected courses are graded on a P-N (pass-fail) system, including all courses in Year Two. Students in the top 20 percent of the class for the entire year's work in pathophysiology, pathology, and pharmacology receive a special letter of commendation that is placed in their official record. 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. On admission to the program in medicine, students sign and pledge to abide by provisions of an honor code that is detailed in the Statement of Intellectual Responsibility. According to these provisions, 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 in their years in Medical School and beyond.

Scholastic Standing and Dismissal

Students may be dismissed from Medical School if, in the opinion of the Student Scholastic Standing Committee, they have not performed at a satisfactory academic level in individual courses or if there are other factors,

such as personality, attitude, or emotional instability, that would prevent the individual from responsibly undertaking the duties of a physician.

Graduation

Requirements for graduation and award of the M.D. degree include satisfactory performance in all courses in the Year One and Year Two programs plus satisfactory completion of the Years Three and Four program, approved by an adviser and faculty group. Passing scores on Steps I and II of the United States Medical Licensing Examination (USMLE) 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 before beginning their specialty training. Students who wish to graduate in mid-year must make special arrangements through the Medical School Office of Admissions and Student Affairs.

Combined M.D.-Ph.D. Program

The University of Minnesota Medical School has a long tradition of dual degree programs in medical science. The current program is one of 33 national programs funded by a Medical Scientist Training Program Grant from the National Institutes of Health. The program combines, in about seven years, coursework, fundamental biomedical research and clinical training culminating in a dissertation, a Ph.D. degree, and an M.D. degree. Because of the additional financial burden this adds to an already expensive training period, those students selected for the program receive a yearly stipend and also have their tuition paid. This support extends throughout the training period.

The program encourages those students interested in biomedical research to use their aptitude and skills to embark on a career that combines opportunities for research with training in clinical areas. The program's goal is to train future academicians in the biomedical

sciences. Interested students should write to the M.D.-Ph.D. Program Office for the M.D.-Ph.D. Program brochure. *Note:* A separate application and interviews are required for consideration by the M.D.-Ph.D. Program. Contact the M.D.-Ph.D. Program Office, Dana Rechtzigel, Box 293 UMHC, 3-100 Owre Hall, 420 Delaware Street S.E., Minneapolis, MN 55455 (612/625-3680).

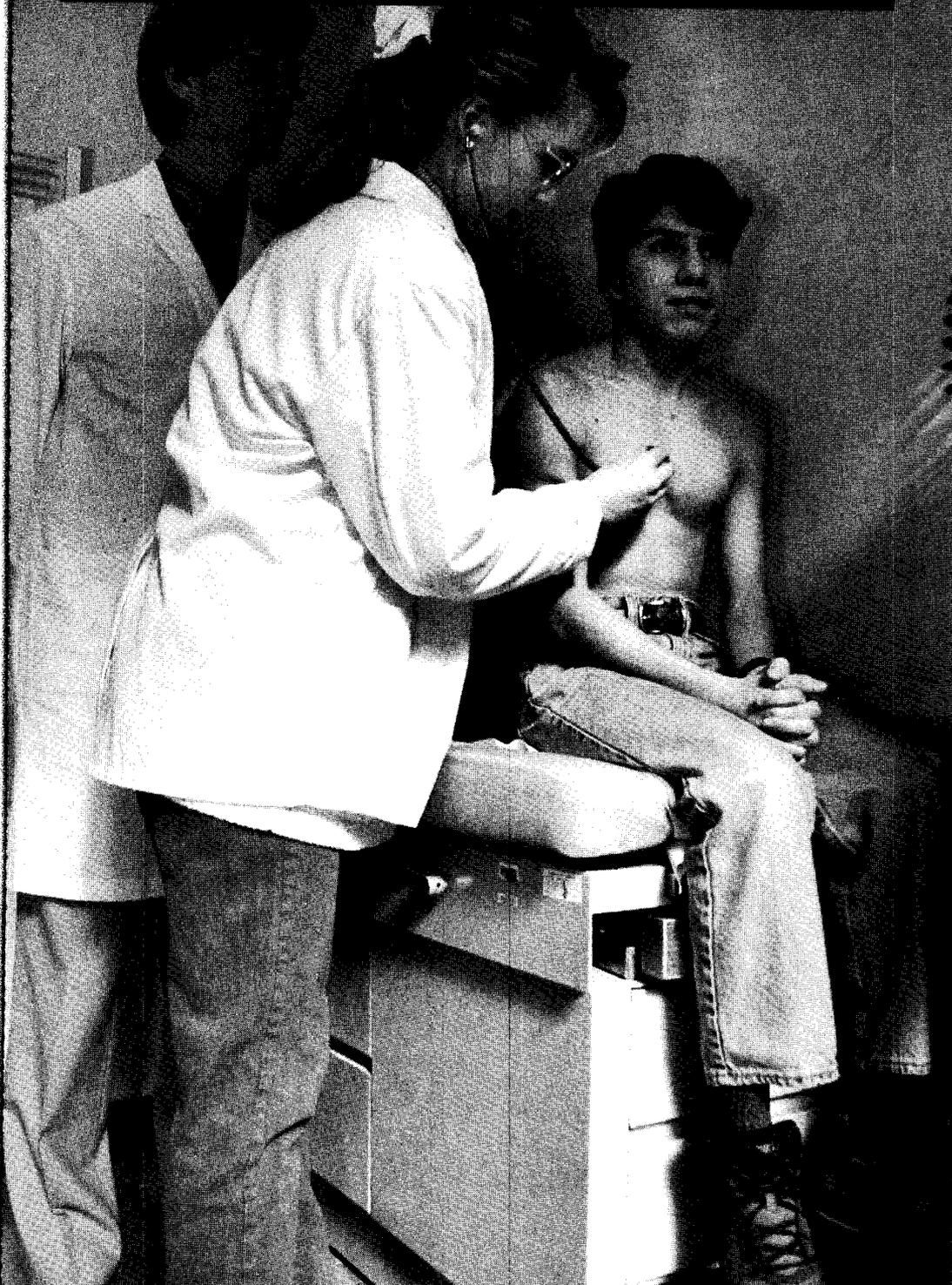
Graduate Degree Programs in Biomedical Disciplines

Students may also pursue the M.D. and Ph.D. degrees by enrolling in the Graduate School with a major in one of the basic sciences after completing some portion of the M.D. curriculum in the Medical School. Funding of stipends may be available for such students enrolled in the Graduate School even though not available while students are registered in the Medical School pursuing the M.D. degree. Information concerning this type of combined medical and graduate degree program can be obtained by contacting the Medical School Office of Admissions and Student Affairs or the individual department heads.

Under the aegis of the Graduate School, all the basic health sciences departments conduct active and extensive programs of graduate student research and study leading to the master's or Ph.D. degree. Some research fellowships, teaching assistantships, or scholarships are available to academically qualified students for advanced study in these or other disciplines related to the biomedical and health sciences. Inquiry should be directed to a faculty member or the department office of the student's field of interest.

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

Departments and Course Descriptions



Phillip M. Kofron, M.D., M.P.H., an assistant professor in the Department of Family Practice, watches medical student Eva Luhman examine patient Greg Block.

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

- , A comma between course numbers (e.g., 8234, 8235, 8236) indicates a series of courses that may be entered any quarter. In prerequisite listings, comma means “and” (e.g., “prereq 5101, 5102 or 5103” means the prerequisites are 5101 and either 5102 or 5103).
 - § Credit will not be granted if credit has been received for the course listed after this symbol.
 - ¶ Concurrent registration is required (or allowed) in the course listed after this symbol.
 - # Approval of the instructor is required for registration.
 - △ Approval of the department offering the course is required for registration.
 - Approval of the college offering the course is required for registration.
 - f, w, s, su
..... fall, winter, spring, summer (follows the course number). Use as a guide only. Contact the department offering the course for updates.
- A hyphen between course numbers (e.g., 5142-5143-5144) indicates a sequence of courses that must be taken in the order listed.

Anesthesiology (Anes)

Richard J. Palahniuk, M.D., professor and head

Professor Emeritus
 Frederick Van Bergen, M.D.
 Joseph J. Buckley, M.D.
 James F. Cumming, M.D.
 John R. Gordon, M.D.

Professor
 Kumar G. Belani, M.B.B.S.

Associate Professor
 David S. Beebe, M.D.
 Calvin B. Cameron, M.D.
 Ji-Chia Liao, M.D., Ph.D.

Assistant Professor
 William W. Anderson, M.D., Ph.D.
 Richard H. Cochrane, M.D.
 Robert L. Gauthier, M.D.

Barbara S. Gold, M.D.
 Ian K. Hasinoff, M.D.
 Paul A. Iaizzo, Ph.D.
 John M. Jackson, M.D.
 Chris H. Kehler, M.D.
 Douglas E. Koehntop, M.D.
 Russell H. Larsen, M.D.
 Josephine N. Lo, M.D.
 Paul S. Molinari, M.D.
 Mark W. Stuckey, M.D.
 Michael F. Sweeney, M.D.
 Henryk K. Swica, M.D.

The anesthesiology department offers instruction in a wide range of surgical and obstetric anesthetic techniques. Because of its unique role in a diverse spectrum of medical care, it also encompasses intensive care and acute and chronic pain management. Patients with an array of complex medical and surgical disorders offer challenges in the management of these conditions as well as in their possible interactions with the stress of surgery and anesthesia.

The department’s educational programs reflect the diversity of involvement in various modes of patient care. The programs emphasize basic sciences such as physiology, pharmacology, and anatomy as well as clinical sciences related to organ system pathophysiology, respiratory care, cardiac disease, and many other medical, surgical, pediatric, and obstetric subspecialties.

Operating room anesthesia and life support systems offers the student opportunities for active involvement in airway management, ventilatory care, and invasive monitoring. The department is active in surgical intensive care, pediatric intensive care, and pain management and provides a 24-hour emergency service in the hospital.

Anesthesiology 5181 is described in the *Medical School Years Three and Four Course Book*. All advanced courses in the 8xxx series are offered as part of the anesthesiology residency (fellowship), prerequisite 5181 and the M.D. degree.

Elective Courses

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

Anes 5182. INDEPENDENT STUDY, ANESTHESIOLOGY. (Cr ar)

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Biochemistry (MdBc)

Simon J. Pilkis, M.D., Ph.D., professor and head

Professor

Leonard J. Banaszak, Ph.D.
James W. Bodley, Ph.D.
Michael D. Caldwell, M.D., Ph.D.
Mary E. Dempsey, Ph.D.
Nelson D. Goldberg, Ph.D.
Ernest D. Gray, Ph.D.
Henricus P. Hogenkamp, Ph.D.
James B. Howard, Ph.D.
James F. Koerner, Ph.D.
David C. LaPorte, Ph.D.
John D. Lipscomb, Ph.D.
Dennis M. Livingston, Ph.D.
Matthew F. Mescher, Ph.D.
Theodore R. Oegema, Ph.D.
Harry T. Orr, Ph.D.
Andreas Rosenberg, D.Sc., Ph.D.
David D. Thomas, Ph.D.
Howard C. Towle, Ph.D.
Kamil Ugurbil, Ph.D.
Brian G. Van Ness, Ph.D.

Adjunct Professor

Quenton T. Smith, Ph.D.

Associate Professor

Kenneth W. Adolph, Ph.D.
Douglas H. Ohlendorf, Ph.D.
Robert J. Roon, Ph.D.
Michel M. Sanders, Ph.D.

Assistant Professor

Vivian J. Bardwell, Ph.D.
Gregg B. Fields, Ph.D.
Daniel P. Gilboe, Ph.D.
Alex Lange, Ph.D.
John P. Perentesis, M.D., Ph.D.
Paul G. Siliciano, Ph.D.
David A. Zarkower, Ph.D.

Lecturer

Charles H. Blomquist, Ph.D.

Biochemistry is the scientific foundation for all medical fields. Biochemistry courses establish that foundation by describing the chemical structures and workings of cells within the context of the tissues and the body. The major themes explore how chemistry has been adapted by our bodies to build a multitude of functional molecules through the required expenditure of energy. Much of fundamental biochemistry is combined with molecular and cell biology to show how the chemical architecture of macromolecules and the intricacies of metabolic transformations provide cells with the ability to divide and to differentiate for the purpose of carrying out such specialized functions as muscle contraction, nerve conduction, digestive secretion, and hormonal signaling.

Accompanying the lecture portion of the courses are class periods devoted to discussions of particular diseases whose understanding and treatment have been advanced by biochemistry. Students emerging from the courses have a basic knowledge of biochemistry that serves as a basis for their understanding of pathophysiology presented in the second year of the medical curriculum. Students may increase their understanding of biochemistry by pursuing advanced courses or by participating in the research efforts of the department.

Required Courses

MdBc 5100. BIOCHEMISTRY. (9 cr; prereq regis med fr, physics, organic chemistry)

MdBc 5101. BIOCHEMISTRY. (1 cr; prereq regis med fr, physics, organic chemistry)

Elective Course

MdBc 5053. PROBLEMS IN BIOCHEMISTRY. (Cr ar [may be repeated for cr]; prereq 5100)

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Cell Biology and Neuroanatomy (CBN)

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

Professor Emeritus

Anna-Mary Carpenter, M.D., Ph.D.
Padmakar Dixit, Ph.D.
Morris Smithberg, Ph.D.

Professor

G. Eric Bauer, Ph.D.
Edward H. Egelman, Ph.D.
Robert P. Elde, Ph.D.
Stanley L. Erlandsen, Ph.D.
Glenn J. Giesler, Ph.D.
Ryoko Kuriyama, Ph.D.
Paul C. Letourneau, Ph.D.
Richard W. Linck, Ph.D.
Steven C. McLoon, Ph.D.
Virginia S. Seybold, Ph.D.
Robert Sorenson, Ph.D.
Janet H. Wylie, Ph.D.

Associate Professor

Mary E. Porter, Ph.D.
Donald W. Robertson, Ph.D.

Assistant Professor

Christopher N. Honda, Ph.D.
Jean Magney, M.S.
Martin W. Wessendorf, Ph.D.
H. Joseph Yost, Ph.D.

Coursework in the Department of Cell Biology and Neuroanatomy provides an integrated approach to study of structure of the human body. In gross anatomy, the three-dimensional architecture and organ development in all body regions are studied through lectures, dissections, and modern imaging techniques (e.g., X-rays, CAT scans). In histology/cell biology, the organization of cells, tissues, and organs is assessed from sections using light microscopy and electron micrographs. Neuroanatomy is taught in conjunction with neurophysiology as an integrated course in Human Neuroscience. Biochemistry, Molecular and Cell Biology integrates aspects of biochemistry, genetics, and cell biology to give students a modern view of how a cell works. Where appropriate, the courses are correlated with clinical disciplines. The courses 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 coursework during elective time.

Required Courses

CBN 5100. GROSS HUMAN ANATOMY A. (8 cr; prereq regis med or grad student, #)
Dissection of the human body.

CBN 5101. GROSS HUMAN ANATOMY B. (4 cr; prereq regis med or grad student, #)
Dissection of the human body.

CBN 5103. HUMAN HISTOLOGY. (3-8 cr; prereq regis med or grad student, #)
Microscopic structure, cytochemical and functional aspects of cells, tissues, and organs.

CBN 5104. BIOCHEMISTRY, MOLECULAR AND CELL BIOLOGY. (1 cr; prereq regis med or grad student, #, §MDBC 5100)
An integrated, introductory course in biochemistry, molecular biology, genetics, cell biology, and developmental biology for freshman medical students.

CBN 5111. HUMAN NEUROSCIENCE A. (3-4 cr, §Phsl 5112; prereq regis med)
Structure and function of the nervous system including the organs of special sense.

Elective Courses

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

CBN 5304. HEAD AND NECK ANATOMY FOR MEDICAL AND DENTAL RESIDENTS

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Years Three and Four Elective Courses

CBN 5500. GENERAL GROSS ANATOMY

CBN 5501. THE EXTREMITIES

CBN 5502. HEAD, NECK

CBN 5504. THE ENDOCRINE SYSTEM

CBN 5508. THE THORAX

CBN 5509. THE ABDOMEN

CBN 5510. PERINEUM, GENITAL-URINARY SYSTEM, PELVIS

Dermatology (Derm)

Peter J. Lynch, M.D., professor and head

Professor

Mark V. Dahl, M.D.

Robert J. Gorlin, D.D.S.

Associate Professor

Sergei A. Grando, M.D.

Maria D. Hordinsky, M.D.

Robert D. Nelson, Ph.D.

Christopher B. Zachary, M.B., F.R.C.P.

Assistant Professor

Kenneth E. Bloom, M.D.

Ellen B. Rest, M.D.

Janelen Smith, M.D.

J. Corwin Vance, M.D.

The elective program in the clinics of the major hospitals in the Twin Cities 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

Derm 5182. PRECEPTORSHIP IN DERMATOLOGY

Derm 5183. ADVANCED COURSE IN DERMATOLOGY

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Family Practice and Community Health (FPCH)

Edward W. Ciriacy, M.D.,
professor and head
John T. Kelly, M.D., M.P.H.,
professor and associate head

Professor

Carole J. Bland, Ph.D.
Theodore R. Thompson, M.D.

Associate Professor

Sharon S. Allen, M.D., Ph.D.
Donald S. Asp, M.D.
Edmond J. Coleman, Ph.D.
Dwenda K. Gjerdingen, M.D.
Harold R. Ireton, Ph.D.
William E. Jacott, M.D.
Joseph M. Keenan, M.D.
Richard L. Reed, M.D., M.P.H.
Sharon B. Satterfield, M.D.
Krishna M. Saxena, M.D.

Assistant Professor

Charles R. Anderson, M.D.
Nancy Baker, M.D.
Kent D. Bergh, M.D.
Linda O. Bergum, M.D.
Mark R. Bixby, M.D.
Ruth A. Bolton, M.D.
Charles E. Boulton, M.D., M.P.H.
R. Craig Christianson, M.D.
Patricia M. Cole, M.D.
Patricia Fontaine Conboy, M.D.
Kathleen Culhane-Pera, M.D., M.A.
David C. Current, M.D.
Diane A. Dahl, M.D.
James W. Dey, M.D.
Gregory J. Gepner, M.D.
Mark A. Gray, M.D.

Gwen W. Halaas, M.D.
Peter G. Harper, M.D.
Kenneth W. Hepburn, Ph.D.
Donald R. Houge, Ph.D.
Mary C. Hroschikoski, OSF, M.D.
Joel P. Jahraus, M.D.
Robert J. Johnson, M.D.
Kenneth N. Kephart, M.D.
Phillip M. Kofron, M.D., M.P.H.
Emily A. Lagace, M.D.
Herbert H. Laube, Ph.D.
Sandra J. Laurant, M.D.
Barbara A. Leone, M.D.
Maurice L. Lindblom, M.D.
Malcolm MacDonald, M.D.
Diane Madlon-Kay, M.D.
William D. Manahan, M.D.
Daniel G. Mareck, M.D.
John C. McCabe, M.D.
David J. Mersy, M.D.
Michael E. Metz, Ph.D.
Deborah Mielke, M.D.
Michael H. Miner, Ph.D.
David A. Nelsen Jr., M.D., M.S.
Leon J. Nesvacil, M.D.
Nancy K. Newman, M.D.
Helen P. Odland, M.D.
Eugene C. Ott, M.D.
James T. Pacala, M.D., M.S.
James J. Pattee, M.D.
Sonia E. Patten, Ph.D.
James Peters, M.D.
Kevin A. Peterson, M.D., F.R.C.S., M.P.H.
Lawrence M. Poston, M.D.
Jerome Potts, M.D.
Brian G. Prokosch, M.D.
Timothy J. J. Ramer, M.D.
Christopher J. Reif, M.D., M.P.H.

Daniel N. Riley, M.D.
Beatrice E. Robinson, Ph.D.
Gerald F. Ronning, M.D.
B.R. Simon Rosser, Ph.D.
Harold C. Seim, M.D., M.P.H.
Peter A. Setness, M.D.
Diane M. Shuck, M.D.
Stanley L. Smith, M.D.
Joseph Sockalosky, M.D.
Walter M. Swentko, M.D., M.S.
James S. Van Vooren, M.D.
Angela M. Vargas, M.D., M.S., M.P.H.
Mark W. Yeazel, M.D., M.P.H.

Instructor

Walter O. Bockting, Drs.
Margretta Dwyer, R.S.M., M.A.
Roseanne M. Kassekert, M.S.W.
James P. Lewis, M.D.
Lynne Morishita, M.S.N.
Vicki L. Short, M.D.
Joseph M. Sierra, M.D.

Lecturer

Faruk S. Abuzzahab, M.D., Ph.D.
William J. Doherty, Ph.D.
Thomas W. Hoban, M.A.
John E. Simon, M.D.

Research Fellow

Sandra L. Nohre, M.A.

Assistant to Department Head and Instructor

Todd S. Wirth, M.P.A.

Program Director and Assistant Educational Specialist

Douglas C. Lund, M.B.A.

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 emphasized. Preventive medicine and the behavioral science aspects of patient care are also emphasized.

During Year One, the Department of Family Practice and Community Health participates in planning, teaching, and providing clinical facilities for the introduction to clinical medicine (Clinical Medicine I and II). Department faculty share responsibility for teaching the medical history taking, interviewing techniques, and physical diagnosis sections of the course.

In Year Two, Clinical Medicine III requires students to spend one day per week 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.

During Years Three and Four, students have the opportunity to participate in a variety of family practice programs and courses. In the third year, a four-week experience in Family Practice is required. This ambulatory medicine rotation consists of one week of didactics and a three-week clinical preceptorship with family physicians in the community and at the residency units. The students participate in patient care in the family practice clinic, hospital, patient's home, and other patient care facilities. Before completing the M.D.

DEPARTMENTS AND COURSE DESCRIPTIONS

requirements, students may elect to spend nine months 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 acquaints students with the world of rural family practice. The department offers a variety of elective courses. In addition to the course offerings listed below, the department offers three extracurricular educational opportunities. These programs include the Rural Observation Experience, the Family Medicine Interest Group, and Doctors Ought to Care, all of which are offered during the first two years of medical school.

The Rural Observation Experience is initially offered to medical students as an introduction to the medical school curriculum. This program matches students with rural physicians and facilitates visits to communities for exposure to rural family medicine. This program is offered throughout the first and second year during scheduled breaks.

The Family Medicine Interest Group (FMIG), composed of first- and second-year students, promotes interest in primary care. The group offers lectures and procedure clinics, and participates in jointly sponsored programs with the Duluth and Mayo Medical Schools.

Doctors Ought to Care (DOC) is a national organization promoting healthier lifestyles for youth. At the University of Minnesota chapter—the largest in the nation—medical students volunteer and train to make presentations to area schools on topics such as sexuality, chemical awareness, eating disorders, stress management, depression, and violence. Students who participate in this organization during their first two years of medical school frequently use DOC information and skills in the Rural Physician Associate Program (RPAP) later in their training. Also, some family practice residency programs allow residents to fulfill their community health through being DOC participants.

Model family practice units have been established at the University and at five additional sites within or near hospitals affiliated with the department. A rural residency program also is offered in Mankato and Waseca. 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 Year One core curriculum and offers elective courses in Years Three and Four as well as advanced workshops, internships, and fellowships 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

FPCH 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.

FPCH 5501. RURAL PHYSICIAN ASSOCIATE PROGRAM (RPAP). (36 cr; prereq minimum completion of Year One and Year Two curricula of University of Minnesota Medical School)

Nine-month 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.

FPCH 5514. INTRODUCTION TO FAMILY PRACTICE. (4.5 cr; prereq 1 previous clinical rotation)

Student will gain a better understanding of problem-solving methods used for most common complaints in family practice.

FPCH 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 the director to make arrangements.

FPCH 5518. INPATIENT FAMILY MEDICINE. (4.5-9 cr; prereq regis med)

Participate in the family practice residency inpatient teaching service at a community hospital.

FPCH 5520. RURAL ROTATION IN FAMILY PRACTICE. (4.5-9 cr; prereq regis med)

Participate in delivery of primary medical care in a small town setting with an emphasis on a team approach. Room and board furnished at several sites.

FPCH 5521. CLINICAL PRACTICE PRECEPTORSHIP: KENAI, ALASKA. (9 cr; prereq regis med)

Sixty-day participation in delivery of primary medical care as performed by a practitioner in Kenai, Alaska. Includes expenses.

FPCH 5523. FAMILY PRACTICE CLERKSHIP-DULUTH (4.5 cr; prereq regis med)

Participate in the delivery of medical care, mainly in an ambulatory setting, as performed by a family doctor.

FPCH 5525. CARDIOVASCULAR MEDICINE IN THE COMMUNITY HOSPITAL. (9 cr; prereq regis med)

Practicum that increases understanding of cardiovascular disease and provides experience in treating patients.

FPCH 5530. CLINICAL PROBLEMS IN FAMILY PRACTICE. (9 cr; prereq regis med)

Participation in patient care in a model family practice clinic.

FPCH 5531. POPULATION BASED PRIMARY CARE CLERKSHIP (4.5-9 cr; prereq regis med)

Health care needs and problems faced by special population groups including immigrant and refugee populations, and various underserved groups. Special issues such as communication, education, and traditional healing beliefs and systems.

FPCH 5533. TRADITIONAL INDIAN MEDICINE (6-9 cr; prereq regis med)

Exposure, training, and experience in clinical and traditional health care settings in an American Indian community in New Mexico.

FPCH 5537. PRIMARY CARE SPORTS MEDICINE. (9 cr; students regis for Years Three or Four of med school; not offered periods I and II)

Familiarizes medical students with the role of exercise and sports medicine in promoting health and preventing disease. Athletic trauma evaluation, treatment and rehabilitation, and exercise prescription.

FPCH 5538. SPORTS MEDICINE IN DULUTH. (6 cr; prereq regis med)

Approaches sports medicine from the musculoskeletal system. Involves delivering medical care in an office practice, rehabilitation center, and at sporting events.

FPCH 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.

FPCH 5580. COMMUNITY EMERGENCY MEDICINE. (9 cr; prereq med or ped or surg)

Student assigned to one of five community hospital emergency services, exposed to medical and surgical problems, and taught how to evaluate and treat these acute problems.

FPCH 5585. SEXUAL PROBLEMS IN CLINICAL PRACTICE. (Cr ar; open to med students only; prereq #)

Clinical management of sex-related problems.

FPCH 5595. RESEARCH IN FAMILY PRACTICE: INDEPENDENT STUDY. (4.5 cr; prereq #)

Provides student the opportunity to pursue academic research and develop knowledge and skills essential for academic careers in family practice.

FPCH 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

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

FPCH 5247. INTRODUCTION TO FAMILY SYSTEMS

FPCH 5596. INTRODUCTION TO INTERNATIONAL AND INTERCULTURAL MEDICINE

FPCH 5950. CLINICAL ISSUES IN HUMAN SEXUALITY. (3 cr; also offered to grad students in health sciences, family social science, education, and psychology) Clinical issues and assessment and treatment techniques pertaining to common sexual problems.

FPCH 5951. RESEARCH IN HUMAN SEXUALITY

FPCH 5952-5953-5954. PRACTICUM IN SEXUAL COUNSELING. (3-6 cr per qtr)

Supervised experience in sex-related counseling of individuals, couples, and groups. Work with problems of sexual adjustment, dysfunction, and couple conflict.

FPCH 5955. DIRECTED STUDY. (1-15 cr; qualified students may regis with consent of instructor for work on a tutorial basis)

FPCH 5956. HUMAN SEXUALITY THROUGHOUT THE LIFE CYCLE FOR THE PRIMARY CARE PHYSICIAN. (3 cr per qtr; offered alt yrs)

Developmental aspects of sexuality throughout the life cycle examined from such theories as psychodynamics and social role theory, with emphasis on significance of psychosocial aspects of sexuality for the primary care physician.

FPCH 5957. FEMALE SEXUALITY. (3 cr per qtr; offered alt yrs)

Lectures and discussion on basic aspects of female experience of sexuality.

FPCH 5960. BASIC RESEARCH METHODS SEMINAR AND PRACTICUM

FPCH 5962. CLINICAL HYPNOSIS WORKSHOP

FPCH 5965. SEMINAR ON PSYCHOLOGICAL MEDICINE: PRINCIPALS OF HUMAN DEVELOPMENT THROUGH LIFE CYCLES

FPCH 5968. COMPUTERS IN THEORY AND PRACTICE

FPCH 5969. INDEPENDENT STUDY

FPCH 5970. PSYCHOLOGICAL CRISIS INTERVENTION WORKSHOP

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 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 makes the physician aware of the foundations of medical knowledge and provides historical perspective on contemporary medical problems.

Department courses provide students with a broad survey of the history of medicine (5400, 5401, 5402), 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 investigate a historical problem for themselves, with assistance from faculty as needed.

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

Elective Courses

HMed 5002. PUBLIC HEALTH ISSUES IN HISTORICAL PERSPECTIVE. (4 cr, §PubH 5002) Eyler
Introduction to the evolution of major recurring problems and issues in public health including environment and health, food customs and nutrition, control of alcohol and drugs, venereal diseases and public policy, human resources regulation, and relationship of science to promotion of health.

HMed 5035. THE GERM THEORY AND THE MEDICAL PROFESSION. (4 cr, §Hist 5035)
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.

HMed 5045. MEDICAL PROFESSION IN AMERICA. (4 cr, §Hist 5045)
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.

HMed 5120-5130. HISTORICAL TOPICS: MEDICINE AND THE MODERN STATE. (4 cr per qtr [sequence may be repeated for a max of 16 cr], §Hist 5940-5950; prereq #)
Eyler
Seminar on the historical relations between medicine and the State from the 18th to 20th centuries. Topics vary yearly.

HMed 5400f. EARLY HISTORY OF MEDICINE. (4 cr, 3 lect hrs per wk) Wilson
The archaeology of disease, disease concepts in primitive medicine, medicine in Egypt and Mesopotamia, ancient Greek medicine, the transmission of Greek medicine through the Islamic and Byzantine cultures, the recovery of ancient Greek medical writings in the Renaissance, Vesalius and the revival of anatomy, Harvey and the discovery of circulation of the blood.

HMed 5401w. MEDICINE DURING THE SCIENTIFIC REVOLUTION, 1650-1830. (4 cr; 3 lect hrs per wk) Wilson
Impact of the discovery of circulation on medical thought, new chemical and mechanical theories of medicine, rise of medical teaching, inoculation and vaccination for smallpox, the growth of hospitals, the rise of surgery, the emergence of the concept of specific diseases.

HMed 5402s. MEDICINE IN THE 19TH AND 20TH CENTURIES. (4 cr; 3 lect hrs per wk) Wilson
Growth of clinical medicine and pathology, cell theory and cellular pathology, the germ theory of disease, anesthesia and antiseptic surgery, the revolution in surgery, the rise of bacteriology and immunology, nutritional deficiency diseases and the discovery of vitamins, the discovery of malaria parasites and the control of malaria, chemotherapy and antibiotics, the reform of medical education and the rise of medical research.

HMed 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.

Interdisciplinary Medicine (InMd)

The courses listed below are required of all medical students. Direct administrative responsibility for organ-system segments of the pathophysiology course is vested in the individual organ system coordinators; planning, teaching, and evaluation of the course and of student performance is carried out by interdepartmental committees.

Required Courses

InMd 5090f. CLINICAL MEDICINE I: ETHICS. (2 cr; prereq regis med) Miles, Ytterberg, staff

InMd 5095w. CLINICAL MEDICINE I: HISTORY TAKING. (2 cr; prereq regis med) Ytterberg, staff

InMd 5100s, su. CLINICAL MEDICINE I: PHYSICAL EXAM. (5 cr; prereq regis med) Ytterberg, staff

InMd 5101f. CLINICAL MEDICINE II. (4 cr; prereq regis med) Ytterberg, staff

InMd 5102. CLINICAL MEDICINE III: INTERNAL MEDICINE. (4 cr; prereq regis med) Ytterberg, staff

InMd 5103. CLINICAL MEDICINE III: FAMILY PRACTICE. (4 cr; prereq regis med) Allen, Ytterberg, staff

InMd 5104. CLINICAL MEDICINE III: PEDIATRICS. (4 cr; prereq regis med) Moller, Ytterberg, staff

InMd 5105. CLINICAL MEDICINE III: NEUROLOGY. (2 cr; prereq regis med) Anderson, Ytterberg, staff

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

InMd 5120su. PREVENTIVE MEDICINE. (2 cr; prereq regis med) Kofron, staff
Introduction to determinants, distribution, and prevention of disease and promotion of health.

InMd 5201. PATHOPHYSIOLOGY I. (13 cr; prereq regis med) Davies, Knopman, Mackenzie, Ulstad, staff
Fundamental concepts in the pathophysiology of respiratory, cardiovascular, neurological, and psychiatric diseases.

InMd 5202. PATHOPHYSIOLOGY II. (10 cr; prereq regis med) Abraham, Niewoehner, staff
Fundamental concepts in the pathophysiology of renal diseases; fluid, electrolyte, and acid-base disturbances; endocrine and metabolic diseases. Overview of normal reproductive biology.

InMd 5203. PATHOPHYSIOLOGY III. (11 cr; prereq regis med) Messner, Miller, Soltis, Transfeldt, staff
Fundamental concepts in the pathophysiology of gastrointestinal, liver, hematologic, bone, joint, and connective tissue diseases.

InMd 5204. PATHOPHYSIOLOGY IV. (6 cr; prereq regis med) Egbert, Levine, Long, Kaplan, Tsukayama, staff
Fundamental concepts in the pathophysiology of infectious diseases; skin diseases; eye diseases; and ear, nose, and throat diseases.

InMd 5233s. HUMAN SEXUALITY. (2 cr; prereq regis med) Coleman, staff

InMd 5290. LABORATORY MEDICINE. (1 cr; prereq regis med) Bradley, staff
Introduction to principles and techniques of laboratory medicine.

InMd 5500. CLINICAL MEDICINE IV: AMBULATORY MEDICINE. (9 cr; prereq regis med) Watson, staff
Participation in patient care in outpatient primary care settings located at internal medicine, family practice, pediatric, and geriatric clinics.

Elective Courses

InMd 5501. EMERGENCY ROOM EXTERNSHIP—Hennepin County Medical Center. (6 cr; prereq regis med) Rusnak, staff
Active clinical participation in care of surgical emergency patients.

InMd 5552. INDIAN HEALTH SERVICE ELECTIVE. (Cr ar; prereq regis med) McCollister
Clinical experience in a major hospital/center in any of the approved (through Curriculum Affairs Medical School) Indian Health Service areas.

InMd 5553. ELECTIVE AWAY AT CENTERS FOR DISEASE CONTROL (CDC). (Cr ar; prereq regis med) McCollister
Full-time experience in one of the sections of CDC.

InMd 5555. ELECTIVE AWAY FOR CREDIT. (Cr ar; prereq regis med) McCollister
Student-arranged, adviser/administration-approved experience at an approved *medical school* location.

InMd 5560. ELECTIVE AWAY AT THE NATIONAL INSTITUTES OF HEALTH (NIH). (Cr ar; prereq regis med) McCollister
Clinical experiences at NIH in Bethesda, Maryland.

InMd 5566. CLINICAL EXPERIENCE IN INTERNATIONAL MEDICINE. (Cr ar; prereq regis med) McCollister
Student-arranged, structured, approved (through Curriculum Affairs Medical School) clinical experience in a foreign medical institution.

Laboratory Medicine and Pathology (LaMP)

Leo Furcht, M.D., professor and head

Allen Pardee, professor of cancer biology professor and director, Biomedical Engineering Center

Regents' Professor
James G. White, M.D.

Professor

Kahlil Ahmed, M.D.
Robert E. Anderson, M.D.
W. Robert Anderson, M.D.
Miguel M. Azar, M.D., Ph.D.
Henry Balfour, M.D.
Ellis S. Benson, M.D.
Richard Brunning, M.D.
Barbara A. Burke, M.D.
Donald P. Connelly, M.D.
Agustin P. Dalmaso, M.D.
John H. Eckfeldt, M.D., Ph.D.
J. Roger Edson, M.D.
Jesse Edwards, M.D.
Richard Estensen, M.D.
Patricia Ferrieri, M.D.
Stanley M. Finkelstein, Ph.D.
Kazimiera Gajl-Peczalska, M.D., Ph.D.
Laël C. Gatewood, Ph.D.
Leonard J. Greenberg, Ph.D.
Franz Halberg, M.D.
Erhard Haus, M.D., Ph.D.
Charles A. Horwitz, M.D.
John H. Kersey, M.D.
Tucker W. LeBien, Ph.D.
Catherine Limas, M.D.
Jeffrey McCullough, M.D.
Takshi Okagaki, M.D., Ph.D.
Harry T. Orr, Ph.D.
Herbert Polesky, M.D.
Gundu H. R. Rao, Ph.D.
Andreas Rosenberg, Ph.D.

Dale C. Snover, M.D.
Michael Steffes, M.D., Ph.D.
Joo Ho Sung, M.D.
Jack L. Titus, M.D.
Lee W. Wattenberg, M.D.

Clinical Professor
Alan Rose, M.D.

Associate Professor

Fred Apple, Ph.D.
Diane C. Arthur, M.D.
Sue A. Bartow, M.D.
G. Mary Bradley, M.D.
H. Brent Clark, M.D., Ph.D.
John T. Crosson, M.D.
Lynda B. Ellis, Ph.D.
Vincent F. Garry, M.D.
Danuta M. Giganti, Ph.D.
Helen M. Hallgren, M.S.
Jose Jessurun, M.D.
Karen S. Karni, Ph.D.
J. Carlos Manivol, M.D.
James B. McCarthy, Ph.D.
Zoltan Posalaky, M.D.
Miriam Segall, Ph.D.
William Swaim, M.D.
Michael Tsai, Ph.D.
Photini-Effie Tsilibary, M.D., Ph.D.
Carol L. Wells, Ph.D.
Michael J. Wilson, Ph.D.
Walid G. Yasmineh, Ph.D.

Assistant Professor

Michael Altmann, Ph.D.
Thomas Arlander, M.D.
Calvin M. Bandt, M.D.
Robert Bowman, M.D.
Frederick T. Boyd, Ph.D.
Doris C. Brooker, M.D., M.S.
Aristidis S. Charonis, M.D., Ph.D.
David Cherwitz, M.D.
Douglas J. Christie, Ph.D.
Gretchen Crary, M.D.

Gregg Fields, Ph.D.
William B. Gleason, Ph.D.
Joseph J. Goswitz, M.D.
Seymour Handler, M.D.
Betsy Hirsch, Ph.D.
J.P. Houchins, Ph.D.
Waclaw Jaszcz, M.D., Ph.D.
Virginia Kubic, M.D., Ph.D.
David J. Lakatua, M.D.
Paul H. Larson, M.D.
Craig E. Litz, M.D.
Karen G. Lofsness, M.S.
Ronald C. McGlennen, M.D.
R. Scott McIvor, Ph.D.
Daniel L. Mooradian, Ph.D.
Gloria Niehans, M.D.
Christopher Pennell, Ph.D.
Elizabeth H. Perry, M.D.
Garry F. Peterson, M.D.
Karen Ringsrud, M.S.
Amy P. Skubitz, Ph.D.
Nancy A. Staley, M.D.
Theresa A. Steeper, M.D.
Robert L. Strom, M.D.
David F. Stroncek, M.D.
Thomas O. Swallen, M.D.
Cheryl D. Swinehart, M.S.
Elizabeth Wayner, Ph.D.
Keith Willard, M.D.

Physician/Assistant Professor

Scott Burger, M.D.
Sarah Ilstrup, M.D.

Instructor

Michael L. Basara, M.D.
Janet Beneke, M.D.
Peter J. Benson, M.D.
Virginia Dale, M.D.
Mark Wilke, M.D.

Clinical Instructor

Karen Kelly, M.D.

Pathology is the study of disease. An understanding of pathology is a prerequisite for and an integral aspect of the practice of medicine, regardless of the specialty.

The required courses of general and systemic pathology (LaMP 5101, 5102, 5103, and 5104) offered by the Department of Laboratory Medicine and Pathology are an introduction to the processes that lead to clinical signs and symptoms.

This sequence of courses extends from the summer quarter of Year One through the first three periods of Year Two.

In the summer quarter of Year One, the general pathology segment introduces the student

to general principles, including cellular injury, inflammation and repair, immunopathologic processes, abnormal hemodynamics, metabolic diseases, and neoplasia. Examples of specific diseases are used to illustrate these principles. In Year Two, diseases are presented in the context of the organ systems, namely cardiac, respiratory, renal, female and male reproductive, neurologic, hematologic, gastrointestinal, endocrine, and orthopedic.

The morphologic alterations caused by disease are emphasized using gross specimens, microscopic slides, and videotapes. Appropriate use of laboratory tests is also discussed, often in conjunction with case studies.

Pathophysiology and pharmacology courses are taught in Year Two concurrently with pathology. The subject matter taught by the three disciplines is coordinated.

In Years Three and Four, the Department of Laboratory Medicine and Pathology offers a variety of electives. Major areas of emphasis include surgical pathology, cytology, autopsy pathology, hematology (with coagulation), clinical chemistry, blood banking, microbiology, genetics, immunology, computer medicine, and molecular diagnostics. A particularly popular elective is LaMP 5187— Interpretation of Laboratory Data. In addition, other specialized laboratory divisions and full-time research may be selected.

Required Courses

LaMP 5101, su. GENERAL PATHOLOGY. (5 cr; prereq regis med or grad student, #)

LaMP 5102, 5103, 5104 f-w. SYSTEMIC PATHOLOGY. (9 cr; prereq regis med or grad student, #)

Elective Courses

General Courses in Anatomic Pathology

LaMP 5150. ANATOMIC PATHOLOGY IN A HOSPITAL SETTING—University Hospital. (Cr ar; prereq #)

The student works in the anatomic pathology department taking part in autopsy pathology, surgical pathology, and clinicopathology correlation sessions.

LaMP 5151. ANATOMIC PATHOLOGY IN A HOSPITAL SETTING—Hennepin County Medical Center. (Cr ar; prereq #) Anderson
For a description, see 5150.

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

LaMP 5153. ANATOMIC PATHOLOGY IN A HOSPITAL SETTING—St. Paul-Ramsey Medical Center. (Cr ar; prereq #) Posalaky
For a description, see 5150.

LaMP 5154. ANATOMIC PATHOLOGY IN A HOSPITAL SETTING—Abbott-Northwestern Hospital. (Cr ar; prereq #) Arneson, Horwitz

General Courses in Clinical Pathology

LaMP 5186. LABORATORY MEDICINE IN A COMMUNITY HOSPITAL. (Cr ar; prereq #) Bandt
Correlations between clinical presentations and laboratory results from the perspective of a busy general hospital clinical laboratory.

LaMP 5187. INTERPRETATION OF LAB DATA.

(Cr ar; prereq #) Ward, Staff
Daily teaching sessions are conducted 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.

LaMP 5188. CLINICAL PATHOLOGY EXTERNSHIP—Methodist Hospital. (Cr ar; prereq #) Manoles

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 are studied. Daily laboratory and weekly clinical conferences.

LaMP 5192. LABORATORY MEDICINE FOR PRIMARY CARE—Virginia. (Cr ar; prereq #)

Students participate in certain daily activities of the laboratory to learn what services are available, how they are provided, and how they are best used 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.

LaMP 5193. CLINICAL PATHOLOGY EXTERNSHIP—Hibbing. (Cr ar; prereq #)

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.

Courses in Specialized Subjects

LaMP 5113. SURGICAL PATHOLOGY—University Hospital. (Cr ar; prereq #) Manivel, Snover
Students participate in the dissection, gross description, microscopic description, diagnosis, and coding of surgical pathology specimens; in frozen section procedures; and in intradepartment conferences.

LaMP 5114. SURGICAL PATHOLOGY—Hennepin County Medical Center. (Cr ar; prereq #) Anderson
For a description, see 5113.

LaMP 5115. SURGICAL PATHOLOGY—Veterans Administration Hospital. (Cr ar; prereq #) Niehans
For a description, see 5113.

LaMP 5119. FORENSIC PATHOLOGY—Medical Examiner's Office, Hennepin County Medical Center. (Cr ar; prereq Year 3 or 4) Peterson
The function of a medical examiner's office in determining the cause and manner of types of death.

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

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LaMP 5141. PROBLEMS IN EXPERIMENTAL PATHOLOGY. (Cr ar; prereq #) 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.

LaMP 5158. CARDIAC PATHOLOGY—United Hospital. (Cr ar; prereq #)

Work with Dr. Jesse Edwards, Dr. Jack Titus, Dr. Karen Kelly, and Dr. Alan Rose in the cardiac pathology laboratory.

LaMP 5181. LABORATORY AND CLINICAL HEMATOLOGY. (Cr ar; prereq #) Brunning

Peripheral blood, bone marrow morphology, and other hematologic analyses are related to case studies. Clinical case conferences, hematology slide sessions, and ward rounds.

LaMP 5184. CLINICAL AND LABORATORY ASPECTS OF BLOOD TRANSFUSION. (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.

LaMP 5195. COMPUTER APPLICATIONS IN MEDICAL RESEARCH. (Cr ar; prereq #) Ellis

Students observe operation of the nine computer facilities currently used for medical research, including monitoring in the intensive care ward and in radiation therapy. Roles of computers in current and future medical research studied through reading and special seminars.

*Lecture Courses and Seminars—
Predominantly for Students
in Other Graduate Programs*

LaMP 5166. FORENSIC PATHOLOGY. (2 cr; prereq #) Peterson

LaMP 5210. SURGICAL PATHOLOGY FOR POST M.D.'s. (Cr ar; prereq #) Staff

LaMP 5211. AUTOPSIES FOR POST M.D.'s. (Cr ar; prereq #) Staff

LaMP 5213. LABORATORY MEDICINE FOR POST M.D.'s. (prereq regis med, fellow spec. #)

LaMP 5765f. HEMATOLOGY. (4 cr per qtr; prereq #) Lofness

Blood and blood-forming organs; blood and bone marrow from the standpoint of diagnosis and prognosis.

Medicine (Med)

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

Professor

David W. Allen, M.D.
Inderjit Anand, M.D.
Robert Asinger, M.D.
Robert Bache, M.D.
Jose Barbosa, M.D.
David Benditt, M.D.
Peter B. Bitterman, M.D.
Henry W. Blackburn, Jr., M.D.
Joseph Bloomer, M.D.
John Bond, M.D.
Elliot Chesler, M.D.
Jay N. Cohn, M.D.
Kent Crossley, M.D.
Pablo Denes, M.D.
William Duane, M.D.
Gary Francis, M.D.
Arthur From, M.D.
Roger Gebhard, M.D.
Gordon Ginder, M.D.
Richard Grimm, M.D.
Ashley Haase, M.D.
Robert Hebbel, M.D.
Morrison Hodges, M.D.
Jordan L. Holtzman, M.D.
Thomas H. Hostetter, M.D.
Robert B. Howe, M.D.
Donald B. Hunninghake, M.D.
Harry S. Jacob, M.D.
Maynard E. Jacobson, M.D.
Gerhard Johnson, M.D.

M. Colin Jordan, M.D.
Robert L. Kane, M.D.
Manuel E. Kaplan, M.D.
Bertram Kasiske, M.D.
Neil Kay, M.D.
William Keane, M.D.
Richard King, M.D.
David Kiang, M.D.
John LaBree, M.D.
Allen Levine, M.D.
Michael D. Levitt, M.D.
Constance Limas, M.D.
Russell Luepker, M.D.
Maren L. Mahowald, M.D.
Cary N. Mariash, M.D.
John Marini, M.D.
Philip B. McGlave, M.D.
Ronald Messner, M.D.
Charles R. Moldow, M.D.
Robert O. Mulhausen, M.D., M.S.
M. John Murray, M.D.
Dennis E. Niewoehner, M.D.
Frank Q. Nuttall, M.D., Ph.D.
Jack Oppenheimer, M.D.
Bruce A. Peterson, M.D.
Lance Peterson, M.D.
Phillip K. Peterson, M.D.
Leopoldo Rajj, M.D.
Koppanadham V. Rao, M.D.
R. Paul Robertson, M.D.
L. D. Sabath, M.D.
Fred Shapiro, M.D.
Burt Sharp, M.D.
Stephen Silvis, M.D.

Geza Simon, M.D.
Clifford Steer, M.D.
Athanasios Theologides, M.D., Ph.D.
Naip Tuna, M.D.
Kamil Urgubil, M.D.
Jack Vennes, M.D.
Greg Vercellotti, M.D.
Yang Wang, M.D.
Edward Weir, M.D.
Daniel J. Weisdorf, M.D.
Carl White, M.D.
Leonard G. Wilson, M.D.

Associate Professor

Paul Abraham, M.D.
Stephen Archer, M.D.
Silvia Azar, M.D.
John Bantle, M.D.
Charles Billington, M.D.
Alan Collins, M.D.
Barbara Daniels, M.D.
Morris Davidman, M.D.
Scott Davies, M.D.
Greg Filice, M.D.
Angeliki Georgopoulos, M.D.
Steven Goldsmith, M.D.
Jesse L. Goodman, M.D.
Charles Gornick, M.D.
Dale Hammerschmidt, M.D.
Keith Henry, M.D.
Marshall Hertz, M.D.
David C. Homans, M.D.
Conrad Iber, M.D.
David Ingbar, M.D.

Edward Janoff, M.D.
 James Johnson, M.D.
 Bert L. Kasiske, M.D.
 Spencer Kubo, M.D.
 David Laxson, M.D.
 Frank Lederle, M.D.
 Sharon D. Luikart, M.D.
 Nicole Lurie, M.D.
 Thomas MacKenzie, M.D.
 Connie Manske, M.D.
 Robert McCollister, M.D.
 Nancy Meryhew, M.D.
 Steven Miles, M.D.
 Wesley Miller, M.D.
 Karl A. Nath, M.D.
 Kristin Nichol, M.D.
 Catherine Niewoehner, M.D.
 Gerald R. Onstad, M.D.
 John Opsahl, M.D.
 Mark Paller, M.D.
 Connie Parenti, M.D.
 Paul Pentel, M.D.
 Robert Perri, M.D.
 Robert A. Petzel, M.D.
 Claus A. Pierach, M.D.
 Gordon Pierpont, M.D.
 Claire Pomeroy, M.D.
 Jeffrey Rank, M.D.
 Frank Rhame, M.D.
 Mark Rosenberg, M.D.
 David Salerno, M.D.
 Pamela Shultz, M.D.
 Harold Schwartz, Ph.D.
 Scott Sharkey, M.D.
 Keith Skubitz, M.D.
 Arne Slungaard, M.D.
 Ronald D. Soltis, M.D.
 Bradford Stone, M.D.
 William R. Swaim, M.D.
 Jonathan Tolins, M.D.
 Kathleen Watson, M.D.
 Robert Wilson, M.D.
 John Winkelmann, M.D.

Assistant Professor

Stuart Adler, M.D.
 John Allen, M.D.
 Thomas Amatruda, III, M.D.
 Charles Andres, M.D.
 Alan Bank, M.D.
 Susan Bannick, M.D.
 Jack Beard, M.D.
 Timothy Behrens, M.D.

Michael Belzer, M.D.
 Robert Berkseth, M.D.
 Stephen Beyer, M.D.
 Thomas Bloss, M.D.
 Milton L. Bullock, M.D.
 Linda Burns, M.D.
 Oliver Cass, M.D.
 Terese Collins, M.D.
 Terry W. Crowson, M.D.
 David Dahl, M.D.
 Terry Dennis, M.D.
 John Degelau, M.D.
 David Dunbar, M.D.
 John Eggert, M.D.
 Sally Ehlers, M.D.
 Michael Elson, M.D.
 Ken Engberg, M.D.
 Winslow Engel, M.D.
 Helen Enright, M.D.
 Kathy Faber-Langendoen, M.D.
 Joan Fox, M.D.
 Martin Freeman, M.D.
 Juan Fried, M.D.
 Mary Gannon, M.D.
 Craig Garrett, M.D.
 Elie Gertner, M.D.
 Michael Goodman, M.D.
 Frank Grund, M.D.
 Robert Gruninger, M.D.
 George Haidet, M.D.
 Kathleen Hall, M.D.
 Keith Harmon, M.D.
 Craig Henke, M.D.
 William Henry, M.D.
 Charles Herzog, M.D.
 Steven Hillson, M.D.
 Alan Hirsch, M.D.
 Samuel Ho, M.D.
 Neal Holtan, M.D.
 Patrick W. Irvine, M.D.
 Jeffrey Jaffe, M.D.
 Anne Joseph, M.D.
 Nigel Key, M.D.
 Floyd Knight, M.D.
 Ann Kools, M.D.
 William P. Korchik, M.D.
 John Kvasnicka, M.D.
 James Leatherman, M.D.
 George Logan, M.D.
 Linda A. Long, M.D.
 Keith Lurie, M.D.
 King-Wai Ma, M.D.
 Thelma Madhok, M.D.

Richard Madlon-Kay, M.D.
 Theodore Marcy, M.D.
 Karen Margolis, M.D.
 William Marinelli, M.D.
 Donald S. Masler, M.D.
 Shannon Matta, M.D.
 John W. McBride, M.D.
 Kenneth McDonald, M.D.
 Edward McFalls, M.D.
 Gary McVeigh, M.D.
 Peter Meier, M.D.
 Jeffrey Miller, M.D.
 Simon Milstein, M.D.
 Kulwant Modi, M.D.
 Daniel Mueller, M.D.
 Avi Nahum, M.D.
 Robert C. Olson, M.D.
 Thomas A. Ophoven, M.D.
 Craig Peine, M.D.
 Thomas Pence, M.D.
 Douglas Peterson, M.D.
 James Radford, M.D.
 Brian Rank, M.D.
 J. Bruce Redmon, M.D.
 Steve Remole, M.D.
 Kathryn Rice, M.D.
 Kirk Rodysill, M.D.
 Terry Rosborough, M.D.
 Peter Schlesinger, M.D.
 Anna Schorer, M.D.
 Leonard Schlossberg, M.D.
 Elizabeth Seaquist, M.D.
 Nahid Shahabi, M.D.
 Gregory Silvis, M.D.
 Margaret Simpson, M.D.
 Charles Smith, M.D.
 Michael T. Spilane, M.D.
 David A. Stuart, M.D.
 Lyle Swenson, M.D.
 Dean Tsukayama, M.D.
 Valerie Ulstad, M.D.
 Tryg Velde, M.D.
 Catherine Verfaillie, M.D.
 David Warden, M.D.
 James Warren, M.D.
 Kathleen Whitley, M.D.
 Georgia Wiesner, M.D.
 Anthony Woolley, M.D.
 Paul Yakshe, M.D.
 Steven Ytterberg, M.D.
 Steven Zimmer, M.D.

Elective Courses

Med 5500. MEDICINE EXTERNSHIP I. (9 cr per period; offered all periods) Parenti
 Students identify clinical problems and care for inpatients on internal medicine services.

Med 5501. MEDICINE EXTERNSHIP II. (9 cr per period; offered all periods; prereq Med 5500) Parenti
 Emphasis on patient management and therapeutics on medical wards, giving students as much individual care responsibility as possible.

Med 5505. INFECTIOUS DISEASE RESEARCH. (9 cr; offered all periods) Jordan
 Examination in depth of a clinical or laboratory problem related to infectious diseases.

Med 5507. RESEARCH IN ONCOLOGY. (9 cr; offered all periods) Ginder
 Research on a problem or problems currently under investigation in oncology.

DEPARTMENTS AND COURSE DESCRIPTIONS

Med 5508. RESEARCH/SPECIAL PROBLEMS IN MEDICINE. (Cr ar; offered all periods) Nath
Research experience in medical problems arranged with various staff members of the Department of Medicine on an individual basis.

Med 5509. RESEARCH IN IMMUNOLOGY—RHEUMATOLOGY. (Cr ar) Mahowald, Messner
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.

Med 5511. RESEARCH IN GASTROENTEROLOGY. (Cr ar; offered all periods) Steer
Students carry on an active research program under the direction of a gastroenterology section staff member.

Med 5512. RESEARCH IN HEMATOLOGY. (9 cr; offered all periods) Jacob
Research on a problem or problems currently under investigation in hematology.

Med 5518. RESEARCH IN DIABETES AND ENDOCRINOLOGY. (9 cr per period; offered all periods) Robertson
Students plan and execute a research project supervised by a faculty member in the Section of Diabetes, Endocrinology, and Metabolism.

Med 5521. INFECTIOUS DISEASE, CLINICAL ASPECTS. (6 cr per period; offered all periods; prereq Med 5500) Jordan
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.

Med 5522. MEDICAL GASTROENTEROLOGY. (6 cr per period; offered all periods) Soltis
Students do workups and attend teaching rounds dealing with patients with gastrointestinal disease. Includes conferences and outpatient clinical experience.

Med 5523. MEDICAL DIABETES, ENDOCRINOLOGY, AND METABOLISM. (6 cr per period; offered all periods) Robertson
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.

Med 5525. CARDIOVASCULAR MEDICINE. (6 or 9 cr per period; offered all periods) Bache
Introduction to the diagnosis and management of cardiovascular disease occurring in adult patients.

Med 5526. MEDICAL ONCOLOGY CONSULTATION. (4.5, 6, or 9 cr per period; offered all periods; prereq Med 5500) Luikart
Students do patient evaluations in the oncology clinic and participate in oncology conferences. Emphasis on clinical evaluation and management of new cancer patients.

Med 5527. RESEARCH IN CARDIOLOGY. (9 cr per period; offered all periods) Bache
Acquaints students with current research in several areas of cardiovascular medicine in which important gaps of knowledge exist.

Med 5528. CLINICAL HEMATOLOGY. (6 or 9 cr per period; offered all periods) Weisdorf
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.

Med 5531. CLINICAL RHEUMATOLOGY. (4.5 or 9 cr per period; offered all periods) Messner
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.

Med 5532. PULMONARY DISEASE. (6 cr per period; offered all periods) Bitterman
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.

Med 5533. CLINICAL ALLERGY. (4.5 or 9 cr; not offered period 5a) Blumenthal
Emphasis on the practical features of doing an allergic and immunologic workup and of treating patients in a safe and medically acceptable fashion.

Med 5534. RESEARCH IN ALLERGY. (9 cr per period; offered all periods) Blumenthal
Student participates in on-going research within the program or in an original investigative project of the student's design. Student plans, performs, and interprets the study; makes a presentation; and writes a report on the project.

Med 5548. CLINICAL GENETICS. (9 cr per period; offered all periods) King, M Pierpont
Students learn the fundamentals of clinical genetics including cytogenetics, biochemical genetics, and genetics counseling and develop an understanding of the application of genetic principles to clinical medicine.

Med 5554. FLUID ELECTROLYTE ACID-BASE METABOLISM. (6 cr per period; offered all periods) Ma
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.

Med 5556. RENAL CONSULTATION—University Hospital. (6 cr per period; offered all periods; prereq Med 5500) Nath
Students gain proficiency in the diagnostic workup, treatment, and management of kidney patients.

Med 5557. RESEARCH IN NEPHROLOGY. (18 cr; prereq 5500; offered all periods) Nath
Research, particularly clinical research, in nephrology.

Med 5561. OUTPATIENT AND CLINICAL NEPHROLOGY—St. Paul Ramsey Medical Center. (6 cr; offered all periods; prereq Med 5500) Abraham
Renal problems common to a community clinic and hospital. Renal clinic experience is available three half days a week. Daily inpatient consultation. Didactic lectures.

Med 5562. CLINICAL NEPHROLOGY—Hennepin County Medical Center. (6 cr per period; prereq 5500; offered all periods) Rao
Clinical problems in the diagnosis and management of patients with renal disease.

Med 5570. CLINICAL MEDICINE IN THE GENERAL CLINICAL RESEARCH CENTER. (6 cr per period; offered all periods) Bantle

Students learn accepted methods of clinical research involving human subjects and share in primary care of adult and pediatric patients with a variety of disorders.

Med 5571. CLINICAL TOXICOLOGY AND EMERGENCY MEDICINE. (4.5 cr per period; offered period 3) Saxena

Opportunity to be involved in initial stages of providing critical care to patients with serious, sometimes life-threatening medical problems. Students will develop understanding of the application of certain procedural principles of critical care and the fundamentals of clinical toxicology.

Med 5580. CORONARY CARE UNIT—Veteran's Affairs Medical Center. (6 cr per period; prereq Med 5500; offered all periods) G Pierpont

After completing 5500, students provide primary care for patients in the Coronary Care Unit (CCU) at the VA Medical Center under direct supervision of a resident and a staff cardiologist attending. Involves aspects of both acute and longitudinal care as patients are followed after transfer out of CCU through to hospital discharge. Concomitant educational conferences, ECG reading, etc., coordinated with cardiology and medicine schedules.

Med 5581. MEDICINE INTENSIVE CARE UNIT—Hennepin County Medical Center. (6 cr per period; offered all periods) Leatherman

The student functions as a member of the critical care service that consults on all ICU patients. Emphasis on respiratory failure, shock, mechanical ventilation, hemodynamic monitoring, central line management, nutrition, acid-base, and fluid-electrolyte issues. Follow 2-6 patients.

Med 5582. MEDICAL INTENSIVE CARE UNIT—St. Paul Ramsey Medical Center. (6 cr per period; offered all periods) Marini

One-month clinical rotation that familiarizes students with key principles of diagnosing and managing critical illness. Cardiopulmonary assessment and management emphasized using mechanical ventilation and hemodynamic monitoring as prime focus points.

Med 5583. FUNDAMENTALS OF CLINICAL ONCOLOGY. (6 cr per period; offered fall and spring. Peterson

For medical students interested in entering a specialty. Emphasis on understanding important oncology concepts and acquiring practical skills relevant to diagnosing and treating common malignancies.

Med 5590. PRECEPTORSHIPS IN INTERNAL MEDICINE. (4.5, 6, or 9 cr; offered all periods) McCollister

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.

Med 5596. OCCUPATIONAL HEALTH. (4.5 or 9 cr per period; offered periods 3, 4, 6, 7, and 8) Lohman

Provides students with the rudimentary skills necessary for the recognition, evaluation, and treatment of occupationally related injury and illness.

Microbiology (MicB)

Ashley T. Haase, M.D., professor and head

Regents' Professor Emeritus
Dennis W. Watson, Ph.D.

Professor

Arthur Johnson, M.D., head, UMD*
Dwight L. Anderson, Ph.D.
P. Patrick Cleary, Ph.D.
Gary Dunny, Ph.D.
Martin Dworkin, Ph.D.
Anthony J. Faras, Ph.D.
Gregory Germaine, Ph.D.
Beulah H. Gray, Ph.D.
Richard Hanson, Ph.D.
Alan B. Hooper, Ph.D.
Margaret Hostetter, M.D.
Russell C. Johnson, Ph.D.
M. Colin Jordan, M.D.
Tucker W. LeBien, Ph.D.
Paul T. Magee, Ph.D., dean, CBS**
Larry McKay, Ph.D.
Harry T. Orr, Ph.D.
Peter G. W. Plagemann, Ph.D.
Paul Quie, M.D.
Palmer Rogers, Ph.D.
Walter Sauerbier, Ph.D.
Patrick Schlievert, Ph.D.
Janet Schottel, Ph.D.
Lawrence Schook, Ph.D.
James F. Zissler, Ph.D.

Associate Professor

Russell F. Bey, Ph.D.
Kathleen Conklin, Ph.D.
Michael Flickinger, Ph.D.
Dale Gregerson, Ph.D.
Ronald Jemmerson, Ph.D.
Marc Jenkins, Ph.D.
R. Scott Melvor, Ph.D.
Robert Nelson, Ph.D.
Bernard E. Reilly, Ph.D.
Michael Sadowsky, Ph.D.
Stewart Scherer, Ph.D.
Peter Southern, Ph.D.
Lawrence Wackett, Ph.D.
Carol Wells, Ph.D.

Assistant Professor

Ambika Mathur, Ph.D.
Daniel Mueller, M.D.
Leslie Schiff, Ph.D.
David Sherman, 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

* University of Minnesota, Duluth

** College of Biological Sciences

DEPARTMENTS AND COURSE DESCRIPTIONS

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

5205w.¹ BASIC AND MEDICAL ASPECTS OF MICROBIOLOGY FOR MEDICAL STUDENTS. (5 cr; prereq regis med fr) Schlievert, 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.

5206s.¹ BASIC AND MEDICAL ASPECTS OF MICROBIOLOGY FOR MEDICAL STUDENTS. (5 cr)
Continuation of 5205. Lecture and lab.

Elective Courses

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

5105f,w,s.¹ BIOLOGY OF MICROORGANISMS. (5 cr, §3103, §Biol 5013; prereq 5 cr biological sciences, Biol 5001 or #) Dunny, Hanson, Sherman
Lectures, demonstrations, and laboratory exercises in taxonomy, anatomy, physiology, biochemistry, and ecology of microbes. Molecular structure in relation to bacterial function.

5218w. IMMUNOLOGY. (3 cr; prereq Biol 5001) Gray
Cellular, protein, and genetic bases of humoral immunity; methods for measuring antibodies and antigens. T lymphocytes: interaction of T helper cells with B lymphocytes and other T cells in cell-mediated immunity. Clinical immunology: immunodeficiency, allergy, autoimmunity, transplantation.

5234w.¹ IMMUNOLOGY AND MEDICAL MICROBIOLOGY LABORATORY. (3 cr; prereq 5218 or ¶5218, ¶5232 or ¶5232) Cleary, Gray
Principles that determine outcome of host-parasite interactions. Methods basic to host defense and immunology, including immunochemical and microbiological methods for diagnosing infectious disease.

5235f. MICROORGANISMS AND DISEASE. (4 cr; prereq 10 cr chemistry, 5 cr biological sciences or #; not open to microbiology majors) Johnson
Lectures and demonstrations on nature of microorganisms, immunology, medical bacteriology, virology, mycology, parasitology, and principles of disease control.

5321f. PHYSIOLOGY OF BACTERIA. (3 cr; prereq 3103 or 5105 or Biol 5013 or VPB 3103, Biol 5001, 10 cr organic chemistry, 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.

5322f. MICROBIAL DIVERSITY AND PHYSIOLOGY LABORATORY. (3 cr; prereq 5321 or ¶5321 or equiv) Dworkin, Rogers
Isolation from natural sources; physiology and metabolism of wide variety of microorganisms, such as *Clostridium*, yeast, *Caulobacter*, myxobacteria, *Leptospira*, photosynthetic bacteria, *Bdellovibrio*, luminescent bacteria, and others. Lab only.

5352s. APPLIED MICROBIOLOGY. (4 cr; prereq MicB 5321 or #) Flickinger
Microbial adaptation to various environments; role of microorganisms in the Earth's biogeochemical cycles. Application of microbial systems to industrial processes; basic principles of fermentation technology; microbial bioconversions and product formation. Biodegradation of chemicals.

5424s. BIOLOGY OF VIRUSES. (4 cr; prereq 5321 or Biol 5001, #) 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.

5425s. VIROLOGY AND MICROBIAL GENETICS LABORATORY. (3 cr; prereq ¶5424 or equiv, Biol 5001, GCB 5022) Plagemann, Sauerbier, Schiff
Modern techniques: animal cell culture, virus infectivity titrations, analysis of viral nucleic acids and proteins by radiolabeling, gel electrophoresis and blot hybridizations, cell transformation by tumor viruses and DNA, analysis and mapping of mutants in microorganisms.

5611w. MICROBIAL ECOLOGY. (3 cr; prereq 3103 or 5105 or Biol 5013 or Soil 5610 or #) Sadowsky
Interrelationship of microorganisms with terrestrial, aquatic, and organismal environments; survey of bacterial, fungal, and algal components of ecosystems; evolution and structure of microbial communities; population interactions within ecosystems; quantitative and habitat ecology; biogeochemical cycling; biotechnological approaches to the study of microbial ecology.

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

¹ *Microscope required. Students may obtain use of microscope by purchasing a \$6.00 microscope card from the bursar.*

Neurology (Neur)

Kenneth F. Swaiman, M.D., professor and acting head

Professor Emeritus

Edward H. Lambert, M.D.

Professor

Gary Birnbaum, M.D.
Ronald E. Cranford, M.D.
Milton G. Ettinger, M.D.
William R. Kennedy, M.D.
Arthur C. Klassen, M.D.
Ilo Leppik, M.D.
Gareth Parry, M.D.
Richard W. Price, M.D.
David Rottenberg, M.D.
Joo Ho Sung, M.D.
Fernando Torres, M.D.
Jonathan D. Wirtschafter, M.D.

Associate Professor

David C. Anderson, M.D.
Khurshed A. Ansari, M.D.
H. Brent Clark, M.D.
William Dobyns, M.D.
Karen Hsiao, M.D., Ph.D.
Costantino Iadecola, M.D.
David Knopman, M.D.
Robert Kriel, M.D.
Myoung C. Lee, M.D.
Lawrence Lockman, M.D.
Winfried Raabe, M.D.
Manuel Ramirez-Lassepas, M.D.
Elsa G. Shapiro, Ph.D.
Phyllis Sher, M.D.

Assistant Professor

Thomas Ala, M.D.
James Ashe, M.D.
Scott Bundlie, M.D.
Kathy J. Christensen, Ph.D.
John G. Davenport, M.D.
William David, M.D.
John Day, M.D., Ph.D.
William H. Frey, M.D.
Christopher Gomez, M.D.
Frederick M. Langendorf, M.D.
Sandra Lundgren, Ph.D.
Mark W. Mahowald, M.D.
J. Riley McCarten, M.D.
James A. Moriarty, M.D.
James Mortimer, M.D.
Souhel Najjar, M.D.
Kendra Peterson, M.D.
M. Elizabeth Ross, M.D., Ph.D.
Lawrence Schut, M.D.
Stephen A. Smith, M.D.
John W. Tulloch, M.D.
Govin T. Vatassery, Ph.D.
Gilbert Westreich, M.D.

Instructor

Martha Nance, M.D.
Mario Quinones, M.D.
Bradley Wrubel, M.D.

The Department of Neurology participates in an interdisciplinary course emphasizing the pathophysiologic basis for the clinical neurosciences. This course is intended primarily for medical students in Year Two. The department also offers externships in clinical neurology including supervised clinical experiences with inpatients and outpatients suffering from neurologic disorders. The elective courses are for students with special interests and/or educational requirements in a wide variety of clinical and laboratory settings.

Required Courses

5510. EXTERNSHIP IN CLINICAL NEUROLOGY—University Hospital and affiliated hospitals. (6 cr; prereq regis med) Staff

Elective Courses

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

5124. SLEEP DISORDERS MEDICINE—EXTERNSHIP—Hennepin County Medical Center. (Cr and hrs ar; prereq regis med) Mahowald

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

Advanced Credit Courses

For a description of 8xxx courses, see the *Graduate School Bulletin*.

Neurosurgery (NSu)

Roberto C. Heros, M.D., professor and head

Professor Emeritus

Shelley N. Chou, M.D., Ph.D.
Lyle A. French, M.D., Ph.D.

Professor

Timothy J. Ebner, M.D., Ph.D.
Donald L. Erickson, M.D.
Stephen J. Haines, M.D.
Richard E. Latchaw, M.D.
Walter C. Low, Ph.D.
Robert E. Maxwell, M.D., Ph.D.
Setti S. Rengachary, M.D.
Gaylan L. Rockswold, M.D., Ph.D.
Jonathan D. Wirtschafter, M.D.

Associate Professor

Walter A. Hall, M.D.
Samuel C. Levine, M.D.

Assistant Professor

Deepak Awasthi, M.D.
Thomas A. Bergman, M.D.
M.H. Biros, M.D.
Paul J. Camarata, M.D.
Christine M. Cox, M.D.
William F. Ganz, M.D.

DEPARTMENTS AND COURSE DESCRIPTIONS

Michael T. Madison, M.D.
Richard L. Sutton, M.D.
Dennis Y.K. Wen, M.D.

The courses in neurological surgery introduce medical students to the theory, philosophy, and treatment of 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 provides 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—University Hospital. (4.5 or 9 cr; prereq regis med)

5510. EXTERNSHIP—Veterans Administration Hospital. (4.5 or 9 cr; prereq regis med)

5511. EXTERNSHIP—Hennepin County Medical Center. (4.5 or 9 cr; prereq regis med)

5512. EXTERNSHIP—St. Paul-Ramsey Medical Center. (4.5 or 9 cr; prereq regis med)

5520. NEUROSURGICAL INVESTIGATION. (9 cr; prereq regis med)

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Obstetrics and Gynecology (Obst)

Leo B. Twiggs, M.D., professor and head

Professor Emeritus
Harry Foreman, M.D.

Professor
Leon L. Adcock, M.D.
Stephen H. Cruikshank, M.D.
Robert J. Gorlin, D.D.S., M.S.
Benjamin S. Leung, Ph.D.
Takashi Okagaki, M.D., Ph.D.
Roger A. Potish, M.D.
Konald A. Prem, M.D.
George E. Tagatz, M.D.
Theodore R. Thompson, M.D.
Leo B. Twiggs, M.D.

Associate Professor
Charles H. Blomquist, Ph.D.
Linda F. Carson, M.D.
Laura E. Edwards, M.D.

Hardin E. Olson, M.D.
Preston P. Williams, M.D.

Assistant Professor
Dennis B. Bealka, M.D.
Calvin P. Boyd, M.D.
Doris C. Brooker, M.D.
Linda Hammer Burns, Ph.D.
Laura L. Coultrip, M.D.
Catherine L. Cowart, M.D.
Peter D'Ascoli, M.D.
William F. Dickes, M.D.
Jeffrey M. Fowler, M.D.
Melvin J. Frisch, M.D.
Rise C. Hatten, M.D.
Hugh Hensleigh, Ph.D.
Marilyn S. Joseph, M.D.
Peter Kapernick, M.D.
Walid S. Kassem, M.D.
Fredrick H. Kravitz, M.D.
June LaValleur, M.D.
Gary T. Lundborg, M.D.
Virginia R. Lupo, M.D.
Jon L. Pryor, M.D.
Sundaram Ramakrishnan, Ph.D.
Jacques P. Stassart, M.D.
Mark L. Tanz, M.D.
Marianne M. Westerheim, M.D.

Instructor
Lowell J. Byers, M.D.
Jay W. Carlson, D.O.
Jonathan R. Carter, M.D.
Ellen M. Hartenbach, M.D.
Andrew K. Saltzman, 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 function of the female reproductive system. At University Hospital, 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. Experience in gynecology includes a systematic study of the diagnosis and therapy of diseases of the female reproductive system, gynecological endocrinology, gynecological oncology, and gynecological pathology. In seminars and small group discussions, problems of current importance in human reproductive biology are discussed.

The primary aim of the Department of Obstetrics and Gynecology is to provide a basic foundation that will enable the student to understand human reproduction. The department offers a series of clinical and investigative courses to fit students' varied interests.

Elective Courses

5500. EXTERNSHIP ON THE PRIMARY CARE OF WOMEN. (Cr ar; prereq regis med) Twiggs, staff

Six-week experience in clinical obstetrics and gynecology spent in hospitals: Hennepin County Medical Center, North Memorial, St. Mary's, Fairview, St. Paul-Ramsey, University, Waconia, St. John's, 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 Years Three and Four students. All students meet at University Hospital Tuesday, Wednesday, and Thursday the first week and each Wednesday afternoon thereafter for didactic presentations.

5520. OBSTETRICS AND GYNECOLOGY EXTERNSHIP IN CLINICAL PRACTICE. (Course and cr ar) Twiggs, 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. 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) Twiggs, 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.

5560. RESEARCH IN REPRODUCTION. (Cr and hrs ar) Twiggs, staff

Topics selected for each student.

5575. GYNECOLOGICAL PATHOLOGY AND DIAGNOSTIC CYTOLOGY. (Cr ar; prereq 5500)

Brooker, Okagaki, Twiggs
Review of daily gynecological histopathology material on 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) Twiggs

Full-time preceptorship in clinical obstetrics and gynecology offered in outstate Minnesota. Similar to experience in 5520, but in smaller community.

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

8217-8221. SEMINAR: OBSTETRICS AND GYNECOLOGY

8222-8223. GYNECOLOGICAL ONCOLOGY

Ophthalmology (Oph)

Jay H. Krachmer, M.D., professor and head

Professor Emeritus
John E. Harris, M.D.

Professor
Donald J. Doughman, M.D.
William H. Knobloch, M.D.
Jay H. Krachmer, M.D.
Jonathan D. Wirtschafter, M.D.

Associate Professor
J. Douglas Cameron, M.D.
Dale S. Gregerson, Ph.D.
Edward J. Holland, M.D.
Robert D. Letson, M.D.
Linda K. McLoon, Ph.D.
J. Daniel Nelson, M.D.
William R. Rathbun, Ph.D.
C. Gail Summers, M.D.

Assistant Professor
James E. Egbert, M.D.
Susan Keirstead, Ph.D.
Martha M. Wright, M.D.
Terri L. Young, M.D.

Elective Courses

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

5180. EXTERNSHIP IN OPHTHALMOLOGY. (4.5 cr; prereq #)

5190. RESEARCH PROBLEMS. (Cr ar)

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Orthopaedic Surgery (OrSu)

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

Professor
James R. Gage, M.D.
Ramon B. Gustilo, M.D.
James H. House, M.D.
Jack L. Lewis, Ph.D.
Theodore E. Oegema, Ph.D.

Associate Professor
Lars Engebretsen, M.D.
Richard F. Kyle, M.D.
Edward McElfresh, M.D.
James W. Ogilvie, M.D.
Robert F. Premer, M.D., Emeritus
Ensor E. Transfeldt, M.D.

Assistant Professor
Elizabeth A. Arendt, M.D.
Joan E. Bechtold, Ph.D.
Daniel Buss, M.D.
Edward Y. Cheng, M.D.
Denis Clohisy, M.D.
Leo J. de Souza, M.D.
Stephen England, M.D.

Timothy A. Garvey, M.D.
 Steven E. Koop, M.D.
 Tom Novacheck, M.D.
 Matthew Putnam, M.D.
 Deborah Quanbeck, M.D.
 Harry J. Robinson, Jr., M.D.
 Lisa Schutte, Ph.D.
 David C. Templeman, M.D.
 Ann Van Heest, M.D.
 Thomas F. Varecka, M.D.
 Kirkham Wood, M.D.

The major goals of the courses in orthopaedic 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 orthopaedic and traumatic disabilities; this advanced experience provides an understanding of fundamental orthopaedic principles, the scope of orthopaedic surgery, and the opportunities for both clinical and basic investigation in orthopaedic surgery.

Elective Courses

- 5180. ORTHOPAEDICS I. (Cr ar; prereq regis med)
- 5185. ORTHOPAEDICS II—EXTERNSHIP IN ORTHOPAEDIC SURGERY. (Cr ar; prereq regis med)
- 5186. RESEARCH PROBLEMS IN ORTHOPAEDIC SURGERY. (Cr ar; prereq regis med)
- 5187. EXTERNSHIP IN ORTHOPAEDIC SURGERY—St. Paul Ramsey Medical Center. (Cr ar; prereq regis med)
- 5188. EXTERNSHIP IN ORTHOPAEDIC SURGERY AND FRACTURES—Gillette Children’s Hospital, St. Paul. (Cr ar; prereq regis med)
- 5190. EXTERNSHIP IN ORTHOPAEDIC SURGERY AND FRACTURES—Veterans Hospital. (Cr ar; prereq regis med)
- 5191. ORTHOPAEDIC EXTERNSHIP—Hennepin County Medical Center. (Cr ar; prereq regis med)
- 5192. PRECEPTORSHIP IN ORTHOPAEDIC SURGERY. (Cr ar; prereq regis med jr or sr)
- 5194. ORTHOPAEDIC EXTERNSHIP-Centennial Lakes Medical Center. (Cr. ar; prereq regis med)

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Otolaryngology (Otol)

George L. Adams, M.D., professor and head

Professor Emeritus
 Frank M. Lassman, Ph.D.
 W. Dixon Ward, Ph.D.

Professor
 Khalil Ahmed, Ph.D.
 Daniel Canafax, Pharm.D.
 Arndt J. Duvall III, M.D.
 G. Scott Giebink, M.D.
 Robert Gorlin, D.D.S., M.S.
 Stephen J. Haines, M.D.
 S. K. Juhn, M.D.
 Robert H. Maisel, M.D.
 Robert H. Margolis, Ph.D.
 David A. Nelson, Ph.D.

Associate Professor Emeritus
 Kurt Pollak, M.D.

Associate Professor
 John H. Anderson, M.D., Ph.D.
 Lawrence R. Boies, Jr., M.D.
 Richard P. DiFabio, Ph.D.
 Peter A. Hilger, M.D.
 Eric Javel, Ph.D.
 Samuel C. Levine, M.D.
 Donald W. Robertson, Ph.D.
 Peter A. Santi, Ph.D.

Assistant Professor
 Kathleen A. Daly, M.P.H., Ph.D.
 Timothy Doyle, Ph.D.
 Markus Gapanay, M.D.
 George S. Goding, Jr., M.D.
 Joseph Goswitz, M.D.
 David B. Hom, M.D.
 Lisa L. Hunter, Ph.D.
 David W. Johnson, M.S.
 John A. Ness, M.D.
 Kent Remley, M.D.
 Robert Schlauch, Ph.D.
 Gary E. Schnitker, M.D.
 Edward Szachowicz II, M.D., Ph.D.

Students are introduced to otolaryngology through a series of didactic lectures that emphasize broad aspects of the field and discussions of basic principles when applicable. The coursework 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 (ears, nose and throat) and in interpretation of findings. The practical work is supplemented by discussions and seminars with the faculty. Students spend a majority of time in the clinic seeing patients. In some cases students attend surgical procedures and assist when appropriate. Teaching rounds in the hospital provide additional opportunities for learning.

Elective Courses

**5200. SURGICAL SPECIALTY:
OTOLARYNGOLOGY**

5500. GENERAL ENT ELECTIVE

5501. ACTING INTERNSHIP IN ENT

5503. RESEARCH: BASIC SCIENCE ENT ELECTIVE

Advanced Credit Courses

**5504. EXTERNSHIP IN OTOLARYNGOLOGY—
OVERSEAS**

5970. DIRECTED STUDIES

Pediatrics (Ped)

Alfred Michael, M.D., regents' professor and
head

Professor Emeritus

Ray Anderson, M.D.
Richard Raile, M.D.
Robert Ulstrom, M.D.

Professor

Diane Arthur, M.D.
Henry Balfour, M.D.
Bruce R. Blazar, M.D.
Robert Blum, M.D., Ph.D.
David M. Brown, M.D.
Barbara Burke, M.D.
C. Carlyle Clawson, M.D.
Ann Dunnigan, M.D.
Patricia Ferrieri, M.D.
Alexandra Filipovich, M.D.
Robert Fisch, M.D.
Alfred Fish, M.D.
G. Scott Giebink, M.D.
Robert Gorlin, D.D.S., M.S.
Ernest Gray, Ph.D.
Stephen Haines, M.D.
Margaret Hostetter, M.D.
Dana Johnson, M.D., Ph.D.
Edward Kaplan, M.D.
John Kersey, M.D.
Youngki Kim, M.D.
Richard King, M.D., Ph.D.
Robert Kriel, M.D.
William Krivit, M.D., Ph.D.
Russell Lucas, M.D.
S. Michael Mauer, M.D.
James Moller, M.D.
Charles Nelson, Ph.D.
Mark Nesbit, M.D.
Thomas Nevins, M.D.
George Noren, M.D.
Paul Quie, M.D.
Norma Ramsay, M.D.
Les Robison, Ph.D.
Albert Rocchini, M.D.
Harvey Sharp, M.D.
Alan R. Sinaiko, M.D.
Kenneth Swaiman, M.D.
Robert ten Bensel, M.D.
Theodore R. Thompson, M.D.

Mendel Tuchman, M.D.
Fatih Uckun, M.D., Ph.D.
Homer Venters, M.D.
Robert Vernier, M.D.
Warren Warwick, M.D.
James White, M.D.
William Woods, M.D.
Christopher Wylie, Ph.D.

Associate Professor

Peter Anderson, M.D., Ph.D.
John Bass, M.D.
Susan Berry, M.D.
Peter Blasco, M.D.
Elizabeth Braunlin, M.D., Ph.D.
Blanche Chavers, M.D.
Amos Deinard, M.D.
William Dobyns, M.D.
Dennis Dykstra, M.D., Ph.D.
Rolf Engel, M.D.
David Fisher, M.D.
Michael Georgieff, M.D.
Peter Hesslein, M.D.
Mathur Kannan, B.V.Sc., Ph.D.
Clifford Kashtan, M.D.
Daniel Kohen, M.D.
Kim Krabill, M.D.
Samuel Levine, M.D.
Lawrence Lockman, M.D.
Mark C. Mammel, M.D.
Joseph Neglia, M.D.
Robert O'Dea, M.D., Ph.D.
Charles Oberg, M.D.
Mary Ella Pierpont, M.D., Ph.D.
Warren Regelman, M.D.
Michael Resnick, Ph.D.
Krishna Saxena, M.D.
Sarah Jane Schwarzenberg, M.D.
Elsa Shapiro, Ph.D.
Phyllis Sher, M.D.
Clark Smith II, M.D.
C. Gail Summers, M.D.
John Wagner, M.D.
O. Douglas Wangenstein, Ph.D.
Sally Weisdorf, M.D.
Chester Whitley, Ph.D., M.D.

Assistant Professor

Richard Andersen, M.D.
Catherine Bendel, M.D.
Iris Borowsky, M.D., Ph.D.
Bruce Bostrom, M.D.
Becky Murray Carpenter, M.D.
Pi-Nian Chang, Ph.D.
Raul Cifuentes, M.D.
J. Michael Coleman, M.D.
Terese Collins, M.D.
David N. Cornfield, M.D.
Stella M. Davies, M.B.B.S., Ph.D.
Ralph Faville, M.D.
Bruce Ferrara, M.D.
Gary Fifield, M.D.
Dana Filipovich, M.D.
Catherine Gatto, M.D.
J. Margaret Horrobin, M.D.
Laura Hoyt, M.D.
Harumi Jyonouchi, M.D.
Deepak Kamat, M.D.
Emmanuel Katsanis, M.D.

DEPARTMENTS AND COURSE DESCRIPTIONS

Carolyn Levitt, M.D.
Ambika Mathur, Ph.D.
Ann Mertens, M.D.
Antoinette Moran, M.D.
Sharon Muret-Wagstaff, Ph.D.
Paul Orchard, M.D.
Andrew Ozolins, M.D.
John Perentesis, M.D.
John Priest, M.D.
Michael Reiff, M.D.
Gary Remafedi, M.D., M.P.H.
Thomas Rolewicz, M.D.
Gerald Rosen, M.D.
Kumud Sane, M.D.
Leon Satran, M.D.
Michael Shannon, M.D.
Ralph Shapiro, M.D.
Xiao Ou Shu, M.D., M.P.H.
Stephen Smith, M.D.
Joseph Sockalosky, M.D.
Julia Steinberger, M.D.
Michael Steinbuch, Ph.D.
Michael Sweeney, M.D.
Marshall Taniguchi, M.D.
John D. Tobin, M.D.
Rachel Trockman, M.D.
Richard K. Vehe, M.D.
Michael Vespasiano, M.D.

Instructor

Cathryn Angel, M.D.
Mussarat Arshad, M.D.
Arthur A. Beisang III, M.D.
Stephen Blythe, M.D.
Gail Brotzman, M.D.
Mark Butterbrodt, M.D.
Diana Cutts, M.D.
Raye-Ann deRegnier, M.D.
John Garcia, M.D.
Jennifer Gobel, M.D.
Sixto Guiang, M.D.
Erik Hagen, M.D.
Joanne Hilden, M.D.
Marjorie Hogan, M.D.
Vivian R. Husnik, M.D.
Anne Kelly, M.D.
V. Jill Kempthorne, M.D.
Helena Kosina, M.D.
Paul Kubic, M.D.
Jeffrey Lobas, M.D.
Peter Loewenson, M.D.
Richard Lussky, M.D.
Dawn Martin, M.D.
Christopher L. Meyer, M.D.
Gregory Plotnikoff, M.D.
Judson Reaney, M.D.
Beverly Ricker, M.D.
Andrew Sagan, M.D.
Kevin Sheridan, M.D.
Marcia Shew, M.D., M.P.H.
Joseph Stenzel, M.D.
David Thompson, M.D.
Linda Thompson, M.D.
Albert Tsai, M.D.
Janet West, M.D.
Sarah Winter, M.D.
Judith Zier, M.D.

Pediatrics is concerned with the basic aspects of human developmental biology both in the prenatal period and postnatal life. Applying knowledge of growth and development is very important to studying diseases in the interdisciplinary organ system courses offered during Year Two. Applying this knowledge to pediatric patients and acquiring skills in assessing and applying growth and developmental aspects are learned through 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 disorders, and adolescent.

In Years Three and Four, students may choose several types of pediatric experience. They may participate in caring for children in the inpatient and outpatient services of the University Hospital and affiliated community hospitals. In these experiences, the diagnoses and management of pediatric disease and its effect on the child's growth and development are emphasized. Students may choose to observe and participate in diagnostic and care programs concerned with specific aspects of pediatrics: the premature and newborn, development, endocrinology, 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, applying basic knowledge in preventing diagnosing, and managing diseases of infants and children is emphasized.

Elective Courses

5501. PEDIATRIC EXTERNSHIP. (Cr ar)

Provides opportunities to work with children and their families as inpatients and in ambulatory settings.

5512. PEDIATRIC ACTING INTERNSHIP. (Cr ar)

Allows students to serve as acting interns on an inpatient pediatric service and to be members of the resident team.

5520. PEDIATRICS AMBULATORY COURSE. (Cr ar)

Provides experiences for third- and fourth-year medical students in developing effective approaches to children seen in ambulatory settings.

5525. INTERNATIONAL HEALTH. (Cr ar)

For students planning either a short-term experience in less-developed countries or students interested in learning more about international health as a career.

5533. PEDIATRIC ALLERGY AT UNIVERSITY HOSPITAL. (Cr ar)

Emphasizes the practical aspects of allergic and immunologic evaluation and management.

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

Evaluation of children with cardiac symptoms or murmurs, establish diagnosis, develop plans and counsel parents.

5535. PEDIATRIC INFECTIOUS DISEASES. (Cr ar)

Work with residents and fellows on the inpatient consultative service in which children with suspected or proven infections are diagnosed and treated.

5536. PEDIATRIC HEMATOLOGY/ONCOLOGY/ BONE MARROW TRANSPLANTATION AT UNIVERSITY HOSPITAL. (Cr ar)

Introduction to hematologic and oncologic problems on inpatient and outpatient children.

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

Work with faculty and residents in small groups in inpatient and outpatient settings with children with problems of growth and development, fluid and electrolytes, disorders, or endocrinologic problems.

5538. PEDIATRIC GASTROENTEROLOGY AND NUTRITION. (Cr ar)

Allows the student to see inpatient and outpatient children with gastrointestinal or nutritional problems.

5539. NEONATAL MEDICINE EXTERNSHIP. (Cr ar)

Student assumes the responsibility of a first-year resident in the management of premature and term infants.

5540. PEDIATRIC NEUROLOGY. (Cr ar)

Function as part of a group of physicians who evaluate and suggest therapy for children with a variety of neurologic conditions.

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

Work in a team evaluating children with renal and neurologic problems, both in an inpatient and outpatient setting.

5544. PULMONARY DISEASE IN PEDIATRICS. (Cr ar)

Work with the pediatric pulmonary health care team, evaluating new and old patients with a diverse group of pulmonary conditions.

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

5548. CLINICAL GENETICS. (Cr ar; same as Med 5548)

Participate as a member of a combined medicine/pediatric clinical genetics group, evaluating patients with a variety of genetic conditions seen in both inpatient and outpatient settings.

5553. ADOLESCENT MEDICINE. (Cr ar)

Major health concerns of youth. Participate in a variety of ambulatory settings.

5555. NEONATAL CLERKSHIP. (Cr ar)

Evaluation and management of ill neonates. Clerkship based in Marshfield, Wisconsin.

5559. PEDIATRIC CRITICAL CARE MEDICINE. (Cr ar)

Work in a resident-physician team assessing and managing medical and surgical problems of critically ill children.

5560. RESEARCH/SPECIAL PROBLEMS IN PEDIATRICS. (Cr ar)

Perform clinical or basic research with a pediatric faculty member.

5565. PEDIATRIC IMMUNOLOGY. (Cr ar)

Function as an acting intern of the pediatric immunology service, providing consultation and assessment of both inpatients and outpatients.

5566. EVOLUTION OF AMERICAN PEDIATRICS. (Cr ar)

Historical perspective and present place of pediatrics in American medicine and society.

Pharmacology (Phcl)

Horace H. Loh, Ph.D., Frederick Stark
professor and head

Professor Emeritus

Gilbert J. Mannering, Ph.D.

Jack W. Miller, Ph.D.

Akira E. Takemori, Ph.D.

Professor

Bianca Conti-Fine, M.D.

Patrick E. Hanna, Ph.D.

Jordan L. Holtzman, Ph.D., M.D.

Donald B. Hunninghake, M.D.

Nancy M. Lee, Ph.D.

Alan R. Sinaiko, M.D.

Norman E. Sladek, Ph.D.

Sheldon B. Sparber, Ph.D.

Fatih M. Uckun, M.D., Ph.D.

George L. Wilcox, Ph.D.

Ben G. Zimmerman, Ph.D.

Associate Professor

Earl W. Dunham, Ph.D.

Kenneth M. Hargreaves, D.D.S., Ph.D.

Ping-Yee Law, Ph.D.

Rita B. Messing, Ph.D.

Robert F. O'Dea, M.D., Ph.D.

Paul R. Pentel, M.D.

Aloysius J. Quebbemann, Ph.D.

Timothy F. Walseth, Ph.D.

W. Gibson Wood III, Ph.D.

Assistant Professor

Frank H. Burton, Ph.D.

Colin R. Campbell, Ph.D.

Leonard Lichtblau, Ph.D.

Louise M. Nutter, Ph.D.

S. Ramakrishnan, Ph.D.

Daniel P. Romero, Ph.D.

Paul J. Sammak, Ph.D.

Stanley A. Thayer, Ph.D.

Li-Na Wei, Ph.D.

DEPARTMENTS AND COURSE DESCRIPTIONS

Lecturer

Faruk S. Abuzzahab, M.D., Ph.D.
Theodore E. Gram, Ph.D.
Donald C. Kvam, Ph.D.
Louis Lemberger, M.D., Ph.D.
Ji-Chia Liao, M.D., Ph.D.
Sabita Roy, Ph.D.

Pharmacology courses provide an in-depth understanding of fundamental principles of rational drug therapy. Emphasis is 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 show, by means of ward rounds and clinical conferences, how principles of pharmacology are applied to disease treatment. Elective courses provide opportunity to explore various specialized areas of pharmacology.

Required Courses

5110su. PHARMACOLOGY. (2 cr; prereq regis med or #) Hunninghake

5111f,w. PHARMACOLOGY. (7 cr; [3 cr F, 4 cr W] prereq 5110 or #) Hunninghake

Elective Courses

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

5503. BASIC PSYCHOPHARMACOLOGY. (1 cr) Sparber
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) Wilcox
Discussions of neurophysiological mechanisms by which drugs and neurotransmitters affect neurons in the CNS. Students help select course topics and papers to be discussed.

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

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

5515. CLINICAL PHARMACOLOGY—University Hospital. (9 cr) O'Dea, Sinaiko
Clinical application of therapeutic agents in pathophysiologic states. Correlations between basic pharmacologic knowledge and its use at the bedside emphasized. Each student is 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 Hospital (inpatients), seminar or journal club
Thursday afternoon—Hypertension-renal clinic (outpatients); drug therapy studies
Friday—Tutorial with O'Dea, Sinaiko, or staff

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Physical Medicine and Rehabilitation (PMed)

Dennis Dykstra, M.D., Ph.D., associate professor and head

Professor

Gary T. Athelstan, Ph.D.
Frank M. Lassman, Ph.D.
Jack Lewis, Ph.D.
Robert P. Patterson, Ph.D.

Emeritus Associate Professor
John Allison, M.S.

Associate Professor

James R. Carey, Ph.D.
Richard DiFabio, M.S., Ph.D.
Corinne Ellingham, M.S.
Steven Fisher, M.D., M.S.
Judith E. Reisman, B.S., M.A., Ph.D.
Glenn Scudder, M.S.

Assistant Professor

Sunanda Apte, M.D.
Warren Bilkey, M.D.
Mary Foshager, M.D.
Gary Goldish, M.D.
Rebecca Koerner, M.D.
Michael Kosiak, M.D.
Linda Krach, M.D.
Loren Leslie, M.D.
Cheryl Meyers, B.S.
Michael Mustonen, D.O.
John E. Quast, M.D.
Charlotte Roehr, M.D.
Barbara Sigford, M.D.
Erica Stern, B.S., M.S., Ph.D.
Marshall Taniguchi, M.D.
Juliann Thomas, B.S., M.H.E.
LaDora V. Thompson, Ph.D.
Richard Timming, M.D.
Ensor Transfeldt, M.D.
Thomas Van Sistine, M.D.
Bonnie L. Warhol, M.D.
Marilyn Weber, M.D.

Instructor

Diane Andersorn
Cheryl Meyers, B.S.
LeAnn Snow, M.D.

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 used 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)

5412. PHYSICAL MEDICINE AND REHABILITATION—VA Medical Center. (Cr ar; prereq regis med)

5415. PRIVATE PRACTICE IN PHYSICAL MEDICINE AND REHABILITATION IN DULUTH. (Cr ar; prereq regis med)

5416. PHYSICAL MEDICINE AND REHABILITATION—St. Paul-Ramsey Medical Center. (Cr ar; prereq regis med)

5417. RESEARCH IN PHYSICAL MEDICINE AND REHABILITATION—University Hospital or VA Medical Center. (Cr ar)

5418. REHABILITATION MEDICINE—Hennepin County Medical Center. (Cr ar)

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 emphasized.

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Physiology (Phsl)

Robert F. Miller, M.D., 3M Cross Professor
and head

Professor Emeritus
Eugene Grim, Ph.D.

Professor
Dwight A. Burkhardt, Ph.D.
Timothy J. Ebner, M.D., Ph.D.
Esther M. Gallant, Ph.D.
Apostolos P. Georgopoulos, M.D., Ph.D.
Hon Cheung Lee, Ph.D.
David Levitt, M.D., Ph.D.
Walter C. Low, Ph.D.
Eric A. Newman, Ph.D.
Richard E. Poppele, Ph.D.
Richard Purple, Ph.D.
John Soechting, Ph.D.

Associate Professor Emeritus
Chiung P. Lee, Ph.D.
Jui S. Lee, Ph.D.

Associate Professor
W. Dale Branton, Ph.D.
Martha Flanders, Ph.D.
Jurgen F. Fohlmeister, Ph.D.
Paul A. Iuzzo, Ph.D.
Stephen Katz, Ph.D.
Alexander V. Lukashin, Ph.D.
Scott M. O'Grady, Ph.D.
John W. Osborn, Ph.D.
Winfried A. Raabe, M.D.
O. Douglas Wangensteen, Ph.D.

Assistant Professor
Vincent A. Barnett, Ph.D.
Linda M. Boland, Ph.D.
Janet M. Dubinsky, Ph.D.
Kevin D. Fox, Ph.D.
LaDora V. Thompson, Ph.D.

Instructor
George Bloom, B.S.

Physiology is the study of biological function at all levels of organization including those of molecules, cells, tissues, organs, and organisms. Functions of interest range from molecular organization to cell processes, such as ion transport or signal transduction, and the integrated activity of several tissues and organs, such as the control of blood pressure or the

DEPARTMENTS AND COURSE DESCRIPTIONS

coordination of muscle movement and higher brain function. The physiology and neuroscience courses for first-year medical students provide a background in normal function that is necessary to understand the abnormal functions manifested in disease. The required physiology courses cover cardiovascular, respiratory, gastrointestinal, and renal organ systems. Courses build upon material from biochemistry, anatomy, and histology, and are integrated with organ system pathophysiology courses taught in the second year. The required neuroscience course combines both neuroanatomy and neurophysiology, and covers the nervous system from individual nerve cells to the complex functions of the central nervous system. Both lecture and tutorial courses are available for advanced study.

Required Courses

5110w. HUMAN PHYSIOLOGY. (4 cr; prereq anatomy, biochemistry)

5111s. HUMAN PHYSIOLOGY. (4 cr; prereq 5110)

5112s. HUMAN NEUROSCIENCE B. (3 cr; for first-yr med and grad students; second qtr of two-qtr sequence—must complete PHSL 5112 to get credit for CBN 5111 Human Neuroscience A)

Elective Courses

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

5201f. COMPUTATIONAL NEUROSCIENCE I—MEMBRANES AND CHANNELS. (5 cr; prereq Phsl 5112 or equiv)
Comprehensive examination of membrane ion channels using UNIX workstations to simulate their properties. Topics include Hodgkin-Huxley model, non-linear dynamic systems, voltage and ligand gated ion channels, impulse propagation.

5202w. COMPUTATIONAL NEUROSCIENCE II—CELLS AND CIRCUITS. (5 cr; prereq an understanding of UNIX, Phsl 5201 or equiv)
Comprehensive investigation of the computational properties of single neurons and locally connected cell networks. Topics will include linear cable theory, compartmental modeling of single neuron properties, spatio-temporal interactions between synaptic inputs in neuronal dendritic tree, computational properties of passive and active dendritic spines and spine clusters, quantitative interpretation of whole-cell voltage-clamp data, and dynamics of locally connected cell networks.

5203s. COMPUTATIONAL NEUROSCIENCE III—NEURAL SYSTEMS AND INFORMATION PROCESSING. (5 cr; prereq Phsl 5202)

Quantitative examination of information processing by networks of neurons based on experimental data and theoretical models. Topics include neural codes, neural network models and information processing, neural control systems, and computational maps.

5444s. MUSCLE CONTRACTION. (3 cr, §MdBc 5444; prereq undergrad courses in biochemistry or physiology, #)
Introduction to the physiology, biochemical regulation, and physical chemistry of muscle contraction.

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)

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Psychiatry

Paula J. Clayton, M.D., professor and head

Adult Psychiatry (AdPy)

Professor

Marilyn Carroll, Ph.D.
Maurice Dysken, M.D.
Elke Eckert, M.D.
Esam El-Fakahany, Ph.D.
Lawrence Greenberg, M.D.
James Halikas, M.D.
Boyd Hartman, M.D.
John T. Kelly, M.D.
Thomas Kiresuk, Ph.D.
Jerome Kroll, M.D.
Thomas B. Mackenzie, M.D.
Richard Magraw, M.D.
James Mitchell, M.D.
Michael Popkin, M.D.
Joseph Westermeyer, M.D., Ph.D.

Associate Professor

Eduardo Colon, M.D.
Dorothy Hatsukami, Ph.D.
Suck Won Kim, M.D.
Gabe Maletta, M.D., Ph.D.
William Meller, M.D.
Richard Pyle, M.D.
Mark Willenbring, M.D.

Assistant Professor

Edward J. Bardon, M.D.
Gary Christenson, M.D.
Ray Conroe, M.D.
Nancy Crewe, M.D.
Scott Crow, M.D.
Vernon Devine, Ph.D.
Philip Edwardson, M.D.

Kathryn Ehlen, M.D.
Patricia Faris, Ph.D.
William Frey, M.D.
John Heefner, M.D.
Thomas Hurwitz, M.D.
Young-Ho Kang, M.D.
Matt Kushner, Ph.D.
Daniel Larson, M.D.
Manuel Mejia, M.D.
Robert Murtaugh, M.D.
Edward W. Posey, M.D.
Nancy Raymond, M.D.
Barry Rittberg, M.D.
Nicholas Rogers, M.D.
Donald Simone, Ph.D.
Sheila Specker, M.D.
Thomas Weier, M.D.
Marlin Wiemer, Ph.D.
Janet Zander, M.D.

The Department of Psychiatry teaches required courses in each of the first three years of the Medical School curriculum. The overall goal is to teach the relationship of brain and behavior in normal and pathological states so that students can recognize and treat mental disorders. Developments in neurobiology, comparative ethology, developmental psychology, cognitive psychology, psychopharmacology, and clinical research indicate that the coming decades will see an explosive growth of psychiatry and the brain sciences. Students of medicine will need a firm grounding in the relationship of brain and behavior and an ability to think critically to absorb and use these developments. Thus the curriculum in the first three years tries to impart a conceptual and clinical foundation and a curiosity and fascination that will enhance the pleasure of practicing medicine in the future.

Human Behavior is a 27-hour course taught in the spring-summer quarters of the first year. This course focuses on growth and development; stress and coping; sleep physiology and behavior; behavioral genetics; the neurobiology of memory, language, emotion, and attention; medical sociology; aging and family systems.

Psyche, a 25-hour course on specific mental disorders, is given in the second year in conjunction with neurology, respiratory, cardiovascular and the pharmacology of drugs affecting the central nervous system. The epidemiology, descriptive psychopathology, etiology, and prognosis of the major child and adult mental disorders are presented. The focus is on the chronic, severe mental disorders, such

as schizophrenia, manic-depression, and alcoholism, which have an early onset and will affect as much as 20 percent of the population. Consideration of treatment is limited to elucidation of etiology. Six hours of the course are taught in a small-group format (12-15 students), which uses videotaped examples of psychopathology.

In the third year, every student takes a full-time six-week clerkship in psychiatry. The clerkship emphasizes inpatient care of adult patients. Attention is given to the psychiatric examination, diagnosis, and treatment. All students should be proficient at assessing depression, psychosis, suicidal potential, and cognitive function. Both somatic and psychosocial treatments are used, and the student is expected to be knowledgeable about the dosages, side effects, and drug interactions of the classes of major psychotropic drugs. Students are instructed on the recognition and discussion of psychosocial factors in the genesis and continuation of psychiatric disorders, but are not trained in psychotherapy. Students will work up and follow specific patients and be responsible for designing and implementing a treatment plan and maintaining the medical record. Each clerkship site gives a series of lectures on diagnosis and treatment of the major mental disorders and a specific text is assigned during the clerkship.

Electives offered to fourth-year students include consultation-liaison psychiatry, child psychiatry, outpatient psychiatry, community psychiatry, chemical dependency, clinical psychopharmacology, neuropsychology, and geriatric psychiatry. Students may participate in psychiatric research projects as part of a formal elective for credit or in an informal manner through arrangement with a faculty member.

Required Courses

AdPy 5107. HUMAN BEHAVIOR. (Cr ar; Year One)
Mackenzie

InMD 5202. PSYCHE SECTION. (Cr ar; Year Two)
Mackenzie

ADPy 5500. PSYCHIATRY EXTERNSHIP—Abbott Northwestern, Anoka State Hospital, Hennepin County Medical Center, St. Paul-Ramsey Medical Center, University Hospital, Veterans Administration Hospital. (Cr ar; Year Three) Eckert

DEPARTMENTS AND COURSE DESCRIPTIONS

Elective Courses

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

5530. INDEPENDENT STUDY. (Cr ar; prereq regis med: location ar) Mackenzie

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Child and Adolescent Psychiatry (CAPy)

Gail Bernstein, M.D., acting director

Associate Professor
Gerald August, Ph.D.
George Realmuto, M.D.

Assistant Professor
Carrie Borchardt, M.D.
Harry Hoberman, Ph.D.
Jonathan Jensen, M.D.
Michael Koch, M.D.

Elective Courses

5201. DIAGNOSTIC PRACTICUM IN CHILD AND ADOLESCENT PSYCHIATRY—University Hospital. (Cr ar; prereq #: A-F only) Realmuto

5203. CHILD AND ADOLESCENT PSYCHIATRY FOR PSYCHOLOGY INTERNS—University Hospital. (Cr ar; prereq #) Hoberman
Experience in assessment and therapeutic interventions with children, adolescents, and families in child and adolescent psychiatric setting.

5204. DIAGNOSTIC METHODS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY—University Hospital. (1 cr; prereq med, #) Realmuto
Multidisciplinary evaluations of children, adolescents, and their families are presented for discussion, dynamic and diagnostic formulations, and disposition planning in a conference setting.

5520f,w,s. OUTPATIENT CLINICAL CHILD AND ADOLESCENT PSYCHIATRY FOR PRIMARY CARE PHYSICIANS—University Hospital. (Cr ar; prereq med, #; not offered period 5; hrs ar) Realmuto
Supervised diagnostic and therapeutic experiences in an outpatient setting.

5522. CLINICAL INPATIENT CHILD AND ADOLESCENT PSYCHIATRY—University Hospital. (Cr and hrs ar) Borchardt
Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary child psychiatric unit with emphasis on group and milieu therapies.

5602f,w. INTRODUCTORY READINGS IN CHILD, ADOLESCENT, AND FAMILY PSYCHIATRY AND RESEARCH METHODS—University Hospital. (3 cr; prereq med, #; hrs ar) Realmuto
Assigned readings and discussions with faculty. Topics include child development, diagnostic and therapeutic techniques, and psychopathology.

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Public Health, School of

The School of Public Health is a distinct academic unit reporting to the Provost for the Academic Health System. It prepares future practitioners, researchers, and teachers across the broad field of public health. The School of Public Health also serves as the preventive medicine department for the Medical School. For more information, contact the Student Services Center, School of Public Health, 420 Delaware St. S.E., Box 819, Minneapolis, MN 55455 (612/626-3500 or 1-800-774-8636).

Administrator

Edith D. Leyasmeyer, Ph.D., M.P.H., interim dean
James R. Boen, Ph.D., associate dean for academic affairs

Professor

Donald Barber, Ph.D., M.P.H.
Henry Blackburn, M.D.
James R. Boen, Ph.D.
Judith Brown, Ph.D., M.P.H.
Jon Christianson, Ph.D.
Bright Dornblaser, M.H.A.
Roger Feldman, Ph.D.
Judith Garrard, Ph.D.
Anne Goldman, Ph.D.
John Himes, Ph.D., M.P.H.
David Jacobs, Ph.D.
Robert Jeffery, Ph.D.
Robert Kane, M.D.
Rosalie Kane, D.S.W., M.S.W.
Marcus Kjelsberg, Ph.D.
John Kralewski, Ph.D., M.H.A.
Harry Lando, Ph.D.
Chap T. Le, Ph.D.
Theodore Litman, Ph.D.
Thomas Louis, Ph.D.
Russell Luepker, M.D.
Jack S. Mandel, Ph.D., M.P.H.
Marshall McBean, M.D.
Willard Manning, Ph.D.
Ira Moscovice, Ph.D.
Cheryl Perry, Ph.D.
Ken Sexton, Sc.D.
Robert W. ten Bensel, M.D., M.P.H.
Robert Veninga, Ph.D.
Donald Vesley, Ph.D.
James Vincent, Ph.D., Sc.D.
Vernon Weckwerth, Ph.D.

Associate Professor

Greg R. Alexander, Sc.D., M.P.H.
Mila A. Aroskar, Ed.D.
Lester Block, D.D.S., M.P.H.
Thomas Choi, Ph.D.
John Connett, Ph.D.
Richard Crow, M.D.
Bryan Dowd, Ph.D.
Michael Finch, Ph.D.
Aaron Folsom, M.D., M.P.H.
Jean Forster, Ph.D., M.P.H.
Susan Gerberich, Ph.D.
Patricia Grambsch, Ph.D.
Ian Greaves, M.D.
George Johnson, Ph.D., M.H.A.
David Murray, Ph.D.
James Neaton, Ph.D.
John Nyman, Ph.D.
Joan Patterson, Ph.D.
Phyllis Pirie, Ph.D.
Michael Resnick, Ph.D.
Barbara Spradley, M.N.
Mary Story, Ph.D.
Deborah Swackhammer, Ph.D.
William Thomas, Ph.D.
Alexander Wagenaar, Ph.D., M.S.W.
Carolyn Williams, Ph.D.

Assistant Professor

Donna Arnett, Ph.D., M.S.P.H.
Lisa M. Brosseau, Sc.D.
I. Marilyn Buzzard, Ph.D.
Bradley Carlin, Ph.D.
Robert Connor, Ph.D., M.H.A.
Patricia Elmer, Ph.D.
John Finnegan, Jr., Ph.D.
Simone French, Ph.D.
Leslie Grant, Ph.D.
Myron Gross, Ph.D.
Rebecca Johnson, Ph.D., M.P.H.
Rhonda Jones-Webb, Dr.PH
Lawrence Kushi, Sc.D.
Edith D. Leyasmeyer, Ph.D., M.P.H.
Leslie Lytle, Ph.D.
Mary Jane Madden, Ph.D.
George S. Maldonado, Ph.D.
Patricia McGovern, Ph.D., M.P.H.
Paul McGovern, Ph.D.
Sandra Potthoff, Ph.D.
Gurumurthy Ramachandran, Ph.D., M.S.
Pamela Schreiner, Ph.D.
Thomas Sellers, Ph.D., M.P.H.
Eyal Shahar, M.D., M.P.H.
Patricia Splett, Ph.D., M.P.H.
Lance Waller, Ph.D.
Elizabeth Wattenberg, Ph.D.
Mark Wolfson, Ph.D.
Wei Zheng, M.D., Ph.D., M.P.H.

Instructor

U. Beate Krinke, M.P.H.
Debra Olson, M.P.H.
James Rothenberger, M.P.H.

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

Biostatistics

Community Health Education
Environmental Health
Epidemiology
Health Services Administration
Health Services Research and Policy
Health Services Research, Policy, and Administration
Healthcare Administration
Maternal and Child Health
Public Health Administration
Public Health Nutrition

Radiology (Rad)

William M. Thompson, M.D., professor and head

Division of Roentgen Diagnosis

William M. Thompson, M.D., professor and director

Professor Emeritus

Eugene Gedgaudas, M.D.

Professor

Kurt Amplatz, M.D.
Robert Boudreau, M.D., Ph.D.
Harry Griffiths, M.D.
David Hunter, M.D.
Christopher Kuni, M.D.
Richard Latchaw, M.D.
David Rottenberg, M.D.
Kamil Ugurbil, Ph.D.
James Walsh, M.D.

Associate Professor

Howard Ansel, M.D.
Carroll Arnett, M.D.
Carol Coleman, M.D.
James Crowe, M.D.
René duCret, M.D.
Simon Efange, Ph.D.
Michael Garwood, Ph.D.
Marvin E. Goldberg, M.D.
Xiaoping Hu, Ph.D.
Donovan B. Reinke, M.D.
E. Russell Ritenour, Ph.D.
Stephen Trenkner, M.D.
Charles Truwit, M.D.
Zeev Vlodayer, M.D.

Assistant Professor

Quentin Anderson, M.D.
Earl Bender, M.D.
Haraldur Bjarnason, M.D.
Karen Blumberg, M.D.
Becky Carpenter, M.D.
Kenneth Cross, M.D.
Charles Dietz, M.D.
Connie Emerson, M.D.
Christopher Engeler, M.D.
Lenore Everson, M.D.
Brian Fiedler, M.D.
David Finlay, M.D.

Mary Foshager, M.D.
 Richard Geise, Ph.D.
 Tom Gilbert, M.D.
 David Gross, M.D.
 Frank Grund, M.D.
 Bruce Hammer, Ph.D.
 Bruce Hasselquist, Ph.D.
 Steven Haugen, M.D.
 Walter Hildebrandt, M.D.
 Stephen Hite, M.D.
 Jeremy Hollerman, M.D.
 Steven Hommeyer, M.D.
 Michael Jerosh-Herold, Ph.D.
 Edith Kang, M.D.
 John Knoedler, M.D.
 Charlens Krenzel, M.D.
 Steven Krueckeberg, M.D.
 Bert Larson, M.D.
 Robert Low, M.D.
 Robert Miller, M.D.
 William Mize, M.D.
 Paul Mulcahy, M.D.
 Timothy Myers, M.D.
 Gwen Nazarian, M.D.
 Mary Jo Nelson, M.D.
 Patrick O'Brien, M.D.
 Richard Patterson, M.D.
 Leland Prewitt, M.D.
 Kent Remley, M.D.
 Shashikant Sane, M.D.
 Warren Stanchfield, M.D.
 Stephen Strother, M.D.
 Martin Strandness, M.D.
 Arthur Stillman, M.D., Ph.D.
 David Swanson, M.D.
 Joseph Tashjian, M.D.
 Saul Taylor, M.D.
 Stephen Trenkner, M.D.
 Joaquim Vieira, M.D.
 Dawn Voegeli, M.D.
 Neil Wasserman, M.D.
 Deborah Wadsworth, M.D.
 Irwin Weisman, M.D.
 Norbert Wilke, Ph.D.

Division of Nuclear Medicine

Robert J. Boudreau, M.D., Ph.D., professor and director

Professor Emeritus
 Merle Loken, M.D., Ph.D.

Professor
 Christopher Kuni, M.D.

Associate Professor
 René duCret, M.D.
 Simon Efang, Ph.D.

Assistant Professor
 Frank Grund, M.D.
 Bert Larson, M.D.

Elective Courses

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

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

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

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

5105. EXTERNSHIP DIAGNOSTIC RADIOLOGY—ST. LUKES-DULUTH. (Cr ar; prereq regis med)

5530. SPECIAL PROBLEMS: RADIATION BIOLOGY. (Cr ar; prereq regis med)

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the *Graduate School Bulletin*.

Surgery (Surg)

David L. Dunn, M.D., professor and interim chair

Regents' Professor Emeritus
 Richard L. Varco, M.D.

Professor
 R. Morton Bolman III, M.D.
 Henry Buchwald, M.D.
 Michael D. Caldwell, M.D.
 Daniel Canafax, Pharm.D.
 Frank B. Cerra, M.D.
 Bruce L. Cunningham, M.D.
 John P. Delaney, M.D.
 John E. Foker, M.D.
 Robert L. Goodale, M.D.
 Allen S. Levine, Ph.D.
 Arthur J. Matas, M.D.
 Donald G. McQuarrie, M.D.
 Ernesto Molina, M.D.
 William D. Payne, M.D.
 David Reynolds, Ph.D.
 Yoshio Sako, M.D.
 David E.R. Sutherland, M.D.
 John Weigelt, M.D.

Associate Professor
 Jerome H. Abrams, M.D.
 David H. Ahrenholz, M.D.
 Robert C. Andersen, M.D.
 Roderick A. Barke, M.D.
 Melvin P. Bubrick, M.D.
 William Engeland, Ph.D.
 Martin Finch, M.A.
 Rainer Gruessner, M.D.
 Hovald Helseth, M.D.
 James T. Lee, M.D.
 Caliann T. Lum, M.D.
 Ernest Ruiz, M.D.
 Sara J. Shumway, M.D.
 Herbert B. Ward, M.D.
 Carol L. Wells, Ph.D.
 Michael A. West, M.D.

Assistant Professor

David Borgstrom, M.D.
John Clark, M.D.
Steven D. Eyer, M.D.
Kristin Gillingham, Ph.D.
Terrence P. Horrigan, M.D.
Eric Irwin, M.D.
Elmer H. Kasperson, M.D.
Vibhu R. Kshetry, M.D.
George Landis, M.D.
Brett Levay-Young, Ph.D.
Michael A. Maddaus, M.D.
Michael McGonigal, M.D.
Charles Mills, Ph.D.
Nancy L. Reinsmoen, Ph.D.
Warren Schubert, M.D.
Lynn D. Solem, M.D.
Richard Strate, M.D.
Jerald Sultz, M.D.
Craig Walvatne, M.D.

Instructor

Paul Druck, M.D.
Stanley Williams

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.

5500. EXTERNSHIP IN GENERAL SURGERY—University Hospital and affiliated hospitals. (Cr ar; prereq regis med) Cerra, staff

Initial history and physical examination of surgical patient; systematic approach to diagnosis and treatment; preoperative preparation of surgical patient; OR's function, surgeon's role; operative procedures used in treating surgical diseases; managing 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 (optional), team discussions, and group seminars and familiarize themselves with pertinent surgical literature in preparation for didactic aspects of rotation.

5502. EXTERNSHIP IN THE SURGICAL INTENSIVE CARE UNIT—University Hospital and affiliated hospitals. (Cr ar; prereq 5500) Cerra, Eyer, Barke, Jacobs
In-depth patient care experience in the management of the critically ill and injured.

5503. RESEARCH PROBLEMS IN SURGERY—University Hospital. (Cr ar) Sutherland
Participation in a research experience designed around a specific topic, arranged on an individual basis by Dr. Sutherland with members of the Surgery Department. Suggested topics include problems in surgical infectious disease, metabolic and nutritional problems in surgery, transplantation and immunology, or another topic of the student's choosing.

5504. EXTERNSHIP IN HOSPITAL BASE NUTRITION—University Hospital. (Cr ar) Cerra

Direct experience in hospital base parenteral and enteral nutrition is provided in this multidisciplinary patient care service consisting of a medical director, pharmacist, nurse clinician, and dietician.

5509. EXTERNSHIP IN BURN MANAGEMENT—St. Paul Ramsey, Solem, Ahrenholz

Direct experience in the physiology and management of burns.

5510. ADVANCED SURGERY EXTERNSHIP: SUBINTERNSHIP—University Hospital. (Cr ar) Cerra

Instruction and special experience in surgery for students who have completed a basic externship or clerkship in surgery. Students work under direct faculty supervision and participate fully with the surgical team on the assigned service, in the care of hospitalized patients, in the operating room, and in clinics.

5511. EMERGENCY MEDICINE—St. Paul Ramsey. (9 cr) Cerra

Students acquire first-hand experience in dealing with emergency problems. Students work one-to-one with trained physicians who evaluate and discuss each patient with them.

5522. PLASTIC AND RECONSTRUCTIVE SURGERY—University Hospital and Affiliates. (Cr ar; prereq 5500) Cunningham

Students cover full spectrum of plastic and reconstructive problems while on rotation. Basic hand surgery, breast reconstruction, aesthetic surgery, facial reconstruction, microsurgery, wound management, surgical research.

5526. CLINICAL NUTRITION SEMINAR. (1 cr; prereq acceptance to master's program in nutrition support or dietetics or Kellogg M.D. Fellowship Program) Shronts
Presentation by graduate students in nutrition on current topics in hospital support or research.

5527. HOSPITAL NUTRITION SUPPORT. (9 cr; prereq acceptance to master's program in nutrition support; S-N only) Shronts
Ten-week course.

Colon and Rectal Surgery

David Rothenberger, M.D., clinical professor and director

5523. EXTERNSHIP IN COLON AND RECTAL SURGERY—University Hospital and affiliated hospitals. (Cr ar) Buls, Gemlo, Goldberg, Rothenberger, Spencer, Wong

Practical experience in managing common anorectal problems. The student acts as an intern on a surgical service with a busy clinic, "first assists" with surgical procedures, attends the colon and rectal seminars, and presets cases. The student becomes adept in the use of the sigmoidoscope and is exposed to colonoscopy. Further opportunities to learn are available with various members of the teaching staff at affiliated hospitals.

Therapeutic Radiology- Radiation Oncology (TRad)

Seymour H. Levitt, M.D., professor and head

Professor

Faiz M. Khan, Ph.D.
Roger A. Potish, M.D.
Chang W. Song, Ph.D.
Fatih M. Uckun, M.D., Ph.D.
Daniel A. Vallera, Ph.D.

Associate Professor

Bruce Gerbi, Ph.D.
Chung Kyu Kim Lee, M.D.

Assistant Professor

Elizabeth A. Auger, Ph.D.
Kwon Cho, M.D.
Kathryn Dusenbery, M.D.
Kathryn E. Farniok, M.D.
Patrick Higgins, Ph.D.
Warren McGuire, M.D.

Elective 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)

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)

5511. DIAGNOSIS, EVALUATION, AND CARE OF
ADULTS AND CHILDREN WITH CANCER. (9 cr)

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)

Advanced Credit Courses

For a description and complete list of 8xxx courses, see the
Graduate School Bulletin.

Urology (Urol)

Pratap K. Reddy, M.D., professor and acting
chairman

Professor

John Hulbert, M.D.

Associate Professor

Hossein Aliabadi, M.D.

Assistant Professor

Peter Bernhard, M.D.
Kevin Billups, M.D.
Cesar Ercole, M.D.
Richard Evans, M.D.
Paul Gleich, M.D.!!
Jon Pryor, M.D.
Kenneth Roberts, Ph.D.
Hoo Yiu Wong, M.D.
Kevin Zhang, M.D.

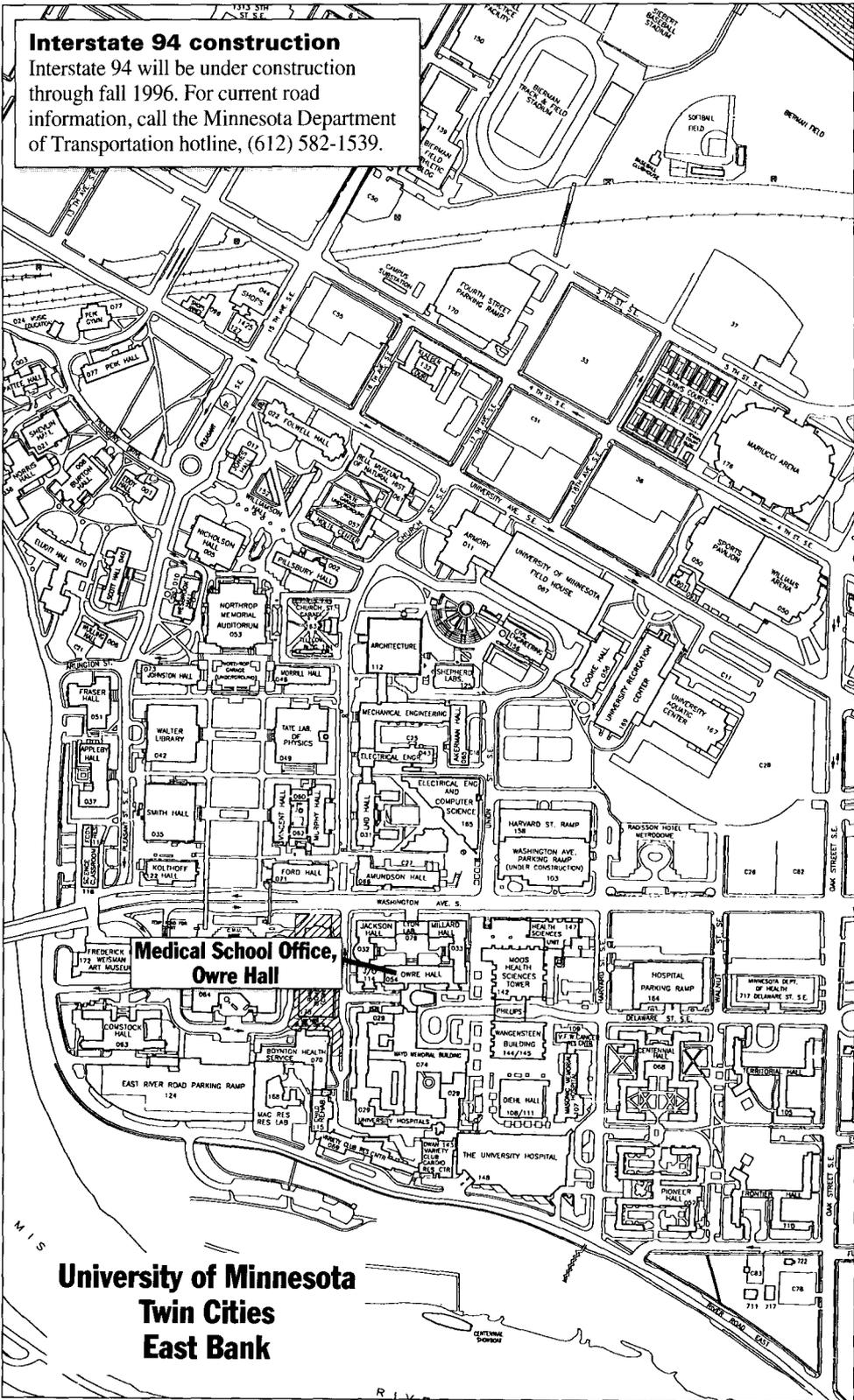
Elective Course

5180. EXTERNSHIP IN UROLOGY. (Cr ar; prereq regis
med)

5200. SURGICAL SPECIALTIES: UROLOGY. (Cr ar;
prereq regis med)

Interstate 94 construction

Interstate 94 will be under construction through fall 1996. For current road information, call the Minnesota Department of Transportation hotline, (612) 582-1539.



**Medical School Office,
Owre Hall**

**University of Minnesota
Twin Cities
East Bank**

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Mailing Address

Office of Admissions and Student Affairs
Medical School
University of Minnesota
Box 293 UMHC, 420 Delaware Street S.E.
Minneapolis, MN 55455
Telephone: (612) 624-1122

Resource Directory

The following campus offices might be helpful and should be contacted through the University of Minnesota, Minneapolis, MN 55455.

(area code 612)

Center of American Indian and Minority Health
Medical School
Box 293 UMHC, 3-105 Owre Hall
420 Delaware St. S.E.
625-0475

Combined M.D./Ph.D. Program
Medical School
Box 293 UMHC, 3-111 Owre Hall
420 Delaware St. S.E.
625-3680

Disability Services
16 Johnston Hall
101 Pleasant Street S.E.
624-4037 voice or TTY

Graduate Assistant Office
1313 5th Street S.E., Suite 317
627-1075

Health Sciences Minority Program
Office of Vice President for Health Sciences
1-125 Moos Tower
515 Delaware St. S.E.
624-9400

Housing Services
Comstock Hall East
210 Delaware Street S.E.
624-2994

Office of Financial Aid
Medical School
Box 193 UMHC, 535 Diehl Hall
420 Delaware St. S.E.
625-4998

Pre-Health Science Advising Center
College of Liberal Arts
Pre-major Advising, 30 Johnston Hall
624-9006

Residence and Reciprocity
240 Williamson Hall
231 Pillsbury Drive S.E.
625-6330

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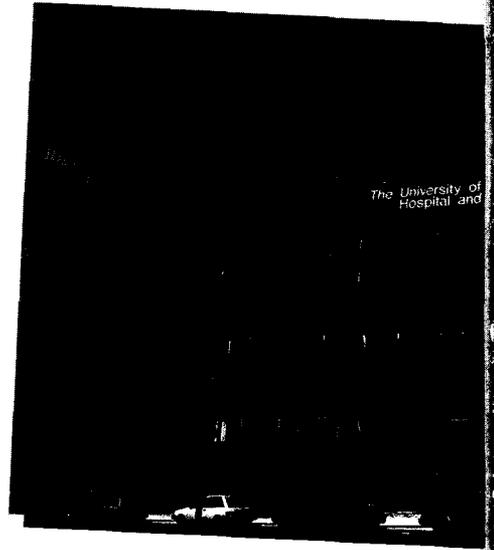
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College of Pharmacy

UNIVERSITY OF MINNESOTA ^{MT}

BULLETIN

1995 - 1997

College of Pharmacy

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Mission

The College of Pharmacy educates pharmacy practitioners to meet the pharmaceutical care needs of the people of Minnesota and the rest of society. The college is committed to improving human health through the development of new drugs and drug delivery systems, optimization of drug use, and improvement of pharmaceutical services. It is committed to advancing pharmaceutical technology to strengthen Minnesota's economy.

Overview

The University of Minnesota College of Pharmacy is recognized as one of the outstanding pharmacy education and research institutions in the world. It is ranked third among the colleges of pharmacy in the United States by the *Gourman Report* and *U.S. News and World Report*. Graduates of the college's doctor of pharmacy (Pharm.D.) program enter the profession as well qualified, highly sought-after pharmacists.

The college's programs are supported by centers of excellence in diverse areas of pharmacy such as pharmaceuticals, geriatrics, pharmacy management and economics, rural pharmacy, and pharmaceutical care. The teaching, research, and service activities of the 64 full-time faculty members and hundreds of volunteer faculty are focused in three disciplines: medicinal chemistry, pharmaceuticals, and pharmacy practice.

The college is housed in the University of Minnesota Academic Health Center, a complex designed specifically for health education, research, and practice. Pharmacy students have access to modern classrooms, laboratories, and more than 350,000 volumes of pharmacy resource materials.

The college is fully accredited by the American Council on Pharmaceutical Education, 311 W. Superior Street, Chicago, IL 60610 (312/554-3575).

History

Throughout the college's history, its programs have evolved to meet the needs of the pharmacy profession. In 1892 the college initiated a program consisting of two years of professional studies leading to the doctor of pharmacy degree. To accommodate new knowledge and technology, the period of formal instruction was extended to a four-year baccalaureate degree (B.S.) in 1927, and increased to five years in 1954. A clinical component was added to the B.S. program in 1967, and was followed by the establishment of a patient-oriented postbaccalaureate doctor of pharmacy (Pharm.D.) program in 1971. The College of Pharmacy added a six-year entry-level Pharm.D. program in 1981. To keep pace with society's changing needs, the college revised the professional education curricula and introduced career tracking options in 1987. In 1995 the college introduced a new entry-level Pharm.D. program and began phasing out the former Pharm.D. and B.S. in pharmacy degrees.

Pharmacy Licensure

Graduates of the Pharm.D. program are eligible to take the state licensure examination to practice pharmacy. For more information about licensure, call the Minnesota Board of Pharmacy at (612) 642-0541.

Programs of Study

Entry-level Doctor of Pharmacy (Pharm.D.)

Program—The Pharm.D. program prepares pharmacists to identify, resolve, and prevent drug-related problems. These practitioners provide drug therapy to achieve positive outcomes that improve the quality of a patient's life. Before enrolling in the college, students complete prepharmacy coursework at an accredited college. The required coursework listed in the Curricula section of this publication is offered on a full-time day school basis.

Postbaccalaureate Doctor of Pharmacy

(Pharm.D.) Program—The postbaccalaureate Pharm.D. program enriches the experience and knowledge base of pharmacists to enable them to practice at an advanced level. The program is open to pharmacists who hold a B.S. in pharmacy from a U.S. college of pharmacy. Applicants admitted fall 1996 must complete the Pharm.D. program in two years. The first year is didactic instruction and the second year is experiential coursework.

1996-97 is the last year applicants will be admitted to the program described in this bulletin. The faculty is discussing plans to offer a new postbaccalaureate Pharm.D. program.

The college is unable to consider B.S. (B.Pharm.) graduates of non-U.S. colleges of pharmacy, with the possible exception of Canada, for fall 1996 admission because the current postbaccalaureate Pharm.D. program is being phased out.

Honors Program—The Honors Program provides Pharm.D. students with opportunities to interact with faculty, develop specialized skills, learn about research, and enhance their professional development. This program is open to students whose grade point average (GPA) is at least 3.25. Specific activities, called honors options, include special projects and honors courses. Special projects are defined by a student and faculty member. They may be laboratory research projects, directed research readings, term papers or seminar preparation on research topics, community service projects, leadership projects, or other appropriate activities. There is no financial remuneration for honors options.

Honors courses available within the college are designated by an "H" following the course number. These are advanced courses that may be of special interest to honors students.

Graduating students who have completed at least five honors options, including at least one special project, graduate with the honors designation of *cum laude* (GPA of 3.25 to 3.49), *magna cum laude* (GPA of 3.50 to 3.79), or *summa cum laude* (GPA of 3.80 to 4.00).

Postgraduate Fellowship and Residency

Programs—The postgraduate fellowship programs in pharmacy practice prepare clinical scientists to become leaders in drug research. The residency programs provide advanced training in specialty practices, including pharmacy administration.

Candidates for fellowships and most residencies must have a Pharm.D., M.S., or Ph.D. and equivalent clinical experience; be eligible for licensure to practice pharmacy in Minnesota; and meet other qualifications specific to the program for which application is made. Some residencies are available to candidates who have a B.S. in pharmacy. Call the Pharmacy Practice Department at (612) 624-2112 for information.

Graduate Programs—College of Pharmacy graduate programs for the M.S. and Ph.D. degrees are offered through the Graduate School in medicinal chemistry (612/624-9919), pharmaceuticals (612/624-5151), hospital pharmacy (612/624-2112), and social and administrative pharmacy (612/624-2112). Detailed information about these programs can be found in the *Graduate School Bulletin*.

Continuing Education Programs—The College of Pharmacy provides continuing education opportunities that enable practicing pharmacists to maintain their competence, update their skills, develop new abilities, and assume new responsibilities as required by changing professional duties and roles. These programs provide a focus for pharmacists' learning activities and offer the opportunity for interactive learning with colleagues and other health professionals. The college offers noncredit as well as University credit programs.

Prepharmacy Advising

The college's Office of Student Affairs provides prepharmacy advising and answers questions about admission requirements and application procedures for the Pharm.D. program. Students may write the College of Pharmacy, Office of Student Affairs, University of Minnesota, 5-110 Health Sciences Unit F, 308 Harvard Street S.E., Minneapolis, MN 55455, or call (612) 624-9490 Monday through Friday 9 a.m. to 3 p.m. The Office of Student Affairs can also refer you to prepharmacy advisers in all Minnesota and nearby Wisconsin colleges.

Admission Requirements

Entry-level Doctor of Pharmacy Program—

The required minimum overall GPA is 2.60. The required prepharmacy courses listed below may be taken at any accredited college. Prepharmacy courses must be taken A-F and completed with a grade of C or better before enrollment.

In addition to the prepharmacy course requirements, students must complete at least 45 quarter (30 semester) credits of general education (nonscience, nonmathematics, nonprofessional) courses, including at least 8 credits of literary or artistic expression, to

graduate. Prepharmacy credits earned in behavioral sciences, English composition, microeconomics, and public speaking apply toward the general education requirement. It is recommended that this requirement be completed before entering the college. General education courses that do not fulfill prepharmacy requirements may be taken S-N (satisfactory-no credit).

Postbaccalaureate Doctor of Pharmacy

Program—The program is open to pharmacists who hold a B.S. in pharmacy from a U.S. college of pharmacy. Applicants must have professional GPAs of 2.80 or better to be considered for admission.

The college is unable to consider B.S. (B.Pharm.) graduates of non-U.S. colleges of pharmacy, with the possible exception of Canada, for fall 1996 admission because the current postbaccalaureate Pharm.D. program is being phased out.

Transfer Students—Students wishing to transfer from another pharmacy college must fulfill all entry-level Pharm.D. admission requirements. Professional courses completed at another college will be evaluated for equivalency to University of Minnesota College of Pharmacy professional coursework. Transfer

Prepharmacy Course Requirements

Biology

- General biology, including lab 1 course
 - Microbiology, including lab 1 course
 - Anatomy, including lab 1 course
- (If anatomy is combined with physiology, the entire anatomy and physiology sequence must be completed.)*

Calculus I and II 2 courses

Chemistry

- General chemistry, including labs sufficient to qualify for organic
- Organic chemistry, including labs 3 quarters or 2 semesters

Physics

- General physics, including labs entire introductory sequence

Behavioral Sciences

- Courses dealing with human behavior in society
(e.g., psychology, sociology, anthropology) 2 courses

English Composition 2 courses

Microeconomics 1 course

Public Speaking 1 course

students must spend a minimum of one year at the University before qualifying for a degree.

Adult Special Students—Pharmacists licensed in the United States may apply for adult special status in the college and complete up to three College of Pharmacy courses. Contact the Office of Student Affairs at (612) 624-9490 for information. Adult special students who wish to enter a degree program must apply for admission following the application process outlined below.

Application Procedures

Application materials are available from the college's Office of Student Affairs in August and are accepted from October 1 through February 1 of the academic year preceding the year of desired admission. February 1 is the postmark deadline for filing all application documents to be considered for admission. Students are admitted to the college fall quarter only. All applicants are notified of admission decisions at the end of March.

Required Documents

- College of Pharmacy Application and \$50 nonrefundable application processing fee
- Professional Goals Statement (essay)
- Official transcript from each college attended
- Three College of Pharmacy Recommendation forms
- Résumé (required only of applicants to the postbaccalaureate Pharm.D. program)
- University of Minnesota Financial Certification Statement (required only of international applicants)
- English language test scores (required of all nonnative English speakers)

English Language Requirements

A nonnative English speaker is a person who primarily spoke a language other than English as a child. There are no substitutes (e.g., grades in English courses, time spent in the United States, degrees earned in English-speaking schools) for the following English language requirements: Test of English as a Foreign Language (TOEFL) score of 580 or Michigan English Language Assessment Battery (MELAB) score of 82, and Test of Spoken English (TSE) score of 50 (or 230 if taken before July 1995).

For more information about TOEFL and TSE, call the Educational Testing Service at (609) 771-7760. MELAB information is available from the English Language Institute at (313) 764-2416. Students are advised to register to take these examinations by October 1.

Evaluation of Applicants

The Admissions Committee consists of four faculty members and one student. The committee reviews applicants whose application documents are received by the February 1 deadline and who meet the minimum GPA requirement. Five criteria are used in the evaluation process:

- Academic achievement, including GPA, course selection, and course load
- Work experience (pharmacy experience desirable but not required)
- Three recommendations, preferably from instructors and employers
- Participation in community or college extracurricular activities
- Applicant goals statement.

Tuition Deposit

Applicants who are admitted pay a \$250 nonrefundable tuition deposit to hold a position in the college. The deposit, along with a signed Declaration of Intent, is due in full by May 1. The tuition deposit will be applied to students' fall quarter tuition. The deposit will not be refunded to applicants who do not enroll in the year for which they have been admitted. The deposit is *not* transferable to another application cycle.

Costs and Financial Aid

Tuition, Fees, and Living Expenses

For information on current tuition and fees, consult the quarterly *Class Schedule*. Expenses for room and board, laundry and clothing, required health insurance, recreation, travel, and other personal expenses vary depending on whether a student lives at home, in a residence hall, or in off-campus housing.

Students complete externships and clerkships as part of their required courses. These practice experiences are conducted at community and hospital sites throughout the state. Students are responsible for additional expenses related to externships and clerkships.

Residency and Reciprocity

To qualify for resident tuition rates, students must fulfill residency requirements. If you are a resident of North Dakota, South Dakota, Wisconsin, or Manitoba, you may qualify for reciprocity tuition rates, which are lower than nonresident tuition rates and, in some cases, comparable to resident rates. For more information, contact the Resident Classification and Reciprocity Office, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-6330), or the residency office on your campus.

Financial Aid

Pharmacy students finance their education from a combination of sources, including personal or family funds, grants and scholarships, loans, and employment. Applications for federal, state, and institutional loans and grants are administered by the University of Minnesota Office of Scholarships and Financial Aid (OSFA). To receive the Free Application for Federal Student Aid (FAFSA), contact the Office of Scholarships and Financial Aid, University of Minnesota, 210 Fraser Hall, 106 Pleasant Street S.E., Minneapolis, MN 55455. Applications should be filed as soon after January 1 as possible. Students may apply for financial aid before they are admitted to the college. Walk-in counseling is available at the Health Professions Financial Aid Office in 2-693

Moos Tower. For more information or counseling hours, call OSFA at (612) 624-1665 and ask to speak with a health professions financial aid counselor.

Inquiries about financial aid for international students may be directed to the International Student and Scholar Services office (612/626-7100).

College of Pharmacy Scholarships

Full-time pharmacy students who are in good academic standing may apply for College of Pharmacy scholarships (see list below) that range from \$250 to \$2,500. To be considered for scholarships with financial need as a criterion, students must have a complete financial aid application on file in the University of Minnesota Office of Scholarships and Financial Aid (OSFA).

College of Pharmacy scholarship applications are available from the Office of Student Affairs on May 1. The application deadline is June 30. The college's Scholarships, Fellowships, and Awards Committee selects scholarship recipients in the summer. These scholarships are disbursed by OSFA. If a fully funded student receives a scholarship, other forms of assistance will be affected.

Allen and Hanburys Scholarship—For a Pharm.D. II student. Based on leadership and involvement in student and community service activities.

American Cancer Society Scholarship—For a Pharm.D. I student with demonstrated leadership potential, maturity, and an interest in oncology. A two-year scholarship.

Benjamin M. Cohen Memorial Scholarship—Based on financial need and academic achievement.

College Board Scholarships—For pharmacy students who demonstrate financial need.

College of Pharmacy Minority and Disadvantaged Student Scholarships—For minority or disadvantaged students who demonstrate financial need.

Kappa Psi Scholarships—For Kappa Psi members based on financial need, activity in the Epsilon Chapter of Kappa Psi, and participation in community activities.

Keith K. Keller Memorial Scholarship—Based on financial need and interest in community pharmacy.

Cecil A. Krelitz Memorial Scholarships—For Pharm.D. I students from Minnesota who plan to practice community pharmacy.

Abbie N. Larson Memorial Scholarships—For students from Minnesota. Based on academic achievement and financial need.

Long's Drug Stores Scholarship—For a Pharm.D. II or III student planning to practice community pharmacy.

Sarah Lavintman Mark Scholarship—For a Pharm.D. IV student interested in hospital pharmacy.

Claude A. Mather Memorial Scholarships—For students from Eveleth, Minnesota.

McKesson Drug Company Scholarship—Based on scholastic achievement, leadership, and financial need. Recipient retains scholarship until graduation as long as satisfactory academic progress is achieved.

Samuel W. Melendy Memorial Scholarships—For the top scholars, based on academic performance the preceding year.

Samuel W. Melendy Undergraduate Research Scholarships—For students to conduct research projects. Based on scholastic performance and potential of the applicants. Award includes a summer stipend and funding for the following two quarters.

Fred Multaler Memorial Scholarship—For a student from Minnesota. Based on financial need.

Paddock Laboratories Scholarship—Based on financial need. Preference given to students who are single parents or from single-parent families.

William M. and Mildred E. Peters Academic Excellence Scholarships—Based on prepharmacy GPA. Awarded to the top applicants who complete their applications by December 31.

William M. and Mildred E. Peters Achievement Scholarships—Based on financial need and extracurricular activities.

William M. and Mildred E. Peters Pharmacy Scholarships—Based on financial need.

William M. and Mildred E. Peters Rural Scholarships—For students from rural Minnesota. Based on scholastic ability, extracurricular activities, and financial need. Recipients retain the scholarship until graduation as long as satisfactory academic progress is achieved.

Pharmacists Mutual Insurance Company Scholarship—For a student from the Midwest who plans to practice community pharmacy in one of the states where the company operates. Based on academic achievement and financial need.

Pharmacy Alumni Society Scholarship—For a deserving pharmacy student.

Harold W. Pratt Memorial Scholarship—For a deserving pharmacy student.

Max and Rose Sadoff Memorial Scholarship—Based on financial need and demonstrated interest in pharmacy law or ethics.

ShopKo Pharmacy Scholarship—For a Pharm.D. III or IV student who has a demonstrated interest in community pharmacy.

Bert Supplee Memorial Scholarship—Based on academic performance or involvement in extracurricular activities or community service.

Thrifty-White Drug Stores Scholarships—For Pharm.D. II or III students from Minnesota, North Dakota, South Dakota, Wisconsin, or Montana. Based on interest in community pharmacy and financial need.

Wal-Mart Pharmacy Scholarship—For a Pharm.D. II student who demonstrates interest in community pharmacy, scholastic excellence, leadership, and financial need.

F. J. Wulling Scholarship—For a deserving pharmacy student.

Student Life

Advising

The College of Pharmacy provides counseling and advising services to students. Students are assigned faculty advisers who help them select elective courses and discuss career opportunities. In addition, Office of Student Affairs staff advisers provide registration materials, discuss academic difficulties, and counsel students with personal concerns.

Housing

University of Minnesota Housing Services (612/624-2994) assists students with their on- or off-campus housing needs.

Activities

Pharmacy students have opportunities for valuable experience and personal growth through activities outside the classroom. Students are encouraged to take an active part in a variety of student groups.

College Board—The Pharmacy College Board is the student government body. It acts as the students' representative and liaison and sponsors many all-college activities. Its purpose is to advance students' interest in the college through active student participation. It is composed of class representatives and leaders of all student organizations in the college.

Academy of Students of Pharmacy/ Minnesota Pharmacists Association—The academy promotes the professional needs of students at the local, state, regional, and national levels. It is actively involved in educational activities and legislative matters affecting the profession at the state and national levels.

Professional Societies—Three professional pharmacy societies are active in the college: Kappa Epsilon, Kappa Psi, and Phi Delta Chi. These groups sponsor activities involving students, the college, the profession, and the public.

Honor Society—Rho Chi, the national honor society of pharmacy, is represented at the University of Minnesota by the Mu Chapter. During their second professional year, eligible

students may be elected to membership by society members. Election to the society is based on scholarship, character, and conduct.

Leadership Society—Phi Lambda Sigma, the national pharmacy leadership society, promotes the development of leadership qualities in pharmacy students. After the first professional year, eligible students may be elected to membership by society members. Election to the society is based on dedication, service, and leadership in the advancement of pharmacy.

Faculty Committees—Students are appointed to most standing and ad hoc committees that govern the college.

Council for Health Interdisciplinary Participation (CHIP)—This health sciences student organization promotes the team approach to health care delivery through student services and community programs.

Career Development—The college offers a variety of career-oriented activities, including career decision-making workshops, career options speaker panels, an annual job fair, internship and postgraduate job listings, and résumé writing and interview skills presentations.

Pharmacopa—The Epsilon Chapter of Kappa Psi Pharmaceutical Fraternity prepares the annual *Pharmacopa*, which contains articles of interest as well as pictures of members of the graduating class, faculty, and staff.

Pharmaceutical Education Trip—Pharmacy students have an opportunity to visit the laboratories of at least one pharmaceutical or biological manufacturer during spring vacation.

Pharmacy Day—This annual celebration is sponsored by the Pharmacy College Board. Classes are excused for a day in May for a picnic for students, faculty, and staff.

Awards and Honors

The following awards are available annually to pharmacy students who are in good academic standing. The college's Scholarships, Fellowships, and Awards Committee recommends candidates to the faculty for its approval.

Academy of Students of Pharmacy Certificate of Recognition—For the graduating student member who has made the greatest contribution to the College of Pharmacy Academy of Students of Pharmacy Chapter.

American Society of Hospital Pharmacists Student Leadership Award—For a graduating student with demonstrated interest in institutional pharmacy practice, involvement and leadership in professional organizations, and academic excellence.

Award of Excellence in Clinical Communications—For a graduating student demonstrating scholastic excellence and superior oral and written clinical communication skills. Sponsored by *Facts and Comparisons*.

Carol A. Beaty Memorial Award—For the student demonstrating the greatest capability or interest in computer applications in pharmacy.

John Y. Breckenridge Memorial Book Award—For a Pharm.D. II student in recognition of outstanding scholastic achievement, professional potential, and leadership ability.

Hallie Bruce Memorial Award—For a graduating student with outstanding achievement in hospital pharmacy.

Harold H. Carpenter Memorial Award—For a student demonstrating exceptional interest in rural pharmacy practice.

College Board Pharm.D. III Award—For a Pharm.D. III student for outstanding contributions to and involvement in the profession, the college, and its students. Candidate must be active during the Pharm.D. III year.

Community Service Award—For a graduating student who has made significant contributions to community education.

Dean's Award—For a graduating student for contributions to the goals of the college.

Dean's Undergraduate Research Award—For a Pharm.D. I, II, or III student in recognition of outstanding achievement in research activities.

Ole Gisvold Medicinal Chemistry Award—For a graduating student with an exceptional record in all chemistry-related courses in the professional curriculum and potential for graduate study in medicinal chemistry.

Kappa Epsilon Award—For a student member who has rendered outstanding service to the college.

Kappa Psi Pharmacopa Awards—For the editors of *Pharmacopa*.

Kappa Psi Scholarship Award—For a graduating student member for scholastic performance.

Deborah A. Kasper Memorial Award—For the Pharm.D. I student who has contributed most to class *esprit de corps*.

Izaak M. Kolthoff Rho Chi Research Award—For a graduating student who has contributed to and shown promise of excellence in research in pharmaceutical science.

Lilly Achievement Award—For a graduating student who exemplifies scholastic and professional achievement, leadership ability, and ethical conduct.

McKesson Drug Company Award—For the president of the Academy of Students of Pharmacy.

McNeil Consumer Products Award—For the student who achieves the highest combined grade in pharmacy administration courses.

Merck Awards—For graduating students with outstanding scholastic achievement.

Metropolitan Professional Pharmacists Society Award—For the president of the College Board.

Minnesota Pharmacists Association (MPhA) Outstanding Student Award—For an outstanding Pharm.D. II student.

MPhA Patient Education Award—For a graduating MPhA/Academy of Students of Pharmacy student for skill and ability in public health education.

MPhA/Academy of Students of Pharmacy Award—For the president of the Academy of Students of Pharmacy.

Minnesota Society of Hospital Pharmacists Outstanding Student Award—For a graduating student (first professional degree) for scholastic excellence, contributions, and demonstrated leadership in hospital pharmacy.

Mylan Pharmaceuticals Excellence In Pharmacy Award—For a graduating student demonstrating academic achievement, high professional motivation, and superior proficiency in providing drug information services.

Pfizer Pharmaceuticals Community Pharmacy Internship Award—For a graduating student demonstrating excellence in community pharmacy internship.

Pharmacists Mutual Award—For a Pharm.D. I student for scholastic achievement and extracurricular involvement.

Pharmacy Alumni Society Graduating Student Award—For a graduating student for scholastic excellence and extracurricular involvement.

Pharmacy Alumni Society Nongraduating Student Award—For a Pharm.D. I, II, or III student demonstrating enthusiasm and the ability to stimulate personal and professional growth among others.

Phi Delta Chi Award—For a graduating student member for outstanding service to the fraternity and the college.

Phi Delta Chi Scholarship Award—For a student member for outstanding scholarship in the first professional year.

Phi Lambda Sigma Award—For the outstanding graduating member of Phi Lambda Sigma.

Rho Chi Award—For the Pharm.D. I student who has earned the highest GPA.

Roche Pharmacy Communications Award—For a graduating student for outstanding instructions and guidance to patients in a clinical practice.

SmithKline Beecham Patient Care Award—For a graduating student demonstrating superior achievement.

T. O. Soine Memorial Award—For a Pharm.D. II student who has made significant contributions by enhancing interstudent communication, stimulating class spirit, and serving the needs of the college and its students.

Carol Windisch Memorial Award—For a student member of the Alpha Chapter of Kappa Epsilon for service to the community and fraternity, scholastic achievement, extracurricular activities, and leadership ability.

F. J. Wulling Pharm.D. I Award—For the student with the second highest GPA.

F. J. Wulling Pharm.D. II Award—For the student with the highest GPA.

F. J. Wulling Graduating Student Award—For the graduating student with the highest GPA.

College of Pharmacy Policies

Pharmacy Student Code of Ethical Responsibility and Professional Behavior¹

Part I—The University of Minnesota Pharmacy Student Code of Ethical Responsibility and Professional Behavior (The Code) is established in the belief that central to any intellectual and professional endeavor is an atmosphere of mutual trust and respect, based on individual maintenance of community standards. Pharmacy education under a voluntary, individual system has a twofold obligation: to ensure observance of rules by its members and to report that its rules have been observed.

The hallmark of becoming a professional is that the individual is willing to undergo a transformation in awareness of his or her personal and social values, profess special personal and social values, and self-regulate his or her behavior and monitor the behavior of peers in terms of these special values.

It is not possible for a community to legislate morality, good sense, independence, learning, or judgment. Each of these is a matter of individual effort and discipline. However, an educational community can create an environment in which these attributes may be cultivated and allowed to flourish. Central to this environment is an awareness and an affirmation of the basic fact that every student's pharmacy education is the product of his or her own intellectual effort. Therefore, every student who enrolls and remains at the University of Minnesota College of Pharmacy understands that to submit work that is not his or her own or to default on clinical obligations violates the purpose and spirit of pharmacy education.

When presented with an allegation that there has been a violation of The Code, the Academic Standing Committee carefully considers all relevant factors, using procedural due process as a guide to its action. Strict confidentiality is observed. The administration is in no way involved in the evaluation of a case. It is to be understood that intellectual responsibility is internal and that the standards delineated in this statement may or may not be those of the individual. However, the precepts of a community must be respected by all members

of that community. The statement is planned as a broad outline of standards within which each student is expected to exercise her or his own judgment, the essence of any affirmative statement being each student's pledge that she or he will uphold that statement's principles.

Part II—In addition to the general principles of ethical conduct mentioned above, each student is bound by the following specific provisions as part of The Code:

- (1) Each student will respect intellectual and physical property and will not use such property without the owner's permission.
- (2) Each student recognizes that academic misconduct is unacceptable behavior for students in a professional school and is a violation of The Code. Academic misconduct includes, but is not limited to, falsification (willfully providing University offices or officials with false, misleading, or incomplete information); cheating on assignments or examinations; plagiarizing; altering, forging, or misusing a University academic record; taking and acquiring or using test materials without faculty permission.
- (3) Each student recognizes the right and obligation of the University of Minnesota College of Pharmacy faculty to establish and maintain high standards of academic performance. Examinations taken at the College of Pharmacy will represent the student's individual efforts only; the student will not use information provided during the examination by other individuals, notes, textbooks, or other references except as specified by the evaluator.
- (4) Each student recognizes that his or her primary responsibility while on clinical clerkships is the care of his or her patients and that the patients' welfare has precedence over a student's personal educational objectives. The student will respect each patient's privacy and dignity and will maintain confidentiality with regard to information about patients. Each student recognizes his or her responsibility to consult with the house staff, preceptor, or attending physician regarding each patient's management.

¹ Adapted from a similar statement adopted by the Medical School Student Council.

- (5) Each student recognizes that part of her or his clinical obligations includes providing coverage when assigned (e.g., at clinics, at night, or on weekends). When such an assignment is made, a student will abide by it or make suitable alternative arrangements with the faculty member who made the assignment. If a student is convinced that such an assignment is inappropriate, the matter must be discussed with the course coordinator.
- (6) A violation of The Code occurs and the Academic Standing Committee must so find if it concludes in a hearing, at which the student must be present, that
 - (a) based on all evidence it is clear and convincing that the act or acts alleged to have occurred did in fact occur, and
 - (b) such act or acts so found are prohibited by The Code.
- (7) Students found by the Academic Standing Committee to be guilty of a violation of The Code are subject to disciplinary action that will range from failure in the course to dismissal from the college.
- (8) Appeals of Academic Standing Committee decisions may be made by students to the President's Student Behavior Review Panel within ten days of the decision.

Part III—Upon accepting a class place in the University of Minnesota College of Pharmacy, each student will be asked to sign the following statement:

I hereby affirm that I have read and understand the provisions and stipulations of the University of Minnesota Pharmacy Student Code of Ethical Responsibility and Professional Behavior.

Each student who is unwilling to sign this statement is required to submit to the Academic Standing Committee for its approval a statement of his or her own, addressing the ethical responsibilities involved in academic conduct, examination policy, and patient care.

In the event that a student witnesses what she or he believes to be a violation of The Code by another student, that student may report her or his suspicions to a member of the Academic Standing Committee or to the course instructor.

Immunization Policy

Students born after 1956 who take more than one University class are required under Minnesota law to submit an Immunization Record form.

A second red measles and Hepatitis B immunizations are required of pharmacy students and must be documented.

Grading Policies

The College of Pharmacy uses the A-B-C-D-F (A-F) and satisfactory-no credit (S-N) grading systems. All required professional courses must be taken A-F unless S-N has been approved by the faculty for a particular course. General education courses may be taken S-N.

Instead of receiving letter grades, students may be assigned one of three registration symbols: W (withdrawal) for official cancellation of a course after the second week of the quarter; V (visitor) for noncredit registration as a visitor; and I (incomplete) for a course in which work will be completed by the end of the next quarter of residence. Students must make up incompletes by the end of the next quarter or the I changes to F or N.

A grade point average (GPA) is computed quarterly for each student, using a 4.00 scale. This GPA is printed on the student's official transcript. N grades, for which no grade points are awarded, are not computed into the University GPA. *However, the College of Pharmacy includes N grades in its calculations to monitor academic progress.* The college computes two separate GPAs for its students—the *overall GPA*, which includes all coursework completed since entering the College of Pharmacy, and the *required GPA*, which is based on required professional coursework completed in the college.

Academic Standing Policies

The Academic Standing Committee consists of four faculty members and one student. This committee meets regularly to monitor the academic progress of students, to consider petitions from students who wish to deviate from the established program requirements or have a requirement waived, and to adjudicate accusations of student misconduct. The following is a summary of the college's academic standing policies:

- (1) The committee periodically reviews the progress of students and can place students on probation at any time. Students on probation may be dismissed from the college if they are not making satisfactory academic progress. The committee informs students by mail of its actions.
- (2) Students who accumulate more than six credits of F, I, or N grades or more than a total of 12 credits of F, I, N, or D grades in required professional courses are not allowed to advance to the fall quarter of the next academic year. These students will be either dismissed from the college or, if their performance merits a second chance, required to repeat all courses for which they earned grades of F, I, or N. The committee may also require that these students repeat courses in which they received grades of D.
- (3) Students who repeat courses must reregister for the courses.
- (4) Students who have an *overall GPA* or *required GPA* of less than 2.00 are placed on probation. These students will be reviewed periodically and may be dismissed from the college if they are not making satisfactory progress.
- (5) Students who earn more than one F, I, or N grade in required courses in one academic year will be placed on probation and continued on probation for the academic year.
- (6) Students who fail a required professional course twice will be dismissed from the college.
- (7) Students who earn an F or I in more than one required clerkship will be placed on probation or dismissed from the college. Students cannot make further progress toward the degree until making up at least one of the required clerkships.
- (8) Students who are dismissed from the college and wish to appeal must present information that was not available at the time of their dismissal and has a direct bearing on their academic performance. This information must be presented to the associate dean within four weeks of the dismissal decision. If the associate dean decides the information is new and substantial, the Academic Standing Committee will reconsider the dismissal decision. Students who wish to be considered for readmission after the four-week period must apply through the admission application process.
- (9) Students must satisfactorily complete required professional courses and have a GPA (overall and required) of at least 2.00 before beginning externships or clerkships.
- (10) Students may have no more than four special examinations in prepharmacy coursework and/or course waivers in required pharmacy coursework.
- (11) A course waiver is in effect for six years from the date the course waiver form was signed.
- (12) The professional pharmacy program must be completed on a full-time, continuous basis. Students must petition the Academic Standing Committee if they wish to extend their programs (i.e., pursue a part-time course of study). Students must request a leave of absence if they will not be enrolled for a period of time in which required classes are scheduled.

Graduation Requirements

Degrees from the University of Minnesota are granted by the Board of Regents on the recommendation of the College of Pharmacy faculty. To be granted a degree, a student must

- (1) meet all prepharmacy course requirements (waived for students who have a B.S. in pharmacy from a college accredited by the American Council on Pharmaceutical Education);
- (2) meet all professional course requirements;
- (3) earn minimum overall and professional GPAs of 2.00;
- (4) complete 45 quarter credits in general education courses, including at least 8 credits of literary or artistic expression (waived for students who have a B.S. in pharmacy from a college accredited by the American Council on Pharmaceutical Education);
- (5) earn a minimum of 45 quarter credits, and at least 30 of the last 45 credits at the University of Minnesota; and
- (6) meet all financial obligations to the University.

Time Limit for Earning the Pharm.D. Degree

- (1) Students in the entry-level Pharm.D. program must complete all degree requirements within eight years of the time they first register for a professional course offered by the college.
- (2) Students in the postbaccalaureate Pharm.D. program must complete all degree requirements within six years of the time they first register for a professional course offered by the college. The required clerkships must be completed on a full-time basis.
- (3) An approved leave of absence is not counted in the time limit.
- (4) Students granted a leave of absence of three continuous quarters or less are entitled to meet only those graduation requirements for their original graduating class.

- (5) Students granted a leave of absence of more than three continuous quarters or more than one leave of absence of three continuous quarters or less, must meet the graduation requirements in effect at the time of graduation.

Chemical Dependency Policy

The University of Minnesota College of Pharmacy supports the efforts of chemically dependent students to become free of their dependency problems. In dealing with chemically dependent students, the college's procedure involves intervention and requiring students to join treatment and rehabilitation programs. This procedure was established to ensure the safety of patients with whom students may come in contact and to protect the interests of patients, students, the college, and faculty.

The following steps will be followed as soon as a student has been identified as having chemical dependency problems:

- (1) The student will be granted a medical leave of absence by the Academic Standing Committee if he or she is participating in educational activities that involve direct patient contact (e.g., clinical clerkships or externships). The request for a leave may be initiated by the student or the associate dean. Students participating in educational activities that do not involve direct patient contact are not required to take a medical leave of absence.
- (2) The associate dean will advise the student to enroll in a chemical dependency treatment program or a different mode of treatment contingent on the associate dean's approval. The student must provide the college with evidence of successful completion of the treatment program.
- (3) The associate dean will advise the student to join a sobriety support group, e.g., Pharmacists Aiding Pharmacists, after completion of the treatment program.
- (4) The student will be asked to give the associate dean permission to solicit letters of reference from counselors, employers, or members of the sobriety support group to monitor the progress of the student's rehabilitation program.

- (5) The student will be asked to agree to give urine samples at any time, without prior notification, for detection of drugs of abuse.
- (6) The associate dean will make recommendations to the Academic Standing Committee to terminate the student's medical leave of absence and allow the student to participate in educational activities that *do not* involve direct patient contact after obtaining evidence that the student has completed the treatment program and is participating in the rehabilitation program.
- (7) The associate dean will make recommendations to the Academic Standing Committee to permit the student to participate in educational activities involving direct patient contact after obtaining evidence that the student has been chemically free for at least ten weeks.
- (8) If the student is a licensed pharmacist and her or his license was suspended because of chemical dependency, lifting of the suspension by the State Board of Pharmacy may be used as evidence of sobriety and is a prerequisite for participation in educational activities involving direct patient contact. However, lifting of the license suspension does not obligate the college to allow the student to participate in educational activities that involve direct patient contact.
- (9) Office of Student Affairs staff are not required to report to the Academic Standing Committee on students who initiate information about a personal chemical dependency problem while being counseled. The staff may report such information to the associate dean.
- (10) The Academic Standing Committee may dismiss from the college students who have a recurrence of chemical dependency problems after completing the treatment and rehabilitation program described above.
- (11) If the student and the associate dean do not reach an agreement on a treatment and rehabilitation program, either may request a hearing by the Academic Standing Committee. The Academic Standing Committee will carefully consider all relevant factors, using procedural due process as a guide to its action. The student may appeal the Academic Standing Committee's decisions to the President's Student Behavior Review Panel within ten days of the decision.

Entry-level Pharm.D. Curriculum

The first three years of the curriculum provide the fundamental components of pharmacy education needed to practice in a variety of settings. Beginning in the second year, students focus on their anticipated career pathway by taking courses in one of four emphasis areas: general pharmacotherapy, community and ambulatory care, management, and research. The majority of emphasis-related courses are taken during the final year. The culmination of students' education is the seminar and thesis in the chosen emphasis area.

The curriculum is subject to change.

First Professional Year

(Course credits are listed in parentheses.)

Fall Quarter (14)

MedC 5151 Biochemistry of Medicinals I (4)
 Phar 5811 Pharmaceutical Care I (4)
 Phar 5865 Pharmacy Clerkship I (1)
 Phcy 5921 Pharmacy Lab I (1)
 Phmc 5450 Introduction to Drug Delivery (2)
 Phsl 3070 Neurophysiology (2)

Winter Quarter (18)

MedC 5152 Biochemistry of Medicinals II (4)
 Phar 5812 Pharmaceutical Care II (4)
 Phar 5865 Pharmacy Clerkship I (1)
 Phcy 5922 Pharmacy Lab II (1)
 Phmc 5451 Drug Delivery I (3)
 Phsl 5100 Systems Physiology (5)

Spring Quarter (18)

MedC 5161 Therapeutic Agents I (3)
 MedC 5170 Pharmaceutical Biotechnology (2)
 Phar 5821 Pharmacotherapy I (3)
 Phar 5830 Pharmacy and Health Care Systems (4)
 Phar 5865 Pharmacy Clerkship I (1)
 Phcy 5923 Pharmacy Lab III (1)
 Phmc 5452 Drug Delivery II (4)

Second Professional Year

Fall Quarter (18)

MedC 5162 Therapeutic Agents II (2)
 MedC 5172 Pharmaceutical Microbiology and Immunology (3)
 Phar 5832 Statistics and Drug Literature Evaluation (3)
 Phcl 5101 Pharmacology I (5)
 Phcy 5924 Pharmacy Lab IV (1)
 Phmc 5460 Pharmacokinetics (4)

Winter Quarter (18)

MedC 5163 Therapeutic Agents III (3)
 MedC 5164 Therapeutic Agents IV (3)
 Phar 5822 Pharmacotherapy II (4)
 Phar 5823 Pharmacotherapy III (3)
 Phar 5866 Pharmacy Clerkship II (1)
 Phcl 5102 Pharmacology II (3)
 Phcy 5925 Pharmacy Lab V (1)

Spring Quarter (17)

MedC 5165 Therapeutic Agents V (2)
 Phar 5824 Pharmacotherapy IV (2)
 Phar 5825 Pharmacotherapy V (5)
 Phar 5866 Pharmacy Clerkship II (1)
 Phmc 5471 Biopharmaceutics I (3)
 Phcy 5926 Pharmacy Lab VI (1)
 Emphasis area course (3)

Third Professional Year

Fall Quarter (12-18)

Phar 5826 Pharmacotherapy VI (5)
 Phar 5834 Pharmacy Practice Management (4)
 Phmc 5472 Biopharmaceutics II (2)
 Phcy 5927 Pharmacy Lab VII (1)
 Emphasis area courses (3-6)

Winter Quarter (15-18)

MedC 5174 Nutrition (4)
 Phar 5827 Pharmacotherapy VII (5)
 Phar 5828 Pharmacotherapy VIII (5)
 Phcy 5928 Pharmacy Lab VIII (1)
 Emphasis area course (1-3)

Spring Quarter (17)

Phar 5836 Ethical Issues in Pharmacy (2)
 Required externships or clerkships (15)

Fourth Professional Year

Summer Session

Required externships or clerkships
 Emphasis area courses

Fall Quarter

Phar 5838 Pharmacy and the Law (2)
 Required externships or clerkships
 Emphasis area courses

Winter Quarter

Required externships or clerkships
 Emphasis area courses

Spring Quarter

Required externships or clerkships
 Emphasis area courses

Emphasis Areas

The *general pharmacotherapy emphasis* prepares pharmacists for patient care activities in a variety of settings. Required classroom courses include therapeutic drug monitoring and over-the-counter drugs. Elective courses are available in areas such as clinical pharmacokinetics, new drug development process, and drug therapy for the elderly. Twenty additional weeks of externships and clerkships are required.

The *community and ambulatory care emphasis* prepares pharmacists to practice in community pharmacy and outpatient settings. Required courses include communications, community pharmacy management, over-the-counter drugs, and ambulatory care practice. Twenty additional weeks of clerkships are required.

The *management emphasis* prepares pharmacists for careers in managing pharmacy services and drug therapy benefits. Required courses include community or institutional management, drug use review and management, and pharmaceutical economics and public policy. Elective courses are available in areas such as business law, marketing, health economics, personnel management, and organizational behavior. Ten additional weeks of clerkships are required.

The *research emphasis* provides students the opportunity to participate in pharmaceutical research and prepares them for graduate education. Students plan individualized programs with faculty advisers. Twelve additional weeks of clerkships are required.

Emphasis area requirements

	General Pharmacotherapy	Community and Ambulatory Pharmacotherapy	Management	Research
Required courses	Phar 5850 (3) Phar 5851 (3)	Phar 5851 (3) Phar 5852 (4) Phar 5853 (3) Phar 5854 (4)	Phar 5852 (4) or Phar 5855 (4) Phar 5856 (3) Phar 5857 (3)	12 credits
Required experiential courses	10 credits	Phar 5843 (5) Phar 5860 (5) Phar 5861 (5) Phar 5862 (5)	Phar 5862 (5) or Phar 5863 (5) Phar 5864 (5)	12 credits
Elective courses	9 credits	none	15 credits	0-11 credits*
Elective experiential courses	10 credits	none	none	0-11 credits*
Seminar	Phar 5890 (2)	Phar 5891 (3)	Phar 5892 (2)	MedC 5190 (2) or Phmc 5490 (2) or Phar 5893 (2)
Thesis	Phar 5895 (2)	Phar 5896 (2)	Phar 5897 (2)	MedC 5195 (2) or Phmc 5495 (2) or Phar 5898 (2)

* Eleven credits required between elective and elective experiential courses. The experiential component consists of not less than one-third or more than two-thirds of the research emphasis. Thesis credits are considered experiential credits.

Postbaccalaureate Doctor of Pharmacy (Pharm.D.) Program

First-Year Postbaccalaureate

Additional professional courses may be required, including pharmacokinetics (Phmc 5680), biostatistics (Phar 5295), and immune diseases (Phar 5503).

Fall Quarter (15)

Phar 5306 Clinical Toxicology (2)
 Phar 5500 P/T Cardiovascular Diseases (4)
 Phar 5504 P/T Gastrointestinal Disorders (2)
 Phar 5505 P/T Kidney and Urinary Disorders (3)
 Career tracking electives (4)

Winter Quarter (15)

Phar 5506 P/T Fluid and Electrolyte Disorders and Shock (3)
 Phar 5507 P/T Neoplastic Diseases (2)
 Phar 5508 P/T Infectious Diseases (3)
 Phar 5514 P/T Clinical Nutrition (1)
 Phar 5516 P/T Endocrine and Reproductive Disorders (2)
 Career tracking electives (4)

Spring Quarter (16)

Phar 5308 Assessment of the Medicated Patient (1)
 Phar 5501 P/T Pulmonary Diseases (3)
 Phar 5502 P/T Nervous System (3)
 Phar 5509 P/T Psychiatric Disorders (3)
 Phmc 5685 Clinical Pharmacokinetics (2)
 Career tracking electives (4)

Second-Year Postbaccalaureate

The final year of the postbaccalaureate Pharm.D. program begins during the summer and consists of 48 credits of clerkships and a two-credit seminar (Phar 5307).

Required clerkships (20)

Phar 5550 Acute Care (12)
 Phar 5551 Pharmacokinetics (4)
 Phar 5552 Pediatrics (4)

Elective clinical clerkships (12-28)

See Phar 5553, 5555, 5556, 5559 course description.

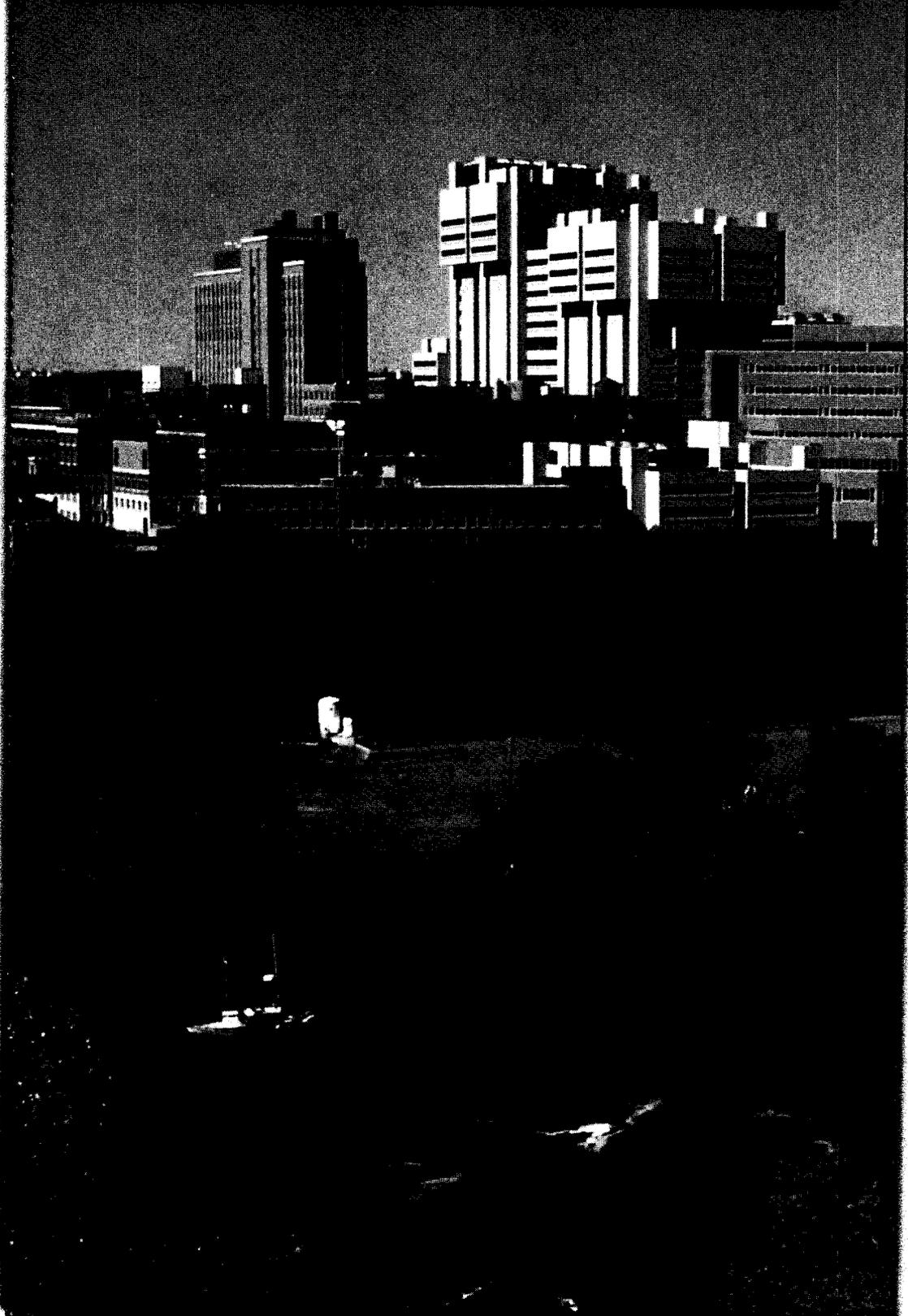
Elective non-clinical clerkships (0-16)

See Phar 5554, 5557, 5558 course description.

Career Tracking Electives

Pharmacy students must complete 12 credits of career tracking elective coursework. They may select courses from three career tracks: pharmacy management, research, and pharmacy clinical practice. Students completing all career tracking elective coursework in one career track will have a transcript notation indicating their area of emphasis.

Course Descriptions



COURSE DESCRIPTIONS

Course Symbols

, The comma, used in prerequisite listings, means "and."

§ ... Credit will not be granted if credit has been received for the course listed after this symbol.

¶ ... Concurrent registration is required (or allowed) in the course listed after this symbol.

... Approval of the instructor is required for registration.

A prerequisite course listed by number only (e.g., prereq 5246) is in the same department as the course being described.

A hyphen between course numbers (e.g., 3142-3143-3144) indicates a sequence of courses that must be taken and successfully completed in the order listed.

A class rank prerequisite (e.g., 3rd yr) states the minimum class standing a student must hold to register for a course without special permission from the Academic Standing Committee.

Course Descriptions

The college's courses are offered by three departments: Medicinal Chemistry, Pharmaceutics, and Pharmacy Practice. Medicinal chemistry courses (biochemistry of medicinals, therapeutic agents, biotechnology, microbiology/immunology) and pharmacology courses focus on understanding the actions and therapeutic uses of various types of medications that can affect organ systems, immune functions, and infections. Pharmaceutics courses (drug delivery, pharmacokinetics, biopharmaceutics) concentrate on principles involved in drug dosage formulations; dosage form design; and how drugs are absorbed, distributed, and eliminated from the body. The pharmacy practice pharmacotherapy sequence applies this basic information to the patient by focusing on the nature and cause of various disease states and the treatment of these disorders. The pharmaceutical care sequence examines the various roles of the pharmacist.

Entry-level Doctor of Pharmacy (Pharm.D.) Required Courses

MedC 5151. BIOCHEMISTRY OF MEDICINALS I.

(4 cr; prereq ¶Phcy 5921; A-F only) Ferguson Biochemistry topics required for understanding pharmacodynamic action and therapeutic use of medicinal agents.

MedC 5152. BIOCHEMISTRY OF MEDICINALS II.

(4 cr; prereq 5151, ¶Phcy 5922; A-F only) Portuguese Intermediary metabolism of carbohydrates, lipids, amino acids, and nucleic acids and how these pathways are affected by therapeutic agents.

MedC 5161. THERAPEUTIC AGENTS I. (3 cr; prereq 5152; A-F only) Hanna

Basic principles of drug design, metabolism, mechanisms of action, and receptor interaction.

MedC 5162. THERAPEUTIC AGENTS II. (pending faculty approval)

Therapeutic properties and uses of autonomic, anti-allergic, antihistaminic, cardiovascular, and renal drugs.

MedC 5163. THERAPEUTIC AGENTS III. (pending faculty approval)

Therapeutic properties and uses of drugs affecting the central nervous, endocrine, and intermediary metabolism systems.

MedC 5164. THERAPEUTIC AGENTS IV. (pending faculty approval)

Therapeutic properties and uses of anti-infective agents.

MedC 5165. THERAPEUTIC AGENTS V. (pending faculty approval)

Therapeutic properties and uses of antiviral and antineoplastic agents.

MedC 5170. PHARMACEUTICAL BIOTECHNOLOGY. (2 cr; prereq 5152; A-F only) Shier Biotechnology in the basic and clinical pharmaceutical sciences; monoclonal antibodies, recombinant DNA techniques, and preparation and use of biotechnology-derived agents in diagnosing and treating disease.

MedC 5172. PHARMACEUTICAL MICROBIOLOGY AND IMMUNOLOGY. (pending faculty approval)

Microbiology and immunology as they relate to basic and clinical pharmaceutical sciences, with emphasis on drug allergies, immunosuppressives, and the preparation of immunological agents in controlling and diagnosing disease.

MedC 5174. HUMAN NUTRITION AND DRUG THERAPY. (pending faculty approval)

Basic concepts of human nutrition and clinical application.

MedC 5180. MEDICINAL CHEMISTRY CLERKSHIP. (pending faculty approval)

Supervised research in medicinal chemistry.

MedC 5190. MEDICINAL CHEMISTRY RESEARCH SEMINAR. (pending faculty approval)

Contemporary topics in medicinal chemistry research.

MedC 5195. MEDICINAL CHEMISTRY RESEARCH THESIS. (pending faculty approval)

Final thesis describing medicinal chemistry research conducted.

COURSE DESCRIPTIONS

Phar 5811. PHARMACEUTICAL CARE I. (4 cr; prereq ¶Phcy 5921; A-F only) Cloyd
The pharmacy profession, drug information retrieval, professional communications, problem-solving skills.

Phar 5812. PHARMACEUTICAL CARE II. (4 cr; prereq 5811, ¶Phcy 5922; A-F only) Strand
Comprehensive pharmaceutical care, health belief model, legal issues, prescription processing.

Phar 5821. PHARMACOTHERAPY I. (3 cr; prereq 5812, ¶Phcy 5923; A-F only) Cipolle
Pathophysiology and pharmacotherapy of conditions in patients who receive pharmaceutical care from community pharmacists. Common medical indications for drug therapy and drug therapy problems. Prescription and nonprescription therapies.

Phar 5822. PHARMACOTHERAPY II. (pending faculty approval)
Pathophysiology and pharmacotherapy of common cardiovascular disorders.

Phar 5823. PHARMACOTHERAPY III. (pending faculty approval)
Pathophysiology and pharmacotherapy of common gastrointestinal and endocrine disorders.

Phar 5824. PHARMACOTHERAPY IV. (pending faculty approval)
Pathophysiology and pharmacotherapy of common pulmonary disorders.

Phar 5825. PHARMACOTHERAPY V. (pending faculty approval)
Pathophysiology and pharmacotherapy of common infectious diseases and toxicologic disorders.

Phar 5826. PHARMACOTHERAPY VI. (pending faculty approval)
Pathophysiology and pharmacotherapy of common renal, fluid, and electrolyte disorders.

Phar 5827. PHARMACOTHERAPY VII. (pending faculty approval)
Pathophysiology and pharmacotherapy of common central nervous system disorders.

Phar 5828. PHARMACOTHERAPY VIII. (pending faculty approval)
Pathophysiology and pharmacotherapy of common hematologic, oncologic, and immunologic disorders.

Phar 5830. PHARMACY AND THE HEALTH CARE SYSTEM. (4 cr; A-F only) Schondelmeyer
Delivery of pharmaceuticals and pharmacy services in the U.S. health care system, issues in hospital and community practice, characteristics of the pharmaceutical industry, economic and financial issues in delivering pharmaceutical services.

Phar 5832. STATISTICS AND DRUG LITERATURE EVALUATION. (pending faculty approval)
Biostatistical methods for data analysis and principles of study design for clinical research. Use of small computers to analyze and present data. Methods of searching for and evaluating drug-related information.

Phar 5834. PHARMACY PRACTICE MANAGEMENT. (pending faculty approval)
Principles of pharmacy management, including inventory control, purchasing, pricing, financial analysis, and personnel management.

Phar 5836. ETHICAL ISSUES IN PHARMACY. (pending faculty approval)
Nature and influences of moral and ethical considerations on decisions and actions in pharmacy practice.

Phar 5838. PHARMACY AND THE LAW. (pending faculty approval)
Minnesota and federal laws, rules, and court decisions affecting the practice of pharmacy. Legal control mechanisms, peer regulation, licensing, unprofessional conduct, labeling, drug distribution channels, the Cosmetic Act, and other regulations and topics.

Phar 5840. AMBULATORY CARE EXTERNSHIP. (pending faculty approval)
Combines didactic and experiential learning. Students assigned to participating community pharmacies and involved in community practice activities 40 hours per week for five weeks. Weekly seminar session.

Phar 5841. INSTITUTIONAL CARE EXTERNSHIP. (pending faculty approval)
Combines didactic and experiential learning. Students assigned to participating hospital pharmacies and involved in hospital practice activities 40 hours per week for five weeks. Students participate in pharmacy administration, drug distribution, IV and clinical services. Weekly seminar session.

Phar 5842. PRIMARY CARE CLERKSHIP. (pending faculty approval)
Supervised ten-week clinical pharmacy experience. Students attend clinical rounds, take medication histories, monitor drug therapy, provide patient education, and research patient-specific drug information questions.

Phar 5843. AMBULATORY CARE CLERKSHIP. (pending faculty approval)
Supervised five-week clinical pharmacy experience in a setting in which the primary focus is on ambulatory patients.

Phar 5844. PEDIATRICS CLERKSHIP. (pending faculty approval)
Supervised five-week clinical pharmacy experience in a pediatric setting. Students provide and manage appropriate pharmacotherapeutic interventions for pediatric patients. Understanding basic pharmacokinetic and pharmacodynamic differences between adult and pediatric patients.

Phar 5845. PATIENT CARE CLERKSHIP. (pending faculty approval)
Supervised five-week clinical pharmacy experience in various patient care settings. Specialties in adult, pediatrics, inpatient, community practice, cardiology, infectious diseases, geriatrics, nutrition, oncology, transplant, psychiatry, nephrology, home health care, epilepsy, and others.

Phar 5850. THERAPEUTIC DRUG MONITORING. (pending faculty approval)
Applying clinical pharmacokinetics and assay methodologies to patient care; assessing drug therapy outcomes.

COURSE DESCRIPTIONS

Phar 5851. OVER-THE-COUNTER DRUG FOCUS. (pending faculty approval)

Expands on over-the-counter information presented in Phar 5821. Diagnostic material and applications in caring for specific patients.

Phar 5852. COMMUNITY PHARMACY

MANAGEMENT. (pending faculty approval)
Management techniques needed in community pharmacy practice, with emphasis on marketing and service.

Phar 5853. PHARMACY PRACTICE IN

AMBULATORY SETTING. (pending faculty approval)
Current topics such as reimbursement and managed care and how they relate to pharmaceutical care in the community/ambulatory setting.

Phar 5854. COMMUNICATIONS FOR THE HEALTH SCIENCES. (pending faculty approval)

Communication models and theories as they relate to health services. Applying theoretical communications knowledge to practical situations with role playing and peer critique.

Phar 5855. INSTITUTIONAL PHARMACY

MANAGEMENT. (pending faculty approval)
Management techniques needed in various institutional pharmacy settings. Integrating distributive and clinical components of institutional practice.

Phar 5856. DRUG USE REVIEW AND

MANAGEMENT. (pending faculty approval)
Principles of drug use review in various health care settings, including optimizing quality and minimizing drug therapy.

Phar 5857. PHARMACEUTICAL ECONOMICS AND PUBLIC POLICY. (pending faculty approval)

Economic and public policy aspects of the U.S. health care system. Health economic principles and trends applied to the pharmaceutical market.

Phar 5860. COMMUNITY CLERKSHIP. (pending faculty approval)

Supervised five-week clinical pharmacy experience in a community pharmacy in which the primary focus is on patient care activities.

Phar 5861. ALTERNATIVE CARE SETTING CLERKSHIP. (pending faculty approval)

Supervised five-week experience in long-term care facilities, home IV therapy, and managed care.

Phar 5862. COMMUNITY PHARMACY MANAGEMENT CLERKSHIP. (pending faculty approval)

Supervised five-week experience using management techniques in a community pharmacy.

Phar 5863. INSTITUTIONAL PHARMACY MANAGEMENT CLERKSHIP. (pending faculty approval)

Supervised five-week experience using management techniques in an institutional setting.

Phar 5864. SPECIALIZED MANAGEMENT CLERKSHIP. (pending faculty approval)

Supervised five-week experience in community chain store management, community independent ownership, hospital management, chain corporate management, long-term care, managed care, wholesale management, industry marketing, industry sales management, or other management area.

Phar 5865. PHARMACY CLERKSHIP. (1 cr; prereq ¶Phcy 5921 fall, ¶Phcy 5922 winter, ¶Phcy 5923 spring; S-N only) Benson, Tomechko

Introduction to pharmacy practice. Students observe pharmacists in various roles and health care settings.

Phar 5866. PHARMACY CLERKSHIP. (1 cr; prereq 5812, 5865, ¶Phcy 5925 winter, ¶Phcy 5926 spring; S-N only) Benson, Tomechko

Introduction to pharmacy practice. Students observe pharmacists in various roles and health care settings.

Phar 5890. PHARMACOTHERAPY SEMINAR. (pending faculty approval)

Students present pharmacy-related topics to peers and faculty evaluators. Emphasizes preparation of a seminar or lecture, presentation of a professional image, and verbal communication skills.

Phar 5891. COMMUNITY AND AMBULATORY PHARMACOTHERAPY SEMINAR. (pending faculty approval)

Students present pharmacy-related topics to peers and faculty evaluators. Emphasizes communication skills.

Phar 5892. MANAGEMENT SEMINAR. (pending faculty approval)

Students present management-related topics to peers and faculty evaluators. Emphasizes preparation of a seminar or lecture, presentation of a professional image, and verbal communication skills.

Phar 5893. PHARMACY PRACTICE RESEARCH SEMINAR. (pending faculty approval)

Students present research to peers and faculty evaluators.

Phar 5895. PHARMACOTHERAPY THESIS. (pending faculty approval)

Final thesis describing patient care-oriented activities conducted.

Phar 5896. COMMUNITY AND AMBULATORY PHARMACOTHERAPY THESIS. (pending faculty approval)

Final thesis describing community and ambulatory patient care-oriented activities conducted.

Phar 5897. MANAGEMENT THESIS. (pending faculty approval)

Final thesis describing management-oriented activities conducted.

Phar 5898. PHARMACY PRACTICE RESEARCH THESIS. (pending faculty approval)

Final thesis describing patient care-oriented research conducted.

Phcy 5921. PHARMACY LABORATORY I. (1 cr; prereq ¶MedC 5151, ¶Phar 5811, ¶Phmc 5450; S-N only) Jafari
Integrating pharmacy curriculum in a lab setting.

Phcy 5922. PHARMACY LABORATORY II. (1 cr; prereq ¶MedC 5152, ¶Phar 5812, ¶Phmc 5451; S-N only) Jafari
Integrating pharmacy curriculum in a lab setting.

Phcy 5923. PHARMACY LABORATORY III. (1 cr; prereq ¶Phmc 5452, ¶Phar 5821; S-N only) Jafari
Integrating pharmacy curriculum in a lab setting.

Phcy 5924. PHARMACY LABORATORY IV. (pending faculty approval)
Integrating pharmacy curriculum in a lab setting.

Phcy 5925. PHARMACY LABORATORY V. (pending faculty approval)
Integrating pharmacy curriculum in a lab setting.

Phcy 5926. PHARMACY LABORATORY VI. (pending faculty approval)
Integrating pharmacy curriculum in a lab setting.

Phcy 5927. PHARMACY LABORATORY VII. (pending faculty approval)
Integrating pharmacy curriculum in a lab setting.

Phcy 5928. PHARMACY LABORATORY VIII. (pending faculty approval)
Integrating pharmacy curriculum in a lab setting.

Phmc 5450. INTRODUCTION TO DRUG DELIVERY. (2 cr; prereq ¶Phcy 5921; A-F only) Grant
Mathematics associated with dosage form design and drug dispensing; technology of common pharmaceutical dosage forms.

Phmc 5451. PRINCIPLES OF DRUG DELIVERY I. (3 cr; prereq 5450, ¶Phcy 5922; A-F only) Rippie
Phenomenological and theoretical bases of equilibrium and steady-state processes controlling drugs and dosage forms.

Phmc 5452. PRINCIPLES OF DRUG DELIVERY II. (4 cr; prereq 5451, ¶Phcy 5923; A-F only) Suryanarayanan
Phenomenological and theoretical bases of kinetic and dynamic processes controlling drugs and dosage forms.

Phmc 5460. PHARMACOKINETICS. (pending faculty approval)
Physiological basis for drug absorption, distribution, metabolism, and excretion; use of mathematical principles for designing dosage forms for individual patients.

Phmc 5471. BIOPHARMACEUTICS I. (pending faculty approval)
Applied theory of dosage form design for optimal drug activity and bioavailability (oral route).

Phmc 5472. BIOPHARMACEUTICS II. (pending faculty approval)
Applied theory of dosage form design for optimal drug activity and bioavailability (all routes other than oral).

Phmc 5480. PHARMACEUTICS CLERKSHIP. (pending faculty approval)
Supervised research in pharmaceuticals.

Phmc 5490. PHARMACEUTICS RESEARCH SEMINAR. (pending faculty approval)
Contemporary topics in pharmaceuticals research.

Phmc 5495. PHARMACEUTICS RESEARCH THESIS. (pending faculty approval)
Final thesis describing pharmaceuticals research conducted.

Contributing Departments

Phcl 5101. PHARMACOLOGY I. (5 cr; prereq 2nd-yr pharmacy student; A-F only) Dunham
Pharmacologic principles and actions of drugs.

Phcl 5102. PHARMACOLOGY II. (3 cr; prereq 5101; A-F only) Dunham
Pharmacologic principles and actions of drugs.

Phsl 3070. NEUROPHYSIOLOGY. (2 cr; prereq biochem, human anatomy; A-F only) Fohlmeister
Principles of nervous system function studied through neuroanatomy and neurophysiology.

Phsl 5100. SYSTEMS PHYSIOLOGY. (5 cr; prereq biochem, human anatomy; A-F only) Katz
Principles of physiology, circulation, respiration, digestion, excretion, metabolism, and endocrine gland function.

Postbaccalaureate Doctor of Pharmacy (Pharm.D.) Required Courses

Phar 5295. CLINICAL RESEARCH METHODS AND BIOSTATISTICS. (3 cr; A-F only) Gross
Introduction to biostatistical methods for data analysis and the principles of study design for clinical research. Use of small computers to analyze and present data.

Phar 5306. CLINICAL TOXICOLOGY. (2 cr; prereq 3rd-yr pharmacy student or #; A-F only) Sioris
Poison treatment and prevention, including managing poison emergencies, salicylate, acetaminophen, narcotic, tricyclic antidepressant, carbon monoxide, heavy metal, alcohol overdoses, drug dependence, and dangers of household products.

Phar 5307. PHARM.D. IV SEMINAR. (2 cr; prereq Pharm.D. IV student; S-N only)
Weekly student presentations of pharmacy-related topics to peers and faculty evaluators. Emphasizes preparation of a seminar or lecture, presentation of a professional image, and verbal communication skills.

Phar 5308. ASSESSMENT OF THE MEDICATED PATIENT. (2 cr; prereq 3rd-yr pharmacy student; S-N only)
Prepares student to systematically collect subjective and objective information from patients receiving or about to receive medications. Emphasis on approaches to monitoring efficacy and toxicity of drug therapy. Classroom and clinical experience in taking histories and measuring selected physical parameters.

Phar 5500. PATHOPHYSIOLOGY AND THERAPEUTICS: CARDIOVASCULAR DISEASES. (4 cr; prereq 3rd-yr pharmacy student; A-F only) Straka
Provides the foundation of pathophysiology of cardiovascular diseases required for comprehensive instruction in cardiovascular therapeutics. Pharmacologic approach to heart failure, arrhythmias, shock, and coronary artery disease.

COURSE DESCRIPTIONS

Phar 5501. PATHOPHYSIOLOGY AND THERAPEUTICS: PULMONARY DISEASES. (3 cr; prereq 3rd-yr pharmacy student; A-F only) O'Connell Pathophysiology of lung diseases; pharmacologic approach to pulmonary embolus, pneumonia, asthma, chronic obstructive airways disease, infections, tuberculosis, and lung cancer. Pharmacokinetics and therapeutic drug plans for major drugs used in treating pulmonary diseases.

Phar 5502. PATHOPHYSIOLOGY AND THERAPEUTICS: NERVOUS SYSTEM DISORDERS. (3 cr; prereq 3rd-yr pharmacy student; A-F only) Wolff Common disorders of the nervous system and how they influence drug therapy decisions. Clinical application of drug therapy principles for seizure disorders, Parkinsonism, strokes, and increased intracranial pressure.

Phar 5503. PATHOPHYSIOLOGY AND THERAPEUTICS: IMMUNE DISEASES. (2 cr; prereq 3rd-yr pharmacy student; A-F only) Canafax Current and future applied pharmacotherapeutic approaches to treating immune diseases.

Phar 5504. PATHOPHYSIOLOGY AND THERAPEUTICS: GASTROINTESTINAL DISORDERS. (2 cr; prereq 3rd-yr pharmacy student; A-F only) Guay Digestive system organs. Primary therapeutic and nutritional agents used to treat digestive system disorders and how these disorders affect drug therapy decisions.

Phar 5505. PATHOPHYSIOLOGY AND THERAPEUTICS: KIDNEY AND URINARY TRACT DISORDERS. (3 cr; prereq 3rd-yr pharmacy student; A-F only) Kidney and urinary tract disorders, including acute and chronic renal failure, glomerulonephritis, and urinary tract infections. Primary therapeutic methods used to treat hypertension and renal dysfunction and how these disorders affect drug therapy decisions.

Phar 5506. PATHOPHYSIOLOGY AND THERAPEUTICS: FLUID AND ELECTROLYTE DISORDERS AND SHOCK. (3 cr; prereq 3rd-yr pharmacy student; A-F only) Mann Principles of achieving fluid and electrolyte homeostasis, correcting acid-base abnormalities, regulating hemodynamics, optimizing oxygen transport and delivery, and treating shock. Primary therapeutic agents used to treat these disorders and parameters that affect drug therapy decisions.

Phar 5507. PATHOPHYSIOLOGY AND THERAPEUTICS: NEOPLASTIC DISEASES. (2 cr; prereq 3rd-yr pharmacy student; A-F only) Brundage Antineoplastic drug usage and the pharmacist's role in monitoring such therapy for patients with specific neoplasms. Appropriate supportive therapy for cancer patients.

Phar 5508. PATHOPHYSIOLOGY AND THERAPEUTICS: INFECTIOUS DISEASES. (3 cr; prereq 3rd-yr pharmacy student; A-F only) Rotschafer Taxonomy of bacteria and microbiologic procedures related to antibiotic therapy; antibiotic pharmacology and common disease states. Identify likely pathogens, select appropriate antibiotics, and identify appropriate action to monitor for efficacy and toxicity in the clinical setting.

Phar 5509. PATHOPHYSIOLOGY AND THERAPEUTICS: PSYCHIATRIC DISORDERS. (3 cr; prereq 3rd-yr pharmacy student; A-F only) Kern Symptomatology and pathophysiology of psychiatric and sleep disorders. Pharmacology, clinical use, and appropriate monitoring parameters of antidepressants, antipsychotics, lithium, and benzodiazepines.

Phar 5514. PATHOPHYSIOLOGY AND THERAPEUTICS: CLINICAL NUTRITION. (1 cr; prereq 3rd-yr pharmacy student; A-F only) Pihlstrom Current guidelines for using parenteral nutrition in the hospital and home setting in adult and pediatric patients. Small-group case discussions and lectures review drug-nutrient interactions and enteral nutrition.

Phar 5516. PATHOPHYSIOLOGY AND THERAPEUTICS: ENDOCRINE AND REPRODUCTIVE DISORDERS. (2 cr; prereq 3rd-yr pharmacy student; A-F only) Lackner Pathophysiology and therapeutics of endocrinology and metabolism, with emphasis on thyroid and adrenal abnormalities and diabetes. Physiology of reproduction, pregnancy, and pharmacologic effects. Drug use from before conception to postpartum.

Phar 5550. PHARMACY PRACTICE CLERKSHIP: ACUTE CARE. (12 cr; prereq Pharm.D. IV student, pharmacy intern; A-F only) Supervised 12-week clinical pharmacy experience in an adult inpatient setting at an affiliated hospital in the metropolitan area. Students attend clinical rounds, take medication histories, monitor drug therapy, provide patient education, and research patient-specific drug information questions.

Phar 5551. PHARMACY PRACTICE CLERKSHIP: CLINICAL PHARMACOKINETICS. (4 cr; prereq Pharm.D. IV student, pharmacy intern; A-F only) Supervised four-week clinical pharmacy experience participating in a pharmacy-based pharmacokinetic consulting service at an affiliated hospital. Students identify clinical situations in which basic pharmacokinetic principles can be applied to evaluate or improve drug therapy. Data collection, interpretation, and application.

Phar 5552. PHARMACY PRACTICE CLERKSHIP: PEDIATRICS. (4 cr; prereq Pharm.D. IV student, pharmacy intern; A-F only) Supervised four-week clinical pharmacy experience in a pediatric setting. Students provide and manage appropriate pharmacotherapeutic interventions for pediatric patients. Understanding basic pharmacokinetic and pharmacodynamic differences between adult and pediatric patients.

Phar 5553, 5555, 5556, 5559. PHARMACY PRACTICE CLERKSHIP: CLINICAL ELECTIVE I, II, III, IV. (4-16 cr; prereq Pharm.D. IV student, pharmacy intern; A-F only) Supervised clinical pharmacy experience in various patient care settings. Specialties in adult, pediatrics, inpatient, community practice, cardiology, infectious diseases, geriatrics, nutrition, oncology, transplant, psychiatry, nephrology, home health care, epilepsy, and others.

Phar 5554, 5557, 5558. PHARMACY PRACTICE CLERKSHIP: SPECIAL ELECTIVE I, II, III. (4-12 cr; prereq Pharm.D. IV student, pharmacy intern; A-F only) Administrative, research, technology, drug delivery, and specially designed electives. May also include coursework.

Phmc 5680. PHARMACOKINETICS. (3 cr; prereq 5620, Math 1221; A-F only) Zimmerman
Kinetics of drug absorption, distribution, metabolism, and excretion in humans. Pharmacokinetic basis for dosage regimen design. (Must be taken if pharmacokinetics course is not completed within two years of admission to the postbaccalaureate program.)

Phmc 5685. CLINICAL PHARMACOKINETICS. (2 cr; A-F only) Sawchuk
Applying knowledge of the time-course behavior of a drug in the body to safe and effective therapeutic management of individual patients in a clinical setting. Selected topics in clinical pharmacokinetic research.

College of Pharmacy Elective Courses

MedC 5200. NEW DRUG DEVELOPMENT. (1 cr)
Abul-Hajj
New drug development process in the U.S. pharmaceutical industry.

MedC 5202. NEW DRUG DEVELOPMENT. (2 cr)
Abul-Hajj
New drug development process in the U.S. pharmaceutical industry.

MedC 5495. VISTAS IN MEDICINAL CHEMISTRY RESEARCH. (1 cr; S-N only) Abul-Hajj
Selected topics of contemporary interest in medicinal chemistry research.

MedC 5710H. MEDICINAL CHEMISTRY SEMINAR. (1 cr; prereq #: A-F only) Staff
Seminar on contemporary topics in medicinal chemistry or pharmacognosy research.

MedC 5711H. NATURAL TOXINS. (2 cr; prereq #: A-F only; offered alt yrs) Shier
Structures and mechanisms of action of natural plant, animal, and microbial toxins. Roles of natural toxins as drugs; as experimental probes in biochemistry, pharmacology, and pathology; and in establishing animal models of human disease.

MedC 5712H. STEROID DRUGS. (2 cr; prereq #: A-F only; offered alt yrs) Abul-Hajj
Natural sources, chemistry, biosynthesis, actions, production, and therapeutic uses.

MedC 5714H. CHEMICAL ASPECTS OF DRUG METABOLISM AND BIOACTIVATION. (2 cr; prereq #: A-F only; offered alt yrs) Hanna
Chemical aspects of drug metabolism and toxicity. Biotransformation mechanisms of drugs and other xenobiotics.

MedC 5715H. ADVANCED CONCEPTS IN DRUG DESIGN. (2 cr; prereq #: A-F only; offered alt yrs)
R Johnson
Current approaches to rational drug design.

MedC 5970. DIRECTED STUDIES. (1-5 cr; prereq #)
Directed studies in medicinal chemistry.

MedC 5999. SPECIAL PROBLEMS. (Cr ar; prereq #)
Research in medicinal chemistry.

Phar 1001. ORIENTATION TO PHARMACY. (1 cr; S-N only) Benson
The pharmacist's role, issues faced by the pharmacy profession, and the University of Minnesota College of Pharmacy. (For prepharmacy students.)

Phar 5007. BIOLOGY OF AGING. (2 cr, §Dent 5070, §HSU 5031, §SAPh 5007) McKennell
Comparative biology and aging at molecular and cellular levels in various plant and animal systems. Emphasis on human biology, including pathobiology and theories of aging, nutrition, immunology, and a review of organ systems.

Phar 5009. MULTIDISCIPLINARY PERSPECTIVES ON AGING. (4 cr, §AdEd 5440, §CPsy 5305, §HSU 5009, §PA 5414, §PubH 5737, §Soc 5960, §SW 5024)
Biological, social, and psychological aspects of aging; theories of aging; death and bereavement; issues and problems of older adults in the United States; human services and their delivery systems; public policy and legislation; environments and housing; advocates; retirement.

Phar 5210. TERMINOLOGY OF THE HEALTH SCIENCES. (2 cr, §HSU 5210) McKennell
Programmed learning course with the most current usage and traditional components; the language of health care delivery.

Phar 5220. ETHICAL ISSUES IN PHARMACY. (2 cr; prereq pharmacy student. #) Morley
Nature and influences of moral and ethical considerations on decisions and actions in pharmacy practice.

Phar 5222. OVER-THE-COUNTER DRUG THERAPY. (3 cr; prereq Phcl 5101) J Johnson
Safe, effective, and economical use of over-the-counter medications and related devices (e.g., diagnostic tests, inhalers); their indications and available dosage forms.

Phar 5225. PRESCRIPTION PRODUCTS. (2 cr; prereq 5821; A-F only) Cipolle
Appropriate use of the most used prescription drug products in the United States, and monitoring of patients being treated with one or more of these products.

Phar 5232. DRUGS AND PRISON HEALTH. (2 cr; S-N only) Kingston
Drug use and abuse in correctional institutions.

Phar 5235. PHARMACEUTICAL ECONOMICS. (3 cr; prereq #) Hadsall
Economic aspects of the pharmaceutical industry and retail pharmacy. Market structure, demand, cost curves, pricing structure, regulation, innovation, social responsibility.

Phar 5280. CONTEMPORARY PHARMACY. (2 cr)
Seminar on contemporary pharmacy topics.

Phar 5290. SPECIALTY CLERKSHIPS. (1-12 cr; prereq #)
Advanced or specialty practice experience in a patient care setting. Provides students with experience in clinical, patient-oriented pharmacy services. Forty hours of on-site experience required for each credit.

COURSE DESCRIPTIONS

Phar 5291. SPECIALTY EXTERNSHIPS. (1-12 cr; prereq #)

Advanced or specialty practice experience in a patient care setting. Provides students with experience in drug distribution or pharmacy management and administration. Forty hours of on-site experience required for each credit.

Phar 5503. PATHOPHYSIOLOGY AND THERAPEUTICS: IMMUNE DISEASES. (2 cr; prereq 3rd-yr pharmacy student; A-F only) Canafax
Current and future applied pharmacotherapeutic approaches to treating immune diseases.

Phar 5512. PATHOPHYSIOLOGY AND THERAPEUTICS: EYE, EAR, NOSE, THROAT, AND SKIN DISORDERS. (1 cr; prereq 3rd-yr pharmacy student; A-F only) Larson

Pathophysiology of common eye, ear, nose, throat, and skin disorders; appropriate therapeutic approaches; monitoring techniques to ensure efficacy and minimize toxicity.

Phar 5513. PATHOPHYSIOLOGY AND THERAPEUTICS: ARTHRITIS AND RELATED DISORDERS. (2 cr; prereq 3rd-yr pharmacy student; A-F only) T Johnson

Pathophysiology and therapeutics of rheumatoid and osteoarthritis, rheumatoid variants, mixed connective tissue disease, lupus and drug-induced lupus, osteoporosis, osteomalacia, and Pagets disease.

Phar 5515. NEUROANATOMY. (1 cr; prereq 3rd-yr pharmacy student; S-N only) Graves
Basic neuroanatomy and neurophysiology for the health sciences student. Emphasis on terminology and preparation for more advanced courses. Self-study, videotape format.

Phar 5517. PHARMACOTHERAPY FOR THE ELDERLY. (2 cr; 3rd-yr pharmacy student; A-F only) Larson

Physiologic changes of aging; changes in drug disposition and specific concerns with drug use in the elderly.

Phar 5770H. HOSPITAL PHARMACY SEMINAR. (1 cr; prereq #; A-F only)

Contemporary topics in hospital pharmacy research.

Phar 5774H, 5775H, 5776H. PHARMACY AND ITS ENVIRONMENT I, II, III. (3 cr; prereq #; A-F only; offered alt yrs)

Cultural foundations of pharmacy. Development of present state of pharmacy practice. Social-psychological factors in drug use, abuse, or nonuse by the patient and practitioner. Role of the pharmacist as health practitioner within the profession and in relation to other health practitioners and the general public.

Phar 5777H, 5778H. HOSPITAL PHARMACY ADMINISTRATION I, II. (3 cr; prereq #; A-F only) Abramowitz, Daniels
Topics in hospital pharmacy administration.

Phar 5970. DIRECTED STUDIES. (1-5 cr; prereq #)
Directed studies in pharmacy practice.

Phar 5999. SPECIAL PROBLEMS. (Cr ar; prereq #)
Research in clinical practice.

Phmc 5681. BASIC PHARMACOKINETIC MODELING. (2 cr; prereq 5460 or 5680 with minimum grade of B; A-F only) Sawchuk
Computer simulation of compartmental and physiologic modeling in pharmacokinetics.

Phmc 5681H. BASIC PHARMACOKINETIC MODELING. (2 cr; prereq 5460 or 5680 with minimum grade of B; A-F only) Sawchuk
See Phmc 5681.

Phmc 5730H. PHARMACEUTICS SEMINAR. (1 cr; prereq #; A-F only)
Contemporary topics in pharmaceuticals research.

Phmc 5731H. INDUSTRIAL PHARMACY. (3 cr; prereq 5450, #; A-F only; offered alt yrs) Schultz
Design, manufacture, and evaluation of modern pharmaceutical dosage forms, including drug regulatory considerations. Preformulation studies, oral liquid and solid pharmaceutical dosage forms, optimization, regulatory affairs.

Phmc 5970. DIRECTED STUDIES. (1-5 cr; prereq #)
Directed studies in physical pharmacy, biopharmaceutics, or pharmacokinetics.

Phmc 5999. SPECIAL PROBLEMS. (Cr ar; prereq #)
Problems in formulating, producing, and evaluating pharmaceutical products.

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 Interim Associate Dean for Academic Affairs
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Thomas M. McKennell, M.A., Director

Faculty

** Recipient of the Horace T. Morse-Minnesota Alumni
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 Professor and Interim Head
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 Earl W. Dunham, Ph.D., Associate Professor
 Simon M. N. Efang, Ph.D.,
 Associate Professor
 David M. Ferguson, Ph.D., Assistant Professor
 *Patrick E. Hanna, Ph.D.,
 Professor and Director of Graduate Studies
 Deborah A. Kallick, Ph.D., Assistant Professor
 Dennis Larson, Ph.D., Assistant Professor
 Herbert T. Nagasawa, Ph.D., Professor
 Philip S. Portoghese, Ph.D., Professor
 Rory P. Rimmel, Ph.D., Associate Professor
 W. Thomas Shier, Ph.D., Professor
 Robert Vince, Ph.D., Professor
 Carston R. Wagner, Ph.D., Assistant Professor

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 *Ronald J. Sawchuk, Ph.D., Professor
 *Raj G. Suryanarayanan, Ph.D., Associate
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 Timothy S. Wiedmann, Ph.D.,
 Associate Professor
 *Cheryl L. Zimmerman, Ph.D.,
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(612/624-2112)

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Director of Professional Relations

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Doris A. Calhoun, B.S., Assistant Professor and

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University Information

Boynton Health Service

Boynton Health Service Building
625-8400

Child Care Center

1600 Rollins Avenue S.E.
627-4014

Counseling and Consulting Services

109 Eddy Hall
624-3323

Continuing Education and Extension/ University College

101 Wesbrook Hall
625-3333

Financial Aid

2-693 Moos Tower
(health professions office)
624-1665

Housing

Comstock Hall East
624-2994

Student Relations, Transcripts

150 Williamson Hall
625-5333

Registration Center

202 Fraser Hall
625-5333

Student Accounts Receivable

20 Fraser Hall
625-8500

University Information

625-5000

Publications

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This publication is available in alternative formats upon request. Please contact the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008; e-mail: admissions@tc.umn.edu).

This bulletin also is available in electronic format on Internet and may be accessed via Gopher.

As a College of Pharmacy student, you are responsible for all information in this bulletin that is pertinent to your pharmacy education. In addition, you should be aware of information in the following sources that may affect you.

Class Schedule—This quarterly publication is distributed with pharmacy registration materials and lists day school courses complete with hours, rooms, instructors, prerequisites, registration instructions, examination fees, maps, grading definitions, and other useful information.

Other Bulletins—Evening and summer courses are listed in the *Continuing Education and Extension/University College Classes Bulletin* and *Summer Session Bulletin*, respectively. Bulletins are also published for other University colleges. Most can be obtained in the Office of Admissions, 240 Williamson Hall, or by calling (612) 625-2008.

Policies

Equal Opportunity—The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

In adhering to this policy, the University abides by the Minnesota Human Rights Act, Minnesota Statute Ch. 363; by the Federal Civil Rights Act, 42 U.S.C. 2000e; by the requirements of Title IX of the Education Amendments of 1972; by Sections 503 and 504 of the Rehabilitation Act of 1973; by the Americans With Disabilities Act of 1990; by Executive Order 11246, as amended; by 38 U.S.C. 1212, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

Inquiries regarding compliance may be directed to the Office of Equal Opportunity and Affirmative Action, University of Minnesota, 419 Morrill Hall, 100 Church Street S.E., Minneapolis, MN 55455 (612/624-9547).

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. (Exceptions under the law include state and federal educational and financial aid institutions.) The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information—name, address, electronic (e-mail) address, telephone number, dates of enrollment and enrollment status (full time, part time, not enrolled, withdrawn and date of withdrawal), college and class, major, adviser, academic awards and honors received, and degrees earned—is considered public or directory information. Students may prevent the release of public information only during their terms of enrollment. To do so, they must notify the records office on their campus.

Students have the right to review their educational records. The regents' policy, including a directory of student records, is available for review at 150 Williamson Hall, Minneapolis, and at records offices on other campuses of the University. Questions may be directed to the Office of the Registrar, 150 Williamson Hall (612/625-5333).

Extracurricular Events—No extracurricular events requiring student participation may be scheduled from the beginning of study day to the end of finals week. Exceptions to this policy may be granted by the Senate Committee on Educational Policy. The Senate advises all faculty that any exemption granted pursuant to this policy shall be honored and that students who are unable to complete course requirements during finals week shall be provided an alternative and timely opportunity to do so.

Smoke-Free Campus Policy—Smoking is prohibited in all facilities of the University of Minnesota, Twin Cities campus except for designated private residence hall rooms.

Interstate 94 construction

Interstate 94 will be under construction through fall 1996. For current road information, call the Minnesota Department of Transportation hotline, (612) 582-1539.

**College of Pharmacy Office,
5-110 Health Sciences Unit F**

**University of Minnesota
Twin Cities
East Bank**

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Allied Health Programs

UNIVERSITY OF MINNESOTA

BULLETIN

1995 - 1997



*Medical Technology
Mortuary Science
Occupational/Physical
Therapy*

Allied Health Programs

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Resources

This biennial bulletin focuses on undergraduate offerings in medical technology, mortuary science, and occupational and physical therapy on the Twin Cities campus of the University of Minnesota.

The *Class Schedule*, distributed with registration materials before the registration period each quarter, lists course offerings with prerequisites, class hours, rooms, and instructors. It also includes registration instructions, final exam schedules, and other useful information.

Information about evening courses and summer school offerings is contained in the *Extension Bulletin* and *Summer Session Bulletin*, respectively.

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U.S.C. 2012, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

Inquiries regarding compliance may be directed to the Office of Equal Opportunity and Affirmative Action, University of Minnesota, 419 Morrill Hall, 100 Church Street S.E., Minneapolis, MN 55455 (612/624-9547).

Immunization—Students born after 1956 who take more than one University class are required under Minnesota law to submit an Immunization Record form.

The form, which is sent along with the official University admission letter, must be filled out and returned to Boynton Health Service within 45 days of the first term of enrollment in order for students to continue registering for classes at the University. Complete instructions accompany the form.

Extracurricular Events—No extracurricular events requiring student participation may be scheduled from the beginning of study day to the end of finals week. Exceptions to this policy may be granted by the Senate Committee on Educational Policy. The Senate advises all faculty that any exemption granted pursuant to this policy shall be honored and that students who are unable to complete course requirements during finals week shall be provided an alternative and timely opportunity to do so.

Smoke-Free Campus Policy—Smoking is prohibited in all facilities of the University of Minnesota, Twin Cities campus except for designated private residence hall rooms.

Introduction



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Student Development & Athletics
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Research and Acting Dean of the Graduate
School
Melvin George, Vice President for Institutional
Relations
Mark B. Rotenberg, General Counsel

Campus Contacts

Medical Technology: Karen Karni, University
of Minnesota, Box 609 UMHC, 420 Delaware
Street S.E., Minneapolis, MN 55455. Offices at
15-170 Phillips-Wangensteen Building
(612/625-9490).

Mortuary Science: John M. Kroshus,
University of Minnesota, Box 740 UMHC, 420
Delaware Street S.E., Minneapolis, MN 55455.
Offices at A275 Mayo, 401 Church Street S.E.
(612/624-6464).

Occupational Therapy: Judith Reisman,
University of Minnesota, 277 Children's
Rehabilitation Center, 426 Church Street S.E.,
Minneapolis, MN 55455 (612/626-5887).

Physical Therapy: James R. Carey, University
of Minnesota, 377 Children's Rehabilitation
Center, University of Minnesota, 426 Church
Street S.E., Minneapolis, MN 55455
(612/626-5303).

Overview

This bulletin contains information about the
following undergraduate programs in the health
sciences at the University of Minnesota:
medical technology, mortuary science,
occupational therapy, and physical therapy.
Also included is information about several
related undergraduate health sciences offerings.
Graduate programs are described in the
Graduate School Bulletin.

The University of Minnesota health sciences
are academic and service units including the
Schools of Dentistry, Medicine, Nursing, and
Public Health; the Colleges of Pharmacy and
Veterinary Medicine; University of Minnesota
Hospital and Clinic (UMHC); and many
programs within these schools. The health
sciences units share a three-fold mission of
service, education, and research.

Health sciences facilities are located in a
complex of buildings on the East Bank of the
Minneapolis campus, including the Mayo
Memorial Building, Malcolm Moos Health
Sciences Tower, Health Sciences Unit F, and
the Phillips-Wangensteen Building. Close to or
connected with the complex are several
facilities of the Jackson-Owre-Millard-Lyon
quadrangle, University of Minnesota Hospital
and Clinic, Variety Club Heart Hospital,
Masonic Cancer Center, Dwan Variety Club
Cardiovascular Research Center, Veterans of
Foreign Wars Cancer Research Center, and
Children's Rehabilitation Center. Extensive
resources and services of the Bio-Medical
Library, including the Learning Resources
Center, are housed in Diehl Hall.

These facilities provide clinical learning,
research, and internship sites for many students.
The hospitals are excellent research centers, not
only for studying diseases, healthy

physiological processes, and environmental health problems, but also for developing new procedures and delivering expert health care. The proximity of the health sciences units to each other and to the rest of the campus facilitates interdepartment communication and underscores the interdisciplinary nature of health professions. The health sciences units also maintain affiliations with many hospitals and other health care facilities around the Twin Cities, which afford students access to a wide spectrum of health care situations.

Admission

Each health sciences unit sets its own standards and requirements for admission. All units, however, require a strong background in the natural sciences (specifically biology, anatomy, and physiology), as well as in the social and behavioral sciences. They also strongly recommend that applicants be keenly and genuinely interested in human services and that they be sincerely committed to promoting the health and general welfare of the community.

Students generally enter the programs described in this bulletin at the beginning of their junior year, after they have completed the required preprofessional courses. To discourage students from focusing too narrowly on a field of specialization and to ensure that all students will receive a broad general education in the liberal arts, certain minimum requirements in several liberal arts categories have been established. To qualify for admission to most of the professional programs, students are expected to complete these group distribution requirements as specified in the individual program sections of this bulletin. In addition, students must complete specified preprofessional courses, some of which fulfill group distribution requirements.

Students already enrolled at the University in day school and seeking admission to one of these programs should obtain an Application for Change of College or Status from the Office of the Registrar, University of Minnesota, 150 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455. Students from outside the University should obtain an Application for Undergraduate Admission from the Office of

Admissions, 240 Williamson Hall. Application procedures and admission standards for individual units are described in the individual program sections of this bulletin.

Students planning to enroll in one of the programs described in this bulletin should begin their planning early. Advisers are available in the College of Liberal Arts Pre-Health Sciences Advising Office to help.

Planning to Transfer?

Minnesota's public colleges and universities are working to make transfer easier. You can help if you PLAN AHEAD, ASK QUESTIONS, and USE PATHWAYS created by transfer agreements.

Preparing for Transfer

If you are currently enrolled in a college or university:

- Discuss your plans with the Pre-Health Science Advising Center, 30 Johnston Hall, (612) 624-9006.
- Call or visit your intended transfer college. You should obtain the following materials and information:
 - college catalog
 - transfer brochure
 - information on admissions criteria and on materials required for admission (e.g., portfolio, transcripts, test scores). Note that some majors have limited enrollments or their own special requirements such as a higher GPA
 - information on financial aid (how to apply and by what date).
- After you have reviewed these materials, make an appointment to talk with an adviser/counselor in the college or program you want to enter. Be sure to ask about course transfer and admission criteria.

If you are not currently enrolled in a college or university, you might begin by meeting with a transfer specialist or an admission officer at your intended transfer college to plan the steps you need to take.

Understanding How Transfer of Credit Works

- The receiving college or university decides what credits transfer and whether those credits meet its degree requirements. The accreditation of both your sending and your receiving institution can affect the transfer of the credits you earn.
- Institutions accept credits from courses and programs like those they offer. They look for similarity in course goals, content, and level. “Like” transfers to “like.”
- Not everything that transfers will help you graduate. Baccalaureate degree programs usually count credits in three categories: general education, major/minor courses and prerequisites, and electives. The key question is, “Will your credits fulfill requirements of the degree or program you choose?”
- If you change your career goal or major, you might not be able to complete all degree requirements within the usual number of graduation credits.

Applying for Transfer Admission

- Application for admission is always the first step in transferring. Fill out the application as early as you can before the deadline. Enclose the application fee. (The occupational and physical therapy programs have an additional admissions application fee.)
- Request that official transcripts be sent from every institution you have attended. You might be required to provide a high school transcript or GED test scores as well.
- Recheck to be certain you supplied the college or university with all the necessary paperwork. Most colleges make no decisions until all required documents are in your file.
- If you have heard nothing from your intended college of transfer after one month, call to check on the status of your application.
- After the college notifies you that you have been accepted for admission, your transcribed credits will be evaluated for

transfer. A written evaluation should tell you which courses transfer and which do not. How your courses specifically meet degree requirements may not be decided until you arrive for orientation or have chosen a major.

- If you have questions about your evaluation, call the Office of Admissions and ask to speak with a credit evaluator. Ask why judgments were made about specific courses. Many concerns can be cleared up if you understand why decisions were made. If not satisfied, you can appeal. See “Your Rights as a Transfer Student” below.

Your Rights as a Transfer Student

- A clear, understandable statement of an institution’s transfer policy.
- A fair credit review and an explanation of why credits were or were not accepted.
- A copy of the formal appeals process.

Usual appeals steps are: 1) Student fills out an appeals form. Supplemental information you provide to reviewers—a syllabus, course description, or reading list—can help. 2) Department or committee will review. 3) Student receives, in writing, the outcome of the appeal. 4) Student can appeal decision to the director of the program to which you are applying.

- At your request, a review of your eligibility for financial aid or scholarships.

For help with your transfer questions or problems, see a pre-health sciences adviser.

Expenses

Tuition assessed at the University generally changes annually, subject to approval by the regents. The most up-to-date information about tuition and other fees, including the student services fee, appears in the quarterly *Class Schedule*. All tuition and fee charges are subject to change.

Students in some programs should plan for additional expenses, such as charges for uniforms, special equipment, and insurance. These program-related expenses are described in the individual program sections of this bulletin.

Financial Aid

The Office of Scholarships and Financial Aid (OSFA) offers students financial assistance, including financial advising.

For most financial aid programs, students should submit application materials in January or February to be eligible for aid the following fall. Most aid programs require a completed American College Testing-Family Financial Statement (ACT-FFS) and a supplemental form, which is only available from OSFA. Most aid is awarded on the basis of financial need and the availability of funds. For more information, contact the Office of Scholarships and Financial Aid, 210 Fraser Hall, 106 Pleasant Street S.E., Minneapolis, MN 55455 (612/624-1665).

The Office of Human Resources Student Employment Center posts job vacancies and refers qualified students for interviews for a variety of on- and off-campus jobs. The center is located in 120 Fraser Hall, Minneapolis campus (612/624-8070).

Residency and Reciprocity

Residence—Because the University is a state institution, Minnesota residents pay lower tuition than nonresidents and, in many programs, receive priority consideration for admission. To qualify for resident status, students must reside in Minnesota for at least one calendar year before the first day of class attendance. For more information, contact the Resident Classification and Reciprocity Office, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-6330), or the residency office on your campus.

Reciprocity—The University has reciprocity agreements with North Dakota, South Dakota, Wisconsin, and Manitoba. If you are a resident of any of these states or this province, you may qualify for reciprocity tuition rates, which are lower than nonresident tuition rates and, in some cases, comparable to resident rates. For more information, contact the Resident Classification and Reciprocity Office, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-6330), or the residency office on your campus.

Some programs limit nonresident enrollment. Consult the individual program sections of this bulletin for details.

Health Sciences Student Services

Pre-Health Sciences Advising—The College of Liberal Arts Pre-Health Sciences Advising Center, 30 Johnston Hall, is a centralized resource offering a wide range of services to University students and others. Health sciences specialists offer academic advising services such as assistance with course planning and registration, evaluation of coursework already completed, and information about admission requirements and application or testing procedures. Specialists also assist individuals in exploring various health care fields and careers. Programs on topics relating to health sciences majors and careers are sponsored throughout the year.

A health sciences library is available in 30 Johnston Hall. It contains a collection of bulletins from schools throughout the country with health-related programs, videotapes from many health sciences schools, occupational files with information about health sciences professions, and general reference materials about health care fields.

For more information or to arrange an advising appointment, call (612) 624-9006.

Minority Program—The Health Sciences Minority Program (HSMP) is committed to the recruitment and retention of minority persons who come from groups underrepresented in the health professions. At the undergraduate level, the program provides summer enrichment programs and a minority pre-health sciences student organization. Advising and special classes are offered through the Martin Luther King Center.

Special services offered by the Health Sciences Minority Program include one-to-one advising, interviews with health sciences faculty, scholarships for entrance test preparation programs, and training for admissions interviews. The Health Sciences Minority Program will also provide information on a variety of health careers and their admission requirements and competitiveness.

For students with special interests, short-term research experiences can be arranged.

The office is at 1-125 Moos Tower, 515 Delaware St. S.E., (612) 624-9400.

Council for Health Interdisciplinary Participation—The Council for Health Interdisciplinary Participation (CHIP) is an interdisciplinary student service organization dedicated to enhancing the quality of life and education of students in dentistry, medicine, nursing, pharmacy, public health, veterinary medicine, and the allied health sciences. Activities include noontime lectures, evening workshops, and weekend symposia in areas such as bioethics, international health, alternative health care, and women's issues. CHIP publishes a monthly newsletter featuring announcements of upcoming health sciences events, volunteer opportunities, and articles about topics of current interest to students. CHIP headquarters are located in an informal, comfortable lounge at 1-425 Moos Health Sciences Tower. For more information, call (612) 625-7100.

Academic Policies and Regulations

Grading—Students have a choice of two grading systems: A-B-C-D-F or Satisfactory-No Credit (S-N). Each academic unit determines which courses, and what percentage of courses, its students can take under the S-N system. Some courses, usually required preprofessional and professional courses, may be taken A-F only; others may be taken under either system. See the appropriate program section of this bulletin for grading regulations in a specific program. The quarterly *Class Schedule* contains detailed information on grading policies and practices.

Grade Reports and Transcripts—The academic records of all health sciences students on the Twin Cities campus are maintained by the Office of the Registrar. These records show all courses for which students were registered beyond the second week of each quarter and the grades or symbols earned for those courses. Transcripts are available on request from Transcripts, University of Minnesota, 155 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455.

Academic Standing—Each academic unit establishes its own criteria and procedures for monitoring students' academic progress and determining whether students are progressing satisfactorily toward a degree. In most units, students must maintain a 2.00 grade point average (GPA) and satisfy certain other criteria. For information about the policies and procedures of the individual units, see the program sections of this bulletin.

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. (Exceptions under the law include state and federal educational and financial aid institutions.) The policy also permits students to review their educational records and to challenge the contents of those records.

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Grievance Procedures and Appeals—Students who have complaints or criticism about the content or conduct of a course have recourse through well-established grievance procedures. Students are expected to confer first with the course instructor. If no satisfactory solution is reached, the complaint should be presented to the department, school, or program head. If these informal processes fail to reach a satisfactory resolution, the department's committee on academic freedom and responsibility will be assembled to hear the

evidence. Further appeals go to college-level and University-level committees.

Staff advisers in the college offices are competent sources for interpretation of college procedures or regulations, and they can often suggest suitable alternatives when a problem is involved.

Other sources of assistance include the Student Ombuds Service (102 Johnston Hall), a student-fee-supported service that helps students resolve problems, and the CLA Student Intermediary Board, the college's official student organization (101 Johnston Hall).

Using the Course Descriptions

The course descriptions in this bulletin are primarily for courses offered by the health sciences academic units and taught by members of the program faculty or by cooperating faculty from other educational units of the University. Descriptions of courses offered by the individual units appear at the end of the program sections of this bulletin. Meeting hours, days, and rooms for these courses are listed in the quarterly *Class Schedule*.

For complete listings and descriptions of courses taught by other educational units of the University, see the bulletins of those units.

Course Numbers and Symbols—Courses primarily for freshmen and sophomores are numbered 1000 through 1998; for juniors and seniors, 3000 through 3998; for juniors, seniors, and graduate students, 5000 through 5998. Courses numbered 8000 and above are open only to graduate students. The following symbols are used throughout the descriptions:

- , The comma, used in prerequisite listings, means "and."
- † All courses preceding this symbol must be completed before credit will be granted for any quarter of the sequence.
- § Credit will not be granted if credit has been received for the course listed after this symbol.
- ¶ Concurrent registration is required (or allowed) in the course listed after this symbol.
- # Approval of the instructor is required for registration.
- Δ Approval of the department offering the course is required for registration.
- Approval of the college offering the course is required for registration.

A prerequisite course listed by number only (e.g., prereq 5246) is in the same department as the course being described.

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.

Freshman Liberal Education Requirements

(effective fall 1994 and later for freshmen enrolling with fewer than 39 credits)

A liberal education introduces you to the modes of inquiry and subject matter of the major branches of knowledge, including the factual information and theoretical or artistic constructs that form their foundations; the "ways of knowing"—the kinds of questions asked and how insight, knowledge, and data are acquired and used; the changes over time of their central ideas or expressive forms; and the interrelationships among them and with human society in general. To these ends, study by all undergraduate students on the Twin Cities campus is guided by a common framework.

The Diversified Core Curriculum

Physical and Biological Sciences. Comprehension of physical and biological principles; understanding of and ability to use the methods of scientific inquiry—the ways in which scientists investigate physical and biological phenomena; and appreciation of the importance of science and the value of a scientific perspective.

Requirement: A minimum of three courses totaling at least 12 credits, including one course with a laboratory or field experience in the physical sciences and one course with a laboratory or field experience in the biological sciences.

History and Social Sciences. Knowledge of how historians and social scientists describe and analyze human experiences and behavior; study of the interrelationships among individuals, institutions, structures, events, and ideas; understanding of the roles individuals play in their historical, cultural, social, economic, and political worlds.

Requirement: A minimum of three courses totaling at least 12 credits, including one course with historical perspective.

Arts and Humanities. Understanding of approaches to the human condition through works of art, literature, and philosophy; knowledge of how artists create and humanistic scholars think; ability to make aesthetic judgments.

Requirement: A minimum of three courses totaling at least 12 credits including courses in two of the following: literature, philosophical perspective, and visual or performing arts.

Mathematical Thinking. Acquisition of mathematical modes of thinking; ability to evaluate arguments, detect fallacious reasoning, and evaluate complex reasoning chains; appreciation of the breadth of applications of mathematics and its foundations.

Requirement: A minimum of one course totaling at least four credits.

The Designated Themes of Liberal Education

The designated themes of liberal education offer a dimension to liberal learning that complements the diversified core curriculum. Each of the themes focuses on an issue of compelling importance to the nation and the world, the understanding of which is informed by many disciplines and interdisciplinary fields of knowledge.

Requirement: A minimum of six courses (or five courses if one includes an approved practicum), including one course in each of the following:

Cultural Diversity. Understanding of the roles gender, ethnicity, and race play in structuring the human experience in and developing the social and cultural fabric of the United States.

International Perspectives. Comprehension of the ways in which you are part of a rapidly changing global environment dominated by the internationalization of most human endeavors.

Environment. Knowledge of the interaction and interdependence of the biophysical systems of the natural environment and human social and cultural systems.

Citizenship and Public Ethics. Reflection on and determination of a clearer sense of your present and future civic relationships and your obligations to the community.

Writing Skills

The ability to communicate effectively is a hallmark of a liberally educated individual and a key to a successful and satisfying life. To encourage refining of writing skills, the liberal education curriculum includes both writing courses and writing across the curriculum.

Requirement: All students will complete the writing requirement specified by the college awarding their baccalaureate degree.

You may satisfy the liberal education requirements with a number of courses and credits different from those of other students because some courses serve multiple goals in the curriculum; e.g., some courses will satisfy a diversified core requirement and a designated theme requirement, and other courses will satisfy the requirements for each of two themes. Thus, you may satisfy the designated theme requirements with a smaller number of courses than is stated in the requirement. Each quarter, the *Class Schedule* will publish the requirements and list all courses that satisfy them. In addition, the *Class Schedule* will list which of these courses are offered that quarter and which are tentatively scheduled for the subsequent quarters during the academic year.

Medical Technology



General Information

Development and Objectives

The program in medical technology was established at the University of Minnesota in 1922 to prepare men and women for professional work in clinical laboratory science and for advanced study in the basic sciences and laboratory medicine. This program attempts to provide both a strong foundation in basic sciences and experience in the clinical laboratory.

The medical technologist performs various diagnostic procedures used in the detection, diagnosis, treatment, and monitoring of disease. Using reagents and complex procedures and instruments, technologists analyze blood and other body fluids. They identify organisms that cause disease, determine blood compatibility, detect coagulation disorders, and identify blood cells.

As a general rule, a student who has excelled in scientific subjects in high school will succeed in medical technology.

As complexities of clinical laboratories increase, many medical technologists specialize in blood banking, hematology, microbiology, chemistry, immunology, virology, coagulation, administration, computer science, education, quality assurance, and other areas. There are opportunities for graduates to work in hospital laboratories, clinics, physician offices, public health agencies, research, and industry.

The program is fully accredited by the National Accrediting Agency for Clinical Laboratory Sciences, 8410 West Bryn Mawr, Suite 670, Chicago, IL 60631 (312/714-8880).

Admission

The curriculum in medical technology consists of the preprofessional program in the College of Liberal Arts or its equivalent at another regionally accredited institution 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 (or their equivalent at another institution). For complete information, consult the *College of Liberal Arts Bulletin*.

Qualified applicants may enter the College of Liberal Arts at the beginning of any quarter, but the sequence outlined is based on entrance to the professional program in the fall quarter of year three or four, depending on completion of prerequisites.

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 quarter credits, including the required courses. The major criterion for admission is satisfactory academic performance as judged by the student's grade point average (GPA) in required courses. Students are usually admitted once a year for the fall quarter. Admission to the professional program is competitive because of 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 a Request for Change of College Within the University form with the Office of Admissions by May 30. Those who have sufficient credits but have course deficiencies should consult with advisers in the Medical Technology Office regarding their status.

Students from other regionally 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 who hold a baccalaureate degree in a science curriculum and have prerequisites completed, may finish the program in 15 months. Students transferring from other colleges may obtain the

Application for Admission from the Office of Admissions, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455. These applications must be filed with the Office of Admissions by May 30. It is strongly advised that transfer students ascertain their status by writing to the Director, Division of Medical Technology, Box 609 UMHC, University of Minnesota, 420 Delaware Street S.E., Minneapolis, MN 55455, so that, if necessary, they may complete required courses during the summer session.

English Proficiency—If English is not your native language, you are required to take the Test of English as a Foreign Language (TOEFL) or the Michigan English Language Assessment Battery (MELAB). To register for the TOEFL, contact the agency that handles TOEFL registration in your country or write to the Educational Testing Service (Box 899, Princeton, NJ 08540 USA) at least 10 weeks before any scheduled test date. If you are already in the Twin Cities area, you may register for the MELAB with the Minnesota English Center, 320 16th Ave. S.E., University of Minnesota, Minneapolis, MN 55455, or call (612) 624-1503. To register for the MELAB outside the Twin Cities area, contact the English Language Institute, Testing and Certification Division, University of Michigan, Ann Arbor, MI 48109 USA, or call (313) 764-2416. The minimum scores required are 550 for the TOEFL or 80 for the MELAB.

Immunizations—All students in the medical technology program are expected to arrange appointments at the Boynton Health Service for necessary immunizations before assignment to the clinical courses of the professional program. This procedure is required to protect the student.

Registration Procedures and Advisers

Students registering for the first time at the University of Minnesota, as freshmen in the preprofessional program or as transfer students with less than two full years of previous college work, are expected to participate in a special orientation-registration program. As part of this 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.

Satisfactory Progress

Students in the professional program are subject to the regulations established by the Division of Medical Technology and must maintain satisfactory academic progress.

Satisfactory performance is considered to be not only a passing level in technical skills and theoretical knowledge, but also complete personal integrity and honesty.

Any student not achieving satisfactory progress may be placed on scholastic probation upon recommendation of the Student Concerns Committee. This committee is composed of Division of Medical Technology faculty and student representatives, as appropriate.

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 quarter. In addition, a student must earn a minimum grade of C in selected courses 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 Concerns Committee for investigation and action. If the committee decides the student should not continue in the curriculum, the student will be notified. Ordinarily, unsatisfactory grades in two courses are sufficient basis for dismissal.

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 professional program courses with a GPA of at least 3.00 may graduate "with distinction," and those with a GPA of 3.60 or higher may graduate "with high distinction."

Application for a degree must be filed with Student Relations (150 Williamson Hall) three quarters before graduation. Students completing the related clinical courses any time before February will be eligible to participate in fall graduation ceremonies.

Certification and Placement

Graduates from the Division of Medical Technology of the University of Minnesota are eligible to take national examinations for certification as medical technologists or clinical laboratory scientists. These examinations are conducted by national certifying agencies. Many institutions require certification for employment.

Program graduates 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.

Student Organizations

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 sponsor social and educational activities, and to consider matters affecting students in the program.

Students in the undergraduate program in medical technology are eligible for student membership in the American Society for Clinical Laboratory Science. Students in medical technology are also eligible to participate in the activities of the Council for Health Interdisciplinary Participation (CHIP) and other University student organizations. For more information, see the introduction to this bulletin.

Curricular Requirements

Bachelor of Science Program

To help students achieve a liberal education, the Division of Medical Technology expects each student to distribute some part of his or her coursework in areas of study outside the major. To integrate the goals of both a liberal and a professional education in a manner appropriate to a baccalaureate curriculum in medical technology, the program emphasizes vigorous training in the physical and biological sciences, with special emphasis on acquiring a knowledge of chemistry and biology that is basic to all facets of laboratory medicine. The program is designed to include not only scientific information and technical skills but also the development of professional and caring attitudes.

In addition to specific required courses, liberal education requirements include a minimum of 12 credits selected from each of the three liberal education categories listed below. The liberal education requirements may be fulfilled at any time before graduation. The credits in each category must be earned in courses in at least two different departments. 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 liberal education requirements.

Students applying to the Division of Medical Technology who will be earning their first baccalaureate degree are required to meet University of Minnesota liberal education requirements.

Diversified Core

- Physical and biological sciences, 12-cr minimum, must include lab.
- History and social science, three courses, 12-cr minimum. One course must be in a historical perspective category.
- Arts and humanities, three courses, 12-cr minimum.
- Mathematical thinking, one course, 4-cr minimum.

Designated Themes

Six courses from the following:
cultural diversity
international relations
citizenship and public ethics
environment

Writing Skills

See page 10.

Preprofessional Program—Students register in the College of Liberal Arts (CLA) or another comparable college 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.)

CBN 3001—Elementary Anatomy (5)
Biol 1009—General Biology (5)
Chem 1051-1052—General Principles (8)
Chem 3301-3302—Organic Chemistry (8)
Chem 3305-3306—Organic Chemistry Laboratory (4)
GCB 3022—Genetics (4)
Completion of the freshman composition requirement as defined by CLA.
HSU 5210—Terminology of the Health Sciences (2) is strongly recommended.

Math 1031 or Math 1051 or Math 1251—
College Algebra or Precalculus or Calculus (4)
MedT 1010—Orientation in Medical Technology (1) (optional)
Phys 1041-1042—Introductory Physics (10)
Electives satisfying liberal education 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 three quarters of calculus and upper division physics. Students should complete the freshman composition requirement in their first year.

Students who transfer into the preprofessional program after the freshman year are exempted from the MedT 1010 requirement. The credit earned in this course does not count toward a B.S. degree.

The following program schedule is suggested for the preprofessional years (credits in parentheses):

	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
FIRST YEAR	Gen Chem 1051 (4) Core elective Math 1031 or 1051 or 1251 MedT 1010 (1) recommended	Gen Chem 1052 (4) Engl Comp 1011 (5) Core elective Elective	Biol 1009 (5) Core elective Core elective Elective
SECOND YEAR	Phys 1041 (5) GCB 3022 (4) Core/theme elective HSU 5210 (2)	Phys 1042 (5) Chem 3301 (4) Chem 3305 (2) Core/theme elective	CBN 3001/3003 (5) (Anat) Chem 3302 (4) Chem 3306 (2) Core elective

Note: To complete the prerequisites in two years, elective courses must satisfy both a diversified core and a designated theme.

MEDICAL TECHNOLOGY

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.)

Math 1051 or 1251 or Stat 3011 (4)
 MdBc 5300, 5301—Biochemistry (7)
 MedT 5010—Introduction to Clinical Laboratory Science (2)
 MedT 5064, 5065—Introduction to Clinical Immunohematology (5)
 MedT 5077, 5078—Hematology, Hemostasis/Instrumentation (6)
 MedT 5080—Seminar: Specialty Rotations (1)
 MedT 5082—Applied Clinical Chemistry (4)
 MedT 5084—Applied Clinical Virology (1)
 MedT 5085—Applied Clinical Hematology (4)
 MedT 5086—Applied Clinical Immunohematology (4)
 MedT 5088—Applied Diagnostic Microbiology (4)
 MedT 5089—Specialty Rotation (1)
 MedT 5100—Virology/Mycology/Parasitology (3)
 MedT 5102—Principles of Diagnostic Microbiology (5)
 MedT 5127—Introduction to Management and Education (1)
 MedT 5310—Clinical Chemistry I (2)
 MedT 5311—Clinical Chemistry I Lab (2)
 MedT 5320—Clinical Chemistry II (2)
 MedT 5321—Clinical Chemistry II Lab (2)
 MedT 5330—Clinical Chemistry III (2)
 MedT 5331—Clinical Chemistry III Lab (2)

MedT 5765—Hematology Morphology (4)
 Phsl 3051—Human Physiology (5)
 VPB 3103—General Microbiology (5)

Electives:

LaMP 5177—Pathology (4) strongly recommended
 GCB 3022—Genetics (4)
 GCB 5015—Histology (5)
 MicB 5218—Immunology (3)
 MedT 5090—Special Laboratory Methods (1-2)
 MedT 5092—Honors Program in Laboratory Methods (5)

Other courses in communications, economics, business, and computer science are recommended but not required.

The clinical courses (MedT 5082, 5084, 5085, 5086, 5088, and 5089) consist of application of basic methods and techniques in chemistry, virology, hematology, immunohematology, and microbiology in the clinical laboratories of the University of Minnesota Hospital and other affiliated institutions. These clinical courses are offered fall and winter quarters 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 coursework and elective coursework 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:

The following program schedule is suggested for the professional years (credits in parentheses):

	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>	<i>Summer Session</i>
THIRD YEAR	Biochem 5300 (4) Math or Stat (4) Comp 3033 (4)	Biochem 5301 (3) Phsl 3051 (5) Theme elective	LaMP 5177 (4) VPB 3103 (5) (Micro) Theme elective	No courses
FOURTH YEAR	MedT 5010 (2) MedT 5077 (3) MedT 5102 (5) MedT 5310 (2) MedT 5311 (2)	MedT 5127 (1) MedT 5078 (3) MedT 5100 (3) MedT 5080 (1) MedT 5320 (2) MedT 5321 (2)	MedT 5064/5065 (5) MedT 5765 (4) MedT 5330 (2) MedT 5331 (2)	Clinical rotations (8-9) or electives
FIFTH YEAR	Clinical rotations (8-9)	Clinical rotations only if needed (Two quarters/18 credits of clinical courses are required)		

Introductory Courses

MedT 5064, 5065
MedT 5077, 5078, 5765
MedT 5310, 5311, 5320,
5321, 5330, 5331
MedT 5100, 5102

Related Clinical Courses

MedT 5086
MedT 5085
MedT 5082

MedT 5084, 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 five quarter/semester credits may be taken in CEE concurrently with the clinical courses.

Master of Science Program

Graduate work in the field of clinical laboratory science is available for the qualified candidate who wishes to prepare for a career of investigation or teaching. A master of science degree program in clinical laboratory science 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 an adviser.

Admission requirements include 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.

More information about the program is available in the *Graduate School Bulletin*. For detailed information, contact Claire Bjorklund, Graduate Programs Coordinator, Box 609 UMHC, 420 Delaware Street S.E., Minneapolis, MN 55455 (612/625-8952).

Medical Technology Courses (MedT)

MedT 1010. ORIENTATION IN MEDICAL TECHNOLOGY. (1 cr [no cr toward degree])
Orientation to the profession of medical technology.

MedT 5010. INTRODUCTION TO CLINICAL LABORATORY SCIENCE. (2 cr; prereq regis professional MedT program)
Basic lab techniques. Centrifuges, analytical balances, photometry. Microscopy and pipetting. Calculations and quality control. Blood collection and specimen handling. Safety.

MedT 5064. INTRODUCTION TO CLINICAL IMMUNOHEMATOLOGY. (3 cr; prereq MicB 5235)
Lecture. Principles of blood grouping, antibody identification, compatibility testing, serology and immunology.

MedT 5065. INTRODUCTION TO CLINICAL IMMUNOHEMATOLOGY. (2 cr; prereq MicB 5235)
Lab exercises illustrating basic techniques used in blood banking and immunology.

MedT 5077. HEMATOLOGY I: BASIC TECHNIQUES. (3 cr)
Theory and application of basic principles and techniques in clinical hematology. Lecture and lab.

MedT 5078. HEMATOLOGY II: HEMOSTASIS/ INSTRUMENTATION. (3 cr; prereq 5077)
Theory and application of basic principles and techniques in hemostasis and hematology instrumentation. Lecture and lab.

MedT 5080. SEMINAR: SPECIALTY ROTATIONS. (1 cr; prereq regis professional MedT program)
Presentations describing each laboratory offering specialty rotations. For seniors planning their clinical rotation programs.

MedT 5082. APPLIED CLINICAL CHEMISTRY. (4 cr; prereq 5112, 5113)
Application of basic methods and techniques in chemistry in the clinical laboratory.

MedT 5084. APPLIED CLINICAL VIROLOGY. (1 cr; prereq 5064, 5065, 5100, 5102)
Application of basic methods and techniques in the virology laboratory.

MedT 5085. APPLIED CLINICAL HEMATOLOGY. (4 cr; prereq 5077, 5078, 5765)
Application of methods and techniques in clinical hematology, morphology, and hemostasis.

MedT 5086. APPLIED CLINICAL IMMUNOHEMATOLOGY. (4 cr; prereq 5064, 5065)
Application of basic techniques and methods in blood banking and immunology in the clinical laboratory. Blood grouping, compatibility testing, and immunologic procedures.

MedT 5088. APPLIED DIAGNOSTIC MICROBIOLOGY. (4 cr; prereq 5100, 5102)
Identification of bacteria by biochemical and microscopic techniques. Correlation with clinical cases. Identification of parasites and fungi.

MedT 5089. SPECIALTY ROTATION. (1 cr; prereq completion of MedT preclinical professional courses)
One-week clinical rotation in a specialty laboratory such as immunophenotyping, cytogenetics, cardiac catheterization, pulmonary function, surgical pathology, molecular diagnostics, advanced virology, or advanced coagulation.

MedT 5090. SPECIAL LABORATORY METHODS. (1-2 cr)
Assignment on an individual basis to one of a wide variety of special areas of experience in the clinical laboratory.

MEDICAL TECHNOLOGY

MedT 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.

MedT 5100. VIROLOGY/MYCOLOGY/PARASITOLOGY FOR MEDICAL TECHNOLOGISTS. (3 cr; prereq MicB 5235)

Basic aspects of laboratory diagnosis of viral, fungal, and parasitic infections; part of the curriculum in medical technology. Lecture.

MedT 5102. PRINCIPLES OF DIAGNOSTIC MICROBIOLOGY. (5 cr; prereq MicB 5235)

Current techniques used in the laboratory diagnosis of infectious disease; isolation and identification of bacteria and yeasts; antimicrobial susceptibility testing. Lecture and lab.

MedT 5127. INTRODUCTION TO MANAGEMENT AND EDUCATION. (1 cr)

Basic concepts in management and education.

MedT 5310. CLINICAL CHEMISTRY I. (2 cr)

Renal structure and function and the analysis of urine and body fluids. Renal role in homeostasis and chemical methods to evaluate renal function. Quality assurance, quality control, reference ranges, method evaluation. Lecture.

MedT 5311. CLINICAL CHEMISTRY I—LABORATORY APPLICATIONS. (2 cr)

Basic lab techniques for analyzing urine and body fluids (physical, chemical, microscopic). Lab skills developed performing renal function tests (e.g., creatinine, urea) and using instrumentation (e.g., spectrophotometers).

MedT 5320. CLINICAL CHEMISTRY II. (2 cr)

Electrolytes, acid-base balance, enzyme kinetics, liver function, digestive tract, carbohydrates. Emphasis on measurement methods and physiological relevance. Lecture.

MedT 5321. CLINICAL CHEMISTRY II—LABORATORY APPLICATIONS. (2 cr)

Analyzing electrolytes, osmolality, blood gases, enzymes, liver, and digestive function tests. Development of lab skills and instrumentation use with emphasis on quality control and technique.

MedT 5330. CLINICAL CHEMISTRY III. (2 cr)

Proteins, lipids, endocrinology, therapeutic drug monitoring, toxicology. Emphasis on measurement methods and physiological relevance. Lecture.

MedT 5331. CLINICAL CHEMISTRY III—LABORATORY APPLICATIONS. (2 cr)

Analyzing proteins, hormones, lipids, and drugs. Techniques include electrophoresis, nephelometry, radioimmunoassay, thin layer chromatography, and gas chromatography.

MedT 5765. HEMATOLOGY MORPHOLOGY. (4 cr)

The morphology, development, and function of hematopoietic cells, with emphasis on the examination of peripheral blood and bone marrow. Correlation of morphologic findings with specific physiologic or pathologic processes.

Required Courses Offered by Other Units

CBN 3001/3003. ELEMENTARY ANATOMY. (5 cr; prereq regis paramed fields, 1 qtr college biology)

A general survey of human anatomy including histology, embryology, gross anatomy, and neuroanatomy, with some clinical and physiological correlations.

Biol 1009. GENERAL BIOLOGY. (5 cr)

Introduction to the principles of biology. The cell, metabolism, heredity, reproduction, ecology, and evolution.

Chem 1051-1052. CHEMICAL PRINCIPLES I-II.

(4 cr per qtr; primarily for science or engineering majors; prereq 1001 or passing placement examination; 3 lect, 1 lab discussion, one 3-hr lab per wk)

Atomic theory; periodic properties of elements; chemical thermodynamics; development of structural concepts; geometry of molecules; bonding theory; behavior of gaseous and liquid states; solid state and materials; chemistry; dynamics; equilibrium; behavior of solutions; acids and bases; descriptive chemistry of elements and compounds.

Chem 3100. QUANTITATIVE ANALYSIS LECTURE.

(3 cr, 3100-3101†; for non-chemistry majors; prereq 1052) Introduction to the theory of quantitative chemical analysis.

Chem 3101. QUANTITATIVE ANALYSIS

LABORATORY. (2 cr, 3100-3101†; prereq 3100 or ¶3100)

Introductory laboratory in quantitative chemical analysis.

Chem 3301-3302. ELEMENTARY ORGANIC

CHEMISTRY I-II. (4 cr per qtr; prereq 1052 or equiv) Important classes of organic compounds, both aliphatic and aromatic, together with some heterocyclic compounds.

Chem 3305. ELEMENTARY ORGANIC

CHEMISTRY LABORATORY I. (2 cr; prereq 3301 or ¶3301)

Laboratory work includes the preparation of typical substances.

Chem 3306. ELEMENTARY ORGANIC

CHEMISTRY LABORATORY II. (2 cr; prereq 3302 or ¶3302)

LaMP 5177. PATHOLOGY FOR ALLIED HEALTH STUDENTS. (4 cr)

General and systems pathology. Strongly recommended.

Math 1031. COLLEGE ALGEBRA AND

PROBABILITY. (4 cr, §1051, §1111, §1151, §1201; prereq 3 yrs high school math, placement exam or GC 0631 with a grade of C or better)

Algebra and analytic geometry explored in greater depth than is usually done in three years of high school mathematics. Additional topics from combinations, permutations, and probability. A suitable prerequisite for 1131 or 1142, but not for 1251.

Math 1051. PRECALCULUS I. (4 cr; §1008, §1031, §1111, §1151, §1201; prereq 3 yrs high school mathematics, placement exam or GC 0631 with a grade of C or better) Algebra, analytic geometry, and trigonometry beyond the usual coverage found in a three-year high school mathematics program. First of two courses (see 1151). Prepares students for the full calculus sequence. Not an acceptable prerequisite for 1131.

Math 1251-1252. ONE-VARIABLE DIFFERENTIAL AND INTEGRAL CALCULUS I-II. (4 cr each, §1211-1221, §1411H-1421H, §1451H-1452H; prereq 4 yrs high school mathematics including trigonometry or grade of C or better in 1151 or equiv; grade of C or better in 1251 required for 1252) Calculus of functions of one variable and related geometry and applications.

MdBc 5300. BIOCHEMISTRY. (4 cr; prereq organic chemistry and physics) Biochemical principles. Includes proteins, enzymes, biological energy metabolism, glycolysis, citric acid cycle, pentose phosphate pathway, gluconeogenesis, glycogen metabolism, fatty acid metabolism, amino acid metabolism, biological membranes. DNA, RNA, the genetic code, control of gene expression.

MdBc 5301. BIOCHEMISTRY. (3 cr; prereq MdBc 5300 or Biol 5001) Biochemical principles. Includes protein synthesis, body fluids, hemoglobin, respiration, kidney function, acid base balance, endocrinology, nutrition, and vitamins.

Phsl 3051. HUMAN PHYSIOLOGY. (5 cr)
The study of normal function (processes) in humans.

Phys 1041-1042. INTRODUCTORY PHYSICS. (5 cr per qtr; prereq high school algebra and plane geometry; 4 lect, 1 rec, 2 lab hrs per wk) Lectures, recitation, and lab sessions. Primarily for students interested in topics useful in technical areas. Fundamental principles of physics in context of the everyday world. Use of kinematics, dynamics, and conservation principles with quantitative and qualitative problem-solving techniques to understand phenomena of mechanics, electromagnetism, and the structure of matter.

Stat 3011. STATISTICAL ANALYSIS. (4 cr per qtr, prereq college algebra) Descriptive statistics; elementary probability; estimation; one- and two-sample tests; correlation; introduction to regression; ANOVA; randomized blocks; multiple comparisons; factorial experiments; multiple regression; goodness of fit; nonparametric methods; contingency tables; selected topics.

VPB 3103. GENERAL MICROBIOLOGY. (5 cr) Basic techniques in microbiology, including microscopy, culture techniques, and microbial structure and growth; application of microbiological techniques to a wide variety of disciplines, including food microbiology, environmental microbiology, and infectious disease. Lecture, lab.

Graduate Courses in Medical Technology (MedT) or Clinical Laboratory Science (CLS)

5120. SEMINAR: MEDICAL TECHNOLOGY. (1-3 cr)

5125. PRACTICUM: TEACHING. (max 3 cr)

**5128. ELEMENTS OF LABORATORY
ADMINISTRATION.** (3 cr)

**5130. PRACTICUM IN LABORATORY
ADMINISTRATION.** (3 cr)

5133. MEDICAL MYCOLOGY. (4 cr)

5135. ADVANCED CLINICAL MICROBIOLOGY.
(5 cr)

5136. ANAEROBIC BACTERIOLOGY. (4 cr)

5138. CLINICAL MICROBIOLOGY SEMINAR. (1 cr)

5140. TECHNIQUES FOR TEACHING. (3 cr)

**5145. DEVELOPMENT OF MEDICAL
TECHNOLOGY.** (3 cr)

5155. ADVANCED CLINICAL HEMATOLOGY. (5 cr)

**5165. ADVANCED CLINICAL
IMMUNOHEMATOLOGY.** (5 cr)

**5173. ANALYTIC TECHNIQUES IN LABORATORY
MEDICINE.**

5175. ADVANCED CLINICAL CHEMISTRY. (5 cr)

5179. CHEMISTRY SEMINAR. (1 cr)

**8176. ADVANCED TOPICS IN CLINICAL
CHEMISTRY.** (Cr ar)

**8178. PRINCIPLES OF DIAGNOSTIC
ENZYMOLGY.** (Cr ar)

8230. ADVANCED MEDICAL BACTERIOLOGY.
(Cr ar)

Faculty and Staff

Administration

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 Rosemary Anderson, B.A., Veterans Administration Medical Center
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 Becky Rose, B.S., Memorial Blood Center of Minneapolis
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University of Minnesota Hospital and Clinic Laboratory Staff

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Administration

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 Harriet Noreen, B.S.

Technical Supervisors

Robin Arnfelt, B.S., drug analysis
 Jean Bucksa, B.S., clinical studies
 Maureen Davidson, B.S., immunology
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 Mary Fowler, B.S., proteins/endocrine
 Frank Gams, B.S., cardiac catheterization
 Nancy Geier, B.S., hematology
 Barbara Getchell, B.S., anatomic pathology, histology
 Patricia Gill, A.A.S., virology
 Dave Guse, M.S., microbiology
 Cindy Hudson, B.S., chemistry
 Marnie Loven-Bell, M.A., pulmonary function
 Devin McKinley, B.A., immunology
 Karen Meyer, B.S., special coagulation
 Judith Moriguchi, B.S., chemistry
 Cindy Nelson, B.A., coagulation
 Kay Newton, B.S., outpatient laboratory
 David Olson, B.S., molecular diagnostics
 Rosalie Phillips, B.S., cytogenetics
 Alice Reineke, B.S., chemistry
 Mary Richardt, M.B.A., Boynton Health Service Laboratory
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 Norynne Schiminsky, B.S., microbiology
 Terry Scofield, B.S., blood bank
 Ella Spanjers, B.S., special hematology
 Nancy Ward, B.S., blood bank
 Mary Jane Kraft-Weisjahn, B.S., immunophenotyping-flow cytometry
 Linda Wessels, B.S., chemistry
 Willard White, HTL (ASCP), anatomic pathology, autopsy

Career Paths

The following career paths list represents positions taken by University of Minnesota medical technology graduates. It depicts the opportunity and versatility afforded by a degree in medical technology.

Hospital/Medical Center: Laboratory Areas

Andrology/Fertility testing
Blood bank
Bone marrow
Cell markers
Chemistry
Coagulation
Computer science
Components—Transfusion service
Cytogenetics
Cytodiagnostic urinalysis
Cytology/Histology
Development laboratory
Drug analysis (toxicology)
Endocrinology
Flow cytometry
Forensic science
Genetics
Hematology
Immunology
Immunopathology
Immunophenotyping
Infection control
Microbiology
Molecular diagnostics
Mycology
Nuclear medicine
Out patient or clinic laboratory
Parasitology
Pathology—Surgical, autopsy
Phlebotomy/Specimen processing
Platelet studies
Photography/Illustration (e.g., in forensic medicine)
Quality assurance
Serology
Skin or bone bank
Special stains
STAT laboratory
Tissue typing
Transplant services
Virology

Health Care Agency/Government

Administrator for Veterans Administration hospital
Biometrist in a government health agency
Crime laboratory scientist
Department of Health—Educator
Department of Health—Proficiency test consultant
Employee recruiter/Placement officer
Environmental health specialist (inspector)
Environmental pathology technologist
Fraud investigator
Health management organization—Health educator
JCAHO Survey team member/CAP inspector
Medical examiner investigator (e.g., for coroner)
Military service—Armed Forces, ROTC, National Guard

NASA mission specialist
Patient educator
Private investigator FBI/Special agent (forensic lab)

Health Care Administration

Clinic manager
Coder—Abstractor (business or medical records office)
Consultant service specialist
Personnel director
Emergency medical services coordinator
Financial manager
Group practice administrator
Hazardous waste coordinator
Health care administrator
Health insurance administrator
Health policy analyst
Health promotion coordinator
Hospital quality assurance coordinator
Infection control officer→Epidemiologist
Laboratory supervisor→Laboratory director
Laboratory utilization review coordinator
Long-term care administrator
Mental health administrator
Purchaser (laboratory/hospital/medical center)
Staffing coordinator (laboratory or home care)

Management Information System

Biometrician
Director—Division of Biometry
Installer/Educator
Systems analyst
Programmer

Health Maintenance Organization

Laboratory supervisor→Administrator

Consultant to Physician Office Laboratories

Reference/Commercial Laboratory Scientist

Veterinary Medicine Laboratory Scientist

Humanitarian Work

Medical missionary work
Peace Corps
Project HOPE, others

Education

Academician
Allied health dean/Health sciences administrator
Education coordinator→Program director
Educator of students in clinical settings
Faculty member in CLS/CLT/Cyto/SBB program
Higher education administrator
Instructor in veterinary medicine or other allied health program
Medical community services program coordinator

Other Professional Routes

Accounting
Dentistry
Health radiation science
Law (e.g., patent attorney)
Legislature—Politician, lobbyist, regulations writer
Medical Physics/Engineering
Medicine
Optometry
Public health
Veterinary medicine

Industry (U.S. or International)

Adviser to or inventor of “home” or other lab tests
Biomedical specialist—Occupational health
Cell culture consultant
Computer consultant
Director of marketing
Editor/manager—Medical publications
Food technologist—Quality assurance manager
Health care reimbursement coordinator
Health promotion and education specialist
Industrial hygiene specialist
Installation specialist
Insurance underwriter
Manager—Health claims administration
Medical claims reviewer/Auditor/Insurance processor
Medical consultant (TV/Movie industry)
Medical fee analyst—Insurance
Owner/Director of employee placement service
Product specialist
Quality control/Quality assurance monitor/Director
Research and development director
Research scientist
Risk management representative—Insurance
Salesperson
Technical representative

Research—Basic and Applied

Research assistant
Associate scientist/Scientist
Director of research

Mortuary Science



General Information

Development

The Program of Mortuary Science at the University of Minnesota, established in 1908, was the first program of its kind in this country to be organized at a state university. During the first 50 years of its existence, the program grew from a 6-week session to a 36-week course of study. In 1951, a two-year curriculum leading to the associate in mortuary science degree was approved. The course of study for the associate degree was expanded to three years in 1955. The bachelor of science degree with a major in mortuary science, granted upon satisfactory completion of a four-year curriculum, was approved by the Board of Regents in 1968. Impetus for the changes in program length and academic credentials resulted from changes in the philosophy and needs of the funeral service profession.

In 1970, the program was placed under the administrative supervision of the vice president for health sciences and in 1990 under the head of the Department of Cell Biology and Neuroanatomy.

The program is accredited by the American Board of Funeral Service Education, an agency recognized by the United States Office of Education, and the Conference of Funeral Service Examining Boards of the United States, Inc.

Aims and Purposes

Upon completing the curriculum requirements, the graduate will have

- received a solid liberal arts foundation;
- synthesized the psycho-social aspects of grief and the funeral directing arts;
- developed technical competence in applying funeral service sciences; and
- identified business, legal, and ethical principles related to funeral service practice.

Objectives

The objectives of the program recognize an obligation to students, the profession, and the community. They have been adopted with

respect to requirements of the Program of Mortuary Science; the University of Minnesota; the American Board of Funeral Service Education; the Conference of Funeral Service Examining Boards of the United States, Inc.; and the Minnesota Department of Health.

Upon completing the curriculum requirements for a bachelor of science degree with a major in mortuary science, the graduate will have identified and applied principles and theoretical concepts in the following areas:

- public health
- business
- natural sciences
- ethics
- behavioral science
- law

In addition, the graduate will have completed

- educational requirements prescribed by the American Board of Funeral Service Education; and
- the requirements to become eligible for admittance to the Conference of Funeral Service Examining Boards of the United States, Inc. National Board Examination.

Admissions Requirements

Students usually enter the Program of Mortuary Science at the start of their junior year. Freshmen and sophomores interested in a mortuary science major are urged to contact the program office at A275 Mayo, Box 740 UMHC, 420 Delaware Street S.E., Minneapolis, MN 55455, for counsel in planning an appropriate preprofessional program. On the Twin Cities campus, freshmen and sophomores usually register in the College of Liberal Arts (CLA) or General College (GC) for their pre-mortuary science work. Admission criteria and other information related to CLA and GC can be found in their respective bulletins. The Program of Mortuary Science considers applicants transferring from any regionally accredited college or university.

Applicants seeking admission to the Program of Mortuary Science who will be earning their first baccalaureate degree must meet the following requirements:

1. Satisfy the University of Minnesota high school preparation requirements, which include four years of English, three years of mathematics, three years of science, two years of a single second language, and two years of social studies. See University of Minnesota Undergraduate Application Booklet for a more detailed explanation of these requirements. *Note:* students who graduated from high school before spring 1987 are not required to complete these requirements.
2. Have completed a minimum of 90 quarter credits with grades of A, B, C, or S from a regionally accredited college or university and have a minimum cumulative GPA of 2.50.
3. Have completed the Program of Mortuary Science preprofessional admission requirements. In addition to electives totaling 90 quarter credits, at least one course in each of the following preprofessional areas must be completed before admission to the program.

English composition
 Introduction to computers
 College algebra
 General biology
 Microbiology*
 Accounting
 General psychology
 General chemistry with lab
 History
 Introduction to sociology
 Speech
 Human anatomy**

* *Students must complete microbiology before enrolling in mortuary science. Prerequisites for enrolling in microbiology at different colleges and universities vary, and some students complete prerequisite coursework at institutions that do not offer microbiology. Therefore, when there is no other alternative and students elect to complete microbiology at the University of Minnesota, they must take ten credits of chemistry and five credits of biological science before enrolling in microbiology at the University.*

** *Students must complete anatomy before enrolling in mortuary science. Prerequisites for enrolling in anatomy at different colleges and universities vary, and some students complete prerequisite coursework at institutions that do not offer anatomy. Therefore, when there is no other alternative and students elect to complete anatomy at the University of Minnesota, they must take one college biology course before enrolling in anatomy at the University.*

Preprofessional Curriculum

All students enrolling at the University's Twin Cities campus fall quarter 1994 or later seeking their first baccalaureate degree and having fewer than 39 credits (and all students matriculating at the Twin Cities campus beginning fall quarter 1996) are required to meet the following liberal education requirements.

Students entering the Program of Mortuary Science who have already completed a bachelor's degree are exempt from the liberal education requirements but must meet all other admission requirements.

Diversified Core

Physical and biological sciences, three courses, 12-credit minimum, including one physical science laboratory and one biological science laboratory.

History and social science, three courses, 12-credit minimum, including one course in the historical perspective category.

Arts and humanities, three courses, 12-credit minimum, including one course in two of the following: literature, philosophical perspective, and visual or performing arts.

Mathematical thinking, one course, 4-credit minimum.

Designated Themes

A minimum of six courses (five if approved practicum is included), including one course in each of the following.

Cultural diversity
 International relations
 Citizenship and public ethics
 Environment

Writing Skills

See page 10.

Some courses may simultaneously satisfy diversified core, designated theme, writing skills, and preprofessional requirements.

Application Procedure

Transfer Within the University—Students already admitted and registered at one college or campus of the University of Minnesota must submit an Application for Change of Status or College, available from the Office of Admissions on any campus. Application deadlines for internal transfer are July 15 for fall quarter admission, November 15 for winter quarter admission, and February 15 for spring quarter admission.

Transfer From Outside the University—Those who have completed their preprofessional work at another university must apply for admission to the University of Minnesota. Transfer students should obtain the Application for Undergraduate Admission from the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008); complete the form; and return it to that office. An official transcript from each institution outside the University where college work was attempted or completed must be sent to the Office of Admissions. A non-refundable application fee is also required.

Financial Aid and Awards

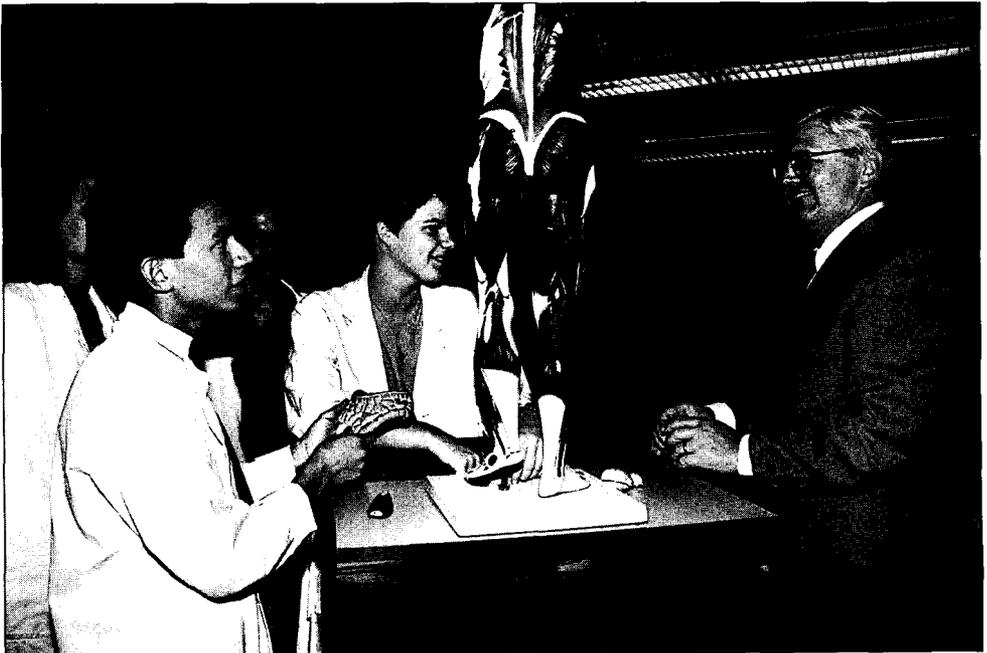
For information concerning financial aid available to all University students, refer to the introduction in this bulletin.

The following funds are available to mortuary science students:

The American Board of Funeral Service Education administers a scholarship fund available to students nationwide. Students may contact the board at American Board of Funeral Service Education, P.O. Box 1305, Brunswick, ME 04011.

The Past Presidents Fund, established by former presidents of the Minnesota Funeral Directors Association, provides scholarship grants for continuing education.

The Minnesota Funeral Directors Association Robert C. Slater Scholarship provides a \$1,000 award to a Minnesota resident to be used for tuition in the first quarter of the senior year of enrollment in the Program of Mortuary Science at the University. Applicants may be high school seniors or college students. The award is retained by the Minnesota Funeral Directors Association until the recipient is



Student-faculty interaction plays a key role in mortuary science education.

admitted to the Program of Mortuary Science at the University. To obtain an application, write to the Program of Mortuary Science at the address listed in this bulletin.

The following awards are presented annually at spring quarter graduation:

The J. M. Nolte Scholar Award was established by the University Mortuary Science Education Association in honor of Julius M. Nolte, former dean of the University's General Extension Division, to recognize his contribution to the founding of the association and his dedication to the advancement of funeral service education at the university level. The award is given to recognize academic and other achievement of graduating students in funeral service.

An Award of Merit is given by the Minnesota Funeral Directors Association to an outstanding mortuary science student. After nomination by the graduating class, a student is selected by a committee composed of members of the association and the faculty. The recipient is chosen on the basis of scholarship, citizenship, and professional attitude.

Student Services

Orientation—A variety of orientation activities are offered to help students get acquainted with one another, the campus, and the program. These activities usually last one day and include individual and group meetings for program planning, and presentations on University resources and regulations. Students are notified of orientation dates at the time they receive registration information.

Advising—Faculty advisers assist students with program and career planning. Advisers may also refer students to another University agency for assistance. Each quarter advisers must approve their students' registration.

University Organizations—Opportunities for recreational, social, political, vocational, and service activities are available. Interested students should contact the Student Organization Development Center, 340 Coffman Memorial Union (612/624-5101).

National Certification—Program of Mortuary Science graduates are eligible to take the National Board Examination for Mortuary

Science. The program arranges to have the test given on campus by the Conference of Funeral Service Examining Boards of the United States, Inc.

Student Activities

Student Association of the Program of Mortuary Science—Mortuary Science majors automatically become members of this association, a forum for expressing student opinion and developing a liaison between students and faculty, and an organization to foster and support mortuary science education.

Curriculum and Academic Regulations

Curriculum for the Bachelor of Science

Junior Year

Fall Quarter

Mort 3001	3
Electives	12
	<hr/>
	15

Winter Quarter

Mort 3040	3
Mort 3070	4
Electives	8
	<hr/>
	15

Spring Quarter

Mort 3010	4
Mort 3030	4
LaMP 3050	4
Mort 3073	3
	<hr/>
	15

Senior Year

Fall Quarter

Mort 3050	4
Mort 3060	8
Mort 3270	1
Electives	2
	<hr/>
	15

Winter Quarter

Mort 3071	6
Mort 3271	1
Electives	8
	<hr/>
	15

Spring Quarter

Mort 3080	15
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Mortuary science students study subjects ranging from anatomy to law to psychology.

Prospective students who have completed a college degree or have more than 90 credits should consult the program's student adviser to determine the most appropriate quarter for admission. A student who has completed all of the admission requirements and upper division electives may be able to complete the mortuary science curriculum in four quarters.

Graduation Requirements

To be recommended for the bachelor of science degree with a major in mortuary science, students must

1. complete a minimum of 180 credits with A, B, C, or S grades. Included in the 180 credits are the admission requirements, an upper division writing course, and the required mortuary science courses. A minimum of 15 credits must be in upper division electives.
2. complete the 90 credits of freshman and sophomore liberal education requirements. The distribution of these credits and categories of study required are detailed under Admission Requirements in this section of the bulletin.

3. earn at least half of their University of Minnesota degree credits with grades of A, B, or C.
4. complete at least 30 of their last 45 credits at the University of Minnesota.

Students planning to practice in a state other than Minnesota should determine the qualifications for licensure by writing to the licensing agency in the capital city of the state in which they intend to practice. These regulations vary from state to state, are frequently changed, and students should make certain they have accurate information.

Honors

Students who have completed their most recent 90 undergraduate credits (A-F), whether transfer or within the University, with a grade point average (GPA) of 3.50 to 3.75 may graduate "with distinction," and those with a GPA of 3.76 to 4.00 may graduate "with high distinction."

Registration

Students are notified of either a special registration appointment or the specified days set aside for registration. When students report for registration, they are given a set of detailed instructions and a suggested program plan for completing all degree requirements.

Credit Load

Most students take about 15 credits of coursework each quarter. To take fewer than 12 credits per quarter requires permission from the Student Scholastic Standing Committee. Registration for more than 18 credits per quarter must also be approved by this committee.

Scholastic Progress

The scholastic probation system identifies, advises, and, if necessary, expels students who are having problems meeting academic standards.

Students' work is considered unsatisfactory when they earn less than a C grade average (2.00 GPA) for all credits earned in a given quarter or a given year.

If a student receives unsatisfactory grades in more than one course, either concurrently or in different quarters, the matter is referred to the Student Scholastic Standing Committee for investigation and action. The student ordinarily is placed on probation. The student is then required to make a contract with the Student Scholastic Standing Committee, agreeing to complete a specified number of credits during the following quarter with grades of C or better. If terms of the contract are not fulfilled, the student may be declared academically ineligible to continue in the program.

Students may be expelled from the program for one of the following reasons:

Dropped for Low Scholarship—Students who fail to meet the terms of their probation.

Hold for Committee Clearance—Students who have scholastic difficulties that indicate they should interrupt their studies for the time being even though their record may not require official drop action. The Student Scholastic Standing Committee must approve a subsequent return to the program in such cases.

A student admitted to the program on probation must achieve satisfactory academic status during the first quarter of enrollment.

Mortuary Science Courses (Mort)

Mort 3001. ORIENTATION IN FUNERAL SERVICE. (3 cr)

Overview of the funeral service profession. History, vocabulary, professional experiences in technical and management areas, sociology of funeral service.

Mort 3010. FUNERAL SERVICE LAW. (4 cr; prereq regis in mort sci)

Licensing/government regulations; restrictions on funeral home sites; legal status of dead bodies; duty of burial/disposal; right to control final disposition; liability for payment of funeral expenses; torts relating to funeral service; cemetery law; applied elements of business law.

Mort 3030. CHEMISTRY. (4 cr; prereq general chem intro course, regis in mort sci)

Fundamentals of organic chemistry and biochemistry. Chemical changes in the human body during life, after death, and during chemical preservation. Disinfection, toxicology, embalming fluids.

Mort 3040. FUNERAL SERVICE PSYCHOLOGY. (3 cr; prereq general psych intro course)

Applied psychological principles helpful in dealing with clients, especially those experiencing emotional crisis.

Mort 3050. RESTORATIVE ART. (4 cr; prereq regis in mort sci)

Restorative art theory and procedures; lab.

Mort 3060. EMBALMING. (8 cr; regis in mort sci or #)

Embalming theory and procedures; lab.

Mort 3070. FUNERAL SERVICE MANAGEMENT. (4 cr; prereq regis in mort sci)

Roles of small business; factors related to starting and operating a funeral business, including risks of ownership, financing, marketing, advertising, public relations, credit and collections, insurance and risk management; professional overview and image; compliance with regulations of state/federal regulatory agencies; cemetery rules and regulations.

Mort 3071. FUNERAL SERVICE PRACTICE. (6 cr; prereq regis in mort sci)

Funeral directing; ethics; funeral home operations, records, forms, pricing, accounting; computer applications for funeral home management; Federal Trade Commission Practice Rule for the funeral industry.

Mort 3073. FUNERAL SERVICE COUNSELING. (3 cr; prereq regis in mort sci)

Counseling principles, techniques, and basic helping skills as applied to the funeral arrangement conference.

Mort 3080. FUNERAL SERVICE PRACTICUM. (15 cr; prereq completion of all requirements for graduation except 3080, Δ; S-N)

Practical experience for one quarter in a funeral home as assigned by the program.

Mort 3090. INDEPENDENT STUDY. (1-3 cr; prereq regis in mort sci, #)

Report based on study and research in a funeral service area of interest to the student.

Mort 3270. FUNERAL SERVICE SEMINAR. (1 cr; prereq regis in mort sci; S-N)

Mort 3271. FUNERAL SERVICE SEMINAR. (1 cr; prereq regis in mort sci; S-N)

Mort 5040. DYING AND DEATH IN CONTEMPORARY SOCIETY. (3 cr, §HSU 5040, §PubH 5040; prereq health sci or mort sci student or public hlth grad or ed sr or certified tchr or #)

Concepts, attitudes, ethics, and lifestyle management in relation to dying, death, grief, and bereavement. Emphasis on educational aspects for community health and helping professionals and educators.

GC 1513. SMALL BUSINESS FUNDAMENTALS. (4 cr)

GC 1534. PRACTICAL LAW. (4 cr)

HSU 5210. MEDICAL TERMINOLOGY. (2 cr)

LaMP 3050. PATHOLOGY FOR MORTUARY SCIENCE. (4 cr; prereq human anatomy, microbiology)

PubH 3001. PERSONAL AND COMMUNITY HEALTH. (3 cr, §3004, §GC 3114)

Faculty and Staff

John M. Kroshus, Ph.D., M.Ed., B.S.,
director, assistant professor

Michael C. Mathews, M.A., B.S., A.M.S.,
assistant professor

Steven P. Tibbetts, M.A., B.S., B.A.,
teaching specialist

Earl L. Burger, M.A., B.S., B.A., A.M.S.,
professor emeritus

Robert C. Slater, B.S.,
professor emeritus

Dale E. Stroud, B.S., A.M.S.,
professor emeritus

All other appointees are staff members of the cooperating colleges, programs, and departments.

Occupational and Physical Therapy



General Information

Objectives

The University of Minnesota Programs in Occupational and Physical Therapy are in the Department of Physical Medicine and Rehabilitation, a part of the Medical School. They provide students with a strong foundation in biological and physical sciences. Theory and application courses focus on functional outcomes that maximize the patient's potential for independence.

Because the nation's health care needs can be met only by multidisciplinary teams of specialists, it is essential that the training of students in occupational therapy and physical therapy reflect an integrated approach to comprehensive health care. The Department of Physical Medicine and Rehabilitation offers its students the opportunity to work with and learn from other health professionals and thus to achieve an integrated perspective.

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 evaluation and 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 and 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

Students currently complete a minimum of two years of preprofessional study in liberal arts before applying for admission to the professional programs, which begin in the junior year. Requirements for preprofessional curricula are detailed under separate sections for occupational therapy and physical therapy.

For detailed information about application procedures for the programs in occupational therapy and physical therapy, refer to their separate sections. Because enrollment in both 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.

The Programs in Occupational Therapy and Physical Therapy admit qualified individuals with disabilities. Graduates must meet entry-level criteria of the professions, successfully pass certification examinations, and meet individual state practice acts to practice their respective professions.

For information about admission to other colleges and universities offering professional programs in physical therapy, career

opportunities, and sources of financial aid, write to the American Physical Therapy Association, 1111 North Fairfax Street, Alexandria, VA 22314 (1-800-999-2782).

For information about admission to other professional programs in occupational therapy, career opportunities, and sources of financial aid, write to the American Occupational Therapy Association, 4720 Montgomery Lane, P.O. Box 31220, Bethesda, MD 20824-1220 (301/652-2682).

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 pre-occupational or pre-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 by applying to the University and having their credits evaluated. Students who have satisfied all preprofessional requirements may apply directly to the Program in Occupational Therapy or the Program in Physical Therapy. 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 undergraduate 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 and Resources

Most of the professional courses are taught in classrooms located on the second floor of the Children's Rehabilitation Center, 426 Church Street S.E., Minneapolis. The Program in Occupational Therapy office is located in 271

Children's Rehabilitation Center (612/626-5887); the Program in Physical Therapy office is located in 382 Children's Rehabilitation Center (612/626-5303). Occupational and physical therapy faculty and directors offices are located on the center's second and third floors.

Students learn occupational and physical therapy concepts in seminars, lectures, recitations, and group discussions, and through individual and group assignments. 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. Open communication between students and teachers is encouraged.

Advisers

Preprofessional Program—College of Liberal Arts students should seek assistance in program planning at the Pre-Health Sciences Advising Center, 30 Johnston Hall (612/624-9006). Advisers in this office are also able to provide information about other health science programs.

Freshmen and sophomores 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 for advice on program planning.

Professional Program—Students in the professional programs will be assigned to faculty advisers 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 quarterly *Class Schedule* for current information.

Other Expenses—The following is an estimate of special expenses for the professional programs:

Locker Fee—\$25

Uniforms—\$75

OCCUPATIONAL AND PHYSICAL THERAPY

Books and Laboratory Manuals—\$1,500 to \$1,700. Books may be purchased at the Health Sciences Bookstore, 2-554 Moos Health Sciences Tower, (612) 625-8600.

Clinical Education—Clinical education occurs in many settings located in the Twin Cities metropolitan area and nationally. Students work with the clinical education coordinator to determine their fieldwork location. Students are responsible for expenses incurred during fieldwork such as transportation and living expenses, uniforms, meals, parking, and other costs dependent on the clinical center's requirements.

Students pay tuition while on their clinical education assignments. They must also purchase their own health insurance and have current CPR certification, Hepatitis B immunization, and current Mantoux.

Financial Aid

Students needing financial assistance should apply as soon as possible after January 1 for consideration for the following academic year. Applications should be filed with the Office of Scholarships and Financial Aid, 210 Fraser Hall (612/624-1665).

For information about either of the following, see an adviser or the director of the Program in Occupational Therapy or Physical Therapy:

Crippled Child Relief, Inc., Loan Fund—Short-term interest-free loans are provided in emergency situations.

Minnesota Occupational Therapy Association Scholarship—Sponsored by members of the state professional association for occupational therapists; awarded annually to a junior or senior in occupational therapy on the basis of scholastic standing, financial need, and professional promise.

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

S-N Grading System—A student may elect to take courses outside 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 (GPA). During the first two years, prerequisite courses for the professional programs *may not* be taken S-N. (See the preprofessional curricula under the separate occupational therapy and physical therapy sections.) Certain professional level courses may be taken S-N with instructor and department approval.

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 coursework by the end of the next quarter, unless special permission is obtained in writing from the instructor. If coursework is not completed within the specified time limit, the I becomes a permanent grade of F or N, subject to review by the Student Progress Committee.

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 make up 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. The programs in physical and occupational therapy each have a Student Progress Committee that reviews the progress of each student at regular intervals. Students must earn no grade lower than a C. Students receiving a grade lower than a C are subject to committee action. Actions may range from academic probation to dismissal from the program. Violations of the conduct code of the University or unsatisfactory classroom/clinical behavior may also be grounds for committee action. See *Policies and Procedures of the Student Progress Committee*.

Students should see their instructors or advisers early for help with courses in which they are having difficulty or with problems that are interfering with their progress.

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 the program director.

Readmission—Students who have left the program in good standing and wish to return to school should discuss their plans with the program director at least a quarter ahead of time.

Graduation—The bachelor of science degree will be recommended for students who have successfully completed their program of study with a minimum GPA of 2.00 overall and in the courses of the professional curriculum. In addition, they must have satisfied the liberal education distribution requirements.

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 Student Progress Committee, with final approval by the faculty. Criteria include a specified GPA in the professional program and superior performance during the full-time clinical placement. To graduate “with distinction,” students must earn a GPA of 3.50 to 3.75. To graduate “with high distinction,” students must earn a GPA of 3.76 to 4.00.

It is the responsibility of the student to file an application for graduation at Student Relations, 150 Williamson Hall.

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 curriculum committee.

Student memberships are available in the American Occupational Therapy Association, the American Physical Therapy Association, the Minnesota Occupational Therapy Association, and the Minnesota Physical Therapy Association. Students may also join the Student Occupational Therapy Association at the University.

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 program director, who determines student eligibility and availability of space. Information regarding continuing education for occupational therapy may be obtained from Cheryl Meyers, University of Minnesota, 378 Children’s Rehabilitation Center, Box 388 UMHC, Minneapolis, MN 55455 (612/626-5170). Some continuing education courses are offered through Continuing Education and Extension/University College (612/625-3333). Information about continuing education offerings for physical therapy may be obtained from the coordinator of continuing education, Margie Gardner (612/626-3591).

A master of science (M.S.) degree program for physical therapists is offered by the Graduate School. An applicant’s record must provide evidence of academic ability and potential to pursue advanced study. Previous or concurrent clinical experience in the practice of physical therapy is preferred. Graduates are expected to be qualified physical therapists with additional advanced expertise in one or more of the following areas: education, administration, clinical specialty, or clinical research.

For the M.S. program the student may select either a 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*. Information about the graduate program in physical therapy may also be obtained from Richard DiFabio, Ph.D., PT, director of graduate studies in physical therapy (612/626-4973 or 612/626-5303).

Occupational Therapy

Dennis Dykstra, M.D., Ph.D., head,
Department of Physical Medicine
and Rehabilitation

Associate Professor

Judith Reisman, Ph.D., interim director

Academic Professional Staff

Diane R. Anderson, M.P.H.

Cheryl L. Meyers, M.S., coordinator,
clinical education

Assistant Professor

Erica Stern, Ph.D.

Clinical Instructor

Linda Brodsky, B.S.

Kathryn N. Dole, B.S.

Judy Eggleston, M.P.H.

Karen L. Kendrick, B.S.

Linda Lorentzen, B.S.

Elizabeth Rivers, B.S.

Jacqueline V. Zschokke, M.P.H.

Overview

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 program 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 Program 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 was director of the Program in Occupational Therapy until July 1986 when Rondell S. Berkeland became the new director. Berkeland left the position in June 1995 and Judith Reisman was appointed interim director.

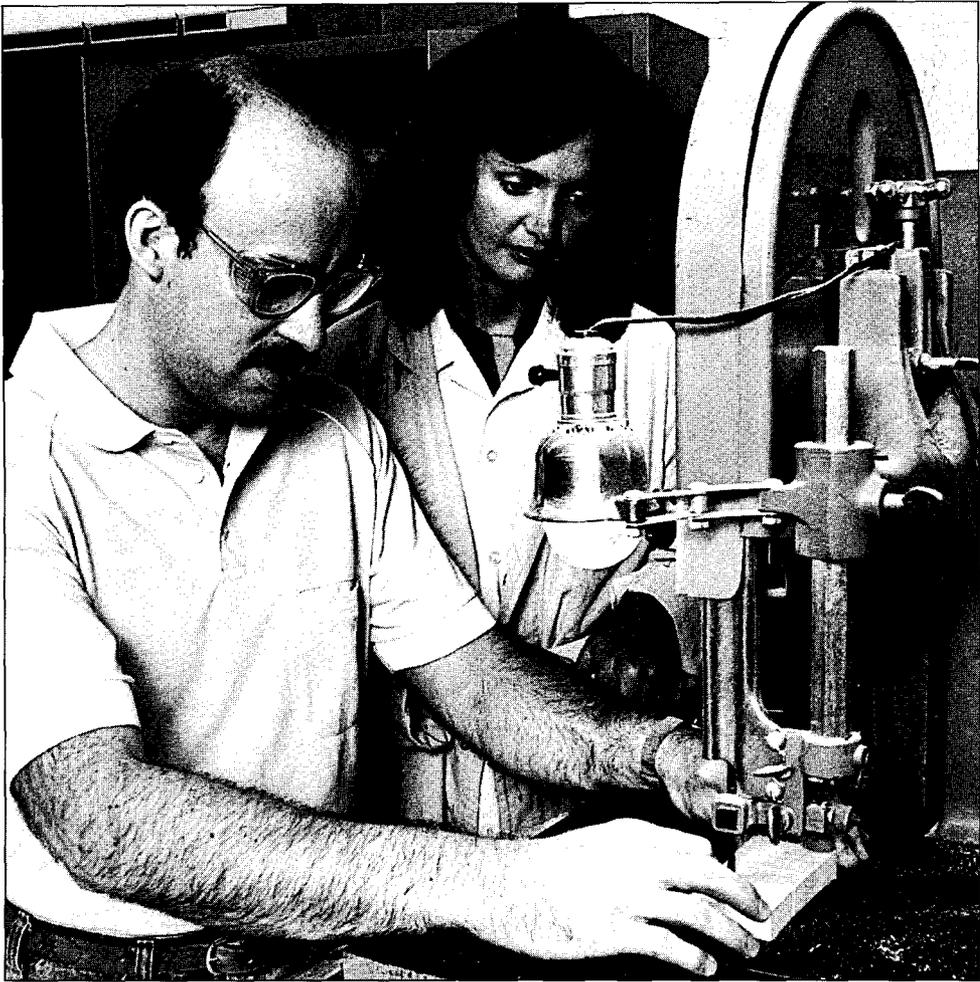
The Program in Occupational Therapy is accredited by the Accreditation Council for Occupational Therapy Education of the American Occupational Therapy Association.

Philosophy and Objectives—The occupational therapist is a human service professional who 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 developmental 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 evaluation 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—Qualified therapists find a variety of employment opportunities. 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—Students spend the first two years of study 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 two 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 two years include academic work combined with part-time fieldwork and a minimum of six months of full-time fieldwork. When they



Occupational therapy students learn the basis for therapeutic occupation and activity analysis.

complete the prescribed program 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 Certification Board.

Admission

Resident and nonresident students will be considered. Only those students with a GPA of 2.50 or higher overall and in the required courses in the Physical and Biological Universe and the Individual and Society will

be considered. Applicants must have completed some successful work or volunteer experience in a health care or related facility that provided them an opportunity to evaluate their 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, volunteering, or working in an occupational therapy department. They should be in good health and have the physical capacity to do the work of a therapist. It is particularly important that they have sufficient maturity for and be sincerely interested in working closely with people and dealing with their problems.

Because of limitations in space and facilities, admission is currently restricted to 35 students each year. Selection is made on a competitive basis. It is expected that students entering the program intend to complete it.

Application Procedure

University of Minnesota students who have satisfactorily completed the prerequisite courses and accumulated 80 to 85 credits by the end of summer session may apply in 150 Williamson Hall for a change of college transfer to the Program in Occupational Therapy. Students attending other colleges may request a University application for admission from the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008). Applications and transcripts should be submitted as soon as possible after December 1 and *no later than February 1* for the professional program that begins each fall quarter. The following additional materials should be submitted to the chair of the Occupational Therapy Admissions Committee, Program in Occupational Therapy, University of Minnesota, 271 Children's Rehabilitation Center, 426 Church Street S.E., Minneapolis, MN 55455 (612/626-5887):

- Face Sheet
- Personal Data form
- Check list of course requirements and GPAs
- Evaluations of work and volunteer experience
- Transcripts of all completed coursework from all schools attended
- 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 will be sent to applicants upon receipt of their application from the Office of Admissions. The deadline for submission of these materials is March 1.

*American Occupational Therapy Association—*For further information regarding other universities and colleges offering programs in occupational therapy, career opportunities, and

sources of financial aid, write to the American Occupational Therapy Association, 4720 Montgomery Lane, P.O. Box 31220, Bethesda, MD 20824-1220 (301/652-2682).

Preprofessional Curriculum

Students applying to the Program in Occupational Therapy who will be earning their first baccalaureate degree are required to meet University of Minnesota liberal education requirements. These include courses from the diversified core, designated themes, and writing skills areas. Writing skills requirements will become effective for students beginning full-time enrollment in fall 1995. Students with a college degree applying to the Program in Occupational Therapy are exempt from the liberal education requirements but must have completed specific occupational therapy prerequisites identified below. Refer to your adviser or the *College of Liberal Arts Bulletin* for information on appropriate categories for specific courses not in this bulletin.

Diversified Core

Physical and biological sciences, 12-cr minimum, must include lab.

History and social science, three courses, 12-cr minimum. One course must be in a historical perspective category.

Arts and humanities, three courses, 12-cr minimum.

Mathematical thinking, one course, 4-cr minimum.

Designated Themes

Six courses from the following:
cultural diversity
international relations
citizenship and public ethics
environment

Writing Skills

See page 10.

Occupational Therapy Prerequisites

Two English composition courses

Medical terminology

Descriptive statistics

Philosophy/logic

Students must have basic word processing skills.

General biology/zoology

Human anatomy

Human physiology
 Public health: personal and community health
 General psychology
 Abnormal psychology

Human development across the life span
 One additional cultural diversity course
 (3-5 credits): The course should enhance student's diversity, broaden perspective differences between cultures, families, individuals, as a basis for personal and professional interaction. The course may be from numerous areas of study, including, but not limited to psychology, sociology, anthropology, and cultural studies.

Complete a minimum of nine credits representing three different studio/applied arts. At least one of the three must be a craft-based course.

Prospective students should consult with the Pre-Health Sciences Advising Center, 30 Johnston Hall (612/624-9006), to ensure they have met both CLE requirements and the occupational therapy prerequisites.

Professional Curriculum

Junior Year

<i>Fall</i>	
CBN 3058	5
LaMP 5172	4
PMed 5300	5
PMed 5370	3
PMed 5393	2
<i>Winter</i>	
AdPy 5121	2
Neur 5121	2
PMed 5182	5
PMed 5311	3
PMed 5312	2
<i>Spring</i>	
PMed 5161	5
PMed 5341	5
PMed 5342	6
PMed 5392	4

Senior Year

<i>Fall</i>	
PMed 5343	5
PMed 5360	3
PMed 5375	4
PMed 5394	4

<i>Winter</i>	
PMed 5344	8
PMed 5380	3
PMed 5391	4

<i>Spring</i>	
PMed 5396	Ar

Summer Session (Both Terms) or Fall Quarter

PMed 5397	Ar
PMed 5398	Ar

Fieldwork Education (PMed 5396-5397-5398)—A minimum of six months of fieldwork is required. During this period the student works with patients with both physical and psychosocial dysfunctions; some students elect an additional experience in a community setting.

Students are individually assigned to cooperating hospitals and community agencies within the limitations of available openings. Students must agree to abide by the hospital's/ agency's policies and conduct code. Unsatisfactory performance in the clinical setting may be grounds for academic probation or dismissal from the program. Students must have a physical examination and up-to-date immunizations before beginning their fieldwork.

Physical Therapy

Professor

Richard DiFabio, Ph.D., PT, director,
graduate studies

Associate Professor

James R. Carey, Ph.D., PT, director
Dennis Dykstra, M.D., Ph.D., head,
Department of Physical Medicine
and Rehabilitation

Corinne T. Ellingham, M.S., PT, coordinator,
clinical education

Glenn N. Scudder, M.S., PT, assistant director

Assistant Professor

LaDora Thompson, Ph.D., PT

Instructor

Krista Coleman, M.S., M.S.C., PT
Marguerite Gardner, M.S., PT, coordinator,
continuing education

Clinical Instructor

Donn O. Berkeland, B.S., PT
Joanell Bohmert, B.S., PT
Karen L. Decker, B.S., PT
Adele A. Di Giovanna, B.S., PT
Paul R. Duxbury, B.S., PT
Robert C. Fink, M.A., PT
Jane C. Golden, Ph.D., PT
Michael L. Gosha, B.S., PT
Horace O. Hallman, M.S., PT
Judy A. Hawley, B.S., PT
Susan J. Isernhagen, B.S., PT
Karen A. Lamecker, B.S., PT
Eileen R. McIsaac, B.S., PT
George L. Mackey, M.S., PT
Kent W. Malcomson, B.S., PT
Daniel C. Morgan, B.S., PT
Jeffrey Lee Newman, B.A., PT
Judith M. Rock, M.S., PT
Gregory L. Santema, B.S., PT
Judith A. Taplin, B.S., PT
Andrew E. Wood, M.S., PT
Alan R. Yeutter, B.S., PT

Overview

History—The Program 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 1946 it became a four-year degree program and was placed under the direction of Ruby Green



Clinical skills are integrated into a diverse theory-based curriculum.

Overmann, education director, and Frederic J. Kottke, M.D., medical director. After Overmann's retirement in 1957, Wilbur L. Moen became educational director. From 1978 to 1993, John D. Allison was educational director. In 1994 James R. Carey became the director.

The program is accredited by the Commission on Accreditation in Physical Therapy Education.

Physical Therapy Practice—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 assume their places in society while learning to live within the limits of their capabilities. Physical therapists interact with a wide variety of health professionals in providing services. Physical therapy involves evaluation, treatment planning, performance of tests and measurements, 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 four 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 a minimum of two 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 two 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

Note: The following information pertains to the B.S. degree and the 1996 entering class. The entry-level program may change to a master's-level program as early as 1997. Applicants seeking admission for 1997 or later should be aware of possible changes in 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 important prerequisite. The student must be in good physical and mental health to be successful in physical therapy; a physical examination by a physician and up-to-date immunizations are required before beginning the professional program.

Because of limitations in space, facilities, and resources, 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 GPA above 2.50 (C+) in coursework in the physical, biological, and behavioral sciences is required as an indication of probable success in the program. In selecting students, applicants who meet University requirements for Minnesota residency are given priority. Consideration will be given to minority applicants regardless of their residency status and nonresidents who have special reasons to attend the University of Minnesota. Applicants to the Program in Physical Therapy who are residents of states or provinces that have tuition reciprocity agreements with Minnesota and have taken 40 credits at the University or other Minnesota colleges under reciprocity agreements, are given the same consideration for admission as Minnesota residents.

Application 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 Program in Physical Therapy. Students attending other colleges may request an Application for Admission from the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008). Applications and transcripts should be submitted as soon as possible after December 1 and no later than February 1 for the professional program that begins each fall quarter. The following additional materials should be submitted to the chair of the Physical Therapy Admissions Committee, Program in Physical Therapy, University of Minnesota, 382 Children's Rehabilitation Center, Box 388 UMHC, Minneapolis, MN 55455 (612/626-5887):

- Admissions processing fee
- Personal Data form
- Checklist of course requirements and GPAs
- References of work and volunteer experience
- Summary of objective measures
- Transcript that includes all grades to date
- 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 after December 1 each year at the above address. Packets will be sent to applicants upon receipt of their application from the Office of Admissions. The deadline for submission of the packet materials is March 1.

Preprofessional Curriculum

Students applying to the Program in Physical Therapy who will be earning their first baccalaureate degree are required to meet the University of Minnesota course requirements established by the Council on Liberal Education (CLE). These include courses from the diversified core, designated themes, and writing skills areas. Writing skills requirements will become effective for students beginning full-time enrollment in fall 1995. Students with a college degree applying to the Program in Physical Therapy are exempt from the CLE requirements but must have completed specific (or comparable) courses listed under the categories below.

Required and elective courses to be taken before entering the program are listed below. Courses may be taken S-N unless otherwise indicated.

Diversified Core

Physical and biological sciences, 12-cr minimum, must include lab.

- Biol 1009—General Biology (5 cr)
- A second biology course of the student's choice.
- CBN 3001—Elementary Anatomy (4 cr)
- Phsl 3051—Human Physiology (5 cr)
- Chem 1051-1052—Chemical Principles I-II (10 cr) or Chem 1001-1002—Chemical Principles and Covalent Systems (8 cr)
- Phys 1041-1042—Introductory Physics I-II (8 cr) or Phys 1104-1105-1106—General Physics I-III (12 cr)

History and social science, three courses, 12-cr minimum. One course must be in a historical perspective category.

- Psy 1001—General Psychology (5 cr)
- Psy 3604—Introduction to Abnormal Psychology (4 cr)
- Human development across the life span course(s) (4-5 cr)

Arts and humanities, three courses, 12-cr minimum.

- Clas 1048—Greek and Latin Terminology in the Medical and Biological Sciences (2 cr)

Mathematical thinking, one course, 4-cr minimum.

- EPsy 5260—Introductory Statistical Methods (4 cr) or a statistics course within the past three years that includes analysis of variance and regression analysis.

Designated Themes

Six courses from the following:

- Cultural diversity
- International relations
- Citizenship and public ethics
- Environment

Writing Skills

See page 10.

Note: All prerequisite courses must be completed before the student enrolls in the professional program. If more than one course (maximum of five quarter credits) is uncompleted after spring quarter of the sophomore year, the student will not be considered for admission that year. A student with only one course remaining at the end of the spring quarter will be required to complete the course by September 1.

Suggested Program—Students attending other colleges should select equivalent courses carrying comparable credit. All physical and biological sciences, except physics (suggested, however), should have an integral laboratory section. Physics courses should include electricity, magnetism, waves, electric circuits, light, mechanics, heat, atoms and spectra, fluids, and gases. The anatomy course should cover major human organ systems. Physiology content should include mammalian if not specific human physiology.

Approximate quarter credits follow the courses for the suggested program below:

Freshman Year

English composition (or exemption)	8
General biology	9-10
Elementary anatomy	4
General chemistry	10
Electives	14
	<hr/> 45-46

Sophomore Year

Physics	8-10
General psychology	5
Abnormal psychology	4
Human physiology	5
Medical terminology	2
Statistics	4-5
Human development across life span	4-5
Electives	13-15
	<hr/> 45-51

Professional Curriculum

Junior Year

Fall

CBN 3058—Anatomy of the Extremities	5
LaMP 5172—Laboratory Medicine and Pathology	4
PMed 5215—Introduction to Physical Therapy Clinical Education	2
PMed 5340—Human Growth and Development	4
	<hr/> 15

Winter

Neur 5121—Descriptive Neurology	2
PMed 5182—Functional Neuroanatomy and Neurophysiology	5
PMed 5221—Therapeutic Procedures I	5
PMed 5230—Theory and Technique of Muscle Function, Tests, and Measurements	5
	<hr/> 17

Spring

PMed 5161—Theory of Physical Medicine and Rehabilitation Applied to Medical Sciences	5
PMed 5222—Therapeutic Procedures II	4
PMed 5281—Theory of Therapeutic Exercise	4
PMed 5283—Techniques of Therapeutic Exercise	4
	<hr/> 17

Summer Session

PMed 5255—Clinical Education in Physical Therapy	Cr ar
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Senior Year

Fall

PMed 5256—Special Interim Clinical Education in Physical Therapy	Cr ar
PMed 5275—Patient Management and Clinical Anatomy	3
PMed 5282—Theory of Therapeutic Exercise	4
PMed 5284—Techniques of Therapeutic Exercise	4
PMed 5288—Evaluation Procedures II	4
	<hr/> 17

Winter

AdPy 5121—Descriptive Psychiatry	2
PMed 5270—Rehabilitation Procedures	3
PMed 5289—Patient Assessment	3
PMed 5290—Administration	3
PMed 5293—Introduction to Research Design	3
	<hr/> 15

Spring

PMed 5295—Clinical Education in Physical Therapy	15
Optional: PMed 5296, PMed 5297	1

Clinical Education—Each student in physical therapy is required to complete a minimum of 19 weeks of full-time clinical education. This full-time experience is divided into four blocks of time: five weeks late summer between the first and second year; two to three weeks fall quarter, second year; two six-week blocks spring quarter; and first summer session of the second year of the professional program. These internships are chosen from the following areas: general-acute, pediatrics, geriatrics, rehabilitation, orthopedic, home health, and sports medicine. A supervised two- or three-week interim affiliation is scheduled fall quarter of the senior year. Integrated, part-time 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 Academic Coordinator for Clinical Education (ACCE) 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. The Program in Physical Therapy faculty believe that direct patient care is a privilege and an essential part of professional health care education. It is also recognized that the primary responsibility of the clinical centers is to provide health care to its clients, and that students assigned to clinical centers must follow the policies and procedures of that center. Written agreements of affiliation between the University and the clinical training center are to be reviewed by the student before the clinical assignment begins. Individual centers may have special requirements such as dress codes, unusual hours, or specific physical examinations or health requirements. In addition, upon admission to the professional

program, students are required to have a general physical examination before participating in full-time clinical education experiences. This includes an update of their vaccinations.

Generally, students will be expected to wear a white uniform top, navy blue slacks/skirt and appropriate street/walking shoes. University of Minnesota nametags are required as part of the clinical dress code.

During clinical education, students will be responsible for their own health insurance, transportation (students should have access to a car), parking, and 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 being required to make it up; any additional absence, for whatever reason, must be made up. The clinical instructor at the center and the academic coordinator of clinical education will decide what constitutes a legitimate absence. Physical therapy departments may be open seven 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, 5256, 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. The University requires that students have hospitalization insurance. Students may elect to purchase outpatient coverage and University-sponsored hospital coverage directly from the Boynton Health Service. Further information about the fee exemption and health coverage is available at Boynton Health Service.

Clinical practice performance is reviewed and evaluated by the student and the clinical instructor. Students are responsible for keeping records while in the clinic and evaluating their experience. Unsatisfactory behavior or 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 complete 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.

Occupational and Physical Therapy Courses

Physical Medicine and Rehabilitation (PMed)

PMed 1002. ORIENTATION TO PHYSICAL THERAPY. (1 cr; offered fall and winter only; S-N only)
Overview of the profession through lectures, demonstrations, films, and tours. Provides factual information and guidance for students planning to enter professional training in physical therapy.

PMed 1003. ORIENTATION TO OCCUPATIONAL THERAPY. (1 cr; offered fall and spring only; S-N only)
Survey of the profession through lectures, films, demonstrations, and tours. For students investigating the field of occupational therapy.

PMed 5161. THEORY OF PHYSICAL MEDICINE AND REHABILITATION APPLIED TO MEDICAL SCIENCES. (5 cr; prereq regis OT or PT)
Lectures focusing on such related fields as surgery, orthopedics, pediatrics, dermatology, medicine, neurology and speech. Correlation clinic includes presentation of patients and discussion of treatment problems.

PMed 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.

PMed 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.

PMed 5221. THERAPEUTIC PROCEDURES I. (5 cr)
Theory and techniques, therapeutic massage, ultraviolet radiation, medical and athletic bandaging, asepsis and isolation, thermotherapy, hydrotherapy, positive pressure devices and volumetric measurements.

PMed 5222. THERAPEUTIC PROCEDURES II. (4 cr; prereq regis PT)
Theory and technique of electrotherapy. Methodology used in measuring patients responses to treatment. Use of goniometry, sensory testing, and muscle testing procedures with patients. Problems in evaluation, documentation, and ambulation training.

PMed 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.

PMed 5255. CLINICAL EDUCATION IN PHYSICAL THERAPY. (Cr ar; prereq regis PT; offered either summer term)
Supervised clinical practice at affiliated hospitals.

PMed 5256. SPECIAL INTERIM CLINICAL EDUCATION IN PHYSICAL THERAPY. (Cr ar; prereq regis PT; offered every qtr and both summer terms)
Full-time, supervised clinical experience at a center that reflects the student's interest.

PMed 5270. REHABILITATION PROCEDURES. (3 cr; prereq regis PT)
Integration of theoretical principles with treatment techniques in the management of selected long-term disabilities. Consideration of the patient's environment, lifestyle, and needs in the selection of treatment goals.

PMed 5275. PATIENT MANAGEMENT AND CLINICAL ANATOMY. (3 cr)
Integration of anatomy and pathokinesiology in physical therapy assessment and treatment planning for musculoskeletal conditions.

PMed 5281. THEORY OF THERAPEUTIC EXERCISE. (4 cr)
Fundamental principles of physiology, physics, and neurology as a basis for therapeutic exercise. Response of tissue to treatment for loss of mobility and strength; cardiopulmonary treatment.

PMed 5282. THEORY OF THERAPEUTIC EXERCISE. (4 cr)
Fundamental principles of neurodevelopment, neurophysiology, and neurology as a basis for therapeutic intervention in motor dysfunction.

PMed 5283. TECHNIQUES OF THERAPEUTIC EXERCISE. (4 cr)
Application of principles and techniques of therapeutic exercise for mobility, strength, and selected clinical problems.

PMed 5284. TECHNIQUES OF THERAPEUTIC EXERCISE. (4 cr)
Application of the principles and techniques of therapeutic exercise for movement dysfunction related to conditions of musculoskeletal and central nervous systems.

PMed 5288. EVALUATION PROCEDURES II. (4 cr; prereq regis PT)
Techniques of electrodiagnosis, gait analysis, posture evaluation, motor and perceptual testing. Principles of orthotics.

PMed 5289. PATIENT ASSESSMENT. (3 cr; prereq regis PT)
Assessment of clinical patients and rationale of treatment to attain rehabilitation goals.

PMed 5290. ADMINISTRATION. (3 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.

PMed 5292. INTRODUCTION TO RESEARCH. (2 cr; prereq regis PT)
Basic concepts of research; introduction to research design; levels of measurement, sampling methods.

PMed 5293. INTRODUCTION TO RESEARCH DESIGN. (3 cr; prereq regis PT)
Predictive research; elementary statistical concepts; analysis of scientific literature; research proposals.

OCCUPATIONAL AND PHYSICAL THERAPY

PMed 5294. INDEPENDENT STUDY IN PHYSICAL THERAPY. (Cr ar; prereq regis PT)
Individual study in areas related to physical therapy.

PMed 5295. CLINICAL EDUCATION IN PHYSICAL THERAPY. (15 cr; prereq regis PT)
Supervised clinical practice at affiliated hospitals.

PMed 5300. CONCEPTS FOR OCCUPATIONAL THERAPY PRACTICE. (5 cr; prereq regis OT)
Critical thinking, ethics, professional resources/organizations, patient-therapist relationship. Level I fieldwork experience.

PMed 5311. THERAPEUTIC OCCUPATION: INDIVIDUAL FOCUS. (3 cr; prereq regis OT)
Bases for therapeutic occupation, activity analysis, application to patient performance deficits.

PMed 5312. THERAPEUTIC OCCUPATION: GROUP FOCUS. (2 cr; prereq regis OT)
Development, practical application, and analysis of activity groups as therapeutic occupation.

PMed 5341. INTRODUCTION TO ASSESSMENT AND INTERVENTION PROCESSES. (5 cr; prereq regis OT)
Assessment concepts, techniques, and application to patient populations with both mental health and physical disabilities components. Treatment planning and documentation.

PMed 5342. COMPENSATORY REHABILITATION: ASSESSMENT AND INTERVENTION. (6 cr; prereq regis OT)
Assessment of daily living performance areas; adaptation techniques to compensate for performance deficits. Level I fieldwork experience.

PMed 5343. SPECIALTY TOPICS: ASSESSMENT AND INTERVENTION. (5 cr; prereq regis OT)
Assessment of intervention for patient populations requiring specialized approaches. Application of critical thinking skills to unique case problems. Level I fieldwork experience.

PMed 5344. NEUROREHABILITATION: ASSESSMENT AND INTERVENTION. (8 cr; prereq regis OT)
Assessment and intervention related to perception, cognition, reflexes, sensory integration, and motor control. Application to individuals with multiple performance component deficits.

PMed 5360. DYNAMICS OF GROUP MODELS. (3 cr; prereq regis OT)
Application of group/team dynamics in diverse professional settings.

PMed 5370. THEORY OF OCCUPATION. (3 cr; prereq regis OT)
Occupational therapy frames of reference, role of activity, and historical development of profession.

PMed 5375. COMMUNITY RESOURCES AND HEALTH CARE ISSUES. (4 cr; prereq regis OT)
Impact of individual and system characteristics on availability, accessibility, and acceptability of service delivery models. Identification and evaluation of community resources; principles of adult education.

PMed 5380. MANAGEMENT OF OCCUPATIONAL THERAPY SERVICES. (3 cr; prereq regis OT)
Principles of administration, supervision, and organization of occupational therapy services.

PMed 5391. WORK ACROSS THE LIFE SPAN: ASSESSMENT AND INTERVENTION. (4 cr; prereq regis OT)
Assessment and intervention to facilitate work roles throughout the life span. Field experience.

PMed 5392. METHODS OF SCIENTIFIC RESEARCH. (4 cr; prereq regis OT)
Analysis of scientific literature and development of research proposals.

PMed 5393. KINESIOLOGY. (3 cr; prereq regis OT)
Analysis of body mechanics and coordinated movement.

PMed 5394. ORTHOTICS. (4 cr; prereq regis OT)
Analysis, design, and construction of orthotic devices.

PMed 5395. INDEPENDENT STUDY IN OCCUPATIONAL THERAPY. (Cr ar; prereq regis OT)
Individual study in areas related to occupational therapy.

PMed 5396-5397-5398. FIELDWORK EDUCATION IN OCCUPATIONAL THERAPY. (Cr ar; prereq regis OT)
Six to eight months of supervised training in affiliated hospitals and community agencies.

Required Courses Offered by Other Units

AdPy 5121. DESCRIPTIVE PSYCHIATRY. (2 cr; prereq regis OT or PT)
Etiology of mental illness including dynamic concepts, personality development, symptom formation, classification of mental illness, treatment presentation. Case presentation.

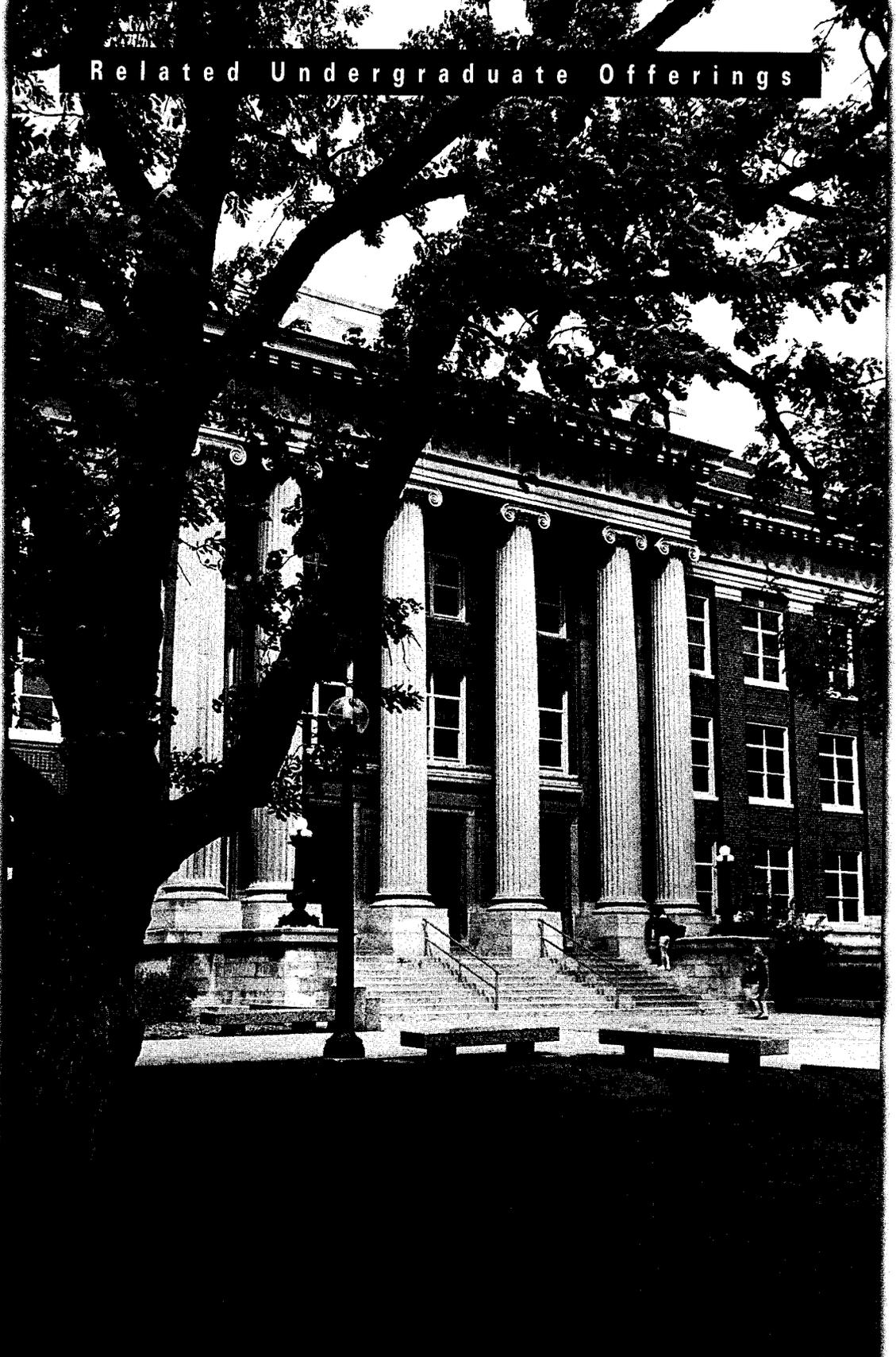
CBN 3058. ANATOMY OF THE EXTREMITIES. (5 cr; prereq 1004, regis OT or PT)
Regional approach to gross human anatomy emphasizing skeletal, muscular, circulatory, and peripheral nervous systems of the extremities and trunk. Lecture, prosection, and lab with dissection of cadavers.

EPsy 5260. INTRODUCTORY STATISTICAL METHODS. (4 cr; prereq physical therapy student or #)
Techniques for organizing and presenting data; descriptive indices of central tendency, variability, and bivariable correlation/regression; procedures for making inferences concerning means and proportions.

LaMP 5172. LABORATORY MEDICINE AND PATHOLOGY. (4 cr; prereq regis nursing or OT or PT or #)
Basic pathologic disease process; terminology. Disease by organ system; clinical and lab manifestations.

Neur 5121. DESCRIPTIVE NEUROLOGY. (2 cr; prereq regis OT or PT)
Central and peripheral nervous system. Correlation of neuroanatomy, neurophysiology, clinical neurology, and pathology of the nervous system.

Related Undergraduate Offerings



For general information about allied health professions, contact the Office of the Coordinator for Allied Health Programs, 15-170 Phillips-Wangensteen Building, Box 609, 516 Delaware Street S.E., Minneapolis, MN 55455 (612/625-9490).

Dental Hygiene Program

The Program in Dental Hygiene was established at the University of Minnesota in 1919 and is fully accredited by the Commission on Dental Accreditation. A baccalaureate degree program was initiated in 1990. It is the only degree-granting program in Minnesota as well as the only program affiliated with a school of dentistry.

The goal of the program is to prepare a liberally educated person who can practice as a dental hygienist in a variety of dental hygiene roles and health care settings. This educational program emphasizes the liberal arts and the basic, behavioral, and dental sciences. Students develop dental hygiene clinical and interpersonal skills in a variety of clinical settings in preparation for providing preventive dental hygiene services to the public. The curriculum consists of the preprofessional program (one year) in the College of Liberal Arts or its equivalent and the professional program (three years) in the School of Dentistry Division of Dental Hygiene.

The graduate is eligible for licensure upon successful completion of both a written National Board Dental Hygiene Examination and a clinical examination. The licensed dental hygienist practices in accordance with the requirements of individual state dental practice acts.

For admission to the professional program, the student must have completed, or present adequate plans to complete, the preprofessional course requirements. The major criteria for admission are satisfactory academic performance as judged by the applicant's GPA in prerequisite coursework and standardized tests. Admission is competitive and occurs once a year for fall quarter. Contact the Division of Dental Hygiene for complete information on the preprofessional and professional course requirements.

Students in residence at the University of Minnesota apply by submitting an Application for Change of College or Status with the Office of the Registrar between January 1 and April 15 of the desired year of entry. Students attending other colleges and universities apply by submitting the Application for Admission to the Office of Admissions. For more information, see the *School of Dentistry Bulletin* or contact Dr. Kathleen Newell, University of Minnesota, 9-436 Moos Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612/625-9121).

Health Sciences Interdisciplinary Courses

The Health Sciences Educational Policy Committee has identified several courses that serve interdisciplinary educational objectives. These courses improve student access to general health sciences activities and prepare students for the cooperative delivery of health care as members of health professional teams.

For a course guide or more information, contact Health Sciences Learning Resources, University of Minnesota, Box 734 UMHC, 420 Delaware Street S.E., Minneapolis, MN 55455 (612/624-5909 or 612/624-7102).

Inter-College Program

The Inter-College Program of University College allows students to design an individual program of study. Students work with advisers to plan an intercollegiate and/or interdisciplinary program leading to a B.A. or B.S. Degrees can be designed to prepare students for graduate and professional programs.

In addition to other options, the Inter-College Program has guidelines for students who wish to design an individualized degree program in health and wellness.

For more information, contact the Inter-College Program, University of Minnesota, 107 Armory, 15 Church Street S.E., Minneapolis, MN 55455 (612/624-2004).

Nurse Anesthesia Program

The nurse anesthesia program, offered by the Medical School through the Department of Anesthesiology, trains certified registered nurse anesthetists (CRNAs) to be educators and managers in nurse anesthesia and enhances the technical competencies of certified nurse anesthetists.

To be admitted to the program, applicants must be nurses who are certified as anesthetists. After admission to the program, students are given 150 "blanket credits" based on previous academic and professional work. To complete the program, students complete 60 more academic credits: 15 credits of clinical work, 25 credits of coursework in the Medical School, and 20 credits of electives. Students who complete the program are granted a bachelor of science in nurse anesthesia (B.S.N.A.) by the Medical School.

Detailed information about the program is available from Shirley Bell, Director, Nurse Anesthesia Program, University of Minnesota, Box 294 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612/624-3161).

Nursing

The School of Nursing offers a four-year program leading to the bachelor of science in nursing (B.S.N.) and eligibility to take the state examination for licensure as a registered nurse (RN). The program prepares nurses who are fully responsible practitioners of professional nursing in the contemporary health care system and ready to participate in molding the future direction of nursing. The program builds a foundation for graduate study and for leadership roles.

The two years of preprofessional (pre-nursing) study (90 quarter credits) may be taken at the College of Liberal Arts, University of Minnesota, or at any regionally accredited college or university where the required courses may be completed. Prerequisites for admission include:

Writing practice (composition)
General chemistry
General biology
Biochemistry or organic chemistry
Human anatomy
Human physiology
Microbiology
General nutrition
Introductory sociology
Cultural pluralism/diversity
General psychology
Abnormal psychology
Small group dynamics
Family theory
Human growth and development
Statistics
Upper division writing

The professional major is a two-year plan during which students acquire the knowledge and develop the skills of professional nursing. Through classes, seminars, projects, and laboratories (including clinical assignments), the role of nursing and nurses and the major health care issues of the day are learned. Clinical assignments are likely to be in acute care settings, homes, communities, schools, laboratories, and with clients of all age groups and varied sociocultural backgrounds.

In addition to the required courses listed above, an admission GPA of 2.80 (based on prerequisites) is preferred and applicants must submit a written profile statement. An honors program is offered to those students who qualify, which allows for individual explorations of the nursing discipline and practice.

The school also offers programs leading to the master of science degree and Ph.D. in nursing.

For more information, see the *School of Nursing Bulletin* or contact the Admissions Office, School of Nursing, 5-160 Health Sciences Unit F, 308 Harvard Street S.E., Minneapolis, MN 55455 (612/624-4454).

Nutrition

This bachelor of science degree program is for those interested in the field of nutrition and its various applications in dietetics, public health, and nutrition science. Employment opportunities are wide-ranging in the areas of health and wellness. Another option is a B.S. in nutritional sciences. This preprofessional degree is for those planning to pursue life sciences studies in medical, dental, or graduate school.

Students are strongly encouraged to take FSCN 1612—Principles of Nutrition before entering the program. Transfer students who have completed organic chemistry or biochemistry courses that are not as extensive as those required must take additional courses.

All students completing 100 credits or more are required to meet with the nutrition special adviser for program evaluation and selection of the dietetics or nutrition science option. To be admitted, transfer students must have a 2.50 GPA and students expecting to apply for graduate school, an internship, or the Coordinated Program in Dietetics should maintain a GPA above 2.80.

Students wanting to become Registered Dietitians need to complete an approved or accredited professional experience and pass the national registration examination. The professional experience can be completed through a postbaccalaureate dietetic internship or by completion of the Coordinated Program in Dietetics offered by the University's Department of Food Science and Nutrition. After completing the academic and experience requirements, graduates are eligible to take the registration examination.

Students interested in medical school, graduate school, or other professional postgraduate programs should complete the nutrition science option and maintain a GPA above 3.00.

This program is open to students registered in either the College of Agricultural, Food, and Environmental Sciences or the College of Human Ecology. Faculty advisers are from the Department of Food Science and Nutrition, which is jointly administered by the two colleges. For more information, see the bulletin

of the College of Human Ecology or the College of Agricultural, Food, and Environmental Sciences, or contact Linda Brady, Department of Food Science and Nutrition, University of Minnesota, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, St. Paul, MN 55108 (612/624-9211).

Radiologic Technology Program

Students in the radiologic technology program combine 45 credits of radiologic technology coursework and experience with 47 credits of general education coursework through Normandale Community College (NCC). Students who complete the program earn an associate in science degree from NCC.

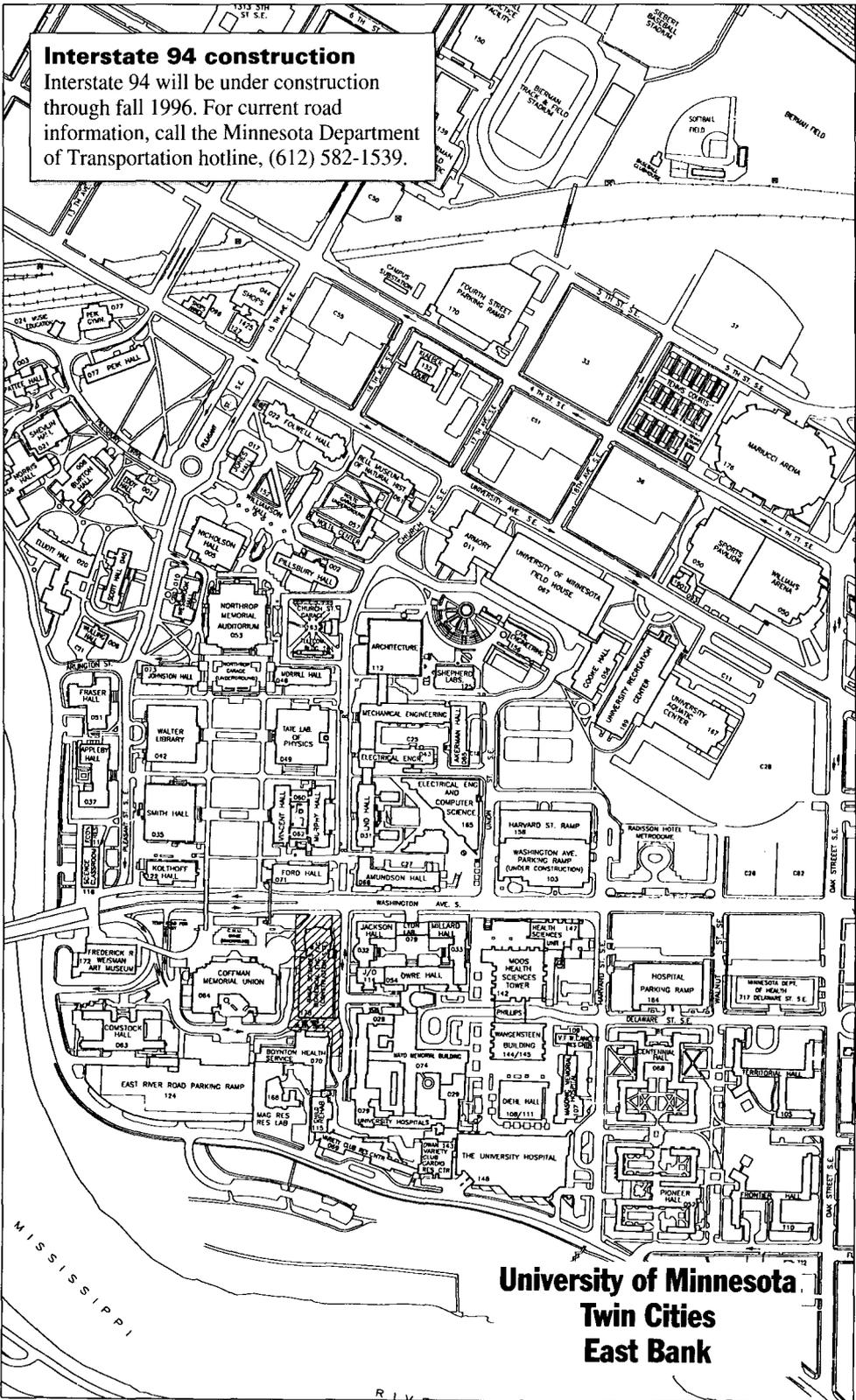
After successful completion of the national registry examination, students will receive certification from the American Registry of Radiologic Technologists and may join the American Society of Radiologic Technologists. Students who complete the radiologic technology program and are certified as radiographers are qualified to use radiographic equipment, perform patient procedures, process film, and assist radiologists in special procedures.

Radiologic technology courses include orientation to radiologic technology, medical terminology, related ethics, darkroom chemistry and techniques, nursing procedures, medical and surgical diseases, radiographic positioning, principles of radiographic exposure, radiographic anatomy, fundamental electricity, radiological physics, special radiographic programs, basics of nuclear medicine, basics of radiation therapy, radiographic equipment, and systems analysis.

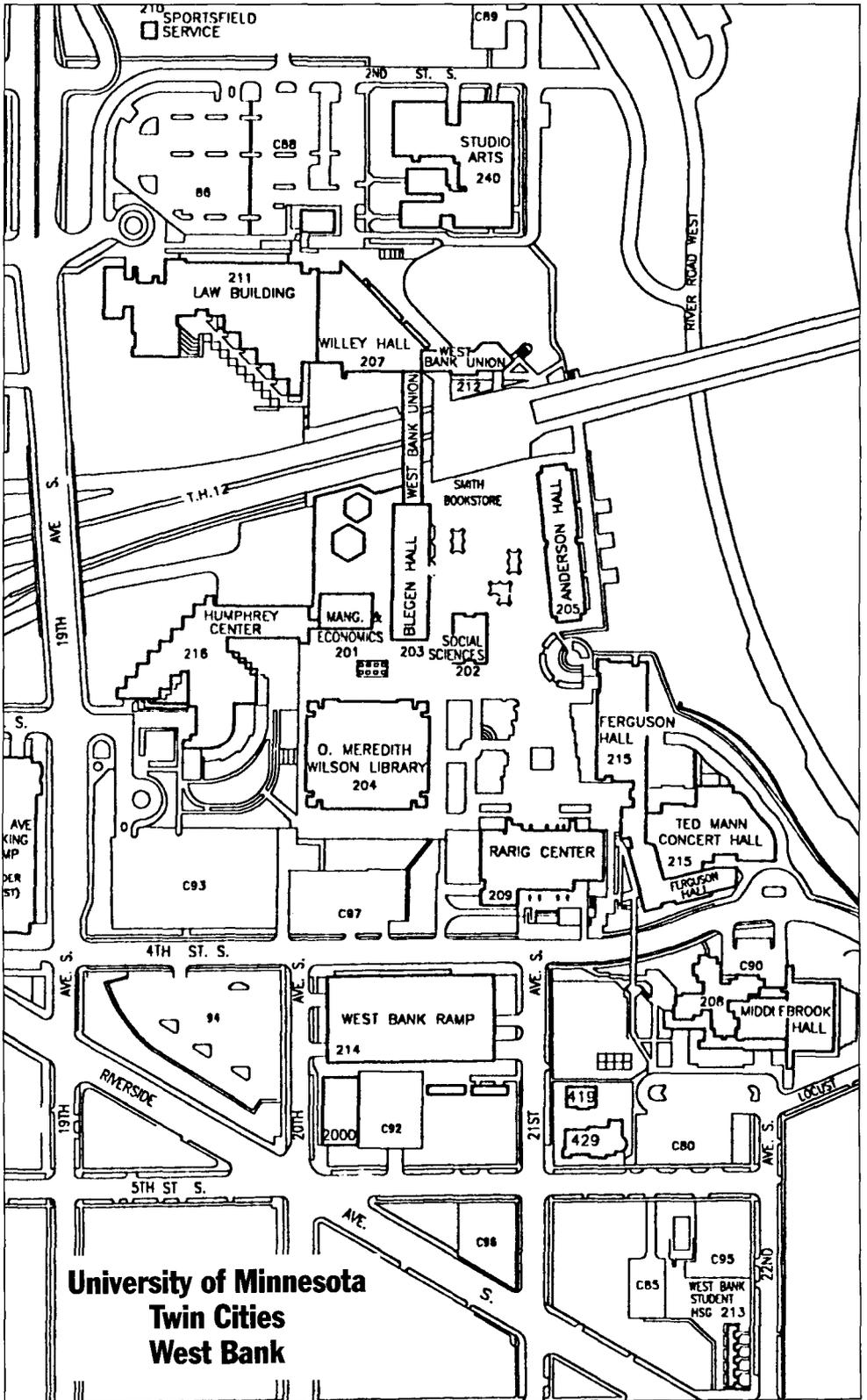
For more information, contact Patricia Skundberg, Coordinator, Department of Radiology, University of Minnesota, 420 Delaware Street S.E., Minneapolis, MN 55455 (612/626-6886); Normandale Community College Admissions (612/830-9315).

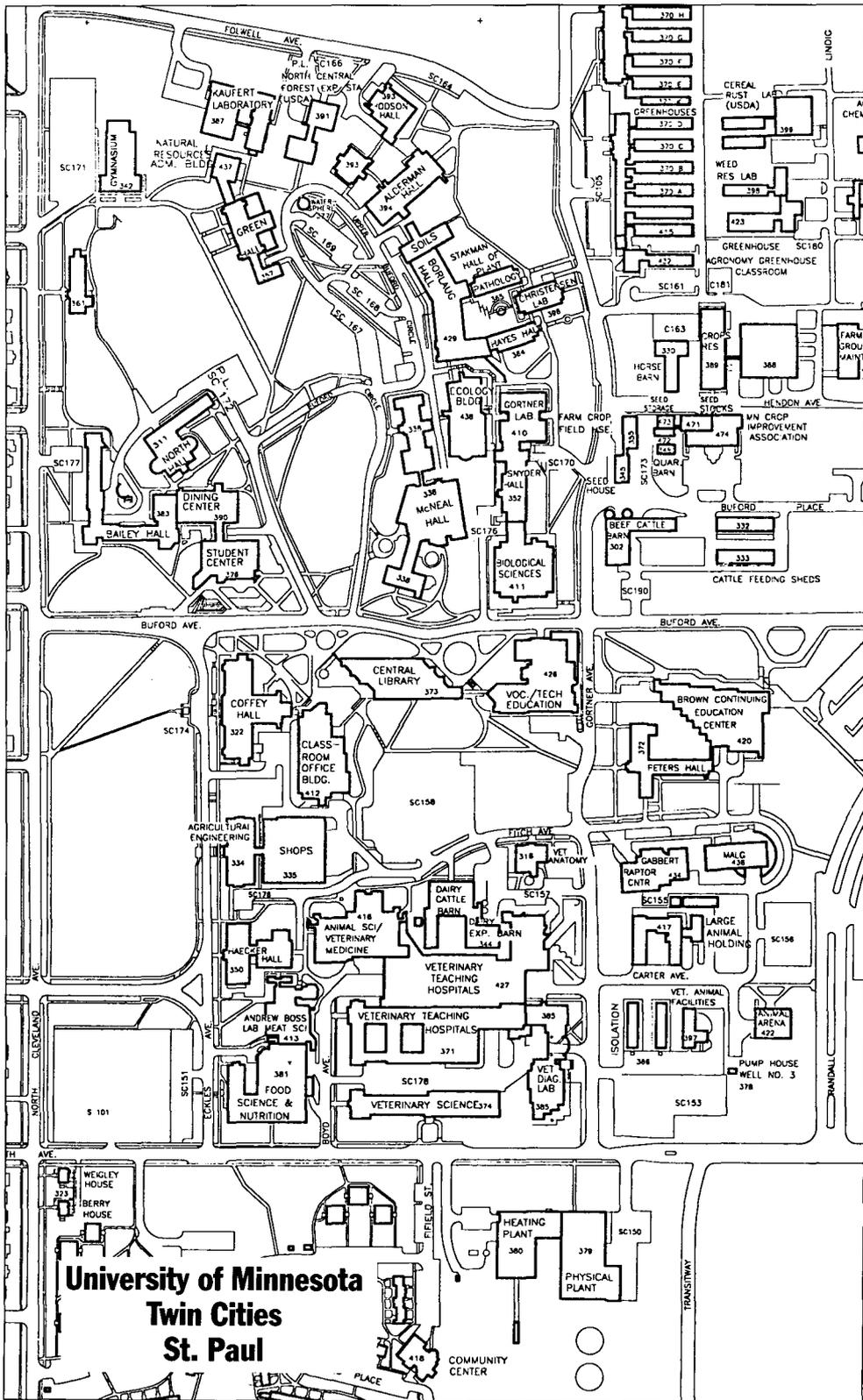
Interstate 94 construction

Interstate 94 will be under construction through fall 1996. For current road information, call the Minnesota Department of Transportation hotline, (612) 582-1539.



**University of Minnesota
Twin Cities
East Bank**





**University of Minnesota
Twin Cities
St. Paul**

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College of Veterinary Medicine

UNIVERSITY OF MINNESOTA

BULLETIN

1995 - 1997



Veterinary
Medicine

College of Veterinary Medicine

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History

Veterinary medicine deals with the prevention, control, and treatment of diseases of animals. Legal documents and other records from about 2200 B.C. found in Babylonia, 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.

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 oldest successful veterinary college in the United States is the College of Veterinary Medicine of Iowa State University, established in 1879. Currently there are 31 veterinary schools in the United States and Canada.

Veterinary Medical Education at the University

The College of Veterinary Medicine (CVM) at the University of Minnesota was established in 1947 in response to the veterinary medical needs of the livestock industry and pet owners, the need for research in animal diseases, and growing student interest in the study of veterinary medicine. Since its establishment, the college has graduated 45 classes with a total of 2,649 veterinarians.

CVM is fully accredited by the Council on 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. Veterinarians in general practice provide care for food and companion animals, both large and small. Those in specialized practice may provide care primarily for a single species, or they may concentrate in clinical disciplines such as animal reproduction, surgery, or diseases of specific systems. Other veterinarians pursue careers in education, research, and

industry. Challenging careers are offered by government agencies such as the Department of Health and Human Services, the Department of Agriculture, the Armed Forces, the Department of Energy, and the National Aeronautics and Space Administration. Careers in laboratory animal medicine, zoo animal practice, public health, and food inspection also are available. There are new opportunities for research and service in such areas as comparative medical research and aquatic and wildlife animal medicine.

In 1982, a National Academy of Sciences report titled "Specialized Veterinary Manpower Needs Through 1990" showed that a balance existed in the supply versus demand for veterinarians. This report identified 18 specialty careers in government, industry, and academia where employment opportunities will be greatest. In 1984, the U.S. Department of Health and Human Services identified a number of areas in high demand, including food animal veterinarians and teaching and research specialty areas such as toxicology and pathology. In 1986, the U.S. Department of Health and Human Services issued a report on the status of health personnel in the United States. This report projected a need for 59,500 veterinarians by the year 2000. The demand for veterinarians continues and the need in several areas of employment continues to exceed the supply.

All students graduating from this college have found employment or pursued further advanced education in veterinary medicine.

Although veterinary medicine traditionally has been viewed as a man's field, women are now entering the profession in increasing numbers. In 1980 approximately 90 percent of veterinarians were male and 10 percent were female. In 1992 nearly 28 percent of veterinarians were female and 72 percent were male. In just over 12 years the proportion of females increased from 1 of 10 to 1 of 2.6 veterinarians.

Resources

This biennial bulletin is the basic source of information about the College of Veterinary Medicine.

The *Class Schedule*, distributed with registration materials before the registration period each quarter, lists course offerings with prerequisites, class hours, rooms, and instructors. It also includes registration instructions, fees, final exam schedules, and other useful information.

Information about evening and summer courses is contained in the *Extension Classes Bulletin* and *Summer Session Bulletin*, respectively.

Policies

Bulletin Use—The information in this bulletin and other University bulletins, publications, or announcements is subject to change without notice. University offices can provide current information about possible changes.

This publication is available in alternative formats upon request. Please contact the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008; e-mail admissions@tc.umn.edu).

This bulletin also is available in electronic format on Internet and may be accessed via Gopher.

Equal Opportunity—The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

In adhering to this policy, the University abides by the Minnesota Human Rights Act, Minnesota Statute Ch. 363; by the Federal Civil Rights Act, 42 U.S.C. 2000e; by the requirements of Title IX of the Education Amendments of 1972; by Sections 503 and 504 of the Rehabilitation Act of 1973; by the Americans With Disabilities Act of 1990; by Executive Order 11246, as amended; by 38 U.S.C. 2012, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

Inquiries regarding compliance may be directed to the Office of Equal Opportunity and Affirmative Action, University of Minnesota, 419 Morrill Hall, 100 Church Street S.E., Minneapolis, MN 55455 (612/624-9547).

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. (Exceptions

under the law include state and federal educational and financial aid institutions.) The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information—name, address, electronic (e-mail) address, telephone number, dates of enrollment and enrollment status (full time, part time, not enrolled, withdrawn and date of withdrawal), college and class, major, adviser, academic awards and honors received, and degrees earned—is considered public or directory information. Students may prevent the release of public information only during their terms of enrollment. To do so, they must notify the records office on their campus.

Students have the right to review their educational records. The regents' policy, including a directory of student records, is available for review at 150 Williamson Hall, Minneapolis, and at records offices on other campuses of the University. Questions may be directed to the Office of the Registrar, 150 Williamson Hall (612/625-5333).

Immunization—Students born after 1956 who take more than one University class are required under Minnesota law to submit an Immunization Record form.

The form, which is sent along with the official University registration letter, must be filled out and returned to Boynton Health Service within 45 days of the first term of enrollment in order for students to continue registering for classes at the University. Complete instructions accompany the form.

Extracurricular Events—No extracurricular events requiring student participation may be scheduled from the beginning of study day to the end of finals week. Exceptions to this policy may be granted by the Senate Committee on Educational Policy. The Senate advises all faculty that any exemption granted pursuant to this policy shall be honored and that students who are unable to complete course requirements during finals week shall be provided an alternative and timely opportunity to do so.

Smoke-Free Campus Policy—Smoking is prohibited in all facilities of the University of Minnesota, Twin Cities campus except for designated private residence hall rooms.



Welcome to Prospective Students

I am pleased to introduce the University of Minnesota's College of Veterinary Medicine. The college is committed to training veterinary professionals, furthering knowledge in veterinary medicine, and providing consultative and referral services to veterinary practitioners and livestock producers in Minnesota and the North Central region. Protecting our animal kingdom is one of humankind's noblest missions. Our satisfaction is unmatched as we care for the livestock, companion, and wild animal species, all of which depend on humankind for their ultimate welfare.

The University's CVM prepares veterinary and graduate students to enter a variety of careers. It offers internationally recognized programs for the D.V.M., M.S., and Ph.D. degrees as well as

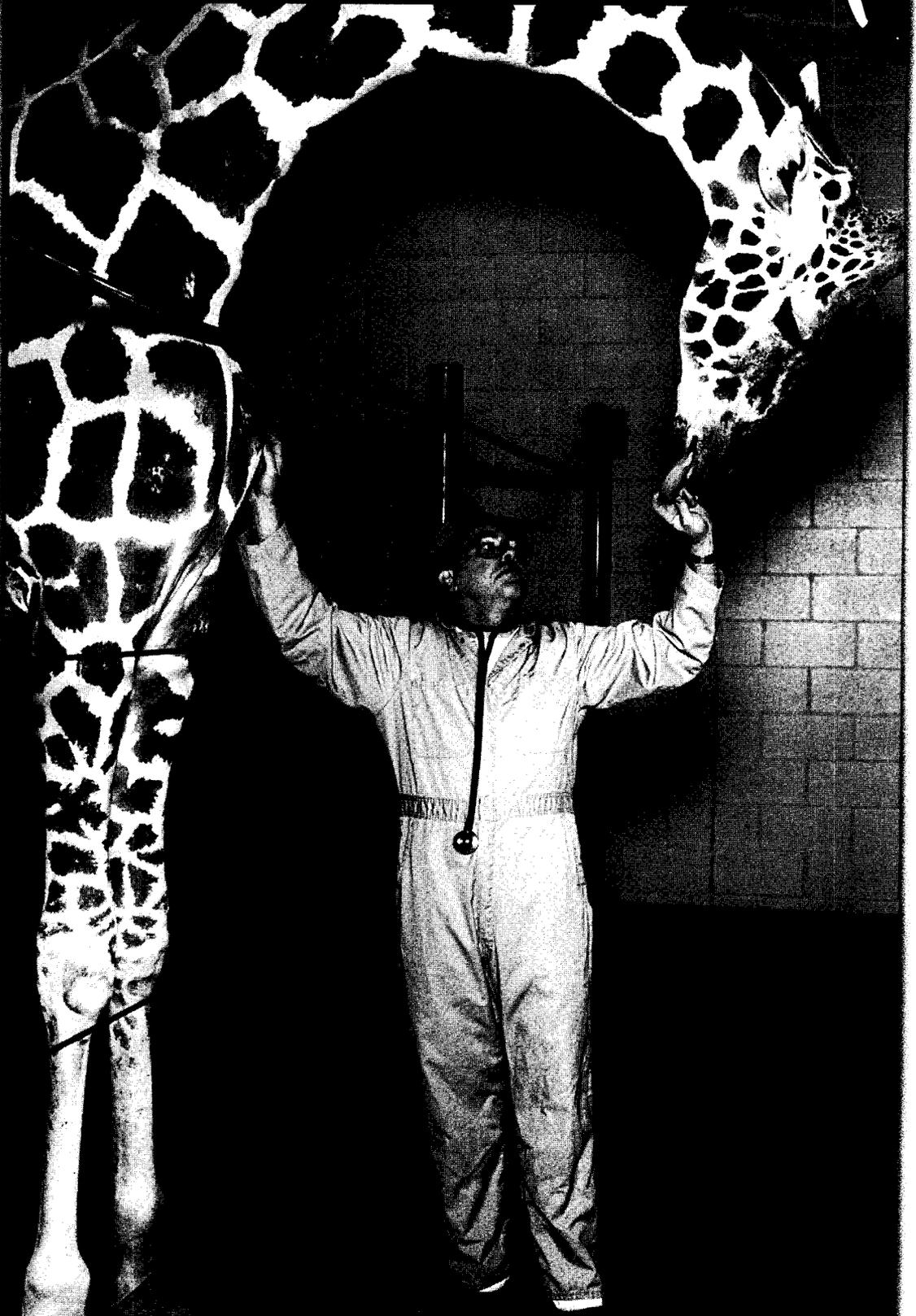
internship and residency training. Many graduate students attain board certification in a veterinary specialty. New programs encourage professional students interested in research careers to undertake the D.V.M. and Ph.D. degrees simultaneously.

Strong basic science programs encourage students to fine-tune their investigative skills in progressive research programs. The University is an exciting intellectual environment for both learning and contributing creatively to the advancement of knowledge while participating in debate on issues facing the veterinary profession. It encompasses all the health, agricultural, biological, and engineering sciences, providing unique opportunities for interdisciplinary studies. Minnesota has remarkably large and diverse livestock and poultry industries, and a genuine concern for its wildlife heritage. The twin cities of Minneapolis and St. Paul form a metropolis rich in animal companions as well as a great center for education, culture, and diverse employment opportunities. Thus, CVM is exceptionally well situated to offer balanced educational programs of the highest quality in superb facilities. To complement this, the college introduced a new curriculum that permits students to select clinical experience in their final year that will provide them with optimal preparation for the type of practice they anticipate entering following graduation.

This bulletin describes the college's academic programs. Please read it and direct any questions you may have to my office or to appropriate faculty. We are very pleased you are interested in veterinary medicine and in our college and University.

David G. Thawley
Dean

Programs and Services



Professional Curriculum

CVM awards two degrees, the bachelor of science (B.S.) in veterinary science and the doctor of veterinary medicine (D.V.M.). Students who wish to earn the B.S. degree in veterinary science may do so at the end of the second year of the veterinary curriculum, providing they have not already earned a B.S. degree from another college or university.

The college also offers a combined D.V.M./Ph.D. program for a limited number of students admitted to both the D.V.M. program and the Graduate School. This program offers scholarships to three entering students each year that includes a stipend while they are enrolled in the veterinary curriculum and a graduate assistantship while they are attending the Graduate School.

The veterinary curriculum provides students with the education and training needed to practice veterinary medicine. The curriculum also allows students to pursue specialized training. Graduates of the program are 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 develop students' professional identity, including their commitment to lifelong learning and service to clients and the community. The curriculum provides necessary background for evaluating and assimilating new information in the biomedical sciences and helps develop the future veterinarian's ability to apply this information.

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, students gain the experience necessary to integrate classroom knowledge with the practice of veterinary medicine.

In the first year of the veterinary curriculum, 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 of 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 veterinary care and develop skills needed for professional practice by dealing with clients and diagnosing and managing patients.

Animal Use

Animals are used in the D.V.M. curriculum to illustrate medical principles and to provide students with firsthand experience in the art and practice of veterinary medicine and surgery. The animals are treated with genuine concern for their welfare; however, in some cases animals must eventually be euthanized in accordance with the Animal Welfare Act. Efforts have been made and are ongoing to reduce the number of animals required in non-clinical teaching.

Given the need to use animals for instructional purposes, prospective students must recognize that successful completion of the D.V.M. curriculum requires that both live and dead animals be incorporated into students' learning experience. In all instances the animals will be treated with dignity and handled in accordance with the Animal Welfare Act. In some cases, procedures will result in termination of the animal's life.

The University and college animal care committees review all courses offered in the college and determine the appropriateness of using animals in each course.

Facilities

CVM is housed primarily in three buildings on the St. Paul campus. Most of the classrooms and laboratories students use during their first two years in the professional curriculum are in the Animal Science-Veterinary Medicine and the Veterinary Science buildings. Extensive research facilities, including the college library and the Learning Resources and Computer

Center, are also located in these buildings. In the Veterinary Teaching Hospitals building, space and facilities are provided for various diagnostic and therapeutic procedures. Clinical laboratories for hematology, chemistry, pathology, toxicology, parasitology, microbiology, and radiology, as well as animal holding facilities, are housed in this building. In addition, the Veterinary Diagnostic Laboratory is attached to the east end of the Veterinary Teaching Hospitals building.

Additional animal holding facilities, for teaching and research, are located east of Gortner Avenue and across from the Veterinary Teaching Hospitals building.

The off-campus facilities of the Minneapolis and St. Paul Health Departments, Minnesota Board of Animal Health, veterinary services of the Department of Agriculture, and food industries in the State are also used in teaching the public health aspects of veterinary medicine.

High School Preparation

First consideration should be given to meeting the admission requirements of the college or university the student plans to attend to complete the preprofessional course requirements. Furthermore, prospective students are urged to take as many mathematics and science courses as possible in high school.

Preprofessional Curriculum

To qualify for admission to CVM, students must complete specified courses—about three years of work—at an accredited college. Application to the professional curriculum must be made nearly one year in advance or not later than November 1 in the year before the fall quarter in which they wish to be admitted.

All coursework used to meet the preprofessional requirements should be evaluated with the A-F letter grading system, except when a college does not offer a required course under that grading system or when advanced placement (exemption) is granted.

The required areas of study, including the number of quarter credits required for admission to CVM, are

Biology (18-25 credits)

General biology or plant biology (5 credits with lab)

Zoology or animal biology (5 credits with lab)

Genetics (4 credits)

To include the mechanisms of heredity and their applications.

Microbiology (4 credits)

An introductory course with laboratory to include taxonomy, morphology, physiology, and ecology of microbes.

Chemistry (26-32 credits)

General chemistry with lab (12 credits, three quarters or two semesters)

Organic chemistry with lab (10 credits, two quarters or one semester)

Biochemistry with or without lab (4 credits)

Liberal arts and humanities (16-20 credits)

History and social science (8 to 10 credits).

Anthropology, economics geography, history, political science, psychology, social science and sociology courses can usually be used to fulfill this requirement.

Arts and humanities (8 to 10 credits).

Art literature and music courses can usually be used to fulfill this requirement as can many humanities, theater and foreign language literature courses.

Mathematics (4 credits)

College algebra (with prerequisite high school higher algebra) or precalculus or calculus.

Physics (10-15 credits)

To include mechanics, heat, sound, light, electricity, magnetism, and atomic physics, topics normally covered in an introductory sequence with laboratory.

Writing skills (8 credits)

Students must satisfy the requirement for graduation of the college they are attending.

Electives

Electives may be selected on the basis of the student's interests in a broad educational program and completion of a degree program in a desired major(s). Students are encouraged to choose courses in the care and management of cattle, dogs, horses,

Freshman Liberal Education Requirements

(effective fall 1994 and later for freshmen enrolling with fewer than 39 credits)

A liberal education introduces you to the modes of inquiry and subject matter of the major branches of knowledge, including the factual information and theoretical or artistic constructs that form their foundations; the “ways of knowing”—the kinds of questions asked and how insight, knowledge, and data are acquired and used; the changes over time of their central ideas or expressive forms; and the interrelationships among them and with human society in general. To these ends, study by all undergraduate students on the Twin Cities campus is guided by a common framework.

The Diversified Core Curriculum

Physical and Biological Sciences. Comprehension of physical and biological principles; understanding of and ability to use the methods of scientific inquiry—the ways in which scientists investigate physical and biological phenomena; and appreciation of the importance of science and the value of a scientific perspective.

Requirement: A minimum of three courses totaling at least 12 credits, including one course with a laboratory or field experience in the physical sciences and one course with a laboratory or field experience in the biological sciences.

History and Social Sciences. Knowledge of how historians and social scientists describe and analyze human experiences and behavior; study of the interrelationships among individuals, institutions, structures, events, and ideas; understanding of the roles individuals play in their historical, cultural, social, economic, and political worlds.

Requirement: A minimum of three courses totaling at least 12 credits, including one course with historical perspective.

Arts and Humanities. Understanding of approaches to the human condition through works of art, literature, and philosophy; knowledge of how artists create and humanistic scholars think; ability to make aesthetic judgments.

Requirement: A minimum of three courses totaling at least 12 credits including courses in two of the following: literature, philosophical perspective, and visual or performing arts.

Mathematical Thinking. Acquisition of mathematical modes of thinking; ability to evaluate arguments, detect fallacious reasoning, and evaluate complex reasoning chains; appreciation of the breadth of applications of mathematics and its foundations.

Requirement: A minimum of one course totaling at least four credits.

The Designated Themes of Liberal Education

The designated themes of liberal education offer a dimension to liberal learning that complements the diversified core curriculum. Each of the themes focuses on an issue of compelling importance to the nation and the world, the understanding of which is informed by many disciplines and interdisciplinary fields of knowledge.

Requirement: A minimum of six courses (or five courses if one includes an approved practicum), including one course in each of the following:

Cultural Diversity. Understanding of the roles gender, ethnicity, and race play in structuring the human experience in and developing the social and cultural fabric of the United States.

International Perspectives. Comprehension of the ways in which you are part of a rapidly changing global environment dominated by the internationalization of most human endeavors.

Environment. Knowledge of the interaction and interdependence of the biophysical systems of the natural environment and human social and cultural systems.

Citizenship and Public Ethics. Reflection on and determination of a clearer sense of your present and future civic relationships and your obligations to the community.

Writing Skills

The ability to communicate effectively is a hallmark of a liberally educated individual and a key to a successful and satisfying life. To encourage refining of writing skills, the liberal education curriculum includes both writing courses and writing across the curriculum.

Requirement: All students will complete the writing requirement specified by the college awarding their baccalaureate degree.

You may satisfy the liberal education requirements with a number of courses and credits different from those of other students because some courses serve multiple goals in the curriculum; e.g., some courses will satisfy a diversified core requirement and a designated theme requirement, and other courses will satisfy the requirements for each of two themes. Thus, you may satisfy the designated theme requirements with a smaller number of courses than is stated in the requirement. Each quarter, the *Class Schedule* will publish the requirements and list all courses that satisfy them. In addition, the *Class Schedule* will list which of these courses are offered that quarter and which are tentatively scheduled for the subsequent quarters during the academic year.

sheep, and swine if they are available. Students not having experiences with food-producing animals are especially encouraged to select courses in the care and management of cattle, sheep, and swine. Other recommended electives include courses in animal nutrition, electronic communication, statistics, economics, public speaking and business management. Students planning academic or research careers should consider additional courses in science, mathematics, and computer science.

Applicants who have not earned a baccalaureate degree before entering CVM and wishing to receive the B.S. in veterinary science at the end of the second year of the D.V.M. curriculum must meet the University's liberal education requirements before entering the D.V.M. program. (See liberal education requirements on page 8.) These requirements apply to all students entering the University 1994 and later.

Examples of courses offered on the University of Minnesota, Twin Cities campus that meet the admission requirements follow.

BioC 3021—Biochemistry
or BioC 5331—Biological Systems
Biol 1009—General Biology
Biol 1106—General Zoology
Chem 1001—General Principles of Chemistry
(placement in Chem sequence determined
by chemistry department)
Chem 1051—Chemistry Principles I
Chem 1052—Chemistry Principles II
Chem 3301/3305, 3302—Elementary Organic
Chemistry I/lab and Chemistry II
GCB 3022—Genetics
Math 1111—College Algebra, Analytic
Geometry
(or) Math 1142—Short Calculus
(or) Math 1201—Pre-Calculus
Phys 1041/1045-1042/1046—Introductory
Physics/Lab
VPB 3103—General Microbiology
Writing skills—Students must satisfy the
requirement for graduation of the college
they are attending.

Admission Procedures for the Professional Curriculum

Enrollment in CVM's professional curriculum 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 spring term. Beginning with admission for fall 1996, the University of Minnesota College of Veterinary Medicine will be part of the national Veterinary Medical College Application Service (VMCAS). VMCAS allows students to use the same application to apply to any of the veterinary colleges belonging to this service. To apply, prospective students should request the VMCAS application packet, available from the Office of the Student Affairs and Admissions, College of Veterinary Medicine, 460 VTH, 1365 Gortner Avenue, St. Paul, MN 55108. Neither Graduate School nor advanced standing applications may be used to apply to CVM. First priority is given to residents of Minnesota and of states and Canadian provinces with which reciprocity or contractual agreements exist. These states/provinces are North Dakota, South Dakota, and Manitoba. Minority applicants are given special consideration. Residents of other states are welcome to apply.

Applicants are encouraged to read carefully and follow all directions in the packet because failure to provide all information requested delays admission decisions.

The completed application form should be returned to the Veterinary Medical College Application Service, PO Box 24700, Oakland, CA 94623-1700.

Applicants for fall 1996 will be rated according to a 100-point scale based on the following areas of evaluation.¹

Academic measures (70 points)

1. GPA in required courses (20 points)
2. Cumulative GPA 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 (20 points)
3. Graduate Record Examination (30 points)

¹ Selection criteria are subject to change.

PROGRAMS AND SERVICES

Nonacademic measures (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, academic load, and amount of time devoted to employment and other activities while enrolled in college (15 points)

Applicants from Minnesota, North Dakota, South Dakota and Manitoba who are offered admission are required to make a non refundable “intent to enroll” deposit of \$100 and applicants from other states a \$250 “intent to enroll” deposit. This deposit is applied to the first quarter’s tuition.

Estimated Yearly Expenses

Students in the first three years pay the following fees and expenses for the 1995-96 academic year. These fees and expenses are subject to change.

Tuition

Resident (\$2,687 per qtr)	\$8,061
Nonresident (\$4,299 per qtr)	\$12,897
Student services fee (\$147 per qtr)	\$441
Microscope	\$650-\$1,200
Books, laboratory equipment, notes, dissecting set, and supplies	\$1,000-\$1,600

The above expenses do not include room and board, laundry and clothing, required health insurance, recreation, travel, and other incidental expenses. For more information, consult the Office for Student Affairs, 460 Veterinary Teaching Hospitals, 1365 Gortner Avenue, St. Paul, MN 55108 (612/624-4747).

Awards, Scholarships, and Loans

CVM students compete for awards and scholarships designated specifically for veterinary medical students. In general, it is the responsibility of the interested student to

obtain, complete, and submit appropriate applications for loans and other financial aid.

For additional information about financial aid, contact the Office of Scholarships and Financial Aid, 210 Fraser Hall, 106 Pleasant Street S.E., Minneapolis, MN 55455.

Awards and scholarships limited to veterinary medical students include the following (most awards are available only to students in the second, third, and fourth years of the veterinary medical program).

AAHA (American Animal Hospital Association)

Award—To a senior with clinical proficiency in small animal medicine and surgery. (\$250 and plaque)

Dr. John Aldrich Memorial Scholarship—To a senior who has chosen to enter a large animal practice. (\$500)

The American Board of Veterinary Practitioners—SCAVMA Case Report Contest. (\$100 and plaque)

American College of Veterinary Radiology Award—

To a senior who excels in clinical radiology. (certificate and one-year subscription to the journal *Veterinary Radiology and Ultrasound*)

American College of Veterinary Surgeons Student

Surgery Award—Two students selected by surgery faculty. (certificate)

The Donna Ant Scholarship—For veterinary medicine students with financial need. (cash awards)

ARDESIGN, Inc. Award—To student with financial need specializing in small animal care. (\$750)

Auxiliary to the Minnesota Veterinary Medical

Association—Cash award made annually to a senior selected on the basis of need and scholarship. (\$500)

James Ford Bell, Jr. Memorial Award—For students who have completed three years in the college. This award is provided by Dr. Ford Bell in memory of his father, James Ford Bell, Jr., based on academic achievement and concern for professionalism as reflected in willingness to work well with classmates, faculty, and staff. (\$500 and plaque)

Caleb Dorr—Cash awards for the top individuals in the freshman, sophomore, and junior classes. The highest-ranking individual in the graduating class is awarded a medal.

Caleb Dorr Certificates—To individuals in the top 10 percent of each class.

Certificates of Commendation—To students for outstanding service to the college and University.

The Class of 1953 Memorial Scholarship—Members of the class of 1953 have created a fund to honor third-year students interested in small animal medicine. (cash award)

The Class of 1961 Memorial Scholarship—Members of the class of 1961 have created a fund in memory of their classmates and give this award to a senior to acknowledge excellence and motivate students toward excellence based on scholastic standing and good collegiate citizenship. (plaque and cash award)

The Winton G. Evans Memorial Scholarship—Presented to a third-year student. (\$500)

The Fenway Award—Presented to a student with an interest in canine medicine and surgery who has demonstrated concern and provided excellent care for the animal patient and its human companions. (\$1,000)

Robert F. Hammer Memorial Award—A plaque for a CVM student who has demonstrated a high level of interest in and understanding of the ultrastructure of animal cells and tissues.

Hill's Pet Nutrition Scholarship—One to a student in each of the first-, second-, and third-year classes, based on financial need. (\$1,000)

Hill's Buddy Award—To a senior student who has demonstrated superior ability to apply principles of small animal clinical nutrition in the practice of medicine and surgery. (cash awards and plaques).

Harvey H. Hoyt Memorial Scholarship Award—Given in memory of Dr. Harvey H. Hoyt to an outstanding senior based on scholarship and intent to pursue a career in teaching and research in veterinary medicine. Emphasis on clinical veterinary medicine. (\$100)

IMPROMED, Inc.—To a junior who exhibits the greatest potential and interest in the art and science of small animal diagnosis. (state-of-the-art diagnostic program, PROVIDES)

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 veterinary medicine. (\$500)

Colin A. Krog Memorial Award—To a senior with a commitment to large animal practice and academic excellence. (\$100 and plaque)

The Dr. Allen D. Leman Outstanding Award in Swine Medicine—To an outstanding veterinary student who has demonstrated good citizenship, clinical proficiency, and scholastic achievement in swine medicine. (\$500)

Lewis Memorial Scholarship—To a first-year student who is academically outstanding, a resident of Minnesota, and a member of an underrepresented, disadvantaged racial or ethnic group.

Lee McDonald Memorial Award in Feline Medicine—To a senior with expertise in feline medicine and surgery. (\$1,000)

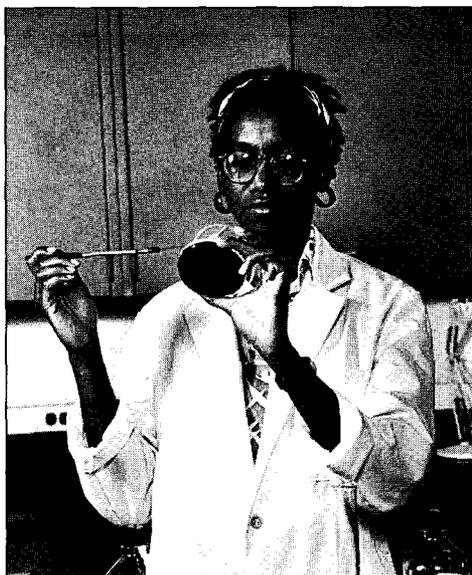
Dr. Jeffrey Lindstrom Memorial Scholarship—To a third-year student who has completed the first two years at the University of Minnesota, financial need, and preferably interest in large animal medicine. (\$500)

Maxwell Award—To a third- or fourth-year student who has a definite interest in either small animal oncology or cardiology. In memory of Maxwell. (\$75 voucher/certificate for book on either oncology or cardiology)

Merck Veterinary Medicine Award—*Merck Veterinary Manuals* are awarded to seniors based on scholastic record and dedication to clinical veterinary medicine.

Dr. Robert A. Merrill Memorial Scholarship—To an entering D.V.M. student from Minnesota planning to pursue a career in large animal medicine. (renewable annually)

Minneapolis Kennel Club Scholarship in Veterinary Medicine—Established to provide recognition for and financial assistance to several qualified students in veterinary medicine at the University of Minnesota. Preference is given to Minnesota residents with special interest in the treatment of small animals. (cash awards)



Catherine St. Hill, D.V.M./Ph.D. student, conducts research in the Avian Health Center.

Minnesota Veterinary Medical Association—Two awards given by this state association. A plaque is awarded to an outstanding senior in clinical veterinary medicine, and a cash award based on need and scholarship is made to two students in the second- or third-year class. (\$1,500)

Bob Monico Memorial Awards—Awards are made to two seniors for excellence in equine medicine in memory of Bob Monico, a senior who was fatally injured in the summer of 1970 while vacationing in Norway. (plaques)

Ned E. Olson Memorial Scholarship Award—Given in memory of Dr. Ned E. Olson to a senior who demonstrates great proficiency and professional promise in large animal medicine. (\$100)

Oxford Swine Proficiency Award—To a senior who has exhibited a high level of interest and achievement in swine medicine and swine production during his/her matriculation at the University of Minnesota. (\$350 and plaque)

Pfizer Award—To a senior based on scholarship, leadership, and financial need. (\$1,000 and plaque)

Purina Mills, Inc.—To a senior who exhibits proficiency in swine medicine. (\$200 and plaque)

Steve Ramsdell Memorial Scholarship Fund—To a junior based on "a positive attitude toward life and people, having strong interests outside of veterinary school, and being liked by all but not necessarily being the most popular member of the class—an all-around nice person." (\$750)

Dr. J. E. Salsbury Veterinary Medicine Scholarships—To senior University of Minnesota veterinary students based on superior scholarship, initiative, perseverance, and potential for leadership. (cash awards)

Carl F. and John C. Schlotthauer Memorial Surgery Award—To a senior who has demonstrated strong interest and outstanding ability in veterinary surgery and/or veterinary pathology. (plaque)

Augustus Searles Scholarship for Women—For women veterinary students based on scholastic standing. (cash awards)

The Upjohn Company Awards—Cash awards to a senior with proficiency in large animal clinical medicine and a senior with proficiency in small animal clinical medicine.

Veterinary Medicine Student Council Awards—To juniors who have been active in extracurricular activities and service to the University, the college, and the community. (cash awards)

The Ted Wikoff Memorial Award—To a sophomore based on academic achievement during the first year. (\$800)

Loans administered by the Office of Scholarship and Financial Aid, Auxiliary to the American Veterinary Medical Association, Auxiliary to the Minnesota Veterinary Medical Association, or Minnesota Veterinary Medical Association include

Ford Federal Direct Subsidized Loan—Loans up to \$8,500 are available for students who qualify via the needs test. Interest is waived while the student is enrolled at least half time in school. Repayment installments and interest begin six months after graduation or termination.

Ford Federal Direct Unsubsidized Loan—Loans up to \$8,500 per year are available for students who qualify via the needs test. Interest while the student is enrolled at least half time in school; however, repayment installments begin six months after graduation, withdrawal, or when the student drops below half time.

Health Professions Loan—Available in limited amounts to students who have financial need. Interest of five percent is deferred while the student is enrolled.

Health Education Assistance Loan—Available to meet most needs but the interest rate is higher and accrues from the date the loan is issued.

Minnesota Veterinary Medical Association Trust Fund—Loans are available for those with exceptional financial need (three percent interest while in school and six percent thereafter).

Financial aid for all veterinary medical students is administered by the Office of Scholarship and Financial Aid, University of Minnesota, 210 Fraser Hall, 106 Pleasant Street S.E., Minneapolis, MN 55455.

Auxiliary to the American Veterinary Medical Association—Loans are available to junior, senior, and graduate students in veterinary medicine. Seniors receive preference. The debt limit is \$4,000.

MVMA Auxiliary Emergency Student Loan Fund—Loans of up to \$500 can be arranged on short notice.

For more information on the auxiliary loans, contact the Office for Student Affairs and Admissions, 460 Veterinary Teaching Hospitals, 1365 Gortner Avenue, St. Paul, MN 55108 (612/624-4747).

Student Services

High school and college students interested in entering CVM are urged to contact the Student Affairs and Admissions Office, 460 Veterinary Teaching Hospitals (612/624-4747), for assistance in planning their educational programs. This office arranges meetings for advisers, applicants, and prospective applicants each fall before the November 1 application deadline for discussion of selection criteria and application procedures. Meetings are held in Minnesota and surrounding states. High school counselors and college advisers are encouraged to contact this office for current information about admission requirements.

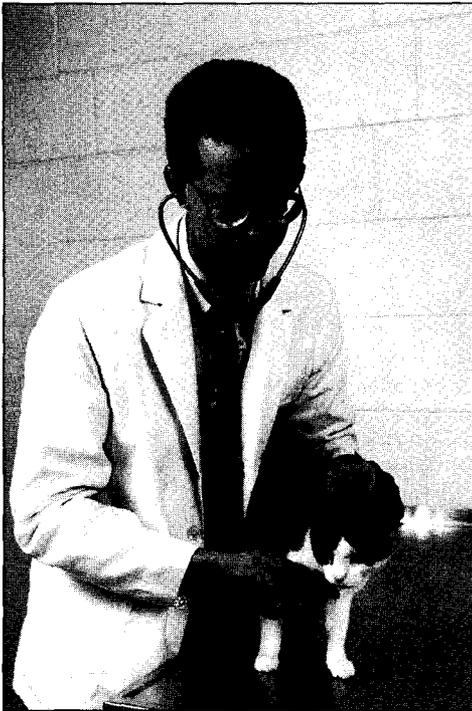
Minority students interested in veterinary medicine as a career are encouraged to contact the Student Affairs and Admissions Office (612/624-4747) for special assistance in planning their educational programs.

The Student Affairs and Admissions Office serves faculty committees on admissions, curriculum, scholastic standing, and awards and scholarships. This office is administratively responsible for maintenance of student records, admission, registration, scholastic standing and degree requirements, and the issuance of awards and scholarships specific to the college and the D.V.M. graduation ceremony.

Each of the four classes in the college has a faculty adviser and a formal mentorship program is in place for entering D.V.M. students. The Student Affairs and Admissions Office provides assistance to these advisers and to student organizations, which include Student Council, Honor Case Commission, and Student Chapter of the American Veterinary Medical Association. Specialty organizations, including Production Animal Medicine Club; Canine Club; Equine Club; Feline Club; Sheep, Goat, and Llama Club; and the Zoo, Exotic, and Wildlife Club are also provided administrative assistance by this office.

Student Activities

CVM 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



Scott Wells, fourth-year student, conducts an exam during a small animal medicine rotation.

and the Twin Cities Student Assembly. Members are elected to represent D.V.M. students. Several 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 CVM Open House (held on a Sunday in April), a speakers bureau that provides speakers for groups located within 60 miles of the campus, lectures by prominent scientists, and a variety of social events. Most activities of the chapter are joint efforts with the college, its alumni, and/or 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 Minnesota Student Association, 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 (SCBOG) guides the activities of the St. Paul 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.

Graduate Programs

Graduate study at the University of Minnesota is coordinated and administered by the Graduate School. The college offers M.S. and Ph.D. degrees in five major fields of veterinary medicine. These are veterinary biology (anatomy, biochemistry, physiology, and pharmacology); veterinary pathobiology (microbiology, pathology, and parasitology); veterinary medicine; veterinary surgery, radiology, and anesthesiology; and theriogenology.

Refer to the *Graduate School Bulletin* for details about general policies regarding admission requirements, registration procedures, and requirements for graduate degrees. Application materials may be obtained from the directors of graduate studies.

Questions regarding specific programs should be addressed to the directors of graduate studies in the appropriate program area.

Veterinary biology James Mickelson
 Veterinary pathobiology Bert Stromberg
 Veterinary medicine Robert Dunlop
 Veterinary surgery, radiology
 and anesthesiology Daniel Feeny
 Theriogenology Brad Seguin

Veterinary Outreach Programs

CVM regularly schedules continuing education programs to bring members of the veterinary medical profession 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 one- and two-day conferences, seminars, and laboratory workshops. Courses are also offered to the general public. For more information, call toll-free 1-800-380-8638 or (612) 624-3434.

CVM Alumni and Friends Society

All graduates of the College of Veterinary Medicine are members of the CVM Alumni and Friends Society. The society promotes interest and support, including financial, for the benefit of the college and its faculty, students, and alumni. The society encourages communication and cooperation among alumni, the college, the University, the University of Minnesota Alumni Association, and the community. It also advises the dean on the dispersal of undesignated gifts to the college.

Society activities include the award winning Mentor Program, the Senior Reception, international externships, undergraduate research, the Senior Directory, the Junior Class/Alumni Dinner program, and the Student Council Awards. Alumni receptions and the quarterly alumni newsletter are also part of the society's program.

The society encourages membership in the University of Minnesota Alumni Association and annual gifts to the College Fund.

University Counseling and Consulting Services

University Counseling and Consulting Services (UCCS) offers counseling for academic, career, personal, or relationship concerns. Besides counseling, UCCS features a variety of services. The Career Development Center and the Learning and Academic Skills Center offer workshops, courses, and materials for career development or academic skills improvement. The Organizational Development Program offers consultation, assessment, team building, conflict mediation, training, and workshops. UCCS's Measurement Services office administers tests; scores exams, surveys, and research instruments for University faculty; and operates the Minnesota Statewide Testing Program for Minnesota elementary and secondary schools. The Testing Center administers admissions, placement, and national tests.

Curriculum and Academic Policies



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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, fourth-year students learn through various field experiences described under Clinic Rotations.

Anatomy—Professors Beitz, Cox, Czarnecki, Fletcher, Gallant. Anatomy is divided into four related areas: gross anatomy, histology, embryology, and neuroanatomy. In gross anatomy, students learn the normal structure and function of domestic animals by dissecting the dog, cat, horse, and cow and comparing them with the pig, sheep, goat, laboratory mammals, and avian species. In histology, students use microscopy to examine the cellular features of tissues and organs. In embryology, students discover normal and abnormal developmental processes as they relate to adult structures. The focus in neuroanatomy is on identification of structural units of the central nervous system that control perception, movement, and overall behavior.

Anesthesiology and Critical Care—Professors Raffae, E. Robinson. Anesthesiology lectures cover the clinical pharmacology of anesthetic agents, and the use of anesthetic agents and equipment in veterinary species. Monitoring of anesthetized patients and anesthetic management of high-risk, diseased animals are taught. Critical care medicine lectures teach the student how to deal with emergencies such as shock and cardiopulmonary arrest and how to manage the traumatized or critically ill patient. Techniques are practiced in anesthesiology laboratories, surgery teaching laboratories and on patients in the veterinary hospitals.

Avian Health—Professors Duke, Halvorson, Nagaraja, Redig, Sharma, Sivanandan, Walser. The goals are to acquaint students with the importance of the normal anatomy and physiology of birds as well as the host-parasite-environment interaction in the pathophysiology of avian diseases. This includes a working knowledge of management practices currently being used in the diverse aspects of domestic

avian production and companion bird medicine. The courses are arranged on a systems basis and deal with a wide variety of etiologies including nutritional and management factors and infectious agents. Courses are offered at the undergraduate, professional, graduate, and continuing education and extension levels. Their structure includes lectures, laboratories, autotutorial programs, and field trips where possible. Additional exposure is available through the Avian Research Center and the Raptor Center.

Biochemistry—Professors Louis, Mickelson, Murtaugh. The functioning of biological systems at the molecular level is the subject of study in this discipline. Students learn the mechanisms by which animals digest and absorb nutrients, how they use the absorbed molecules to maintain normal physiological processes, and how the end products of metabolism are eliminated. The role of the different hormones in regulatory metabolism of the whole animal under different nutritional states is discussed. 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. Recombinant DNA applications in animal health are introduced and molecular biological aspects of growth, gene expression, and cellular regulation in bacteria and animals are presented.

Clinical Pathology—Professors Greig, Perman, Weiss. Clinical pathology is a broad area of laboratory medicine that crosses several disciplines including hematology, cytology, surgical pathology, immunohematology, blood coagulation, clinical chemistry, and urine analysis. Although students learn techniques, appropriate text selection and interpretation are emphasized.

Diagnostic Medicine—Professors Bergeland, Collins, Goyal, Kurtz, Murphy, Ruth, Shaw, Singh. This program identifies the etiologic basis of animal diseases by collecting, correlating, and interpreting laboratory and epidemiological data. Techniques of various disciplines including anatomical pathology, biochemistry, endocrinology, epidemiology, genetics, hematology, immunology,

microbiology, nutrition, parasitology, toxicology, and virology are applied to the evaluation of animal and environmental specimens and feeds submitted to the Diagnostic Laboratory by veterinary practitioners. Food animals receive major emphasis, but companion animals, zoo animals, and wildlife also are evaluated.

Epidemiology, Food Hygiene, and Public Health—Professors Dunlop, Pullen, R.

Robinson, Thawley. By studying epidemiology, public health, and public practice, veterinary students learn the principles of epidemiology, statistics, 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 production economics, in clinical epidemiology, in food protection and hygiene maintenance throughout food production, in transmission of diseases between animals and humans, and in management of environmental factors affecting the health of animals and humans. Problems relating to state, national, and international diseases are also presented.

Microbiology—Professors Bey, Maheswaran, Mellencamp, Molitor, Rutherford, Schook. Microbiology includes the areas of immunology, virology, bacteriology, and mycology. Courses expand the student's basic background in microbiology acquired in the preveterinary curriculum. Microbiology provides a basis for the study of many disciplinary areas of the curriculum including pathology, medicine, surgery, pharmacology, and public health. Emphasis is on basic mechanisms and interactions between microbial pathogens and their animal hosts.

Nutrition—Professors Armstrong, W. Olson, Otterby, Pettigrew, Waibel. Students learn how to assess an animal's dietary requirements for water, energy, protein, vitamins, and minerals. The role of these nutrients in the overall metabolism of the animal is reviewed and related to the metabolic pathways covered in biochemistry. Factors affecting the relative amounts of nutrients required at different stages of growth and lactation and in an adult animal are discussed. The signs of deficiency and

excess are described in relation to the metabolic role of each nutrient. Later the focus is on sources of nutrients in animal feeds, feed quality and antiquality factors, and formulation of diets to meet the requirements for various species. Finally, a series of lectures is presented on applying these principles to feeding monogastrics (swine, poultry, and dogs), ruminants (dairy, beef, sheep), and horses given by faculty who have expertise with particular species.

Parasitology—Professor 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 detecting and identifying parasites and to drugs and management procedures used to control them.

Pathology—Professors Bergeland, Collins, Hayden, K. Johnson, O'Brien, O'Leary, Ruth, Shaw, Walser. 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 nonneoplastic 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. Pathology related to organ systems and diagnosis of species specific diseases are discussed.

Pharmacology—Professors Brown, Kannan, Larson. The goals for students in this course are twofold: to understand the general principles of pharmacology as the conceptual basis of rational drug therapy and to acquire detailed knowledge of specific drugs and their applications in veterinary practice through study of examples from the major drug groups. The general principles of pharmacology involve mechanisms of drug action and drug disposition, dose-response relationships, pharmacokinetics, drug interactions, and

adverse effects. Specific drug groups studied include anesthetics, analgesics, tranquilizers, anti-inflammatory agents, chemotherapeutic (antibiotic, antiparasitic) drugs, and drugs that act on specific organ systems.

Physiology—Professors Duke, Dunlop, Hunter, O’Grady, Osborn, Redig, Wheaton. This discipline, which is closely related to both anatomy and biochemistry, focuses on the basic mechanisms 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 relative to the principal effects, target organs, interrelationships, and regulation of hormones.

Radiology—Professors Feeney, Jessen, G. Johnston, Walter. Radiology concentrates on the properties and production of X-rays: their use in diagnosis and therapy; safety factors, including the major safety regulations; and film processing. Interpretation of radiographs and basic principles of radiation therapy, ultrasound, computed tomography, and nuclear medicine are also highlighted.

Theriogenology—Professors Fahning, S. Johnston, J. Olson, Seguin, Troedsson. The discipline includes animal reproduction, infertility, obstetrics, and breeding technology. Students learn the effect of management, genetics, nutrition, environment, and disease on reproductive performance of most domestic animal species. Laboratories, hospital cases, and extensive reproductive herd health programs provide opportunities for students to develop skills for monitoring reproductive efficiency and managing infertility (see Clinic Rotation below).

Large Animal Medicine—Professors Ames, Dial, Farnsworth, Joo, Marsh, Morrison, W. Olson, Pijoan, Valberg, Wilson. 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. Precepteeships (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 Armstrong, Bistner, Hardy, S. Johnston, Klausner, Lulich, McKeever, Ogburn, Osborne, Polzin. Current information about all aspects of diseases of companion 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 teaching hospital, students integrate and use information obtained in both basic science and clinical courses to solve companion animal health problems.

Large Animal Surgery—Professors Kobluk, Trent, Turner. 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 for specific diseases. 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 Caywood, Kramek, Lipowitz, Wallace. The small animal surgery program provides students with a broad basic education in principles, theories, and techniques of veterinary surgery. 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.

Toxicology—Professors Murphy, Singh. The formal sequence of courses in the professional curriculum deals initially with the active principles, toxic effects, and recognition of poisonous plants of the United States and Canada, particularly those of the upper midwestern states. The second phase of the sequence is directed toward the toxicology of heavy metals, rodenticides, molluscicides, herbicides, and the several classes of insecticides including the xenobiotic halogenated compounds. When applicable, issues regarding environmental toxicology are clarified.

Clinical Rotations—The clinical teaching program includes assignments for students to gain experience with veterinary medical problems in the Veterinary Teaching Hospitals, livestock production units in the field, private veterinary practices, public health and animal disease regulatory agencies, and other veterinary medical institutions.

The curriculum consists of 45 two-week rotations. Students are required to complete 25 of these rotations and are allowed one two-week vacation rotation and three two-week precepteeship rotations. Students must select one of three options: small companion animal, food animal, or mixed animal. Each option has specific requirements to provide an opportunity for students to specialize. The small companion animal option requires 26 weeks of small animal rotations and 16 weeks of elective clinical rotations; 6 weeks of precepteeship are permitted. The food animal option requires 20 weeks of large animal rotations, 2 weeks of public health, 2 weeks of necropsy, and 18 weeks of elective clinical rotations; 6 weeks of precepteeship are permitted. The mixed animal option requires 10 weeks of large animal rotations, 2 weeks of public health, 2 weeks of necropsy, 2 weeks of radiology, 2 weeks of community practice, 2 weeks of specialties, 2 weeks of anesthesiology, 4 weeks of small animal surgery, 4 weeks of small animal medicine; 6 weeks of precepteeship are permitted.

Two-week clinical rotations include *companion animal*: emergency medicine, internal medicine, ophthalmology/dermatology, surgery, clinical nutrition, community practice, critical care medicine, small animal theriogenology, and clinical oncology;

food animal: poultry health, large animal medicine, large animal surgery, total herd health practice, general theriogenology, dairy theriogenology management, beef cow/calf practice, bovine surgery, dairy diseases, youngstock management, dairy—mastitis, dairy—ruminant nutrition, dairy—applied nutrition, dairy records analysis, small ruminants, swine disease diagnoses, swine production systems, swine nutrition, swine advanced immunology and viral diseases, epidemiology and biostatistics, swine economics, financial management, and marketing;

equine: lameness, podiatry, sports—preventive medicine, equine theriogenology;

comparative services: anesthesiology, hematology/cytology/microbiology, necropsy, public health, radiology, zoo, wildlife, raptor, and laboratory animal, cardiology, and veterinary toxicology;

other rotations: precepteeship, professional career development, rotations at other institutions, vacation.

Students electing precepteeships off campus are supervised for periods of up to six weeks by practicing veterinarians who are selected by, but not associated with, the college. Location and type of practice covers a broad range. For example, students serve precepteeships in equine practice in Kentucky, beef feedlot practice in Texas, small animal practice in California, and specialty practice all over the United States.

Professional Curriculum

The college's four-year curriculum is based on standards established by the Council on Education of the American Veterinary Medical Association. Course requirements for the first three years are similar for all members of a class. Basic science courses (anatomy, biochemistry, physiology) predominate in the first year of the curriculum. The second year

CURRICULUM AND ACADEMIC POLICIES

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 coursework is completed by the beginning of the fourth year, which lasts for four quarters and is devoted chiefly to clinical training. Students may pursue special interests through optional clinical assignments and elective coursework. A breakdown of the program by year and term follows.

First Year

Fall Quarter	Credits
CAPS 5150 Diagnostic and Therapeutic Techniques	1
CVM 5100 Orientation to Veterinary Medicine	3
VPB 5100 Veterinary Anatomy I	6
VPB 5103 Veterinary Developmental Anatomy	3
VPB 5104 Microscopic Anatomy of Domestic Animals	5
VPB 5210 Veterinary Biochemistry	3
Total	21

Winter Quarter

SACS 5270 Animal Behavior	2
VPB 5102 Veterinary Neurobiology	3
VPB 5105 Microscopic Anatomy of Domestic Animals	4
VPB 5212 Veterinary Biochemistry	4
VPB 5306 Animal Physiology	4
Total	17

Spring Quarter

CAPS 5165 Introduction to Animal Nutrition	2
CAPS 5650 Veterinary Epidemiology and Statistics	4
VPB 5308 Animal Physiology	4
VPB 5501 Basic Veterinary Pathology	5
VPB 5701 Advanced Veterinary Microbiology, Immunology	3
Total	18

Second Year

Fall Quarter	Credits
VPB 5310 Animal Physiology	3
VPB 5400 Veterinary Pharmacology and Therapeutics I	3
VPB 5502 Systemic Veterinary Pathology	6
VPB 5601 Veterinary Parasitology I	4
VPB 5703 Veterinary Virology	4
Total	20

Winter Quarter

CAPS 5151 Diagnostic and Therapeutic Techniques I	1
VPB 5401 Veterinary Pharmacology and Therapeutics II	4
VPB 5550 Laboratory Animal Medicine	2
VPB 5504 Veterinary Clinical Pathology	4
VPB 5602 Veterinary Parasitology II	4
VPB 5702 Pathogenic Bacteria and Fungi	5
VPB 5704 Avian Diseases	3
Total	23

Spring Quarter

CAPS 5160 Large Animal Medicine	6
CAPS 5550 Diagnostics and Obstetrics in Theriogenology	2
CAPS 5551 Theriogenology Diagnostics Laboratory	1
SACS 5170 Small Animal Medicine	4
SACS 5451 Veterinary Radiology I	1
VPB 5126 Veterinary Anatomy II	5
VPB 5402 Veterinary Pharmacology and Therapeutics III	3
Total	22

Third Year

Fall Quarter

	Credits
CAPS 5161 Large Animal Medicine	5
CAPS 5552 Veterinary Obstetrics Laboratory	1
SACS 5171 Small Animal Medicine	4
SACS 5350 Principles of Veterinary Surgery	5
SACS 5380 Anesthesiology and Critical Care	3
SACS 5452 Veterinary Radiology II	3
VDM 5164 Toxicology of Poisonous Plants	1
Total	22

Winter Quarter

CAPS 5162 Large Animal Medicine	6
CAPS 5570 Reproductive Diseases of Domestic Animals	5
SACS 5152 Diagnostic and Therapeutic Techniques	2
SACS 5172 Small Animal Medicine	5
SACS 5351 Veterinary Surgery	5
Total	23

Spring Quarter

CAPS 5153 Diagnostic and Therapeutic Techniques II ...	1
CAPS 5270 Economics and Practice Management	2
CAPS 5271 Law and Ethics in Veterinary Medicine	2
CAPS 5352 Large Animal Surgery	5
CAPS 5651 Veterinary Community Medicine	3
CAPS 5663 International Animal Disease Problems	1
SACS 5260 The Problem-Oriented Medical System	1
VDM 5165 Veterinary Toxicology	2
VDM 5503 Diagnostic Pathology	3
VPB 5180 Applied Immunology	1
Total	21

Fourth Year

Required Core Clinical Rotation Courses

Summer Sessions	Credits
CAPS 5011 Veterinary Public Health	4
CVM 5091 Precepteeship	4
CAPS 5111 Large Animal Medicine	4
CAPS 5211 Large Animal Surgery	4
CAPS 5221 Equine Lameness	4
CAPS 5231 Equine Podiatry	4
CAPS 5241 Bovine Surgery	4
CAPS 5511 Equine Theriogenology	4
CAPS 5531 Dairy Palpation	4
CAPS 5541 Dairy Theriogenology Management	4
CAPS 5611 Swine Disease Diagnostics, Therapeutics, and Prevention	4
CAPS 5621 Swine Production Systems	4
CAPS 5631 Swine Nutrition	4
CAPS 5641 Swine Economics, Management, and Marketing	4

CAPS 5711	Equine Sports and Preventive Medicine	4
CAPS 5811	Dairy Disease Control, Parasitology, Youngstock Management	4
CAPS 5821	Mastitis, Milking Machines, and Milk Quality	4
CAPS 5831	Ruminant Nutrition	4
CAPS 5841	Applied Dairy Nutrition	4
CAPS 5851	Dairy Record Analysis, Epidemiology, and Economics	4
CAPS 5911	Advanced Building Design and Total Herd Evaluation	4
CAPS 5921	Beef Production Medicine	4
CAPS 5941	Small Ruminant Health and Production	4
CVM 5601	Rotations at Other Institutions	4
SACS 5111	Internal Medicine	4
SACS 5121	Comparative Ophthalmology/Dermatology	4
SACS 5131	Emergency Rotation	4
SACS 5141	Clinical Nutrition/Internal Medicine	4
SACS 5151	Community Practice	4
SACS 5211	Small Animal Surgery	4
SACS 5311	Anesthesiology	4
SACS 5321	Small Animal Critical Care Medicine	4
SACS 5411	Radiology	4
SACS 5901	Zoo, Exotic, Raptor, and Companion Birds	4
VDM 5111	Diagnostic Medicine	2
VDM 5611	Advanced Veterinary Toxicology	4
VPB 5011	Veterinary Hospital Necropsy	2
VPB 5021	Clinical Hematology and Cytology	2
VPB 5031	Clinical Microbiology	2
VPB 5721	Poultry Health Rotations	4

Fall Quarter

CAPS 5012	Veterinary Public Health	4
CVM 5092	Precepteeship	4
CAPS 5112	Large Animal Medicine	4
CAPS 5212	Large Animal Surgery	4
CAPS 5222	Equine Lameness	4
CAPS 5232	Equine Podiatry	4
CAPS 5242	Bovine Surgery	4
CAPS 5512	Equine Theriogenology	4
CAPS 5532	Dairy Palpation	4
CAPS 5542	Dairy Theriogenology Management	4
CAPS 5612	Swine Disease Diagnostics, Therapeutics, and Prevention	4
CAPS 5622	Swine Production Systems	4
CAPS 5632	Swine Nutrition	4
CAPS 5642	Swine Economics, Financial Management, and Marketing	4
CAPS 5712	Equine Sports and Preventive Medicine	4
CAPS 5812	Dairy Disease Control, Parasitology, Youngstock Management	4
CAPS 5822	Mastitis, Milking Machines, and Milk Quality	4
CAPS 5832	Ruminant Nutrition	4
CAPS 5842	Applied Dairy Nutrition	4
CAPS 5852	Dairy Record Analysis, Epidemiology, and Economics	4
CAPS 5912	Advanced Building Design and Total Herd Evaluation	4
CAPS 5942	Small Ruminant Health and Production	4
CVM 5602	Rotations at Other Institutions	4
SACS 5112	Internal Medicine	4
SACS 5122	Comparative Ophthalmology/Dermatology	4
SACS 5132	Emergency Rotation	4
SACS 5142	Clinical Nutrition/Internal Medicine	4
SACS 5152	Community Practice	4
SACS 5212	Small Animal Surgery	4
SACS 5312	Anesthesiology	4
SACS 5322	Small Animal Critical Care Medicine	4

SACS 5412	Radiology	4
SACS 5902	Zoo, Exotic, Raptor, and Companion Birds	4
VDM 5112	Diagnostic Medicine	2
VDM 5612	Advanced Veterinary Toxicology	4
VPB 5012	Veterinary Hospital Necropsy	2
VPB 5022	Clinical Hematology and Cytology	2
VPB 5032	Clinical Microbiology	2
VPB 5722	Poultry Health Rotations	4

Winter Quarter

CAPS 5013	Veterinary Public Health	4
CVM 5093	Precepteeship	4
CAPS 5113	Large Animal Medicine	4
CAPS 5213	Large Animal Surgery	4
CAPS 5223	Equine Lameness	4
CAPS 5233	Equine Podiatry	4
CAPS 5243	Bovine Surgery	4
CAPS 5513	Equine Theriogenology	4
CAPS 5533	Dairy Palpation	4
CAPS 5543	Dairy Theriogenology Management	4
CAPS 5613	Swine Disease Diagnostics, Therapeutics, and Prevention	4
CAPS 5623	Swine Production Systems	4
CAPS 5633	Swine Nutrition	4
CAPS 5643	Swine Economics, Financial Management, and Marketing	4
CAPS 5713	Equine Sports and Preventive Medicine	4
CAPS 5813	Dairy Disease Control, Parasitology, Youngstock Management	4
CAPS 5823	Mastitis, Milking Machines and Milk Quality	4
CAPS 5833	Ruminant Nutrition	4
CAPS 5843	Applied Dairy Nutrition	4
CAPS 5853	Dairy Record Analysis, Epidemiology, and Economics	4
CAPS 5913	Advanced Building Design and Total Herd Evaluation	4
CAPS 5923	Beef Cow/Calf Production Medicine	4
CAPS 5943	Small Ruminant Health and Production	4
CVM 5303	Professional Career Development	4
CVM 5603	Rotations at Other Institutions	4
SACS 5113	Internal Medicine	4
SACS 5123	Comparative Ophthalmology/Dermatology	4
SACS 5133	Emergency Rotation	4
SACS 5143	Clinical Nutrition/Internal Medicine	4
SACS 5213	Small Animal Surgery	4
SACS 5313	Anesthesiology	4
SACS 5323	Small Animal Critical Care Medicine	4
SACS 5903	Zoo, Exotic, Raptor, and Companion Birds	4
VDM 5113	Diagnostic Medicine	2
VDM 5613	Advanced Veterinary Toxicology	4
VPB 5013	Veterinary Hospital Necropsy	2
VPB 5023	Clinical Hematology and Cytology	2
VPB 5033	Clinical Microbiology	2
VPB 5723	Poultry Health Rotations	4

Spring Quarter

CAPS 5014	Veterinary Public Health	4
CVM 5094	Precepteeship	4
CAPS 5114	Large Animal Medicine	4
CAPS 5214	Large Animal Surgery	4
CAPS 5224	Equine Lameness	4
CAPS 5234	Equine Podiatry	4
CAPS 5244	Bovine Surgery	4
CAPS 5514	Equine Theriogenology	4
CAPS 5534	Dairy Palpation	4
CAPS 5544	Dairy Theriogenology Management	4
CAPS 5614	Swine Disease Diagnostics, Therapeutics, and Prevention	4

CAPS 5624	Swine Production Systems	4
CAPS 5634	Swine Nutrition	4
CAPS 5644	Swine Economics, Financial Management, and Marketing	4
CAPS 5714	Equine Sports and Preventive Medicine	4
CAPS 5814	Dairy Disease Control, Parasitology, Youngstock Management	4
CAPS 5824	Mastitis, Milking Machines, and Milk Quality	4
CAPS 5834	Ruminant Nutrition	4
CAPS 5844	Applied Dairy Nutrition	4
CAPS 5854	Dairy Record Analysis, Epidemiology, and Economics	4
CAPS 5914	Advanced Building Design and Herd Evaluation	4
CAPS 5924	Beef Cow/Calf Production Medicine	4
CAPS 5944	Small Ruminant Health and Production	4
CVM 5604	Rotations at Other Institutions	4
SACS 5114	Internal Medicine	4
SACS 5124	Comparative Ophthalmology/Dermatology ..	4
SACS 5134	Emergency Rotation	4
SACS 5144	Clinical Nutrition/Internal Medicine	4
SACS 5154	Community Practice	4
SACS 5214	Small Animal Surgery	4
SACS 5314	Anesthesiology	4
SACS 5324	Small Animal Critical Care Medicine	4
SACS 5414	Radiology	4
SACS 5904	Zoo, Exotic, Raptor, and Companion Birds ..	4
VDM 5114	Diagnostic Medicine	2
VDM 5614	Advanced Veterinary Toxicology	4
VPB 5014	Veterinary Hospital Necropsy	2
VPB 5024	Clinical Hematology and Cytology	2
VPB 5034	Clinical Microbiology	2
VPB 5724	Poultry Health Rotations	4

Academic Policies

Registration—Students admitted to the first-year class receive complete registration information from the Office for Student Affairs and Admissions.

Equipment—Each student is required to purchase a microscope that meets the minimum specifications announced at the time of acceptance. Used microscopes must be examined and approved by designated faculty members before they are purchased. In addition to a microscope and textbooks, the student will be expected to purchase certain special items of clothing and some instruments.

Animal Use—Animals are used in the D.V.M. curriculum to illustrate medical principles and to provide students with firsthand experience in the art and practice of veterinary medicine and surgery. The animals are treated with genuine concern for their welfare; however, in some cases animals must eventually be euthanized in accordance with the Animal Welfare Act. Efforts have been made and are ongoing to reduce the number of animals required in non-clinical teaching.

Given the need to use animals for instructional purposes, prospective students must recognize that successful completion of the D.V.M. curriculum requires that both live and dead animals be incorporated into students’ learning experience. In all instances the animals will be treated with dignity and handled in accordance with the Animal Welfare Act. In some cases, procedures will result in termination of the animal’s life.

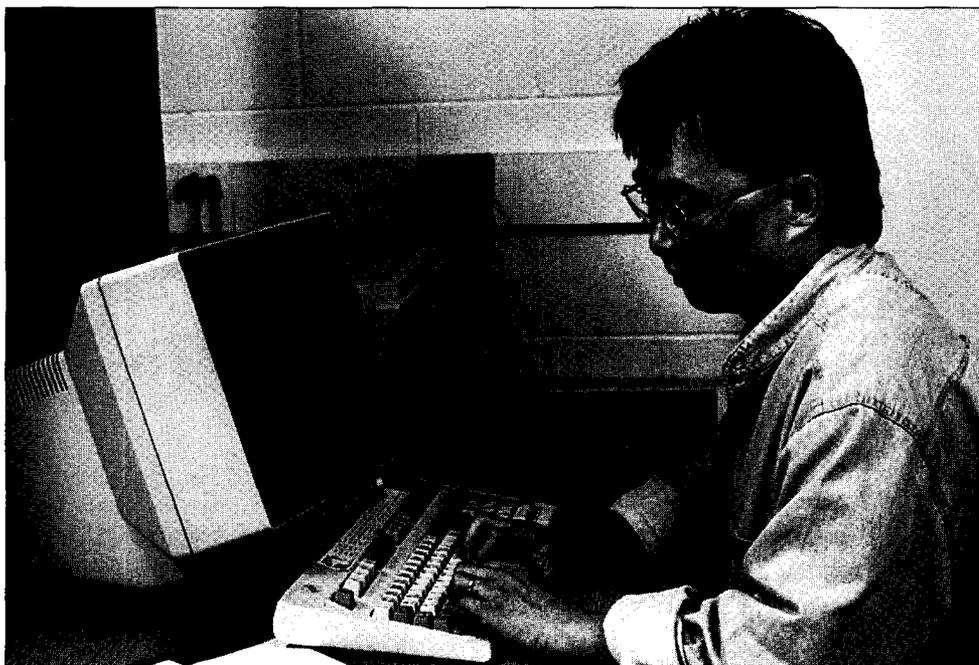
The University and college animal care committees review all courses offered in the College and determine the appropriateness of using animals in each course.

Degree Requirements—The bachelor of science (B.S.) degree with a major in veterinary science is granted to students upon satisfactory completion of the first two years of the program of studies with a grade point average of 2.00 or above, providing they have not already earned a bachelor’s degree from another college or university. Students earning the bachelor’s degree must also satisfy the University’s liberal education requirements.

The doctor of veterinary medicine (D.V.M.) degree is awarded following the satisfactory completion of the four-year professional curriculum with a grade point average of 2.00 or above.

Honor System—CVM students, 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 this 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.



On-line services play an increasingly important role in veterinary education and practice.

The honor system is a preventive rather than a punitive system. New students receive a brochure on the honor system. The system is also explained to them by a member of the Honor Case Commission during the Orientation to Veterinary Medicine course.

Examinations and Assignments—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 titled Clinical Rotation 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-F 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 meet 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. F represents performance that fails to meet basic course requirements and is unworthy of credit.

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) or F 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 coursework 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 (or summer break in the case of an I received spring quarter) becomes an F or 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 six 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 F or 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, nongrade registration.

Scholastic Requirements—Each student must maintain a grade point average (GPA) of 1.50 or higher for any single quarter and must earn a passing grade in each course. Students failing to achieve a GPA of at least 1.50 or receiving a grade of F or N (no credit) in any single quarter in a required course or clinic rotation will be dropped from the professional curriculum. Those having a quarterly GPA lower than 2.00 are placed on probation. A student will be allowed to proceed from one quarter to the next on academic probation for no more than three quarters. The fourth time a student achieves a quarterly GPA of less than 2.00 during any block of eight consecutive quarters, he/she will be dropped from the professional curriculum. A GPA of 2.00 must be maintained at the end of each academic year to continue in the professional curriculum and to earn the D.V.M. degree.

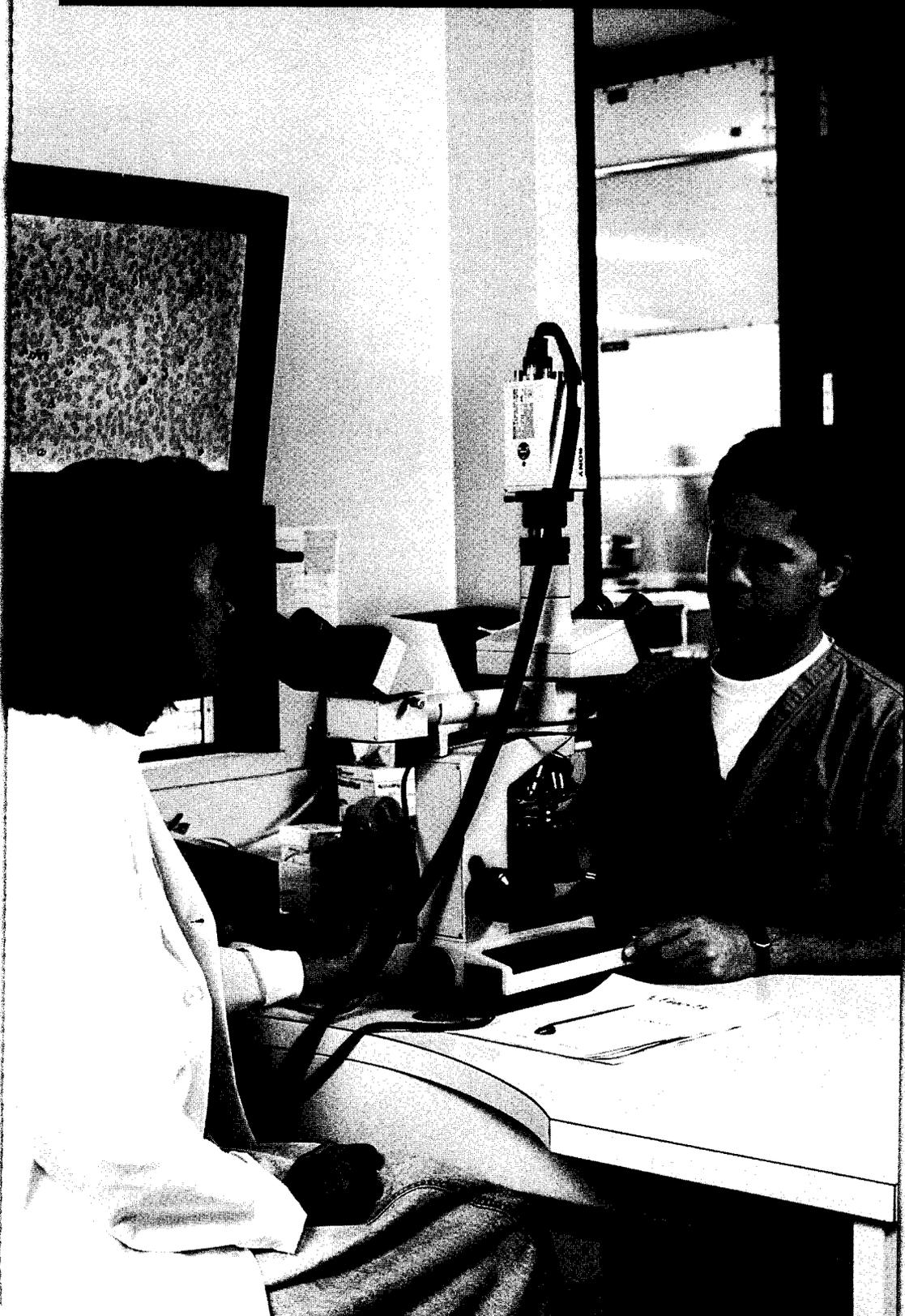
Any student having completed a course(s) similar or identical to required courses in the D.V.M. curriculum may petition the Admissions and Scholastic Standing Committee to substitute for that requirement. Forms for this purpose are available in the Office for Student Affairs and Admissions, 460 Veterinary Teaching Hospitals.

Readmission—If students are dropped from the program, they 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. Students dismissed for the second time, or second-, third-, or fourth-year students who have attained quarterly GPAs of less than 2.00 in more than 40 percent of the quarters enrolled, or students who have incomplete (I) grades in required courses will not be considered for readmission.

The Admissions and Scholastic Standing Committee, upon granting readmission, will stipulate the courses to be repeated and the level of performance that must be achieved. Failure to achieve these requirements will result in permanent dismissal from the professional curriculum. If permitted to return, students will be placed on probation and may be dropped again any time their 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. 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.

Course Descriptions



COURSE DESCRIPTIONS

Symbols—The following symbols are used throughout the course descriptions.

.... Approval of the instructor is required for registration.

Δ Approval of the department offering the course is required for registration.

, The comma, used in prerequisite listings, means “and.”

f,w,s,su

..... Following a course number indicate fall, winter, spring, or summer terms.

A prerequisite course listed by number only (e.g., prereq 5246) is in the same department as the course being described.

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.

Elective courses available to third-year students are identified in groupings titled “Other Courses” and are listed by departments.

AnSc 5404. APPLIED ANIMAL NUTRITION. (2 cr; prereq #)
Nutrient requirements of beef and dairy cattle, swine, horses; nutrient content of feedstuffs; protein and nonprotein nitrogen use; energy use; nutritional disorders; formation of adequate rations.

Other Courses

CVM 1100. INTRODUCTION TO VETERINARY MEDICINE. (1 cr)

History of the veterinary profession, careers within the profession, and employment trends. Resources available to those interested in a career in the profession, including the College of Veterinary Medicine and animal health technology courses offered in Minnesota.

CVM 1809. INTERNSHIP IN ANIMAL HOSPITAL PRACTICE. (4 cr; prereq #)

Labs on principles and techniques of medical and surgical nursing care, examination, diagnostic and therapeutic procedures, and applied procedures in anesthesiology and radiology. Rotations in small animal medicine and surgery, large animal medicine and surgery, anesthesiology, radiology, and intensive care.

CVM 3100. PERSPECTIVES: INTERRELATIONSHIPS OF PEOPLE AND ANIMALS IN SOCIETY TODAY. (2 cr)

(Same as PubH 3301 and 5301) Interrelationships of people and animals from several viewpoints. Social, economic, and health consequences of these relationships, including issues such as pets and people sharing an urban environment, animal rights, and the influence of differences in cultures on animal-human relationships.

CVM 5800. PROBLEMS IN VETERINARY RESEARCH. (5 cr; prereq #)

Develop and undertake an approved research project in the lab of a faculty member who supervises conduct of the research over a ten-week summer period. Course grade is based on performance in the lab and the quality of a written report.

CVM 5801. VETERINARY RESEARCH SURVEY SEMINAR. (1 cr; prereq #)

Fixed format seminars presented by University researchers to expose students to a range of research problems and techniques. Course grade is based on student essays critically discussing one or more of the topics presented.

Clinical and Population Sciences (CAPS)

Required Courses

CAPS 5011-5012-5013-5014. VETERINARY PUBLIC HEALTH CLINIC ROTATION. (4-24 cr; prereq 3rd- or 4th-yr vet med)

Preparation for health and social responsibility roles in veterinary community medicine (rural and/or urban) and for federal accreditation. Introduction to public practice veterinarians.

CAPS 5111-5112-5113-5114. LARGE ANIMAL MEDICINE. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Diseases of horses, cattle, and small ruminants. History taking, clinical diagnosis, patient management.

College of Veterinary Medicine (CVM)

Required Courses

CVM 5091-5092-5093-5094. PRECEPTESHIP.

(4-24 cr; prereq 3rd- or 4th-yr vet med)
Participation in a practice setting involving large, mixed, or small animals; equine, specialty, or other fields of veterinary medicine as approved by precepteeship program director.

CVM 5100. ORIENTATION TO VETERINARY MEDICINE. (3 cr; prereq 1st-yr vet med)

Lectures and lab on academic policies, student support services, curriculum, student government, personal health and safety, and legal issues related to the D.V.M. program.

CVM 5301-5302-5303-5304. PROFESSIONAL CAREER DEVELOPMENT. (4-24 cr; prereq #)

Developing job search skills in resume writing, interviewing, and negotiating with prospective employers. Balancing professional and personal goals.

CVM 5601-5602-5603-5604. ROTATIONS AT OTHER INSTITUTIONS. (4-24 cr; prereq 4th-yr vet med or #)
Off-site clinical rotations in selected areas of veterinary medicine.

CAPS 5150. DIAGNOSTIC AND THERAPEUTIC TECHNIQUES. (1 cr)

Demonstration and application of diagnostic techniques and procedures and restraint of animals. Discussion of therapeutic regimens and demonstration of therapeutic procedures.

CAPS 5151. DIAGNOSTIC AND THERAPEUTIC TECHNIQUES I. (1 cr; prereq 5150 or #)

Application of general physical examination procedures, special diagnostic techniques, and therapeutic procedures for large animals.

CAPS 5153. DIAGNOSTIC AND THERAPEUTIC TECHNIQUES II. (1 cr; prereq #)

Demonstration and practice of restraint of and diagnostic and therapeutic techniques for large animals.

CAPS 5160. LARGE ANIMAL MEDICINE. (6 cr; prereq 5151 or #)

Ruminant diseases covered on a system basis.

CAPS 5161. LARGE ANIMAL MEDICINE. (5 cr; prereq 5160 or #)

Continuation of study of ruminant diseases plus equine diseases, covered on a system basis.

CAPS 5162. LARGE ANIMAL MEDICINE. (6 cr; prereq 5161 or #)

Continuation of equine diseases plus porcine diseases, covered on a system basis.

CAPS 5165. INTRODUCTION TO ANIMAL NUTRITION. (2 cr; prereq VPB 5210, VPB 5212, VPB 5306 or #)

Requirements and functions of nutrients in large and small animals. Sources of nutrients and evaluation of feedstuffs.

CAPS 5200. CLINICAL VIROLOGY, IMMUNOLOGY, PARASITOLOGY, AND TOXICOLOGY. (1 cr; prereq VDM 5164, VPB 5601, VPB 5602, VPB 5701, VPB 5702, VPB 5703, #; to be taken concurrently with VDM 5165)

Diagnostic techniques and their clinical application for viral and immunologic diseases; parasite identification methods and their application in preventing and controlling animal parasitisms; clinical signs, differential consideration, and diagnostic alternatives for toxicologic disorders.

CAPS 5211-5212-5213-5214. LARGE ANIMAL SURGERY. (4-24 cr; prereq 3rd- or 4th-yr vet med)

Diagnostic and therapeutic management of lameness and surgical diseases of large animals (equine, bovine, small ruminants) in a hospital setting.

CAPS 5221-5222-5223-5224. EQUINE LAMENESS. (4-24 cr; prereq 3rd- or 4th-yr vet med)

Two-week course involving clinical, didactic, and lab learning.

CAPS 5231-5232-5233-5234. EQUINE PODIATRY. (4-24 cr; prereq 3rd- or 4th-yr vet med)**CAPS 5241-5242-5243-5244. BOVINE SURGERY.** (4-24 cr; prereq 3rd- or 4th-yr vet med)

Technical and theoretical skills necessary for working in a mixed or dairy practice involving individual cow surgical disease management.

CAPS 5270. ECONOMICS AND PRACTICE MANAGEMENT. (2 cr; prereq 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.

CAPS 5271. LAW AND ETHICS IN VETERINARY MEDICINE. (2 cr; prereq vet med or #)

Legal and ethical issues in veterinary medicine.

CAPS 5352. LARGE ANIMAL SURGERY. (5 cr; prereq #)

Common surgical procedures applied to large animals.

CAPS 5511-5512-5513-5514. EQUINE THERIOGENOLOGY. (4-24 cr; prereq 3rd- or 4th-yr vet med)

Skills in equine reproduction: teasing for estrus detection, rectal palpation and ultrasound examination of ovaries and pregnancy diagnosis, breeding management, vaginal examination, uterine culture and biopsy, intrauterine therapy, artificial insemination, semen collection and evaluation.

CAPS 5531-5532-5533-5534. DAIRY PALPATION. (4-24 cr; prereq 3rd- or 4th-yr vet med)

Technical skills of palpating the reproductive tract of cows per rectum.

CAPS 5541-5542-5543-5544. DAIRY THERIOGENOLOGY MANAGEMENT. (4-24 cr; prereq 5531, 5532, 5533, 5534, 3rd- or 4th-yr vet med)

Two-week rotation on embryo transfer, breeding soundness evaluation, obstetrics, and dairy herd reproductive management.

CAPS 5550. DIAGNOSTICS AND OBSTETRICS IN THERIOGENOLOGY. (2 cr; prereq vet med or grad or #)

Diagnostic, therapeutic, and obstetrical procedures in theriogenology.

CAPS 5551. THERIOGENOLOGY DIAGNOSTICS LABORATORY. (1 cr; prereq vet med or grad or #)

Demonstration and lab practice in diagnostic and therapeutic procedures in theriogenology.

CAPS 5552. VETERINARY OBSTETRICS LABORATORY. (1 cr; prereq 5550 or #)

Demonstration and lab practice in obstetrical procedures.

CAPS 5570. REPRODUCTIVE DISEASES OF DOMESTIC ANIMALS. (5 cr; prereq 5550 or #)

Physiology and pathology of reproduction, artificial insemination, abortive diseases, postpartum injuries, breeding management in domestic animals.

CAPS 5591-5592-5593-5594. GENERAL THERIOGENOLOGY. (prereq #)

Comparative theriogenology training program based on clinical case load in the Veterinary Teaching Hospitals and theriogenology field herds. Comparative teaching labs (e.g., semen evaluation). Students focus on species of interest (bovine, equine, small animal) depending on season and case load.

CAPS 5601-5602-5603-5604. ANALYTICAL TECHNIQUES IN VETERINARY MEDICINE I. (4-24 cr; prereq #)

Two-week rotation dealing primarily with on-farm disease diagnostics, treatment, and control programs.

COURSE DESCRIPTIONS

CAPS 5611-5612-5613-5614. SWINE DISEASE DIAGNOSTICS, THERAPEUTICS, AND PREVENTION. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Two-week rotation dealing primarily with on-farm disease diagnostics, treatment, and control programs.

CAPS 5621-5622-5623-5624. SWINE PRODUCTION SYSTEMS. (4-24 cr; prereq 3rd- or 4th-yr vet med)
American swine industry.

CAPS 5631-5632-5633-5634. SWINE NUTRITION. (4-24 cr; prereq 3rd- or 4th-yr vet med or DVM or grad)
Nutrition and feeding of pigs.

CAPS 5641-5642-5643-5644. SWINE ECONOMICS, FINANCIAL MANAGEMENT, AND MARKETING. (4-24 cr; prereq #)
Manipulation, analysis, and interpretation of data from all phases of swine production using biological and financial records. Case studies used to develop diagnostic skills in identifying causes of suboptimal productivity. Financial analysis techniques used to develop cost-effective and feasible solutions to production problems, and swine marketing alternatives.

CAPS 5650. VETERINARY EPIDEMIOLOGY AND STATISTICS. (4 cr; prereq 10 cr biol, 12 cr chem or #)
Principles of epidemiology, ecology, and veterinary public health. Biostatistics applied to measuring health and disease in populations.

CAPS 5651. VETERINARY COMMUNITY MEDICINE. (3 cr; prereq VPB 5503, VPB 5703 or #)
Principles and practices of environmental health and food hygiene; meat, poultry, milk, and other foods as they are important for animal and human health. Diseases transmitted between animals and humans.

CAPS 5663. INTERNATIONAL ANIMAL DISEASE PROBLEMS. (1 cr; prereq #)
Diagnosis, transmission, and epidemiology of animal diseases not currently present in the United States. International role of veterinarians in reducing disease and increasing world animal production.

CAPS 5681-5682-5683-5684. SWINE VIROLOGY AND IMMUNOLOGY. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Lab techniques for diagnostic virology, serology, and immunology. Research techniques for using fluorescent antibodies, determining of classes of immunoglobulins, and immunostimulating of lymphocytes.

CAPS 5691-5692-5693-5694. EPIDEMIOLOGY AND BIostatISTICS. (4-24 cr; prereq #)
Strengths and limitations of statistical methodologies used in veterinary medicine and epidemiology. Design of a feasible research program given constraints of funding, time, and facilities. Preparation of a detailed research proposal suitable for submission for competitive funding.

CAPS 5711-5712-5713-5714. EQUINE SPORTS AND PREVENTIVE MEDICINE. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Equine industry. Emphasizes various sports performance activities and the veterinarian's role.

CAPS 5811-5812-5813-5814. DAIRY DISEASE CONTROL, PARASITOLOGY, YOUNGSTOCK MANAGEMENT. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Common infectious diseases and parasites that limit dairy calf performance.

CAPS 5821-5822-5823-5824. MASTITIS, MILKING MACHINES, AND MILK QUALITY. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Develops skills to evaluate herd mastitis problems and recommend solutions.

CAPS 5831-5832-5833-5834. RUMINANT NUTRITION. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Strongly recommended for students interested in dairy and suggested for students interested in beef. Nutrient requirements for ruminants, nutrient content of feedstuffs (primarily forages), energy use, protein and nonprotein nitrogen use, nutritional disorders, formulation of adequate rations, techniques for analyzing rations.

CAPS 5841-5842-5843-5844. APPLIED DAIRY NUTRITION. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Principles, techniques, goals, and objectives of providing nutritional advice, counseling, and/or assessment to a dairy farm.

CAPS 5851-5852-5853-5854. DAIRY RECORD ANALYSIS, EPIDEMIOLOGY, AND ECONOMICS. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Evaluation of a dairy herd using biological and economic records.

CAPS 5911-5912-5913-5914. ADVANCED BUILDING DESIGN AND TOTAL HERD EVALUATION. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Advanced housing, ventilation, equipment, and building design principles using the epidemiologic approach to promoting animal health. Integration of total animal health care, environmental control, and herd management into herd veterinary services.

CAPS 5921-5922-5923-5924. BEEF PRODUCTION MEDICINE. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Maximizing efficiency of the beef cow/calf herd.

CAPS 5941-5942-5943-5944. SMALL RUMINANT HEALTH AND PRODUCTION. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Sheep and goat production, medicine and health management.

Other Courses

CAPS 3502. ANIMAL HEALTH AND DISEASE. (5 cr)
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 them. How stress and management practices aggravate and create new disease conditions.

CAPS 5180. INTRODUCTION TO HERD HEALTH AND DAIRY HERD HEALTH MANAGEMENT. (2 cr; prereq 3rd- or 4th-yr vet med or grad or #)
Herd health management, general epidemiology, disease surveillance, economics of farming. Dairy cattle genetics and breeding, reproduction, applied nutrition, housing, preventive medicine programs, management practices.

CAPS 5182. SHEEP AND GOAT HERD HEALTH MANAGEMENT. (1 cr; prereq regis vet med 3rd- or 4th-yr or grad or #)
Sheep and goat breeds and breeding, reproduction, applied nutrition, housing, preventive medicine programs, and management practices.

CAPS 5184. EQUINE NEONATOLOGY. (1 cr; prereq 3rd- or 4th-yr vet med or #)

Instruction, emergency duty, and practical application of principles in evaluating and treating sick equine neonates. Seasonal participation in clinically managing hospitalized foals and periodically reviewing past cases.

CAPS 5274. UNDERSTANDING THE BUSINESS OF VETERINARY PRACTICE. (1 cr; prereq 5270 or #)

For senior veterinary students. Veterinary business management including choosing a practice; interviewing for an associate position; negotiating contracts, benefits, hours, covenants; law, tax, business, and financial concepts; insurance; ownership or partnership.

CAPS 5275. DISEASES OF ZOO ANIMALS AND EXOTIC PETS. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)

Diseases of and management procedures for zoo animals and exotic pets; restraint procedures, medication, diagnosis.

CAPS 5276. ADVANCED ZOO ANIMAL MEDICINE. (1 cr; prereq 5275, 3rd- or 4th-yr vet med or #)

Adapting existing veterinarian techniques and principles to zoo animal medicine. Animal management and preventive medicine programs used in zoo animal medicine.

CAPS 5280. WORLD FOOD PROBLEMS. (3 cr; prereq major in ag or vet med or nutr sci or soc sci or #; grad by #) (Same as AgEc 5790, FScN 5643, Soc 5675)

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.

CAPS 5355. EQUINE COLIC MANAGEMENT. (2 cr; prereq 1st-yr vet med)

Principles and techniques evaluating and treating equine colic cases.

CAPS 5356. EQUINE COLIC TEAM. (1 cr; prereq 5355, vet med)

Four quarters of clinically managing equine colic cases and periodically reviewing past cases, success rates, and topics in related fields.

CAPS 5357. ADVANCED COLIC TEAM. (1 cr; prereq 5356, vet med)

Four quarters of clinically managing cases and periodically reviewing past cases, success rates, and topics in related fields. Students act as team leaders during clinical management and assist in lab exercises for 5355.

CAPS 5571. REPRODUCTION AND INFERTILITY IN THE HORSE. (1 cr; prereq 5570, 4th-yr vet med or grad or #)

Reproductive patterns, breeding practices, management, artificial insemination, economics of reproductive performance, and infertility in horses.

CAPS 5575. REPRODUCTION AND INFERTILITY IN SWINE. (1 cr; prereq 5570, 4th-yr vet med or grad or #)

Reproductive patterns, breeding practices, management, artificial insemination, synchronization of estrus, economics of reproductive performance, and infertility in swine.

CAPS 5605. ANALYTICAL TECHNIQUES IN VETERINARY MEDICINE I. (3 cr; prereq regis vet med 3rd- or 4th-yr or grad or # or IV Track)

Principles and practices of developing and using computer systems for processing, analyzing, and interpreting various categories of animal health data. Acquiring resources necessary to undertake a research program. Developing a critical approach to reading veterinary medical literature.

CAPS 5615. ADVANCED SWINE DISEASE DIAGNOSTICS, THERAPEUTICS, AND PREVENTION. (4 cr; prereq IV track or grad or #)

Two week rotation dealing primarily with on-farm disease diagnostics, treatment, and control programs.

CAPS 5625. SWINE PRODUCTION SYSTEMS. (4 cr; prereq IV track or grad or #)

Factors affecting the biological productivity and financial competitiveness of commercial swine farms.

CAPS 5645. ADVANCED SWINE ECONOMICS, FINANCIAL MANAGEMENT, AND MARKETING. (4 cr; prereq IV track or grad or #)

Manipulation, analysis, and interpretation of data from all phases of swine production using biological and financial records. Case studies used to develop diagnostic skills in identifying causes of suboptimal productivity. Financial analysis techniques used to develop cost-effective and feasible solutions to production problems, and swine marketing alternatives.

CAPS 5665. MONITORING AND SURVEILLANCE OF DISEASE. (Cr ar; prereq #; offered odd yrs)

Techniques used to monitor disease in animal populations.

CAPS 5671. BIOHAZARDS IN VETERINARY MEDICINE. (Cr ar; prereq #)

Microbiological, toxicological, drug, and other hazards in veterinary medicine.

CAPS 5672. PERSPECTIVES: ANIMAL-HUMAN RELATIONSHIPS AND COMMUNITY HEALTH. (2-3 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.

CAPS 5673. PROBLEMS IN DISEASE CONTROL AND ERADICATION. (Cr ar; prereq PubH 5330 or #; offered odd yrs)

Past and present disease control and eradication programs and factors influencing degree of success and failure. Students develop models for proposed disease control and eradication programs in the United States or a foreign country for group evaluation and analysis.

CAPS 5680. PROBLEMS IN VETERINARY EPIDEMIOLOGY AND PUBLIC HEALTH. (Cr ar; prereq 5650 or equiv or #)

Individual study arranged with a faculty member.

CAPS 5855. ADVANCED DAIRY RECORD ANALYSIS, EPIDEMIOLOGY, AND ECONOMICS. (4 cr; prereq IV track or grad or #)

Evaluation of a dairy herd using biological and economic records.

COURSE DESCRIPTIONS

Graduate Courses

(See the *Graduate School Bulletin* for course descriptions)

CAPS 5015. ADVANCED VETERINARY PUBLIC HEALTH (VPH) CLINIC ROTATION

CAPS 5115. ADVANCED LARGE ANIMAL MEDICINE

CAPS 5190. LARGE ANIMAL INTERNAL MEDICINE I

CAPS 5191. LARGE ANIMAL INTERNAL MEDICINE II

CAPS 5215. ADVANCED LARGE ANIMAL SURGERY

CAPS 5225. ADVANCED EQUINE LAMENESS

CAPS 5235. ADVANCED EQUINE PODIATRY

CAPS 5245. ADVANCED BOVINE SURGERY

CAPS 5535. ADVANCED DAIRY PALPATION

CAPS 5545. ADVANCED DAIRY THERIOGENOLOGY MANAGEMENT

CAPS 5595. ADVANCED GENERAL THERIOGENOLOGY

CAPS 5615. ADVANCED SWINE DISEASE DIAGNOSTICS, THERAPEUTICS, AND PREVENTION

CAPS 5635. ADVANCED SWINE NUTRITION

CAPS 5645. ADVANCED SWINE ECONOMICS, FINANCIAL MANAGEMENT, AND MARKETING

CAPS 5695. ADVANCED EPIDEMIOLOGY AND BIostatISTICS

CAPS 5715. ADVANCED EQUINE SPORTS AND PREVENTIVE MEDICINE

CAPS 5815. ADVANCED DAIRY DISEASE CONTROL, PARASITIOLOGY, YOUNGSTOCK MANAGEMENT

CAPS 5825. ADVANCED MASTITIS, MILKING MACHINES, AND MILK QUALITY

CAPS 5835. ADVANCED RUMINANT NUTRITION

CAPS 5845. ADVANCED APPLIED DAIRY NUTRITION

CAPS 5855. ADVANCED DAIRY RECORD ANALYSIS, EPIDEMIOLOGY, AND ECONOMICS

CAPS 5915. ADVANCED BUILDING DESIGN AND TOTAL HERD EVALUATION

CAPS 5925. ADVANCED BEEF COW/CALF PRODUCTION MEDICINE

CAPS 5935. ADVANCED BEEF FEEDLOT PRODUCTION MEDICINE

CAPS 5945. ADVANCED SMALL RUMINANT HEALTH AND PRODUCTION

CAPS 5951. DIRECTED STUDIES

CAPS 5965. ADVANCED VETERINARY DIAGNOSTIC MEDICINE AND HOUSING AND MANAGEMENT INVESTIGATIONS TO PROMOTE ANIMAL HEALTH, PRODUCTIVITY, AND WELL-BEING

CAPS 8193. ADVANCES IN CLINICAL IMMUNOBIOLOGY

CAPS 8194. PROBLEMS IN DIAGNOSTIC VIROLOGY, SEROLOGY, AND IMMUNOLOGY

CAPS 8195. PREVENTIVE VETERINARY MEDICINE

CAPS 8197. METABOLIC AND NUTRITIONALLY INDUCED DISEASES OF CATTLE

CAPS 8199. PROBLEMS IN ECONOMICS OF ANIMAL HEALTH

CAPS 8290. ADVANCED VETERINARY MEDICINE

CAPS 8291. ADVANCED DIAGNOSIS AND THERAPEUTICS OF ANIMAL DISEASES

CAPS 8292. SEMINAR: VETERINARY MEDICINE

CAPS 8293. MEDICAL CONFERENCE

CAPS 8299. RESEARCH IN VETERINARY MEDICINE

CAPS 8390. SEMINAR: VETERINARY SURGERY

CAPS 8392. ADVANCED LARGE ANIMAL SURGERY

CAPS 8393. PROBLEMS IN LARGE ANIMAL ORTHOPEDICS

CAPS 8397. LARGE ANIMAL ANESTHESIA

CAPS 8590. ADVANCED DIAGNOSTIC METHODS IN REPRODUCTIVE DISEASES

CAPS 8591, 8592, 8593. ADVANCED ENDOCRINOLOGY OF REPRODUCTION

CAPS 8594. SPECIAL PROBLEMS IN ANIMAL REPRODUCTION

CAPS 8595. SEMINAR: VETERINARY OBSTETRICS

CAPS 8690. EPIDEMIOLOGY OF ZOOSES AND DISEASES COMMON TO HUMANS AND ANIMALS

CAPS 8790. PROBLEMS IN VETERINARY CLINICAL PHARMACOLOGY AND THERAPEUTICS

CAPS 8791. SEMINAR IN CLINICAL PHARMACOLOGY AND THERAPEUTICS

Small Animal Clinical Sciences (SACS)

Required Courses

SACS 5111-5112-5113-5114. INTERNAL MEDICINE. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Problem-solving skills including problem definition; quality patient care; clinical skill acquisition and application; communication skills including record keeping; ethics; economics of internal medicine; referral etiquette.

SACS 5121-5122-5123-5124. COMPARATIVE OPHTHALMOLOGY/DERMATOLOGY. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Case material that entry-level veterinarians face in practice.

SACS 5131-5132-5133-5134. EMERGENCY ROTATION. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Assist interns with night and weekend emergency cases.

SACS 5141-5142-5143-5144. CLINICAL NUTRITION/INTERNAL MEDICINE. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Answers to client questions about feeding practices for the normal dog and cat; nutritional aspects of medical patients and use of therapeutic diets.

SACS 5151-5152-5153-5154. COMMUNITY PRACTICE. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Clinical experience using preventive health, behavior, and communication skills. Basic small animal husbandry. Client education resources. Importance of teamwork regarding the practice environment, referral cases, and community involvement. Selected pet bird and pocket pet appointments.

SACS 5161-5162-5163-5164. CLINICAL ONCOLOGY ROTATION. (4-24 cr; prereq #)
 Two-week rotation offered once in 1995-96. Routine diagnostic procedures; ultrasound-guided aspirations; core, bone marrow, and lymph node biopsies. Monitor chemotherapy and radiation therapy.

SACS 5170. SMALL ANIMAL MEDICINE. (4 cr; prereq #)
 Etiology, pathophysiology, diagnosis, prognosis, and treatment of disorders of various companion animal body systems. Fundamental principles of diagnosis and treatment. Polysystemic disorders including nutritional abnormalities, immune-mediated diseases, infectious diseases, intoxications, and neoplasia.

SACS 5171. SMALL ANIMAL MEDICINE. (4 cr; prereq 5170 or #)
 Continuation of 5170.

SACS 5172. SMALL ANIMAL MEDICINE. (5 cr; prereq 5171 or #)
 Continuation of 5171.

SACS 5181-5182-5183-5184. CLINICAL SMALL ANIMAL CARDIOLOGY. (4-24 cr; prereq 5170, 5171, 5172, #)
 Students actively participate in the clinical evaluation and management of cardiopulmonary disease. Students perform physical examinations, electrocardiograms, and echocardiograms in addition to interpreting radiographs and participating in group case discussions.

SACS 5192. DIAGNOSTIC AND THERAPEUTIC TECHNIQUES. (2 cr; prereq 3rd- or 4th-yr vet med)
 Demonstrate and apply diagnostic procedures for and restraint of animals. Discuss therapeutic regimens and demonstrate therapeutic procedures.

SACS 5211-5212-5213-5214. SMALL ANIMAL SURGERY. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Diagnostic skills; clinical and technical surgical skills; quality patient care; economics related to surgical practice.

SACS 5260. THE PROBLEM-ORIENTED MEDICAL SYSTEM. (1 cr; prereq #)
 Fundamentals of problem definition and solution. Problem-oriented system of diagnosis and therapy, with emphasis on the problem-oriented medical record.

SACS 5270. ANIMAL BEHAVIOR. (2 cr; prereq #)
 Principles of animal behavior and applied aspects relating to managing clinical behavioral problems. Emphasizes companion and food animals.

SACS 5311-5312-5313-5314. ANESTHESIOLOGY. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Preoperative evaluation; restraint; sedation; anesthetic, management, and post-operative care of canine, feline, and occasional exotic animal cases.

SACS 5321-5322-5323-5324. SMALL ANIMAL CRITICAL CARE MEDICINE. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Individual case contact and nursing, assistance in the SAICU, rounds review of SAICU cases. CPR, nutrition, fluid therapy, respiratory care, shock. Rostering in the SAICU allows case contact with critical patients during assigned time blocks.

SACS 5350. PRINCIPLES OF VETERINARY SURGERY. (5 cr; prereq VPB 5126 or #)
 Basic materials necessary for clinically managing large and small animal surgical patients. Aseptic technique, patient evaluation, physiologic responses of body systems to surgery, repair and healing of tissue, surgical anatomy.

SACS 5351. VETERINARY SURGERY. (5 cr; prereq CVM 5350 or #)
 Common surgical procedures applied to small animals.

SACS 5380. ANESTHESIOLOGY AND CRITICAL CARE. (3 cr; prereq 5170 or #)
 Principles and application of anesthesia. Managing severely injured patient.

SACS 5411-5412-5413-5414. RADIOLOGY. (4-24 cr; prereq 3rd- or 4th-yr vet med)
 Positioning of animals, standard survey radiograph techniques and special procedures, interpretive skills.

SACS 5451. VETERINARY RADIOLOGY I. (1 cr; prereq #)
 Radiographic interpretation of normal systems.

SACS 5452. VETERINARY RADIOLOGY II. (3 cr; prereq 5451 or #)
 Principles of radiography and radiographic interpretation of abnormal systems.

COURSE DESCRIPTIONS

SACS 5501-5502-5503-5504. CLINICAL SMALL ANIMAL THERIOGENOLOGY. (4-24 cr)
Collect and complete reproductive histories of companion animals, interpret vaginal cytology specimens in female dogs. Measure/interpret serum progesterone concentrations in planning breeding management. Dystocia management. *Brucella canis* testing in dogs. Collect and evaluate canine serum.

SACS 5901-5902-5903-5904. ZOO, EXOTIC, RAPTOR, AND COMPANION BIRDS. (4-12 cr; prereq 4th-yr vet med or #)

Disease prevention/husbandry practice. Treating injured, orphaned, and diseased wild animals, including avian, mammalian, and reptilian species. Clinical experience with companion birds. Restraint, application of anesthesia procedures, collecting diagnostic samples for various raptors.

Other Courses

SACS 5180. CRITICAL CARE TEAM. (2 cr prereq 2nd- or 3rd- or 4th-yr vet med or #)

Instruction, rostered duty in the critical care unit, and practical application of principles and practices related to critically ill patients. Clinically managing hospitalized patients in the critical care unit and periodic review of past cases.

SACS 5250. SMALL ANIMAL DERMATOLOGY.

(1-2 cr; prereq 3rd- or 4th-yr vet med or grad or #)
Pathogenesis, clinical features, diagnosis, and therapy of skin diseases of companion animals.

SACS 5251. COMPARATIVE CLINICAL VETERINARY DERMATOLOGIC PATHOLOGY.

(1-2 cr; grad or #)
Microscopic pathology of basic dermatologic reactions and variable disease states.

SACS 5255. DISEASES OF THE URINARY SYSTEM.

(2 cr; prereq 3rd- or 4th-yr vet med or grad or #)
Etiology, pathophysiology, clinical and lab findings, diagnosis, prognosis, and treatment of urinary system disorders. Case-oriented format with student participation in discussion emphasized.

SACS 5256. DISEASES OF THE LIVER AND PANCREAS. (2 cr; prereq 3rd- or 4th-yr vet med or grad or #)

Etiopathogenesis, diagnosis, and treatment of hepatic and pancreatic diseases in companion animals.

SACS 5257. A CLINICIAN'S ANALYSIS OF URINALYSIS. (1 cr; prereq completion of first 3 yrs of veterinary curriculum)

Interpret urinalysis findings in patients with a variety of disorders of various body systems.

SACS 5271. HOSPITAL MANAGEMENT. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)

Managing a small animal hospital. Emphasizes zoning restrictions, employee supervision, drug purchases, facilities, and fees.

SACS 5285. CANINE CLINICAL NEUROLOGY. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)

Anatomic and physiologic bases for neurological examination of the dog. Emphasis on a clinical approach to neurology, illustrated with case materials.

SACS 5330. WILD BIRD MEDICINE. (2 cr; prereq 3rd- or 4th-yr vet med or grad or #)

Important aspects of avian anatomy and physiology. Diseases common to wild birds and surgical repair of common injuries and fractures.

SACS 5360. SMALL ANIMAL ORTHOPEDICS.

(2-3 cr; prereq 3rd- or 4th-yr vet med or grad or #)
Small animal orthopedic problems and surgical procedures to correct them.

SACS 5396. INDEPENDENT STUDY IN VETERINARY MEDICINE. (2 cr; prereq #)

Independent study, by arrangement, in a clinical specialty area of veterinary medicine.

SACS 5398. INDEPENDENT RESEARCH IN VETERINARY ANESTHESIOLOGY. (1-6 cr; prereq vet med or grad or #)

Controlled study, prospective, and retrospective models of evaluation defined, critiqued, and used for experimental design and data collection. Analysis of data collection to validate research methods.

SACS 5453. SPECIAL PROCEDURES IN VETERINARY RADIOLOGY. (2 cr; prereq 3rd- or 4th-yr vet med or grad or #)

Contrast agents and procedures used to examine various body systems or anatomical areas.

SACS 5454. ROENTGENOLOGY BONE—LARGE ANIMALS. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)

Roentgen signs of common bone diseases of large animals. Emphasizes the horse.

SACS 5455. ROENTGENOLOGY BONE—SMALL ANIMALS. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)

Roentgen signs of common bone diseases of small animals.

SACS 5572. REPRODUCTIVE PATTERNS AND INFERTILITY IN THE DOG AND CAT. (1 cr; prereq CAPS 5570, 3rd- or 4th-yr vet med or grad or #)

Reproductive patterns, breeding management, artificial insemination, and infertility in dogs and cats.

SACS 5802. RESIDENCY IN VETERINARY DERMATOLOGY. (Cr ar; prereq #)

Rotations in veterinary dermatology clinics and review of dermatopathology slides submitted to the Veterinary Diagnostic Lab. Rotations through veterinary internal medicine, human dermatology service (Medical School), and dermatology journal club.

SACS 5812. COMPANION ANIMAL ONCOLOGY.

(2 cr; prereq DVM or equiv; offered spring alt yrs)
Biologic behavior, treatment, and prognosis of various neoplastic disorders.

Graduate Courses

(See the *Graduate School Bulletin* for course descriptions)

SACS 8180. ADVANCED CLINICAL NEUROLOGY

SACS 8190. COMPARATIVE CARDIOVASCULAR DISEASES

SACS 8191. ADVANCED COMPARATIVE ELECTROCARDIOLOGY

SACS 8192. SPECIAL CARDIOLOGY CLINICS

SACS 8196. INTERNAL MEDICINE IN SMALL COMPANION ANIMALS

SACS 8197. ADVANCED DERMATOLOGIC CLINICS

SACS 8198. PROBLEMS IN VETERINARY COMPARATIVE DERMATOLOGY

SACS 8200. DIRECTED STUDIES IN VETERINARY COMPARATIVE DERMATOLOGY

SACS 8290. ADVANCED VETERINARY MEDICINE

SACS 8291. ADVANCED DIAGNOSIS AND THERAPEUTICS OF ANIMAL DISEASES

SACS 8292. SEMINAR: VETERINARY MEDICINE

SACS 8293. MEDICAL CONFERENCE

SACS 8295. COMPARATIVE VETERINARY MEDICAL OPHTHALMOLOGY

SACS 8296. COMPARATIVE VETERINARY SURGICAL OPHTHALMOLOGY

SACS 8297. ADVANCED CLINICAL VETERINARY OPHTHALMOLOGY

SACS 8298. RESEARCH IN VETERINARY OPHTHALMOLOGY

SACS 8299. RESEARCH IN VETERINARY MEDICINE

SACS 8390. SEMINAR: VETERINARY SURGERY

SACS 8391. ADVANCED SMALL ANIMAL SURGERY

SACS 8394. SURGERY OF THE GASTROINTESTINAL SYSTEM

SACS 8396. ADVANCED VETERINARY ANESTHESIA

SACS 8398. RESEARCH IN VETERINARY ANESTHESIA

SACS 8399. SEMINAR: VETERINARY ANESTHESIA

SACS 8410. SURGICAL PHYSIOLOGY

SACS 8420. NEUROSURGERY

SACS 8430. THORACIC AND CARDIOVASCULAR SURGERY

SACS 8471. THERAPEUTIC RADIOLOGY

SACS 8480. SEMINAR: VETERINARY RADIOLOGY

SACS 8483. ABDOMINAL ROENTGENOLOGY

SACS 8484. UROLOGIC AND GYNECOLOGIC ROENTGENOLOGY

SACS 8485. THORACIC ROENTGENOLOGY

SACS 8490. ADVANCED VETERINARY RADIOLOGY

SACS 8491. FUNDAMENTALS OF NUCLEAR MEDICINE

SACS 8492. RADIATION BIOLOGY

Veterinary Diagnostic Medicine (VDM)

Required Courses

VDM 5011-5012-5013-5014. VETERINARY HOSPITAL NECROSPY. (2-12 cr; 3rd- or 4th-yr vet med)

VDM 5111-5112-5113-5114. DIAGNOSTIC MEDICINE. (2-12 cr; prereq 3rd- or 4th-yr vet med)

Applying principles and techniques of the basic and clinical medical sciences to veterinary diagnostic medicine.

VDM 5164. TOXICOLOGY OF POISONOUS PLANTS. (1 cr; prereq VPB 5401 or #)

Toxicology and identification of poisonous plants.

VDM 5165. VETERINARY TOXICOLOGY. (3 cr; prereq VPB 5401 or #)

Toxicology of minerals, pesticides, herbicides, venoms, and miscellaneous toxins. Recognition, diagnosis, and treatment of animal poisons.

VDM 5503. DIAGNOSTIC PATHOLOGY. (3 cr; prereq VPB 5502 or #)

Gross and microscopic changes associated with specific infectious and noninfectious diseases of domestic animals.

VDM 5611-5612-5613-5614. ADVANCED VETERINARY TOXICOLOGY. (4-24 cr; prereq 5164, 5165 or #)

Clinical, diagnostic, mechanistic, and therapeutic aspects of Biotoxins, organic and inorganic toxins that affect livestock, poultry, wildlife, and companion animals or present a potential threat to the public health.

Graduate Courses

(See the *Graduate School Bulletin* for course descriptions)

VDM 5511. SWINE DISEASE DIAGNOSIS

VDM 5522. DIAGNOSTIC PATHOLOGY

VDM 5524. PROBLEMS IN DIAGNOSTIC PATHOLOGY

VDM 5620. SCIENTIFIC WRITING AND SPEAKING

VDM 5622. PROBLEMS IN DIAGNOSTIC VIROLOGY

VDM 5851. SEMINAR: DIAGNOSTIC MEDICINE

VDM 8503. ADVANCED DIAGNOSTIC PATHOLOGY

VDM 8602. COLLOQUIUM IN VIROLOGY

VDM 8792. SEMINAR IN VETERINARY TOXICOLOGY

COURSE DESCRIPTIONS

Veterinary Pathobiology (VPB)

Required Courses

VPB 5021-5022-5023-5024. CLINICAL HEMATOLOGY AND CYTOLOGY. (2-12 cr; prereq 3rd- or 4th-yr vet med)

Applying principles and techniques of the basic and clinical medical sciences to hematology and cytology.

VPB 5031-5032-5033-5034. CLINICAL MICROBIOLOGY. (2-12 cr; prereq 3rd- or 4th-yr vet med)

Applying principles and techniques of veterinary clinical and diagnostic microbiology.

VPB 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 of the dog, cat, ruminant, horse, pig, and lab animals presented from a comparative approach.

VPB 5102. VETERINARY NEUROBIOLOGY. (3 cr; prereq #)

(Same as NSc 5102) Structural and functional organization of the central nervous system of domestic animals.

VPB 5103. VETERINARY DEVELOPMENTAL ANATOMY. (3 cr; prereq #)

Ontogenetic processes in organ systems of domestic animals and developmental anomalies of clinical significance.

VPB 5104. MICROSCOPIC ANATOMY OF DOMESTIC ANIMALS. (5 cr; prereq #)

Light microscopic and relevant ultrastructural studies of cells, tissues, and organ systems.

VPB 5105. MICROSCOPIC ANATOMY OF DOMESTIC ANIMALS. (4 cr; prereq #)

Continuation of 5104.

VPB 5126. VETERINARY ANATOMY II. (5 cr; prereq VPB 5100 or #)

Comparative anatomy with emphasis on the pelvis, reproductive system, limbs, and head from a morphodynamic and radiographic approach. Species covered include horse, domestic ruminants, swine, dog, cat, and bird.

VPB 5210. VETERINARY BIOCHEMISTRY. (3 cr; prereq 1st-yr vet med or #)

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.

VPB 5212. VETERINARY BIOCHEMISTRY. (4 cr; prereq VPB 5210 or #)

Control and integration of metabolism in the whole animal. Includes hormonal regulation, specialized metabolism in different mammalian tissues and species, and applications of molecular biology to animal health.

VPB 5306. ANIMAL PHYSIOLOGY. (5 cr; prereq vet med or #)

Physiology of cell membranes, cardiovascular, renal, and body fluid systems of animals.

VPB 5308. ANIMAL PHYSIOLOGY. (4 cr; prereq vet med or #)

Physiology of digestion, respiration, and the mechanisms of temperature regulation and heat production in animals.

VPB 5310. ANIMAL PHYSIOLOGY. (4 cr; prereq VPB 5308 or #)

Physiology of the endocrine and reproductive systems of domestic animals.

VPB 5400. VETERINARY PHARMACOLOGY AND THERAPEUTICS I. (3 cr; prereq VPB 5310 or equiv or #)

(Same as NSc 5400) General principles of drug action, disposition, and use, focusing on drug action in the central and peripheral nervous systems. Topics include pharmacology of autonomic drugs, local anesthetics, parenteral general anesthetics, tranquilizing agents, analeptics, anticonvulsants, and neuromuscular blockers. Veterinary applications.

VPB 5401. VETERINARY PHARMACOLOGY AND THERAPEUTICS II. (5 cr; prereq VPB 5310, VPB 5400 or #)

Pharmacology of cardiopulmonary drugs (i.e., inhalational anesthetics, antiarrhythmic agents, cardiac glycosides), anti-inflammatory agents (i.e., NSAIDs, corticosteroids, antihistamines), and drugs affecting fluid and electrolyte homeostases (e.g., diuretics, gastrointestinal drugs). Veterinary applications.

VPB 5402. VETERINARY PHARMACOLOGY AND THERAPEUTICS III. (3 cr; prereq VPB 5401 or #)

Pharmacology of sulfonamides, nitrofurans, arsenicals, antibiotics, coccidiostats, and other antiprotozoan drugs and antifungal agents, anthelmintics, and other anti-infectious drugs. Principles and applications in preventing and treating microbial and parasitic diseases of domestic animals.

VPB 5501. BASIC VETERINARY PATHOLOGY. (5 cr; prereq #)

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). Applying basic principles of pathology to evaluation of gross and microscopic tissue alterations.

VPB 5502. SYSTEMIC VETERINARY PATHOLOGY. (6 cr; prereq VPB 5501 or #)

Reaction of specific systems to injury emphasizing basic response capabilities of the tissue or organ, with materials illustrating gross and microscopic changes.

VPB 5504. VETERINARY CLINICAL PATHOLOGY. (4 cr; prereq VPB 5503 or #)

Technique, application, and interpretation of basic lab tests applied to clinical diagnosis.

VPB 5550. LABORATORY ANIMAL MEDICINE. (2 cr; prereq VPB 5502 or #)

Care and management of lab animals. Diseases, nutrition, zoonoses, gnotobiotics, restraint, anesthesia, and environmental practices.

VPB 5601. VETERINARY PARASITOLOGY I. (4 cr; prereq VPB 5501 or #)

Helminth parasites and parasitic diseases of animals with emphasis on principles of control.

VETERINARY PATHOBIOLOGY (VPB)

VPB 5602. VETERINARY PARASITOLOGY II. (4 cr; prereq VPB 5601 or #)
Systematic and biologic study of protozoan and arthropod parasites of animals. Emphasis on their relationships to diseases and principles of parasite control.

VPB 5701. VETERINARY IMMUNOLOGY. (3 cr; prereq VPB 3103, 1st-yr vet med, #)
Humoral and cellular immune responses, hypersensitivity, regulation of the immune system, immunosuppression, autoimmunity and vaccination.

VPB 5702. PATHOGENIC BACTERIA AND FUNGI. (5 cr; prereq VPB 5701 or equiv or #)
Animal pathogens with emphasis on basic infection mechanisms.

VPB 5703. VETERINARY VIROLOGY. (4 cr; prereq VPB 5701 or equiv or #)
Basic virology techniques with emphasis on viral and rickettsial agents causing animal diseases.

VPB 5704. AVIAN DISEASES. (3 cr; prereq VPB 5703 or #)
Diseases of poultry and caged and aviary birds.

VPB 5721-5722-5723-5724. POULTRY HEALTH ROTATIONS. (4-24 cr; prereq #)
Diagnosing and preventing poultry diseases; performance evaluation; troubleshooting and disease treatment; processing, inspection, and food safety.

VPB 5780. APPLIED IMMUNOLOGY. (1 cr; prereq vet med or grad or #)
Principles of immunology and their clinical application.

Other Courses

VPB 3103. GENERAL MICROBIOLOGY. (3-5 cr; not open to vet med students; prereq 10 cr chem, 4 cr biol sci)
Morphology, taxonomy, genetics, physiology, and ecology of microorganisms. Practical application of fundamental principles of microbiology to other phases of science and industry.

VPB 5110. CYTOGENETIC EVALUATION OF ANIMAL DISEASES. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)
Five lectures dealing with using cytogenetics in animal disease diagnosis and methods of lab preparation and analysis of chromosomes. Five lab periods devoted to preparing prophase spreads of chromosomes, staining and photographing them, and preparing karyograms for analysis.

VPB 5140. VERTEBRATE MICROANATOMY. (1-6 cr; prereq #)
Microscopic structure and cytochemical and functional aspects of cells, tissues, and organs of representative 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.

VPB 5320w. AVIAN PHYSIOLOGY. (4 cr; prereq AnSc 3301 or 5 cr systemic physiology or equiv, #; offered even yrs)
Wild and domestic bird physiology.

VPB 5460w. NEUROCHEMICAL COMMUNICATION. (4 cr; prereq biochem)
(Same as NSc 5460 and MdBc 5460) Electrophysiology and biochemistry of neuronal signaling and its manipulation of pharmacological agents, in context of historical findings and current research techniques. Information on most systems (e.g., autonomic and central nervous) in context of specific transmitter systems wherever practical. Two objective, short-answer examinations.

VPB 5533. DIRECTED STUDIES IN VETERINARY PATHOBIOLOGY. (Cr ar; prereq 4th-yr vet med, #)
Principles, methods, and lab exercises for selected pathobiological research problems. Study conducted under faculty supervision.

VPB 5603s. PARASITES OF WILDLIFE. (2 cr; prereq VPB 5601, VPB 5602 or #; offered odd yrs)
Epidemiology and disease potential of some of the more significant helminth, arthropod, and protozoan parasites of regional wild mammals and birds. Term paper required.

VPB 5707. POULTRY DISEASE CONTROL. (3 cr; not open to vet med students; prereq AnSc 1100, Biol 1106, VPB 3103 or equiv)
General anatomy; physiology of digestion and reproduction; prevention and control of important poultry diseases.

VPB 5709. PREVENTIVE AVIAN MEDICINE. (1-2 cr; prereq 4th-yr vet med or grad or #)
Preventive avian disease programs and management practices. Visits to poultry and aviary establishments.

VPB 5748. PROBLEMS IN VETERINARY MICROBIOLOGY AND PUBLIC HEALTH. (Cr ar; prereq VPB 5703 or equiv, #)

Graduate Courses (VPB)

(See the *Graduate School Bulletin* for course descriptions)

VPB 5149. TOPICS OF ORGANOLOGY

VPB 5444. MUSCLE CONTRACTION

VPB 5513. PATHOLOGY OF WILDLIFE DISEASES

VPB 5520. ADVANCED VETERINARY CLINICAL PATHOLOGY

VPB 5523. PATHOLOGY OF SPONTANEOUS DISEASES OF LABORATORY ANIMALS

VPB 5524. PATHOLOGY OF SPONTANEOUS DISEASES OF POULTRY

VPB 5720. ADVANCED CLINICAL MICROBIOLOGY

VPB 5920. INDEPENDENT RESEARCH IN VETERINARY BIOLOGY

VPB 5950. DIRECTED STUDIES

VPB 8111. HISTOLOGIC AND ULTRAHISTOLOGIC TECHNIQUES

VPB 8112-8113-8114. RESEARCH PROPOSITIONS IN MORPHOLOGY

VPB 8134-8135. COMPARATIVE VETERINARY NEUROLOGY

COURSE DESCRIPTIONS

VPB 8136. EXPERIMENTAL COMPARATIVE VETERINARY NEUROLOGY

VPB 8149. RESEARCH IN VETERINARY ANATOMY

VPB 8150. RESEARCH PROBLEMS IN VETERINARY ANATOMY

VPB 8349. RESEARCH IN PHYSIOLOGY

VPB 8448. PROBLEMS IN VETERINARY PHARMACOLOGY

VPB 8449. NEUROTOXICITY OF ORGANOPHOSPHORUS INSECTICIDES

VPB 8450. DRUG-RECEPTOR INTERACTIONS

VPB 8460. NEUROCHEMICAL COMMUNICATION

VPB 8500. SEMINAR: VETERINARY PATHOLOGY

VPB 8501. ADVANCED VETERINARY BASIC PATHOLOGY

VPB 8502. ADVANCED SYSTEMIC PATHOLOGY

VPB 8504. SEMINAR: ADVANCED VETERINARY HISTOPATHOLOGY

VPB 8530. ONCOLOGY

VPB 8531. HOSPITAL PATHOLOGY

VPB 8532. COMPARATIVE NEUROPATHOLOGY

VPB 8533. PROBLEMS: PATHOLOGY

VPB 8534. PROBLEMS: CLINICAL PATHOLOGY

VPB 8550. SEMINAR: VETERINARY BIOLOGY

VPB 8601. ADVANCED VETERINARY PARASITOLOGY

VPB 8602. ADVANCED VETERINARY PARASITOLOGY

VPB 8611. IMMUNITY AND PARASITIC INFECTIONS: PROTOZOA AND ARTHROPODS

VPB 8612. IMMUNITY TO PARASITIC INFECTIONS: HELMINTHS

VPB 8648. PROBLEMS IN VETERINARY PARASITOLOGY

VPB 8700. SEMINAR: VETERINARY MICROBIOLOGY

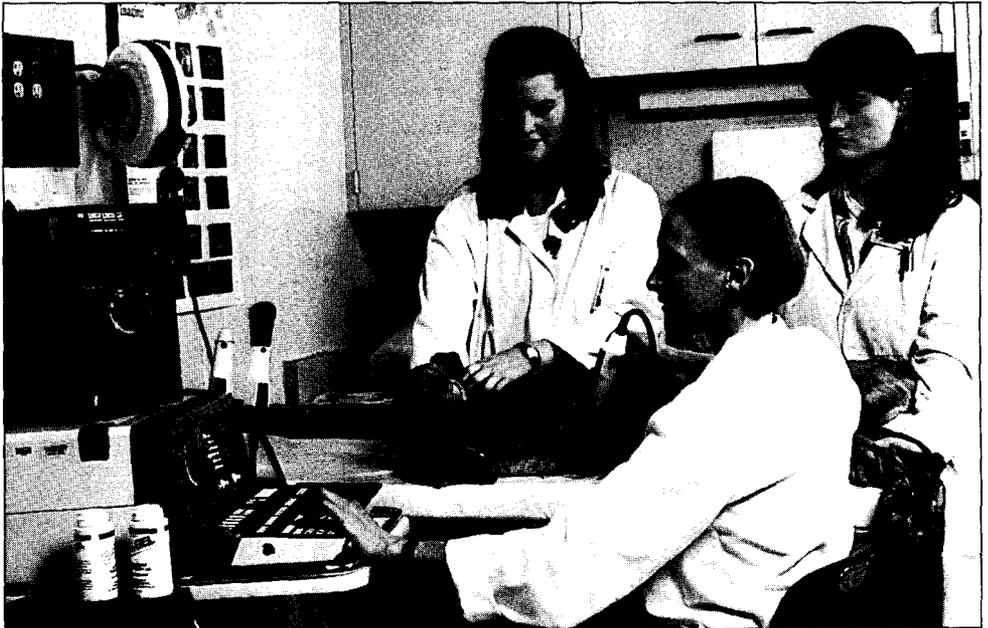
VPB 8720. ADVANCED VETERINARY MICROBIOLOGY

VPB 8721. IMMUNODIAGNOSTIC TECHNIQUES FOR AVIAN DISEASES

VPB 8723. IMMUNOBIOLOGY OF THE LYMPHOCYTE

VPB 8724. ADVANCED VETERINARY DIAGNOSTIC MICROBIOLOGY

VPB 8726. COLLOQUIUM IN IMMUNOLOGY



Veterinary students use state-of-the-art equipment, including ultrasound, to diagnose disease in companion animals.

University Regents

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 H. Bryan Neel III, Rochester, Vice Chair
 Wendell R. Anderson, Wayzata
 Julie A. Bleyhl, Madison
 William E. Hogan II, Minnetonka
 Jean B. Keffeler, Minneapolis
 Hyon T. Kim, St. Anthony
 Warren C. Larson, Bagley
 William R. Peterson, Eagan
 Jessica J. Phillips, Morris
 Stanley D. Sahlstrom, St. Cloud
 Patricia B. Spence, Rice

University Administrators

Nils Hasselmo, President
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 C. Eugene Allen, Provost for Professional Studies
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 Student Development & Athletics
 Mark L. Brenner, Acting Vice President for
 Research and Acting Dean of the Graduate School
 Melvin George, Vice President for Institutional Relations
 Mark B. Rotenberg, General Counsel

College of Veterinary Medicine Administrators

David G. Thawley, B.V.Sc., Ph.D., professor and dean
 (455A Veterinary Teaching Hospitals; 624-6244)
 Carl R. Jessen, D.V.M., Ph.D., professor and associate dean
 for planning and veterinary medical services
 (457 Veterinary Teaching Hospitals; 625-9268)
 Victor Perman, D.V.M., Ph.D., professor and associate dean
 for research (443 Veterinary Teaching Hospitals;
 624-2744)
 Ava M. Trent, D.V.M., M.V.Sc., associate professor and
 acting associate dean for academic and student affairs
 (462 Veterinary Teaching Hospitals; 624-7474)
 Sagar M. Goyal, B.V.Sc., Ph.D., professor and acting
 associate dean for academic and student affairs
 (462 Veterinary Teaching Hospitals; 624-7474)
 Dale K. Sorensen, D.V.M., Ph.D., professor emeritus
 Martin E. Bergeland, D.V.M., Ph.D., professor and director
 of Minnesota Veterinary Diagnostic Laboratory
 (244 Diagnostic Laboratory; 625-8787)
 Stanley L. Diesch, D.V.M., M.P.H. professor and director of
 international programs (424 Veterinary Teaching
 Hospitals; 625-7296)
 Donald C. Plumb, B.S., Pharm.D., director of Veterinary
 Teaching Hospitals (305 Veterinary Teaching Hospitals;
 625-9268)
 Charles H. Casey, D.V.M., director of veterinary outreach
 programs (414 Veterinary Teaching Hospitals;
 624-1711)
 Larry D. Bjorklund, B.S., M.S., director of student affairs
 and admissions (462 Veterinary Teaching Hospitals;
 624-4747)

Peter E. Poss, D.V.M., assistant to the dean (447 Veterinary
 Teaching Hospitals; 624-7428)
 Philip C. Oswald, M.S., development officer (410
 Veterinary Teaching Hospitals; 624-5315)
 Marilyn J. Rasmussen, senior administrative director
 (460B Veterinary Teaching Hospitals; 624-3695)
 Janice L. Swanson, assistant to the director of veterinary
 outreach programs (414 Veterinary Teaching Hospitals;
 624-2268)

Faculty

Department of Clinical and Population Sciences

Professor

David G. Thawley, B.V.Sc., Ph.D., *dean*
 John P. Fetrow, V.M.D., M.B.A., *chair*
 Trevor R. Ames, D.V.M., M.S.
 Gary D. Dial, D.V.M., Ph.D.
 Robert H. Dunlop, D.V.M., Ph.D.
 Melvyn L. Fahning, D.V.M., M.S., Ph.D.
 Ralph J. Farnsworth, D.V.M., M.S.
 Donald W. Johnson, D.V.M., Ph.D.
 Han Soo Joo, D.V.M., M.S., Ph.D.
 Thomas W. Molitor, B.A., M.S., Ph.D.
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 Michael M. Pullen, D.V.M., M.S.
 Robert A. Robinson, B.V.Sc., Ph.D.
 Bradley E. Seguin, D.V.M., M.S., Ph.D.

Associate Professor

William E. Marsh, B.S., M.S., Ph.D.
 Martha A. Mellencamp, B.S., M.S., Ph.D.
 Robert B. Morrison, D.V.M., Ph.D.
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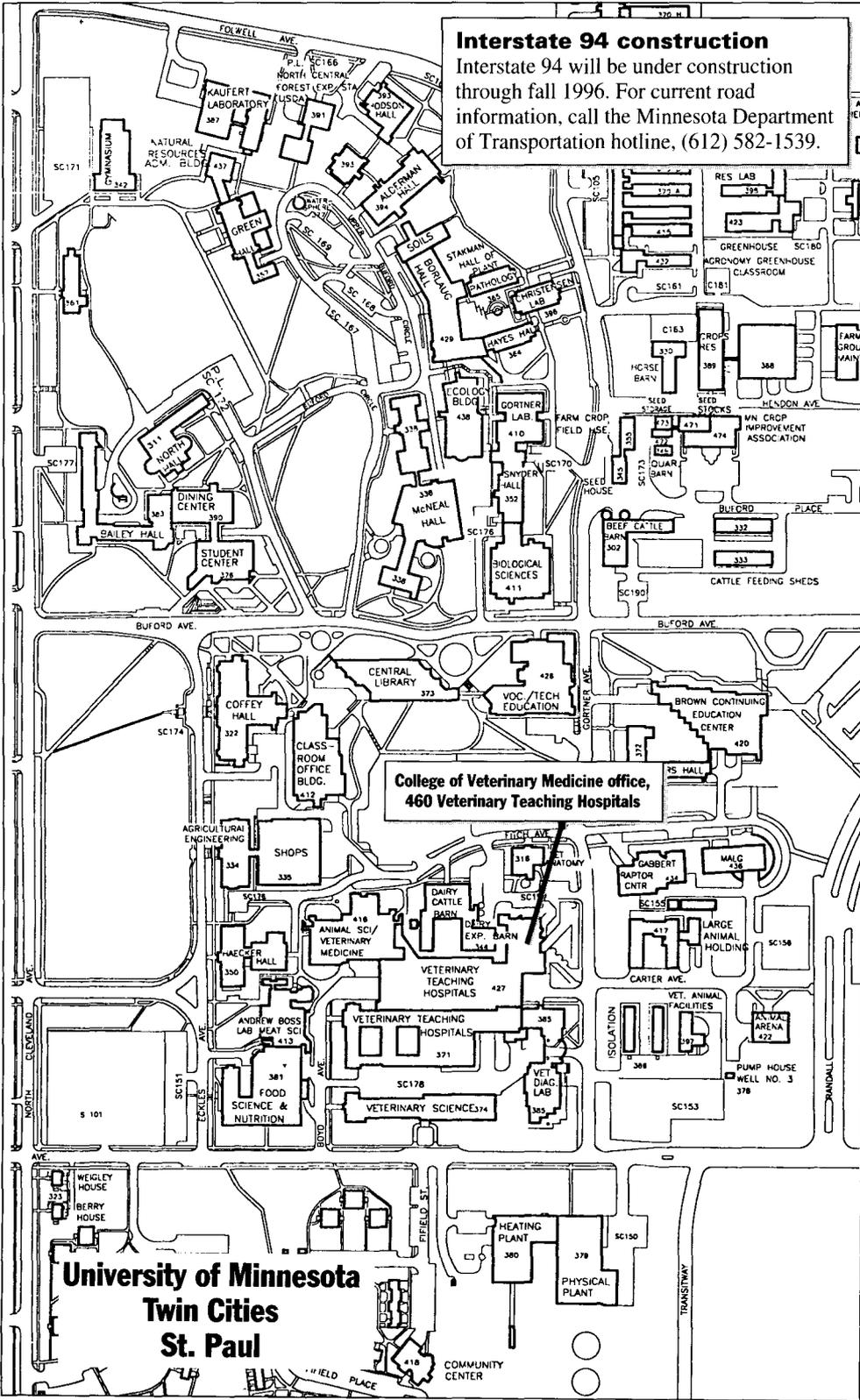
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Interstate 94 construction

Interstate 94 will be under construction through fall 1996. For current road information, call the Minnesota Department of Transportation hotline, (612) 582-1539.

College of Veterinary Medicine office, 460 Veterinary Teaching Hospitals

University of Minnesota Twin Cities St. Paul



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Postal Statement

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School of Dentistry

UNIVERSITY OF MINNESOTA

BULLETIN

1995-1997

SCHOOL OF DENTISTRY

DOCTOR OF DENTAL SURGERY

BACHELOR OF SCIENCE IN DENTAL HYGIENE

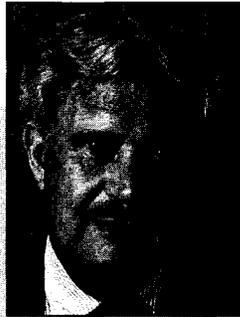


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A L E T T E R F R O M T H E D E A N

We're glad you're interested in the University of Minnesota School of Dentistry.



dental practitioners can develop the skills they need to provide quality patient care.

As one of the outstanding dentistry schools in the United States, we're committed not only to generating new knowledge and technology for our profession and the people it serves, but also to providing a supportive, nurturing environment in which future

We're proud of our school and its historic excellence and we invite you to explore more fully the opportunities we offer.

A handwritten signature in dark ink, appearing to read 'R. Elzay', with a stylized flourish at the end.

Richard P. Elzay, dean

DENTISTRY IN MINNESOTA

A Brief History

The School of Dentistry celebrated its centennial in 1988. In its long history, the school has developed an international reputation for research, education, and service that includes...

2

A strong tradition:

- Twenty-two students and four faculty members composed the University of Minnesota College of Dentistry when it began in 1888 as a division of the Department of Medicine. The college became the School of Dentistry in 1932.
- Early students used a dental engine driven by a foot pedal and made some of their own laboratory and clinical instruments in class.
- By the 1938-39 academic year, the original three-year program of study had been lengthened to four years, preceded by two years of prescribed undergraduate courses. In 1976, the prerequisites were changed to include three years of undergraduate coursework.
- A two-year dental hygiene program was added in 1920. The two-year program remained until 1989 when it was replaced by a baccalaureate program.
- A dental graduate degree program began in 1937; from 1957 to 1993, several programs were developed to give dental graduates the opportunity to earn a Ph.D. in various disciplines.

Research excellence:

- School of Dentistry faculty have earned worldwide reputations for their contributions to the understanding of fluoride and decay prevention, microbiology and oral-facial genetic anomalies, periodontal disease prevention, pain control, oral cancer, and effective care delivery.
- The Dental Research Institute, which applies high technology to oral health problems, and the Clinical Research Center for Periodontal Diseases, which collaborates with international corporations, offer specialized research opportunities.
- Undergraduates can participate in summer research programs, in which they work in areas of interest with faculty mentors.

International exchange:

- Since 1969, international student exchange programs have offered undergraduates an opportunity to study with faculty from Guatemala, Denmark, Germany, and Norway.
- Undergraduate students have provided dental care to people in 89 countries. The school has hosted faculty and students from 57 countries for education and research experiences.
- In 1967, the Lasby Visiting Professorship was created to bring American and foreign scientists and clinicians to the School of Dentistry.

A history of the School of Dentistry, written by professor Mellor Holland, is available in the University of Minnesota School of Dentistry Dental Reading Room.

The Dental Profession

New knowledge, concepts, and techniques have made dental and dental hygiene care beneficial for patients and more challenging, interesting, and comprehensive for practitioners. Today's dentist can reorganize crowded teeth; replace missing teeth with implants; seal enamel defects; and whiten, laminate, or crown discolored or cracked teeth. Tomorrow's dentists, particularly general practitioners and dental hygienists, will be expected to provide an even greater range of dental and personal health services. And more dental professionals will be needed. In 1990, it was estimated that the United States would have only 44.8 dentists per hundred thousand population, the fewest since World War I. Yet by the year 2000, it is estimated there will be 30 million more Americans for the profession to serve.

More than 140,000 dentists are practicing in the United States today and roughly half of these are over the age of 45. About 90 percent are in private practices (solo or groups), with the rest working in a variety of other settings: city, state, and federal agencies such as public health departments; community and nonprofit agencies; dental educational institutions; research programs sponsored by universities, foundations, and corporations; and armed forces programs. Of those dentists in private practice, approximately 95 percent have an ownership interest. Fewer dentists are now going into solo practice (approximately 70 percent); more are forming partnerships and other group practices (30 percent). About 80 percent of all dentists practice general dentistry; the remainder practice a dental specialty.

The Community

With more than 2 million residents, the Twin Cities provide the educational and cultural advantages of a major metropolitan area while offering easy access to abundant natural and wildlife areas. Plentiful parks, lakes, and rivers are close to most metropolitan homes and provide year-round opportunities for outdoor recreation, including skiing, skating, and hiking in the winter; and swimming, sailing, fishing, cycling, golfing, tennis, and

jogging in the warmer seasons. Major league sports teams include baseball's Minnesota Twins, football's Vikings, and basketball's Timberwolves.

Cultural opportunities abound. The Minnesota Orchestra, St. Paul Chamber Orchestra, Minneapolis Institute of Arts, Guthrie Theater, and Walker Art Center set the pace for many vigorous theaters, galleries, dance companies, museums, and musical groups. With such cultural, sporting, and recreational opportunities, it is no surprise to Minnesotans that quality-of-life studies rank us consistently among the top metropolitan areas in the nation.

The University

With four campuses, 4,500 faculty members, and more than 45,000 students, the University of Minnesota is one of the nation's largest, most comprehensive public institutions of higher learning. It is both a land-grant university with a strong tradition of education and public service, and a major research institution with scholars of national and international reputation.

The Twin Cities campus is the largest of the four campuses. Made up of 20 colleges, it offers a full range of undergraduate, graduate, and professional degrees. The Twin Cities campus is actually two close but geographically separate campuses, one in Minneapolis and the other in St. Paul. The Mississippi River divides the Minneapolis campus into the East Bank—where the School of Dentistry and the health sciences center are located—and the West Bank. Adjacent campus neighborhoods cater to student interests, while readily accessible downtowns in both Minneapolis and St. Paul offer metropolitan services and activities.

The School of Dentistry

Location The School of Dentistry, including the Division of Dental Hygiene, is headquartered on the East Bank of the University of Minnesota's Twin Cities campus. The school's main administrative office is in 15-209 Malcolm Moos Health Sciences Tower,



Dental student Kathryn Dubell researched purification of dental unit waterlines and presented her findings in Singapore in 1994.

515 Delaware Street S.E., Minneapolis, MN 55455.
Division of Dental Hygiene offices are in 9-436
Malcolm Moos Health Sciences Tower.

Rich Curriculum The professional D.D.S. program features diversified courses in the preclinical and clinical disciplines; basic medical sciences; professional, interpersonal, and ecological aspects of dental care; and practice management. Designed to meet student needs, the curriculum emphasizes the scientific, scholarly, interpersonal, and communication skills graduates will need to deal with a continually changing profession. Teaching methodologies range from traditional lectures to small group tutorials to clinical practice in a comprehensive, group care setting where students apply the skills they learn. In addition, career planning and placement are integrated into the core of the curriculum so students can prepare for the transition to practice or advanced education.

Graduate dentists can earn the M.S. degree in eight specialties. Seven of those programs are offered through the Graduate School, while the program in oral health services for older adults is offered through the School of Dentistry. Ph.D. degrees are offered in oral biology and the basic medical sciences. Three post-D.D.S. residency and training programs are also available.

The professional dental hygiene program, established in 1919, has an illustrious record of accomplishment and innovation and is one of the country's premiere programs. Today's graduates complete a baccalaureate degree that blends a solid dental hygiene clinical education with the biological, behavioral, and social sciences as well as the liberal arts.

Important Research Vital clinical and basic research, conducted by the faculty in superb research facilities, includes work in areas such as oral microbiology; fluoride chemistry; bone substitutes; genetic study of viruses; dental restorative materials in a simulated, computerized artificial mouth; and microcirculation. Dental and dental hygiene students benefit from this research through new information provided by the faculty as well as summer research fellowships under the guidance of faculty mentors.

Facilities The School of Dentistry offices are in the Malcolm Moos Health Sciences Tower, a flexible, innovative environment for teaching and practicing dentistry and dental hygiene and conducting research. All the basic science teaching laboratories are in Moos Tower, except for the adjacent anatomy and histology laboratories. Reference books and periodicals for dental and dental hygiene students are in the Reading Room on the ninth floor, and nonprint materials are in the Learning Resources Room on the eighth floor. The Bio-Medical Library in Diehl Hall, one block south of the Moos Tower, features an extensive selection of reference materials in the fundamental and clinical health sciences. The large Twin Cities campus library system is headquartered in Wilson Library on the West Bank.

Dentistry A magazine for University of Minnesota alumni, donors, parents, and friends, *Dentistry* is distributed nationally twice a year. Feature stories on important topics in dentistry, alumni news, and a special message from the dean are included.



G E N E R A L I N F O R M A T I O N



GENERAL INFORMATION

Mission

As part of a large metropolitan university with a strong commitment to the health sciences, the School of Dentistry offers a variety of academic and cultural opportunities. It is a member of the American Association of Dental Schools, and the undergraduate programs in dentistry and dental hygiene are approved by the Commission on Dental Accreditation.

The mission of the School of Dentistry is to educate dental professionals; discover new knowledge, technology, and skills; and apply those discoveries to the dental profession and the community it serves.

The goal of the D.D.S. curriculum is to educate dental professionals whose scholarly capabilities, scientific acumen, and interpersonal skills are commensurate with their clinical mastery.

Outstanding Reputation

The School of Dentistry has a proud and productive history. It has gained a national and international reputation for the quality of its educational, clinical, research, service, and patient-care programs. Its faculty have wide-ranging educational and research experience in many institutions throughout the nation and the world.

Special Clinics Special services and teaching clinics include a cleft palate and maxillofacial clinic for patients with congenital or acquired defects; and a head and facial pain clinic, which provides broad evaluation and treatment services for patients with complicated pain problems. Both clinics have extensive consulting and in-house staffs of dental and medical specialists.

Small Group Learning Dental and dental hygiene students work in small groups on a number of problems/case studies using paper cases, simulations, and their own patients. This stimulates group discussion of clinical and basic science concepts within a problem-solving framework and a cooperative learning environment.

Excellent External Support The School of Dentistry enjoys strong support from its large, active alumni society, which has the highest percentage of membership of any major school at the University of Minnesota. A large pool of friends, including our alumni, are generous with their monetary support for endowments, current gifts, and educational programs. We are constantly expanding the use of endowments to include private support for research activities among our faculty and students.

Degrees Offered

Doctor of Dental Surgery The professional doctor of dental surgery (D.D.S.) program involves a four-year curriculum. Requirements are explained in the D.D.S. section of this bulletin.

A B.S. degree is not offered through the University of Minnesota School of Dentistry. However, an individual can still earn a B.S. degree while completing the dental curriculum if the institution at which the individual took preprofessional coursework recognizes the basic science coursework taken at the School of Dentistry and awards the degree independently.

B. S. in Dental Hygiene The B.S. degree in dental hygiene is offered through the Program in Dental Hygiene. Requirements are explained in the dental hygiene section of this bulletin.

Graduate Programs Graduate programs prepare dental professionals for careers in education, research, and specialty practice. The master of science (M.S.) degree is offered through the Graduate School in a variety of disciplines: endodontics, oral biology, oral pathology, orthodontics, pediatric dentistry, periodontics, and prosthodontics. The Ph.D. degree in oral biology and the Dentist Scientist Award Program, providing Ph.D. training in basic sciences and advanced education in a clinical dental specialty, are also offered through the Graduate School. The School of Dentistry offers a four-year residency program in



Junior and senior dental hygiene students treat patients in the School of Dentistry Hygiene, Pediatric, and Periodontology Clinics.

oral and maxillofacial surgery, as well as two one-year residency programs: a general practice residency and an advanced education program in general dentistry. Students can also obtain advanced education degrees (M.S., Ph.D.) in all the basic biological sciences and public health through the Graduate School. For details, consult the *Graduate School Bulletin*.

Continuing Education Short courses are regularly offered to keep members of the dental profession informed of new developments in clinical and research procedures. Special brochures listing courses, dates, and costs are available through the Continuing Dental Education Program, 6-406 Malcolm Moos Health Sciences Tower (612/625-1418).

Dental and dental hygiene students are encouraged to attend selected continuing education courses during their senior year on a space-available basis. These courses expose seniors to a broad scope of information and technology from a variety of local and national speakers. Students gain by selecting their own educational experiences and interacting with practicing dentists and dental hygienists.

Interpersonal communication skills are continually emphasized throughout the students' dental education.



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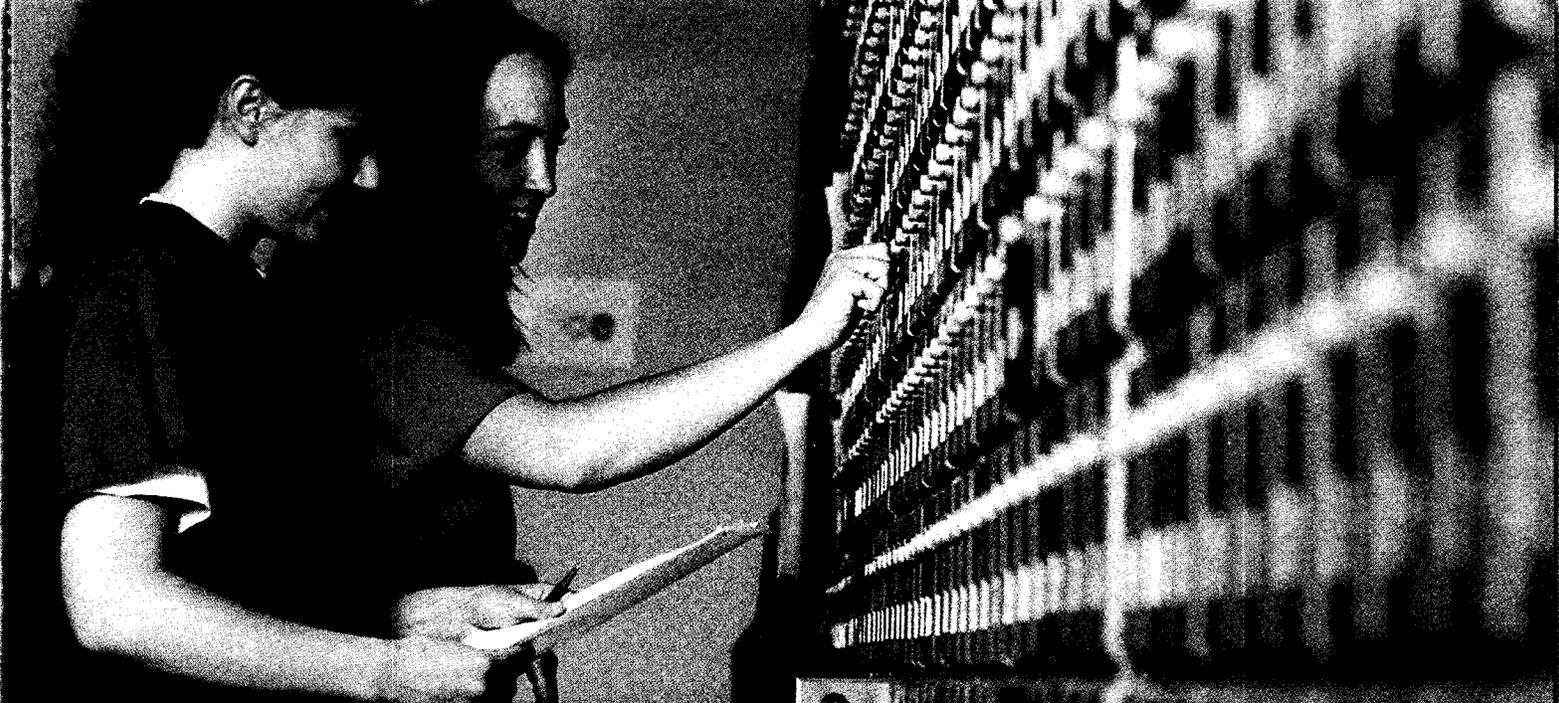
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Students are assigned their own patients for whom comprehensive oral health care is provided. Treatment is carried out in clinics located within the school.



S T U D E N T L I F E



S T U D E N T L I F E

Organizations

Student and State Organizations Each year undergraduate dental and dental hygiene students elect the School of Dentistry Council of Students, which discusses matters of mutual interest with faculty advisers and promotes many projects and activities. Undergraduates also have representatives with voting privileges on School of Dentistry committees pertaining to student admission, educational policy, student affairs, and clinical systems. The Student Affairs Committee, composed of both dental and dental hygiene students and faculty, is responsible for student concerns such as membership in local and national organizations, ethics, counseling, tutorial assistance, questions on the educational programs, financial aid, publications, housing, and alumni relations. Students have the opportunity to serve as representatives on the Board of Directors of the School of Dentistry Alumni Society and also serve as student delegates for the House of Delegates of the Minnesota Dental Association and Minnesota Dental Hygienists' Association.

National Organizations Dental and dental hygiene students may join several national organizations that provide students with exposure to organized dentistry and a voice in shaping the future of dental professions. Organizations for dental students include the American Association of Dental Students (AADS) and American Student Dental Association (ASDA). Or-

ganizations for dental hygiene students include the American Dental Hygienists Association and the American Association of Dental Schools. Membership fees for these organizations entitle students to various dental publications and special services.

Fraternities The professional dental fraternity provides all the advantages of fraternal affiliation and also offers the means through which students with a common professional interest develop close ties among themselves and with alumni in the fraternity who are practicing in the community. Chapters generally have strong faculty support because they bridge the gap between the student, the faculty, and the profession.

Each dental fraternity emphasizes the importance of high professional ethics and practices in the selection and development of its members. The dental fraternities emphasize the importance of professional development, often conducting programs of speakers, tours, and forums. In addition, dental fraternity chapters foster social and athletic functions to promote each member's full personal development.

One of the most important benefits of dental fraternity membership comes after graduation. Each dental fraternity has alumni organizations across the nation providing professional and social contacts of great value to the alumnus. The fraternity offers individuals the opportunity to obtain expert advice and professional guidance from fellow members.

At the University of Minnesota, all four of the professional dental fraternities are represented: Alpha

Omega, Delta Sigma Delta, Psi Omega, and Xi Psi Phi. These fraternities have more than 140 undergraduate chapters in this country and more than 150 active alumni chapters scattered throughout the world. Eighty-five percent of the men and women active in the dental profession have fraternity affiliation.

Honor Societies Fourth-year dental students may be elected by the faculty to the Beta Beta Chapter of the national dental honor society, Omicron Kappa Upsilon. Graduating dental hygiene students may be elected to the Eta Chapter of the National Dental Hygiene Honor Society, Sigma Phi Alpha.

Student Volunteer Outreach Activities

Many students at the School of Dentistry are interested in serving the community while they are in dental school. While many opportunities exist, some are specifically related to the delivery of dental care.

The Jamaica Volunteer Mission This program was initiated in 1986 in response to a report that cited Jamaicans as having one of the highest rates of dental caries and periodontal disease in the world due to a diet very high in sugar, an unfluoridated water supply, and a severe shortage of dental personnel.

Each year, students raise funds to cover the expense of sending faculty, fourth-year students, and supplies to the island to treat patients seeking assistance. Initially, treatment of pain and acute infection were the primary concern. However, the program is still evolving to include a wider variety of preventive and restorative procedures.

While conditions are extremely primitive, this ten-day mission provides students with some unique life experiences and real-world dental experiences.

The Union Gospel Mission Two evenings each week, School of Dentistry students and staff volunteer to meet the dental needs of the lower income and homeless population in the inner city. Many of those seeking dental care are suffering from conditions that require immediate attention. The primary concern is to relieve pain and provide appropriate services to prevent reoccurrence of the problem.

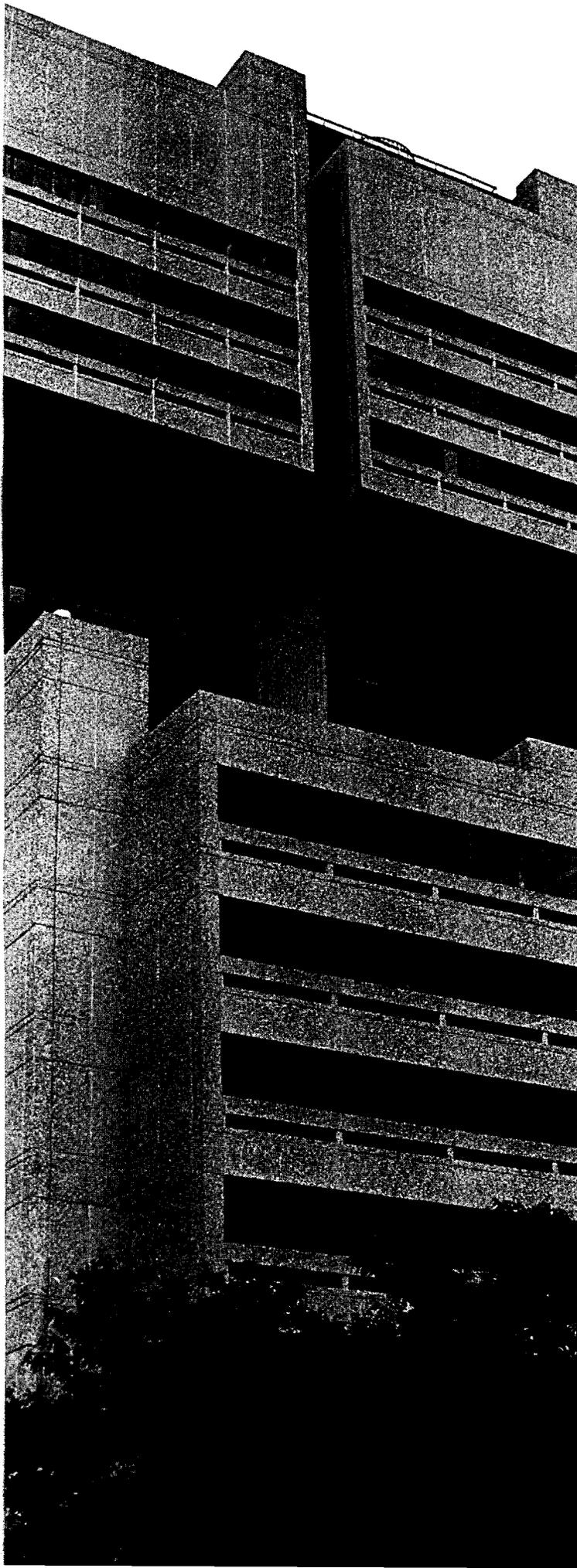
The High-Rise Program Established in 1979, this elective program broadens fourth-year dental students' exposure to fabricating and maintaining removable prosthodontic appliances and provides greater insight into the behavioral aspect of aging. Students visit various high-rise complexes in Minneapolis to provide dental care for older adults. For more information, contact Cynthia Johnson, Division of Health Ecology, 15-141 Malcolm Moos Health Sciences Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612/625-1417).

Special Opportunities

International Exchanges The School of Dentistry has had an active exchange program with a variety of universities over the last 20 years. Currently we have formal exchange agreements with the Colleges of Dentistry in Århus and Copenhagen in Denmark; the Universities of Göttingen, Heidelberg, and Munich in Germany; the University of Bergen, Norway; the University of Nijmegen, The Netherlands; and the University of Melbourne, Australia.

This program provides a cultural and educational exchange and increases awareness of and appreciation for dentistry in a more global context. Students experience a different culture, political system, and lifestyle and return with greater understanding, sensitivity, and acceptance of differences in people, their customs, and culture. Experiences have been extremely positive. Better understanding and mutual respect gained through these experiences contribute to the personal growth of our future health professionals.

Summer Research Fellowship The School of Dentistry Summer Research Fellowship Program provides research experiences for exceptional dental and dental hygiene students with an interest in research careers and in relating that interest to postgraduate research training. Freshmen, sophomores, and juniors are invited to apply for a research fellowship position in the spring. If selected, they are assigned to a faculty mentor for the summer. During a ten-week period, students collect and analyze data, undertake a structured research project, and prepare



a formal report. Research fellows attend a weekly research training seminar where they learn research methods. They also evaluate selected journal articles and review abstracts and oral presentations of former trainees. Stipends of \$2,085 are provided. Each year, 19 to 22 students participate in this program.

Policies

Grading Policies and Practices There are two grading systems, A-B-C-D-F and S-N. The School of Dentistry determines to what extent and under what conditions each system may be available to its students and faculty.

The two systems may not be combined for a particular student in a particular course. Students may receive symbols only from the grading system under which they are registered. S grades do not affect the GPA; N grades are calculated as F.

When the two grading systems are available, students must declare a choice of systems as part of their initial registration. The choice may not be changed after the end of the second week of classes.

The following symbols, as defined, may be used on the University's official transcript, the chronological quarterly record of the student's registrations, after the end of the second week of classes (or at the end of the first five days of classes for summer sessions). The official transcript is released by the University only at the student's request, with the official seal imprinted.

- A Represents achievement that is outstanding relative to the level necessary to meet course requirements.
- B Represents achievement that is significantly above the level necessary to meet course requirements.
- C Represents achievement that meets the basic course requirements in every respect.
- D Represents achievement that is worthy of credit even though it does not fully meet the basic course requirements in every respect.
- F Represents performance that fails to meet basic course requirements and is unworthy of credit.

The School of Dentistry is housed in the Malcolm Moos Health Sciences Tower, part of a major medical complex at the University of Minnesota.

- S Represents achievement that is deemed by the instructor to be satisfactory for the course in which the student is registered. This definition is intended to imply that the standard for S may vary from one course to another.
- W Entered by the Office of the Registrar when a student officially withdraws from a course. School of Dentistry students may withdraw at any time before the final examination if they have earned a passing grade up to that point, or if no grade is available, with course director's permission.
- I Assigned by the instructor to indicate incomplete, in accordance with provisions announced in class at the beginning of the quarter, when in the instructor's opinion there is a reasonable expectation that the student can complete successfully the work of the course. An I that is not made up by the end of the next quarter of residence may become an F if the course was taken A-F or an N if the course was taken S-N. Instructors may set dates within the quarter for makeup examinations. When an I is changed to another symbol, the I is removed from the record.
- N Assigned when the student does not earn an S and is not assigned an I. It stands for no credit.
- X Reported to indicate that a student may continue in a sequence course in which a grade cannot be determined until the full sequence of quarters is completed. The instructor will submit a grade for each X when the student has completed the sequence.
- V Indicates registration as an auditor or visitor; a no-credit, no-grade registration.
- T Posted in front of the original grade indicates credits transferred from another institution and not included in the calculation of the student's University GPA.

In connection with all achievement symbols, but especially in connection with the S, the instructor is obligated to define to a class as explicitly as possible in its early meetings the performance that will be necessary to earn each symbol.

Each course director should announce the grading policies, including policies regarding I grades, at the beginning of each quarter. Each course director should make opportunities for remediation available

to students so they have an opportunity to resolve I, F, or N grades before the beginning of the following academic year. If prompt remediation is not possible, the course director should discuss the student's situation with the appropriate class committee.

All final examinations in the School of Dentistry will be given on the assigned date. No examinations will be permitted earlier than that date. Persons failing to take examinations at the appointed time and place may take the examinations at a later date with the course director's permission. The date and place of the makeup examination will be set by the course director. Excuses for missing the regularly scheduled examination must be acceptable to the course director. Final examinations must be given no less than 48 hours or no more than two weeks following the last formal class meeting.

Confidentiality of Student Grades Under provisions of federal and state legislation, examination scores, course grades, and similar indicators of student academic progress are not public information. Accordingly, such information cannot be released or made public without written student permission, except for normal educational and administrative uses within the University.

Posting lists of examination scores or course grades, or returning test materials to students in ways which make it possible for students to obtain information about other students' scores or grades is inappropriate.

Of course, it is permissible to post grades or return graded materials using an identification number which cannot be associated with an individual student by others who view the materials. It is not permissible to leave blue books or other examination materials with students' names on them in halls or other public places for retrieval.

Bulletin Use The information in this bulletin and other University bulletins, publications, or announcements is subject to change without notice. University offices can provide current information about possible changes.

This publication is available in alternative formats upon request. Please contact the Office of Admissions,

University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2008; e-mail admissions@tc.umn.edu).

This bulletin also is available in electronic format on Internet and may be accessed via Gopher.

Equal Opportunity The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

In adhering to this policy, the University abides by the Minnesota Human Rights Act, Minnesota Statute Ch. 363; by the Federal Civil Rights Act, 42 U.S.C. 2000e; by the requirements of Title IX of the Education Amendments of 1972; by Sections 503 and 504 of the Rehabilitation Act of 1973; by the Americans With Disabilities Act of 1990; by Executive Order 11246, as amended; by 38 U.S.C. 2012, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended; and by other applicable statutes and regulations relating to equality of opportunity.

Inquiries regarding compliance may be directed to the Office of Equal Opportunity and Affirmative Action, University of Minnesota, 419 Morrill Hall, 100 Church Street S.E., Minneapolis, MN 55455 (612/624-9547).

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. (Exceptions under the law include state and federal educational and financial aid institutions.) The policy also permits students to review their educational records and to challenge the contents of those records.

Some student information — name, address, electronic (e-mail) address, telephone number, dates of enrollment and enrollment status (full time, part time, not enrolled, withdrawn and date of withdrawal), college and class, major, adviser, academic awards and honors received, and degrees earned — is considered public or directory information. Students may pre-

vent the release of public information only during their terms of enrollment. To do so, they must notify the records office on their campus.

Students have the right to review their educational records. The regents' policy, including a directory of student records, is available for review at 150 Williamson Hall, Minneapolis, and at records offices on other campuses of the University. Questions may be directed to the Office of the Registrar, 150 Williamson Hall (612/625-5333).

Immunization Students born after 1956 who take more than one University class are required under Minnesota law to submit an Immunization Record form.

The form, which is sent along with the official University admission letter, must be filled out and returned to Boynton Health Service within 45 days of the first term of enrollment in order for students to continue registering for classes at the University. Complete instructions accompany the form.

All dental health care workers, including students, are required to provide evidence of a hepatitis vaccination or to sign a waiver of vaccination form. Contact the director of Clinical Systems in 8-434 Moos Tower for the waiver form.

Extracurricular Events No extracurricular events requiring student participation may be scheduled from the beginning of study day to the end of finals week. Exceptions to this policy may be granted by the Senate Committee on Educational Policy. The Senate advises all faculty that any exemption granted pursuant to this policy shall be honored and that students who are unable to complete course requirements during finals week shall be provided an alternative and timely opportunity to do so.

Smoke-Free Campus Policy Smoking is prohibited in all facilities of the University of Minnesota, Twin Cities campus except for designated private residence hall rooms.



BACHELOR OF SCIENCE
IN DENTAL HYGIENE



B A C H E L O R O F S C I E N C E I N D E N T A L H Y G I E N E

General Information

The dental hygiene program was established at the University of Minnesota in 1919 and is fully accredited by the Commission on Dental Accreditation. It is the only dental hygiene program in Minnesota that grants a B.S. degree and is affiliated with a school of dentistry.

The program offers qualified individuals the opportunity to fulfill both professional and personal goals while developing competence in dental hygiene. The program prepares graduates with professional and theoretical knowledge, skills, and attitudes to serve them in both career and life.

Dental hygienists are preventive oral health professionals who have graduated from an accredited dental hygiene program in an institution of higher education and are licensed in dental hygiene. They provide educational, clinical, research, administrative, and therapeutic services supporting total health through the promotion of optimal oral health.

The education of the dental hygienist blends a solid dental hygiene clinical education with the biological, behavioral, and social sciences as well as the liberal arts.

Dental hygienists practice in settings such as private dental offices and clinics; federal, state, and local health departments or associated institutions; hospitals and nursing homes; school districts or departments of education; educational programs for dental, dental hygiene, and dental assisting students; private business/industry; correctional facilities; private and public centers for pediatric, geriatric, and other

groups/individuals with special needs; and health maintenance organizations.

The dental hygiene curriculum consists of the preprofessional program in the College of Liberal Arts or its equivalent at some other regionally accredited institution and the professional program in the School of Dentistry Division of Dental Hygiene.

Admission Requirements

Admission to the program is competitive and occurs once a year for fall quarter. Applications are accepted from January 1 of the desired year of entry until April 15. Applications received after the deadline are considered on a space-available basis.

Requirements for application include: high school graduate or equivalent; high school or college chemistry (within the past few years); ACT, PSAT, or SAT scores; transcripts of all high school and college courses; at least a 2.00 grade point average (GPA) (cumulative and preprofessional coursework); and evidence of plans for completion of preprofessional coursework before proposed entry.

Application Procedures

Students enrolled at the University of Minnesota apply by submitting a Request for Change of College Within the University to the Office of Admissions. Students attending other colleges and universities apply by submitting the Application for Undergraduate Admission, an official transcript from each institution previously attended, and an application fee to the Office of Admissions.

Applications and Change of College forms are available from the Office of Admissions, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-2006).

Dental Hygiene Office

The Division of Dental Hygiene is located in 9-436 Malcolm Moos Health Sciences Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612/625-9121; fax: 612/626-2652).

Student Support Program

The Division of Dental Hygiene provides a student support program to enhance the success of its students. Student performance is monitored and academic assistance is provided through tutoring and consultation. Counseling and advising are available through the division, the School of Dentistry counselor, University Counseling and Consulting Services, and faculty of the student's choosing.

Tuition and Fees

For information on current tuition, fees, and estimated total expenses, consult the quarterly *Class Schedule* or the estimated expense information provided by the Division of Dental Hygiene. The School of Dentistry provides virtually all dental instruments and supplies needed by students. This reduces costs for students and allows the school to maintain control over the sterility and maintenance of instruments and supplies used in the clinics. Students pay a usage fee.

Residence and Reciprocity

Residence Because the University is a state institution, Minnesota residents pay lower tuition than non-residents and, in many programs, receive priority consideration for admission. To qualify for resident status, students must reside in Minnesota for at least one calendar year before the first day of class attendance. For more information, contact the Resident Classification and Reciprocity Office, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-6330), or the residency office on your campus.

Reciprocity The University has reciprocity agreements with North Dakota, South Dakota, Wisconsin, and Manitoba. If you are a resident of any of these states or this province, you may qualify for reciprocity tuition rates, which are lower than nonresident tuition rates and, in some cases, comparable to resident rates. There are some exceptions: Wisconsin students enrolled in the School of Dentistry, Medical School, College of Veterinary Medicine, or School of Medicine, Duluth are not eligible for reciprocity. For more information, contact the Resident Classification and Reciprocity Office, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612/625-6330), or the residency office on your campus.

Financial Aid

The Office of Scholarships and Financial Aid offers students financial assistance, including student employment and financial advising. Applications should be filed as soon after January 1 as possible. Students should apply for financial aid at the time they are applying for admission. Most aid is awarded on the basis of financial need and the availability of funds. For more information, contact the Office of Scholarships and Financial Aid, University of Minnesota, 210 Fraser Hall, 106 Pleasant Street S.E., Minneapolis, MN 55455 (612/624-1665 or, toll-free, 1-800-400-UOFM).

The Student Employment Center posts job vacancies and refers qualified students for interviews for a variety of jobs on and off campus. The center is located in 120 Fraser Hall (612/624-8070).

Honors and Awards

The following awards are presented annually by the program faculty to selected dental hygiene students.

Louise C. Ball Scholarship—For selected juniors and seniors who are in good academic standing and have established financial need.

Ione M. Jackson Scholarship—Established to honor Ione M. Jackson, former program director; awarded to a qualified senior who wishes to become a dental hygiene educator.

Shirley Burgan Lichtwardt Memorial Scholarship—For selected juniors and seniors who are in good academic standing and have established financial need.

Sigma Phi Alpha, Eta Chapter Membership—National Dental Hygiene Honor Society established to recognize and honor excellence in scholarship, service, and character among graduating dental hygiene students. A maximum of 10 percent of each graduating class is selected for membership.

Sigma Phi Alpha Award—Awarded to the sophomore and junior who maintain the highest GPAs.

Procter & Gamble Excellence in Dental Hygiene Award—For a selected junior who exhibits scholarship, leadership, service, and contribution to the dental hygiene profession.

Naomi Rhode Dental Hygienist-Patient Relationship Award—For a selected senior who exhibits the most interest and skill in the dental hygienist-patient relationship.

Student Activities

Students in the professional program are represented by the Student Dental Hygiene Organization. In addition, members from each class are elected to serve on the School of Dentistry Council of Students. Students are also eligible for membership in the Student American Dental Hygienists' Association. Participation in Council for Health Interdisciplinary Participation (CHIP) activities is encouraged.

Graduation

The minimum requirements for graduation are completion of the curricular requirements and a minimum of 180 credits with at least a 2.00 cumulative GPA.

Licensure and Placement

Graduates are eligible for licensure after successfully completing a written National Board Dental Hygiene Examination and a clinical examination, both of which are given on the University's Minneapolis campus. The School of Dentistry provides placement assistance to dental hygiene graduates through the Office of Enrollment Management (612/625-7149) and the Dental Hygiene Office (612/625-9121). The licensed dental hygienist practices in accordance with the requirements of individual state dental practice acts. In many states, a dental hygienist must participate in continuing education courses for license renewal.

Preprofessional Program

Admission

Students entering the preprofessional program (one year) must meet the admission criteria of the College of Liberal Arts or their equivalent at some other regionally accredited institution. For information on freshman liberal education requirements, see page 37. Consult the College of Liberal Arts Bulletin for complete information.

Admission to the preprofessional program does not ensure admission to the professional program.

Curriculum

The following courses or their equivalents must be completed before entering the professional program (quarter credits follow in parentheses).

High school or college chemistry (one course, within the past five years)
Anatomy 3001—Elementary Anatomy (4)
Biology 1009—General Biology (5)
Comp 1011—Writing Practice I (5)
FScN 1612—Principles of Nutrition (4)*
Psy 1001—General Psychology (5)
Soc 1001—Introduction to Sociology (4)
Spch 1101—Fundamentals of Speech Communication (4)
Stat 1001—Introduction to Ideas of Statistics (4)
Liberal education electives

Note: Liberal education requirements may be completed during students' freshman and sophomore years. For information on freshman liberal education requirements, see page 37.

* May be taken through Continuing Education and Extension/University College or Independent Study before fall quarter of junior year if unavailability of nutrition course is documented.

Professional Program

Curriculum

Students register in the Division of Dental Hygiene for the professional program. The following courses must be completed to satisfy graduation requirements (quarter credits follow in parentheses).

Sophomore Year

Fall Quarter

- DH 1001—Dental Anatomy (3)
- DH 1002—Head and Neck Anatomy (1)
- DH 1190—The Dental Hygiene Care Process (6)
- MdBc 1030—Elementary Biochemistry (4)
- MicB 5235—Microorganisms and Disease (3)

Winter Quarter

- DH 1092—Introduction to Dental Hygienist-Patient Relationships (3)
- DH 1191—The Dental Hygiene Care Process: Clinical Application I (3)
- DH 3175—Oral Histology and Embryology (3)
- Phsl 3051—Human Physiology (5)

Spring Quarter

- DH 1093—Cariology (3)
- DH 1094—Periodontology (3)
- DH 1192—The Dental Hygiene Care Process: Clinical Application II (4)
- DH 3176—General and Oral Pathology (3)
- DH 3275—Oral Radiology I (2)

Junior Year

Fall Quarter

- DH 1203—Dental Specialties (2)
- DH 1204—Dental Specialties Practicum (0)
- DH 3030—Applied Nutrition in Dental Hygiene Care (2)
- DH 3193—The Dental Hygiene Care Process: Clinical Application III (4)
- DH 3202—Dental Hygiene Care for the Pediatric/Orthodontic Patient (2)
- DH 3276—Oral Radiology II: Theory and Principles of Radiology (2)
- DH 3278—Clinical Oral Radiology (0)
- Phcl 1001—Pharmacology (2)

Winter Quarter

- DH 1202—Introduction to Biomaterials (3)
- DH 1205—Dental Specialties Practicum (0)
- DH 3194—The Dental Hygiene Care Process: Clinical Application IV (4)
- DH 3203—Dental Hygiene Care for the Older Adult (2)
- DH 3277—Oral Radiology III: Radiographic Analysis (1)
- DH 3279—Clinical Oral Radiology (0)
- Dent 5451—Periodontology I (2)

Spring Quarter

- DH 1206—Dental Specialties Practicum (0)
- DH 3050—Research Methods in Dental Hygiene (3)
- DH 3095—Adjunct Clinical Procedures (2)
- DH 3195—The Dental Hygiene Care Process: Clinical Application V (4)
- DH 3204—Dental Hygiene Care for Individuals with Disabilities (2)
- DH 3280—Clinical Oral Radiology (0)
- PH 3001—Personal and Community Health (3)

Senior Year

Fall Quarter

- Comp 3033—Writing in the Health Sciences (4)
- DH 1207—Dental Specialties Practicum (0)
- DH 3196—The Dental Hygiene Care Process: Clinical Application VI (5)
- DH 3281—Clinical Oral Radiology (0)
- Dent 5027—Epidemiology, Prevention, and Dental Public Health (3)
- Dent 5184—Patient Management (2)
- Dent 5453—Periodontology III (2)

Winter Quarter

- DH 1208—Dental Specialties Practicum (3)
- DH 3061—Community Outreach (3)
- DH 3096—Ethics, Jurisprudence, and Principles of Practice (3)
- DH 3197—The Dental Hygiene Care Process: Clinical Application VII (5)

- DH 3282—Clinical Oral Radiology (0)
- Dent 5185—Patient Management (1)

Spring Quarter

- DH 3097—Social, Economic, and Practice Factors in Oral Health (3)
- DH 3198—The Dental Hygiene Care Process: Clinical Application VIII (5)
- DH 3283—Clinical Oral Radiology (3)
- Dent 5186—Patient Management (1)

Dental Hygiene Courses (DH)

DH 1001. Dental Anatomy. (3 cr)

All deciduous and permanent teeth, including tooth form, function, and relationship to oral health; calcification, eruption, and exfoliation patterns; ideal static occlusion; dental terminology and tooth annotation systems. Lab experiences include identification and annotation of teeth and restoration, in wax, of portions of selected typodont teeth.

DH 1002. Head and Neck Anatomy. (1 cr)

Anatomical structures of the head and neck as they relate to dental treatment.

DH 1092. Introduction to

Dental Hygienist-Patient Relationships. (3 cr)

Oral hygiene techniques implemented through communication between patient and oral health provider. Co-therapeutic problem solving.

DH 1093. Cariology. (3 cr)

Dental caries; etiology, pathology, and prevention.

DH 1094. Periodontology. (3 cr)

Periodontal disease; etiology, assessment, and treatment options. Clinical experience in root planing and placing periodontal dressings.

DH 1190. The Dental Hygiene Care Process. (6 cr)

Normal oral structures, assessment of oral health, clinical instrumentation skills. Lecture, lab, clinical experiences.

DH 1191. The Dental Hygiene Care Process:

Clinical Application I. (3 cr)

School of Dentistry Comprehensive Dental Clinics and assessment in dental hygiene care.

DH 1192. The Dental Hygiene Care Process:

Clinical Application II. (4 cr)

Prevention and control of dental caries and periodontal diseases; skill development in ultrasonic scaling and hypertension screening; evaluation of products used in treating dental caries and periodontal diseases.

DH 1202. Introduction to Biomaterials. (3 cr)

Physical, chemical, and mechanical properties of materials used in dentistry. Lab.

DH 1203. Dental Specialties. (2 cr)

Various dental specialties and the dental hygienist's role in services provided.

DH 1204-1205-1206-1207. Dental Specialties Practicum. (0 cr)

Various dental specialties and the dental hygienist's role in services provided.

DH 1208. Dental Specialties Practicum. (3 cr)

Various dental specialties and the dental hygienist's role in services provided.

DH 3030. Applied Nutrition in Dental Hygiene Care. (2 cr)

Principles of diet and nutrition applied to dental hygiene patient care; skills for dental caries counseling.

DH 3050. Research Methods in Dental Hygiene. (3 cr)

Skills in the scientific method and critical analysis of research findings; emphasis on types of research, problem selection, hypothesis writing, research planning and design, data collection and measuring techniques, analysis and interpretation of data, and writing the research proposal.

DH 3051. Directed Research. (Cr ar)

Individual empirical research project leading to a written report and/or intensive observation/participation in the clinical research center.

DH 3061. Community Outreach. (3 cr)

Dental hygiene care in a variety of community settings.

DH 3095. Adjunct Clinical Procedures. (2 cr)

Lab and clinical experiences in the principles and techniques of impression making; finishing and polishing restorations; margination; monitoring nitrous oxide sedation; placing and removing rubber dam; and placing temporary restorations and pit and fissure sealants.

DH 3096. Ethics, Jurisprudence, and Principles of Practice. (3 cr)

Employment, economic, and business management aspects of dental practice. Current and extended roles for dental hygienists.

DH 3097. Social, Economic, and Practice Factors in Oral Health. (3 cr)

Factors and issues related to health care promotion, regulation, and delivery as well as the political/legislative process as related to current status and trends in dentistry.

DH 3175. Oral Histology and Embryology. (3 cr)

Embryology and histology of human oral structures as well as other parts of the head and neck. Teeth, mandible, maxilla, palate, tongue, and salivary glands emphasized and correlated with development abnormalities.

DH 3176. General and Oral Pathology. (3 cr)

Circulatory disturbances, inflammation, and tremors with emphasis on diseases affecting the oral cavity, dental caries, periodontal diseases, oral neoplasias, and similar problems.

DH 3193. The Dental Hygiene Care Process: Clinical Application III. (4 cr)

Treatment planning in dental hygiene care.

DH 3194. The Dental Hygiene Care Process: Clinical Application IV. (4 cr)

Implementation component of the dental hygiene care process.

DH 3195. The Dental Hygiene Care Process: Clinical Application V. (4 cr)

Evaluation component of the dental hygiene care process.

DH 3196-3197-3198. The Dental Hygiene Care Process: Clinical Application VI-VII-VIII. (15 cr total)

Orientation to outreach experiences. Adaptation of dental hygiene care to meet preventive and treatment needs of patient populations in particular outreach assignments. Analysis of patient preventive and treatment needs through case studies/presentations. Students participate in Comprehensive Dental Clinics and outreach assignments.

DH 3202. Dental Hygiene Care for the Pediatric/Orthodontic Patient. (2 cr)

Knowledge, skills, and attitudes required for providing dental hygiene care for pediatric/orthodontic patient.

DH 3203. Dental Hygiene Care for the Older Adult Patient. (2 cr)

Knowledge, skills, and attitudes required for providing dental hygiene care for the older adult in various states of change associated with aging, with or without concomitant disease.

DH 3204. Dental Hygiene Care for Individuals with Disabilities. (2 cr)

Knowledge, skills, and attitudes required for providing dental hygiene care for individuals with mental, physical, and social/emotional handicapping conditions.

DH 3275. Oral Radiology I. (2 cr)

Intraoral and extraoral films and radiographs used in dentistry; descriptions and identification of individual radiographs and intraoral radiographic surveys; intraoral radiograph mounting and viewing; radiographic density and contrast; geometry of image formation; nature and characteristics of radiographic film; chemistry of darkroom processing techniques; intraoral radiographic technique; quality evaluation; radiographic anatomy.

DH 3276. Oral Radiology II:**Theory and Principles of Radiology.** (2 cr)

Nature of particulate and electromagnetic radiations; production and control of X-rays; characteristics of radiographic film and image; mathematics of exposure; intensifying screens, cassettes, and grids; stain removal and radiographic density reduction; radiation biology, dosimetry, law, controversy.

DH 3277. Oral Radiology III: Radiographic Analysis. (1 cr)

Discrepancies and technical errors in intraoral radiographs produced by angle-bisector and paralleling techniques, radiographic anatomy, and radiographic evidence of deviations from the spectrum of normal anatomic variations.

DH 3278-3279-3280-3281-3282. Clinical Oral Radiology. (0 cr)

Students observe and participate in demonstrations of various radiographic procedures (intraoral and extraoral, including panoramic radiography) to produce acceptable, complete periapical-bitewing radiographic surveys on mounted skulls and patients, process exposed films, qualitatively evaluate their results, mount and interpret their radiographs, and discuss oral radiology topics.

DH 3283. Clinical Oral Radiology. (3 cr)

Same as 3278-3279-3280-3281-3282.

DH 5027. Epidemiology, Prevention, and Dental Public Health. (3 cr)

Scientific method in dentistry.

DH 5184-5185-5186. Patient Management IV. (1 cr per qtr)

Educational setting (clinic) for students to integrate, apply, and develop skills in patient management.

DH 5451. Periodontology I Lectures. (2 cr)

Periodontal anatomy, physiology, and etiology of periodontal diseases. The clinical, histopathological study, and pathogenesis of gingivitis and periodontitis, as well as the role of genetics and systemic disorders. Preventive and therapeutic procedures associated with diagnosis, prognosis, treatment planning, and initial phase of periodontal therapy.

DH 5453. Periodontology III Lectures. (2 cr)

Clinical procedures associated with surgical phase of periodontal therapy. Emphasis on evaluation of periodontal treatment, maintenance phase, relationship between periodontics and other dentistry disciplines, roles of clinical research in periodontics.

Required Courses Offered by Other Units**MdBc 1030. Elementary Biochemistry.** (4 cr)**Comp 3033. Writing in the Health Sciences.** (4 cr)

Thoughts, forms, and modes of expression common to health sciences writing.

MicB 5235. Microorganisms and Disease. (3 cr)

Nature of microorganisms, immunology, medical bacteriology, virology, mycology, parasitology, and principles of disease control.

PH 3001. Personal and Community Health. (3 cr)

Fundamental principles of health conservation and disease prevention.

Phcl 1001. Pharmacology. (2 cr)**Phsl 3051. Human Physiology.** (5 cr)**Faculty***Associate Professor*

Kathleen J. Newell, R.D.H., Ph.D., director, Division of Dental Hygiene

Joy B. Osborn, R.D.H., M.A.

Jill L. Stoltenberg, R.D.H., M.A., clinic director

Lynda J. Young, R.D.H., M.A., director, Continuing Dental Education

Assistant Professor

Susan Kyle Dittmar, R.D.H., B.S., assistant clinical specialist

Marilyn H. Ingebritson, R.D.H., M.A., assistant clinical specialist

UNIVERSITY OF MINNESOTA



T H E A D V A N T A G E
O F T H E U N I V E R S I T Y
O F M I N N E S O T A . . .

...a major research university in the heart of a dynamic metropolitan area, where a large and diverse population base of just over 2 million supports dentistry clinical programs.

...supports the nation's largest health sciences center between the Mississippi River and the West Coast.

...includes the Malcolm Moos Health Sciences Tower, one of the nation's premier dental education facilities.



Dynamic research program...

- ranks among the top five dental research programs in the nation.
- provides an opportunity for students to take projects from start to finish under the direction of a faculty mentor.
- furthers career tracks in education and research through the postdoctoral research/clinical program.

SCHOOL OF DENTISTRY



Small group learning...

- integrates basic and clinical sciences with patient care skills.
- develops interpersonal skills required to practice dentistry.
- models and promotes attitudes conducive to life-long learning.



*Comprehensive program
and specialty offerings...*

- provide students the opportunity to treat patients' comprehensive dental needs.
- have earned a strong reputation for educating fine clinicians and diagnosticians.
- offer programs including orthodontics, pediatric dentistry, oral and maxillofacial surgery, periodontics, prosthodontics, endodontics, and oral pathology.





The Twin Cities...

- rank second on *Money* magazine's list of most desirable cities.
- offer a wealth of cultural opportunities including major theatre, two world-class orchestras, and many musical, dance, film, and entertainment activities.
- sponsor several professional and college sports teams.
- feature a wide variety of outdoor recreational opportunities that change with the seasons.

This page: Minnesota Office of Tourism photos





DOCTOR OF DENTAL SURGERY



DOCTOR OF DENTAL SURGERY

Admission

The School of Dentistry is committed to improving educational and professional dental career opportunities for underrepresented minorities. As part of pursuing this goal, the School of Dentistry publicizes dental career opportunities for prospective students, actively recruits qualified individuals, and provides a broad range of support services for currently enrolled minority students.

General Requirements A first-year class is admitted to the dentistry program once a year in the fall, although students planning to enter dental school can begin their pre dental studies at any time.

High school credentials are not examined as part of the admission evaluation, but students anticipating dental careers should take a sound academic program in high school to prepare properly for the pre dental and dental programs. Coursework should include mathematics, chemistry, physics, biology, foreign languages, English, and social studies.

A minimum of 130 quarter credits or 87 semester credits of liberal arts courses from an officially accredited U.S. or Canadian college or university is required. A maximum of 96 quarter credits from community or junior colleges will be applied to the 135 quarter credits that are considered equivalent to 3 full years of college education, or to the 180 quarter credits considered equivalent to a 4-year college pro-

gram. A minimum of 170 quarter credits is accepted for a 4-year classification. (One semester credit is equivalent to 1½ quarter credits.) While acceptance is based primarily on performance quality, applicants are encouraged to have a broad liberal education. *Note:* University liberal education requirements are not required for a D.D.S. but are recommended.

To help achieve the goals of a liberal education, the School of Dentistry prefers that all students distribute some part of their pre dental college coursework in areas of study other than those related to the biological and physical sciences. Pre dental students are urged to plan their coursework to satisfy the University's liberal education requirements.

An overall GPA of 2.50 is the minimum required for admission consideration. However, acceptance is on a competitive basis and an average well above this is usually necessary to be admitted.

Courses and minimum credits required for admission are listed below. Required courses should be completed by the end of the regular academic year (spring quarter) for enrollment the following fall. Completing required courses the summer before the fall of enrollment is discouraged.

Science coursework must include both lecture and lab instruction. Exemptions and advanced courses with fewer credits will be recognized, but transcripts or other academic records must clearly identify them and individual evaluations will be made. Courses in biology, chemistry, and physics may be considered out-

dated if taken more than five years before the time of application. Only under unusual circumstances will credits graded on a satisfactory-no credit evaluation system be accepted for required courses. Applicants may submit a maximum of the following percentage of S credits in elective courses: 10 percent of the minimum total credits for 3-year students, and 15 percent of the minimum total credits for 4-year students. Incomplete grades are looked upon with disfavor by the Admissions Committee. Any incomplete and withdrawal grades in excess of one per academic year must be explained in the application.

Required Courses

1. *English*—12 quarter credits. Two composition and one speech course preferred; or one composition course, one speech course, and one additional course in either literature or humanities that has a composition component.
2. *General Biology or Zoology*—10 quarter credits. General zoology alone is acceptable but not preferred.
3. *Physics*—10 to 12 quarter credits. Complete basic course series required.
4. *General Principles of Chemistry*—12 quarter credits. Complete basic course series required.
5. *Organic Chemistry*—8 to 10 quarter credits. Course content must include study of both the aliphatic and aromatic series. One-semester courses generally do not have sufficient credits or depth to be acceptable.
6. *Mathematics*—A minimum of 3 quarter credits in one of the following courses: college algebra or precalculus by college credit or college validation, computer science, or statistics.
7. *Applied Human Psychology*—At least 4 quarter credits in general human psychology, child and adolescent human psychology, or business psychology.

Recommended Elective Courses

Elective courses should be selected to achieve as broad and liberal an education as possible. However, students are encouraged to take the following preferred electives: art, biochemistry, cell biology, histology, human anatomy, microbiology, and physiol-

ogy. These electives are especially important for persons who have completed only the minimum credits required (130 quarter/87 semester) to enter dental school. Additional electives can be chosen from among the following subjects: accounting, analytical chemistry, anthropology, biochemistry, business (practical courses), classics, comparative anatomy, economics, etymology, history, humanities, higher mathematics, logic, microbiology, microscopic anatomy, political science, sociology, and a foreign language.

Individuals considering dental careers are expected to gain information about dentistry through discussions with professionals in the field and through observation of, or participation in patient care and lab procedures in dental offices, dental labs, and dental school clinics and labs. Other expected orientations to dentistry include experiences involving fine manual dexterity, knowledge of health fields, and direct personal services to people on a one-to-one basis.

Early Admission To be considered for early admission, qualified applicants must complete at least one year of college, including science coursework. Applicants then meet with School of Dentistry Enrollment Management staff during or after their sophomore year to evaluate their qualifications. At that time, provisional acceptance may be granted to qualified applicants for the appropriate entering first-year class. Those participating in this program must meet the criteria listed below. For more information, contact the Office of Enrollment Management (612/625-7149).

Applicants must

1. maintain an overall GPA of 3.20 and complete 150 quarter/semester credits before enrollment.
2. maintain a science GPA of 3.00.
3. maintain at least a 3.00 GPA in any semester/quarter.
4. earn satisfactory grades in three of the following electives: anatomy, biochemistry, cell biology, histology, microbiology, and physiology. Applicants are also strongly encouraged to take "Becoming a Master Student" or other learning and academic skills course.
5. tour the School of Dentistry before matriculation either on specified tour days or the school's Careers Day.

6. have all application materials submitted to the School of Dentistry by October 1 of the year before matriculation.
7. take the Dental Admission Test no later than October of the year before matriculation.

Required Entrance Tests All applicants are required to take the DAT prepared by the American Dental Association. It is given two times a year, usually in October and April, in many testing centers throughout the United States and in several foreign countries. It is administered on the University's Minneapolis campus. Many applicants take the test as soon as they have completed the required courses in biology, general chemistry, and organic chemistry.

Candidates should take the test by October for enrollment the following fall. Although the test generally measures aptitude rather than special knowledge, some specific questions are asked in biology, general chemistry, and organic chemistry; thus a review of these subjects before taking the test is strongly recommended. Applicants are encouraged to study test preparation materials such as those provided free of charge by the American Dental Association's Division of Educational Measurements. An application and a brochure describing the test, testing centers, and test dates are available from the School of Dentistry. These materials can also be obtained by writing to the Division of Educational Measurements, American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611 (1-800/621-8099).

English Proficiency The School of Dentistry requires all applicants who are not native speakers of English to submit written evidence of either a Test of English as a Foreign Language (TOEFL) or a Michigan English Language Assessment Battery (MELAB) scores. A TOEFL score of at least 550 with a minimum score of 55 in Part I, Oral Comprehension, is required. Individuals selecting the TOEFL must also take the Test of Written English (TWE). A standard score of 5 on the TWE is the desired proficiency level for University of Minnesota School of Dentistry students. The Admissions Committee evaluates TWE results, along with other selection criteria measures, to determine acceptability. The TWE is administered 5 times per year with the TOEFL.

A MELAB score of at least 80 with a mean score of 85 in Part II, Listening, is required. The TOEFL/MELAB must have been administered within 2 years before the date of application to the School of Dentistry. To register for the TOEFL, contact the agency that handles TOEFL registration in your country or write to the Education Testing Service (Box 899, Princeton, NJ 08540 USA) at least 10 weeks before any scheduled test date. If you are already in the Twin Cities area, you may register for the MELAB with the Minnesota English Center, University of Minnesota, 320 16th Avenue S.E., Minneapolis, MN 55455 or call (612) 624-1503. To register for the MELAB outside the Twin Cities area, contact the English Language Institute, Testing and Certification Division, University of Michigan, Ann Arbor, MI 48109 USA, or call (313) 764-2416.

Residence Requirements First priority for admission is given to Minnesota residents, second to residents of neighboring states and provinces with which the University of Minnesota has special admission arrangements, and third to other nonresidents who have acceptable reasons for attending the University of Minnesota School of Dentistry.

Personal Interview Although candidates are not required to appear for an interview as part of the admission process, it is highly recommended that they make a personal visit to the School of Dentistry to tour our state-of-the-art facilities and meet with our Office of Enrollment Management professionals. The address is Office of Enrollment Management, University of Minnesota, 15-106 Malcolm Moos Health Sciences Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612/625-7149; fax: 612/626-2654).

Criteria for D.D.S. Admissions Selections

1. **Quality of College Performance:** Grade point average (overall and science) is viewed in terms of consistency and improvement. But the quality of coursework and challenge per term is also considered. An overall GPA of 2.50 is the required minimum; however, much higher overall and science GPAs are usually needed to be considered competitive.

2. **Completion of Required Courses:** Sufficient credits. Correct courses.

3. **Preferred Elective Coursework:** Students are encouraged to take the following preferred electives: art, biochemistry, cell biology, histology, human anatomy, microbiology, physiology, and statistics.

4. **Dental Admission Test (DAT):** Biology, general chemistry, organic chemistry, reading comprehension, quantitative reasoning, perceptual ability. Applicants are strongly encouraged to take the fall DAT before the year of matriculation. Students should score at or above the national average.

5. **Residency Status:** Preference to Minnesota residents and residents of Manitoba, Montana, North Dakota, South Dakota, and Wisconsin, with whom the school has special admission arrangements. Consideration is also given to applicants from states other than those named above.

6. **Personal Statement in Application:** Why interested in dentistry? Other interests and special achievements.

7. **Recommendations:** From employer, peer, college teacher, friend.

8. **Orientation to Dentistry:** Observation of and participation in patient care.

9. **Demonstrated Interest in the University of Minnesota School of Dentistry:** Students must demonstrate their interest in the University of Minnesota School of Dentistry through a personal visit or phone contact.

10. **Personal Service to People on a One-to-One Basis:** Youth counselor, big brother/sister, chairside dental assistant, hospital orderly, nurse's aide, youth worker.

11. **Fine Dexterity Experiences:** Sculpturing, drawing, painting.

12. **English Proficiency:** The School of Dentistry requires all applicants who are not native speakers of English to submit written evidence of either a Test of English as a Foreign Language (TOEFL) or a Michigan

English Language Assessment Battery (MELAB) scores. A TOEFL score of at least 550 with a minimum score of 55 in Part I, Oral Comprehension, is required. Individuals selecting the TOEFL must also take the Test of Written English (TWE). A standard score of 5 on the TWE is the desired proficiency level for University of Minnesota School of Dentistry students. The Admissions Committee evaluates TWE results, along with other selection criteria measures, to determine acceptability. The TWE is administered 5 times per year with the TOEFL.

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13. **Foreign Applicants:** Foreign applicants who have been accepted must guarantee sufficient funds to meet all their educational and personal expenses for the duration of their F-1 status at the University of Minnesota.

14. **Evaluation of Foreign Coursework:** A minimum of 130 quarter credits or 87 semester credits of liberal arts courses from an officially accredited U.S. or Canadian college or university is required. However, the School of Dentistry will consider foreign coursework from an accredited college or university, if supplied with official or certified transcripts, mark sheets, and degree statements from all institutions attended. Applicants must complete a minimum of 45 quarter credits or 30 semester credits from an accredited U.S. or Canadian college or university, which must include required prerequisite courses and/or upper division science courses. English courses taken from a foreign college or university do not fulfill the School of Dentistry English requirement for admission.

Note: These criteria are not necessarily ranked in order of importance.

Application Procedures

The School of Dentistry participates in the American Association of Dental Schools Application Service (AADSAS), a national agency that coordinates dental application services. All students seeking admission to the school must apply through this service, whether they are new applicants or reapplicants. AADSAS application materials may be obtained from AADSAS through an application request card, which is available from the Office of Enrollment Management. The AADSAS application materials can also be obtained directly from the School of Dentistry while supplies last. After the application materials are completed, they should be mailed to AADSAS, 625 Massachusetts, NW, 6th Floor, Washington DC 20036-2212.

After the University of Minnesota has received the AADSAS application, each applicant will be sent a University of Minnesota School of Dentistry application to complete and a request for the following additional materials:

1. One *official* transcript from each college attended. Transcripts must be submitted to the School of Dentistry at the time of application and after each quarter or semester of subsequent work until a decision is made on the application. They are in addition to those submitted to AADSAS. Transcripts marked "student copy" or with a similar reference are not acceptable. Appearance on one college/university transcript of courses and credits transferred from other institutions is not sufficient. Accepted students must continue to submit a transcript after each quarter or semester of study until completion of all coursework.
2. Three written recommendations submitted on special recommendation forms sent to the applicant with the request for supplemental information. These recommendations should come from persons who have been very familiar with the applicant and the applicant's work within the last four years. At least one recommendation should come from an employer, if possible. The rest may come from peers, college teachers, college recommendation committees, college counselors, and other appropriate individuals. All recommendations must be accompanied by a letter of reference in

addition to the completed form. Applicants are requested to limit their recommendations to three. The recommendations must be submitted directly from the recommender to the School of Dentistry.

3. A \$50 application processing fee.
4. Test results — DAT scores, and TOEFL or MELAB scores (as required).

Applications should be filed between June 1 and February 1 of the preceding academic year for entry the following fall. The AADSAS application must be received by AADSAS before February 1; filing by October 1 is strongly recommended. The School of Dentistry Admissions Committee reviews applications as they are received, giving highest priority to the most qualified applicants. Acceptance letters are sent between December 1 and March 1, or until the class is filled.

Tuition and Fees

The figures below are for the 1994-95 academic year. Future increases are possible.

Tuition

Full-time students (per quarter)

Residents \$2,940.00

Nonresidents 4,656.00

Students carrying fewer than
12 credits (per credit)

Residents 242.50

Nonresidents 385.50

Student Services Fee (per quarter) 146.45

Instrument Usage Fee (per quarter) 475.00

Precious Metals

First year — spring 100.00

Second year — fall 500.00

Books

First year 975.00

Second year 695.00

Third year 395.00

Fourth year 122.00

Other Fees See the current *Class Schedule* or contact the Office of Enrollment Management for information on late registration, late payment, installment payment, or other miscellaneous fees, and current information on the fees listed above.

Instrument Usage Fee (listed above) The School of Dentistry provides virtually all dental instruments and supplies needed by students. This reduces costs for students and allows the school to maintain control over the sterility and maintenance of the instruments and supplies used in the clinics. Students pay a usage fee. The fee per quarter for the 1995-96 academic year is \$495.

Financial Aid

Special loans, scholarships, fellowships, awards, and honors for qualified School of Dentistry students are sponsored by a variety of individuals, graduating classes, foundations, philanthropic groups, societies, and commercial firms. For more information, contact the Office of Enrollment Management (612/625-7149) or the University's Office of Scholarships and Financial Aid (612/624-1665 or, toll-free, 1-800-400-UOFM).

The Student Employment Center, 120 Fraser Hall (612/624-8070), posts part-time and summer job openings, but the demands of the dentistry program make it difficult for students to devote much time to outside employment. A number of summer research fellowships are available to School of Dentistry students.

Student Affairs Support Program

The School of Dentistry provides a student support program that enhances the success of its students. Students' performance is monitored test-by-test and additional academic assistance through tutoring, seminars, and consultation is encouraged and provided for those in need. A School of Dentistry Learning and Academic Skills counselor assists faculty and administration in assessing students' academic, financial, and psychological needs and makes referrals accordingly. This program also encourages and promotes student study groups, a student mentorship program, and consultation and resource development with faculty.

Special Opportunities

The School of Dentistry offers resident tuition to higher-ability minority or disadvantaged persons who reside outside Minnesota. For more information, contact the Office of Enrollment Management (612/625-7149).

Oral and Maxillofacial Surgery Externships

The School of Dentistry helps place its students in off-site oral surgery externships. Contact the Division of Oral and Maxillofacial Surgery (612/624-9959).

Scholarships and Awards

The School of Dentistry awards more than \$50,000 annually in high-ability incentive scholarships to qualified first-year dental students. All applicants' qualifications are reviewed by the School of Dentistry Admissions Committee and scholarships are awarded upon matriculation.

The school also offers many \$500 to \$1,000 scholarships and awards to current dental students at its annual Honors Day program. For more information about scholarships and awards, contact the School of Dentistry's Office of Enrollment Management (612/625-7149).

Retention and Promotion in the D.D.S. Curriculum

For purposes of retention and promotion in the School of Dentistry, the grades A, B, C, D, and S are passing grades. The grades F, N, and I are not passing grades. Students who receive I grades are expected to meet with the faculty immediately and make arrangements to complete the incomplete coursework. I grades that remain unresolved for more than one quarter may be changed to F at the discretion of the faculty.

To be promoted from one year to the next or to graduate, a student must have received passing grades in all required courses and earned a GPA of at least 2.00.

Any student with a grade point deficiency of 16 or more honor points at the end of any quarter will be dismissed from the School of Dentistry but will be given the option of withdrawing. Honor points equal credits multiplied by grade value (A=4, B=3, C=2, D=1, F=0) summed over all courses. An honor point deficiency exists when the total honor points are less than the sum of credits taken, multiplied by two. Students with grades of F or N or GPAs below 2.00 are placed on academic probation until the deficiencies are resolved.

The director of the Office of Educational Research, Planning, and Development notifies students of academic deficiencies following class committee meetings. Each class committee makes decisions regarding retention and promotion of students in their classes. The chairs of the class committees meet quarterly with the directors of Educational Research, Planning, and Development and Enrollment Management to review the actions of their committees.

Students repeating parts of the curriculum for whatever reason will have all grades calculated into their GPA.

Students dropped for low scholarship who have applied for readmission and have been accepted to repeat the entire curriculum of the first year will not have their previous grades calculated in their School of Dentistry GPA. However, these grades will remain on the official University of Minnesota transcript.

Students must receive passing grades in all clinically related courses before they may engage in primary patient care. For a third-year student to participate in any patient care/clinical activities, all first- and second-year courses must be satisfactorily completed with a minimum combined 2.00 GPA. No student can enter the third year without completing these requirements.

Students not completing clinical requirements by June of the fourth academic year must register for and attend classes (clinical or otherwise) beginning with the summer session, until such requirements have been completed.

Leave of Absence A leave of absence from the School of Dentistry, not to exceed one year, may be granted to a student in good standing (not on scholastic probation and with no pending unsatisfactory

grades). Application for a leave of absence is made at the Office of Educational Research, Planning, and Development, University of Minnesota, 15-234 Malcolm Moos Health Sciences Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612/625-9945).

Graduation Requirements

Candidates for the doctor of dental surgery (D.D.S.) degree must have

1. complied with the rules and regulations of the School of Dentistry and the University of Minnesota.
2. demonstrated sound moral character.
3. received a passing grade in all required courses.
4. completed all department clinical requirements.
5. completed treatment of all clinical patients.
6. completed half-time clinic attendance in the summer session after the second year and full-time clinic attendance for seven quarters thereafter.
7. returned all equipment and supplies assigned for their use.
8. earned a minimum GPA of 2.00 (C).
9. discharged all financial obligations to the University.
10. been recommended by School of Dentistry faculty for the degree.

National Board Dental Examinations

The National Board Dental Examinations are held on the Minneapolis campus. Virtually all students elect to take these written examinations, which are recognized by all 53 licensing jurisdictions in the United States.

Placement

The School of Dentistry has provided placement assistance to graduates and Minnesota dentists since the early 1970s, and to Minnesota dental hygienists since the early 1980s. The program extends to those wishing to recruit associates or hygienists, or buy or sell a dental practice. Dentists, hygienists, and oth-

ers interested in posting positions or in reviewing available positions may do so through the Office of Enrollment Management (612/626-0171).

Evaluation of Student Performance

Student progress and achievement are evaluated through a variety of means including written and oral examinations, practical examinations, observation of clinical performance, and course assignments. Students must attain a minimum GPA of 2.00 before graduation and also must complete many experiential requirements in a variety of disciplines. The University's grading systems of A-B-C-D-F and S-N are used. Refer to pages 12-13 for specific academic and grading policies.

Faculty class committees review grades and course progress and make quarterly evaluations of each student's achievement and personal conduct. Recommendations on a student's status and promotion are made by these committees and are given to the director of the Office of Educational Research, Planning, and Development. In general, a 2.00 GPA is required for promotion between academic years and required prerequisite coursework must be completed with a passing grade before students are permitted to begin patient care.

Students are expected to learn professional behaviors in addition to achieving academically, and a student conduct code stipulates guidelines for this (see *Student Handbook*). Students can be dismissed from school for disciplinary as well as scholastic reasons.

Students must exercise their clinical responsibilities with discretion and display concern for the dignity and importance of patients.

Special Programs

Guarantee of Quality This program offers new graduates the opportunity to enhance their knowledge of the practice of general dentistry as inexpensively as possible.

Up to 18 months after graduation, dentists may participate in this program in two ways. First, upon gradua-

tion new dentists receive vouchers that can be redeemed for applicable continuing dental education courses. To find out which courses are available or to register, call Continuing Dental Education (612/625-1418).

Second, new dentists may apply for admission as full-time adult special students for a maximum of one academic year of study. To sign up to audit any didactic or preclinical course listed in this bulletin, call the Office of Enrollment Management (612/625-7149).

Reentry Program for Dentists Some dentists take time out from their professional career. Before returning to dental practice, they may want assistance upgrading their knowledge and clinical or technological skills.

Dentists may enroll in more than 100 continuing dental education programs offered through the school each year. To find out which courses are available or to register, call Continuing Dental Education (612/625-1418).

Dentists may enroll as adult special students in selected general dental practice courses. Special general dentistry clinical mentorships can also be arranged as needed. For more information about this program, call the Office of Enrollment Management (612/625-7149).

Program in Dentistry (D.D.S.)

First Year

Coursework includes basic science courses on normal human tissues from the molecular to the cellular to organ systems. Technical dental courses, analysis of dental literature, and ethical training inherent in the profession begin during the first year.

Fall Quarter

CBN 5103—Human Histology	7
CBN 5107—Gross Anatomy for Dental Students: Extremities	4
CBN 5108—Gross Anatomy for Dental Students: Torso	4
Dent 5026—Introduction to Dental Care Delivery	2
Dent 5091—Professional Problem Solving	0
Dent 5648—Oral Anatomy I	4
Dent 5670—Introduction to Oral Biology	1
MdBc 5201—Biochemistry for Dental Students	4

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Winter Quarter

CBN 5109—Gross Anatomy for Dental Students: Head and Neck	4
Dent 5092—Professional Problem Solving	0
Dent 5200—Current Literature Seminar	2
Dent 5210—Introduction to Clinical Preventive Dentistry I	2
Dent 5600—Introduction to Biomaterials I	1

Dent 5649—Oral Anatomy II	2
Dent 5725—Oral Histology and Embryology	4
MdBc 5202—Biochemistry	3
Phsl 5100—System Physiology	5
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Spring Quarter

CBN 5110—Neuroscience for Dentistry Students	1.5
Dent 5000—Fixed Prosthodontics Technique Lecture	1
Dent 5003—Fixed Prosthodontics Laboratory	3
Dent 5093—Professional Problem Solving	1
Dent 5150—Operative Dentistry I	2
Dent 5153—Operative Dentistry Laboratory I	4
Dent 5201—Current Literature Seminar	2
Dent 5211—Introduction to Clinical Preventive Dentistry II	1
Dent 5401—Pediatric Dentistry I	1
Dent 5601—Introduction to Biomaterials II	4
Dent 5775—Oral Radiology I	3
Dent 5810—Physical Evaluation I	1
Phsl 5101—Neuroscience for Dentistry Students	1.5
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Second Year

Basic science courses focus on pathology. Technical dental courses culminate in treating patients.

Fall Quarter

Dent 5001—Fixed Prosthodontics Technique Lecture	2
Dent 5004—Fixed Prosthodontics Laboratory	4
Dent 5151—Operative Dentistry II	2
Dent 5154—Operative Dentistry Laboratory II	4
Dent 5202—Current Literature Seminar	2
Dent 5317—Pain and Anxiety Control	2
Dent 5776—Oral Radiology II	2
Dent 5786—Oral Radiology Preclinical Laboratory	0
MdBc 5203—Topics: Dental Biochemistry	3
MicB 5201—Microbiology	8
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Winter Quarter

Dent 5002—Fixed Prosthodontics Technique Lectures	1
Dent 5005—Fixed Prosthodontics Laboratory	2
Dent 5100—Genetics: An Introduction for Dentistry Students	1
Dent 5152—Operative Dentistry III	1
Dent 5155—Operative Dentistry Laboratory III	3
Dent 5402—Pediatric Dentistry II	1
Dent 5451—Periodontology I	2
Dent 5464—Periodontology Technique	2
Dent 5550—Removable Prosthodontics Lecture I	2
Dent 5554—Removable Prosthodontics Laboratory I	3
Dent 5559—Special Prosthodontics	0
Dent 5787—Oral Radiology Preclinical Laboratory	0
Dent 5809—Patient Management I	1
Dent 5811—Physical Evaluation II	3
La.MP 5099—General Pathology	2
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Spring Quarter

Dent 5157—Patient Management II	2
Dent 5212—Introduction to Comprehensive Clinics	1
Dent 5452—Patient Management II	1
Dent 5551—Removable Partial Dentures Lecture	2
Dent 5555—Removable Partial Dentures Laboratory	2
Dent 5560—Special Prosthodontics	2
Dent 5624—Endodontics Technique	1
Dent 5625—Endodontics	2
Dent 5751—Occlusion	3
Dent 5788—Oral Radiology Preclinical Laboratory	2
La.MP 5100—Systemic Pathology	3
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*Summer Session (half-time attendance required)**

Dent 5900—Dental Clinic (students may elect 3 or 6 cr)	
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Third Year

Clinical science courses occupy much of the student's time. Correlations among basic, behavioral, and clinical sciences are established in the clinical setting.

Fall Quarter

Dent 5010—Fixed Prosthodontics Clinic	4
Dent 5036—Organization and Management of Dental Practice I	2
Dent 5094—Professional Problem Solving	0
Dent 5161—Operative Dentistry Clinic	4
Dent 5180—Patient Management III	2
Dent 5251—Oral Pathology	2
Dent 5310—Oral and Maxillofacial Surgery I	1
Dent 5409—Clinical Pediatric Dentistry	0
Dent 5453—Periodontology Lecture III	2
Dent 5465—Periodontology Clinic	1
Dent 5562—Removable Prosthodontics Clinic	3
Dent 5778—Oral Radiology Clinic	1
Dent 5800—Oral Medicine/Diagnosis	1
Dent 5850—Treatment Planning Clinic	1
Phcl 5103—Pharmacology	5
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Winter Quarter

Dent 5006—Fixed Prosthodontics I	1
Dent 5011—Fixed Prosthodontics Clinic	3
Dent 5052—Dental Auxiliary Utilization Clinic (DAU I-II)	0
Dent 5095—Professional Problem Solving	0
Dent 5160—Operative Dentistry IV	1
Dent 5162—Operative Dentistry Clinic	3
Dent 5181—Patient Management III	1
Dent 5311—Oral and Maxillofacial Surgery II	1
Dent 5328—Medical Emergencies in the Dental Office	1
Dent 5371—Orthodontics I	3
Dent 5410—Clinical Pediatric Dentistry	0
Dent 5466—Periodontology Clinic	2
Dent 5563—Removable Prosthodontics Clinic	4
Dent 5777—Oral Radiology III	1
Dent 5779—Oral Radiology Clinic	0
Dent 5801—Oral Medicine/Diagnosis	1
Dent 5812—Physical Evaluation III	2
Dent 5851—Treatment Planning Clinic	1
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Spring Quarter

Dent 5007—Fixed Prosthodontics II	1
Dent 5012—Fixed Prosthodontics Clinic	3
Dent 5030—Geriatric Dentistry and Special Patient Care	2
Dent 5053—Dental Auxiliary Utilization Clinic (DAU I-II)	0
Dent 5096—Professional Problem Solving	0
Dent 5163—Operative Dentistry Clinic	3
Dent 5182—Patient Management III	1
Dent 5252—Oral Pathology	3
Dent 5315—Oral and Maxillofacial Surgery III	1
Dent 5372—Orthodontics II	2
Dent 5376—Orthodontics Laboratory	1
Dent 5411—Clinical Pediatric Dentistry	0
Dent 5467—Periodontology Clinic	2
Dent 5564—Removable Prosthodontic Clinic	3
Dent 5780—Oral Radiology Clinic	2
Dent 5802—Oral Medicine/Diagnosis	1
Dent 5853—Treatment Planning Clinic	1
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Summer Session (required)

Dent 5900—Dental Clinic	6
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Fourth Year

Clinical science training is completed and the transition from school to practice begins.

Fall Quarter

Dent 5015—Fixed Prosthodontics Clinic	4
Dent 5027—Epidemiology, Prevention, and Dental Public Health	3

Dent 5054—Dental Auxiliary Utilization Clinic (DAU I-II)	2
Dent 5090—Business and Legal Aspects of a Dental Practice	5
Dent 5097—Professional Problem Solving	0
Dent 5165—Operative Dentistry Clinic	5
Dent 5184—Patient Management IV	2
Dent 5316—Oral and Maxillofacial Surgery Clinic Rotation	2
Dent 5340—Hospital Dentistry Lecture	1
Dent 5412—Clinical Pediatric Dentistry	0
Dent 5468—Periodontology Clinic	2
Dent 5565—Removable Prosthodontic Clinic	2
Dent 5626—Endodontics Clinic	1
Dent 5642—Hospital Dentistry Rotation	0
Dent 5804—Emergency Clinic	0

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Winter Quarter

Dent 5016—Fixed Prosthodontics Clinic	3
Dent 5098—Professional Problem Solving	0
Dent 5164—Operative Dentistry V	1
Dent 5166—Operative Dentistry Clinic	3
Dent 5185—Patient Management IV	1
Dent 5318—Oral and Maxillofacial Surgery Clinic Rotation	21
Dent 5377—Orthodontic Clinic Rotation	0
Dent 5404—Dental Care for the Handicapped	1
Dent 5413—Clinical Pediatric Dentistry	0
Dent 5469—Periodontology Clinic	2
Dent 5566—Removable Prosthodontics Clinic	2
Dent 5627—Endodontics Clinic	1
Dent 5643—Hospital Dentistry Rotation	0
Dent 5675—Oral Biology: Fundamental and Applied	2
Dent 5753—TMJ Disorders: Diagnosis and Treatment	1
Dent 5805—Emergency Clinic	0

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Spring Quarter

Dent 5017—Fixed Prosthodontics Clinic	3
Dent 5099—Professional Problem Solving	1
Dent 5167—Operative Dentistry Clinic	3
Dent 5186—Patient Management IV	1
Dent 5319—Oral and Maxillofacial Surgery Clinic Rotation	1
Dent 5378—Orthodontic Clinic Rotation	1
Dent 5414—Clinical Pediatric Dentistry	5
Dent 5470—Periodontology Clinic	2
Dent 5567—Removable Prosthodontic Clinic	2
Dent 5628—Endodontics Clinic	1
Dent 5644—Hospital Dentistry Rotation	1
Dent 5806—Emergency Clinic	2
Dent 5853—Treatment Planning Clinic	1

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Dentistry (Dent) Course Descriptions

Department of Diagnostic/Surgical Sciences

William F. Liljemark, D.D.S., Ph.D., chair

Division of Oral Medicine and Diagnosis

Professor Emeritus

James W. Little, D.M.D., M.S.D.

Associate Professor

Ramesh K. Kuba, B.D.S., oral and maxillofacial radiology

Gene P. Nystrom, D.D.S., M.P.H., M.S.Ed.

Nelson L. Rhodus, D.M.D., M.P.H., director

Assistant Professor

George M. Taybos, D.D.S., M.S.Ed.

Dent 5775. Oral Radiology I. (2 cr)

Films, radiographs, cassettes, and grids used in dentistry darkroom; principles of protection.

Dent 5776. Oral Radiology II. (2 cr)

Radiographic anatomy; application of image shift principles in localization; nature and characteristics of atomic radiations; production and control of X-rays; mathematics of radiographic exposure; biological effects of ionizing radiations; radiation dosimetry, regulations, and recent imaging modalities.

Dent 5777. Oral Radiology III. (1 cr)

Interpretation of intraoral and extraoral radiographs.

Dent 5778-5779-5780. Oral Radiology Clinic. (Cr ar)

Radiographic procedures (intraoral and extraoral, including panoramic techniques).

Dent 5786-5787-5788. Oral Radiology Preclinical Laboratory. (1 cr total)

Dent 5800-5801-5802. Oral Medicine/Diagnosis. (4 cr total)

Patient evaluation, treatment planning, providing emergency dental care.

Dent 5809. Patient Management I. (1 cr)

Patient admission, use of dental record, phase I treatment planning, billing and accounting, patient assignment.

Dent 5810. Physical Evaluation I. (1 cr)

Basics of oral diagnosis, case history, diagnostic process, physical signs and symptoms of disease.

Dent 5811. Physical Evaluation II. (3 cr)

Principles of disease and oral pathology, normal vs. abnormal oral tissues, managing medically compromised dental patients.

Dent 5812. Physical Evaluation III. (2 cr)

Oral medicine; managing dental patients with systemic disease; recognizing, preventing, and managing medical problems and emergencies in dental practice.

Electives

Dent 5781. Advanced Oral Radiology Clinic. (Cr and hrs ar)

Dent 5785. Oral Radiology: Independent Study. (Cr and hrs ar)

Dent 5815. Oral Medicine Elective. (2 cr)

Advanced clinical experience managing medically compromised patients, advanced diagnostic modalities, oral soft tissue lesions, salivary gland dysfunction. Research in oral medicine. Special clinics, e.g., xerostomia, CPCs. Seminars and student CPC presentations.

Division of Oral and Maxillofacial Surgery

Professor Emeritus

Mellor R. Holland, D.D.S., M.S.D.
Norman O. Holte, D.D.S., M.S.D.

Professor

Mohamed E. El Deeb, B.D.S., D.O.S., M.S.D.

Associate Professor

Mitchell Day, D.D.S., M.A., director,
Oral and Maxillofacial Surgery Clinic Predoctoral Education
James O. Swift, D.D.S., director

Dent 5310. Oral and Maxillofacial Surgery I. (1 cr)
Principles of surgery; armamentarium.

Dent 5311. Oral and Maxillofacial Surgery II. (1 cr)
Complications in oral surgery.

Dent 5315. Oral and Maxillofacial Surgery III. (1 cr)
TMJ; salivary glands; trauma; developmental deformities; oral malignancies; facial space infections.

Dent 5316-5318-5319. Oral and Maxillofacial Surgery Clinic Rotation. (1 cr per qtr)
Oral Surgery Clinic experience.

Dent 5317. Pain and Anxiety Control. (2 cr)
Use of local and general anesthetic agents in dentistry.

Dent 5340. Hospital Dentistry Lecture. (1 cr)
Providing dental care in a hospital setting. Hospital organization, privileges, credentialing, chart entries and records requirements, operating room procedure and protocol.

Electives

Dent 5320. Oral and Maxillofacial Surgery: Independent Study. (Cr and hrs ar)

Dent 5328. Medical Emergencies in the Dental Office. (1 cr)
Acute management of medical emergencies in dental practice.

Dent 5330. Nitrous Oxide Inhalation Analgesia/ Emergency Drug Use. (1 cr)

Dent 5335. Oral and Maxillofacial Surgery Clinic Elective Rotation. (Cr ar)
Examination, diagnostic, treatment planning, and clinical skills.

Division of Orthodontics

Professor Emeritus

Frank Worms, D.D.S., M.S.D.

Professor

T. Michael Speidel, D.D.S., M.S.D., J.D., director and
graduate program director

Assistant Professor

Patricia A. Macchiarulo, D.M.Sc., D.M.D.

Clinical Dental Specialist

Douglas Vayda, D.D.S.

Dent 5371. Orthodontics I. (3 cr)
Factors contributing to normal and abnormal development of deciduous, mixed, and permanent dentitions; space maintenance and tooth guidance procedures; biomechanics and construction of fixed and removable appliances.

Dent 5372. Orthodontics II. (2 cr)
Clinical management of specific orthodontic problems.

Dent 5376. Orthodontics Laboratory. (1 cr)
Practical applications of developing occlusion analysis. Fundamentals of orthodontic appliances.

Dent 5377-5378. Orthodontic Clinic Rotation. (1 cr total)
Diagnosis, treatment timing and objectives, skills required to perform orthodontic procedures.

Electives

Dent 5380. Orthodontics. (Cr and hrs ar)
Principles and procedures in preventive, interceptive, and corrective orthodontics interrelated through case analysis and treatment planning.

Dent 5385. Orthodontics: Independent Study. (Cr and hrs ar)

TMJ/Orofacial Pain Program

Associate Professor

James R. Friction, D.D.S., M.S.
John K. Schulte, D.D.S., M.S.D., director
Eric L. Schiffman, D.D.S., M.S.

Dent 5753. Temporomandibular Disorders: Diagnosis and Treatment. (1 cr)
Etiology, pathophysiology, diagnosis, and treatment of temporomandibular and other masticatory disorders.

Electives

Dent 5755. Occlusion: Independent Study. (Cr and hrs ar)

Dent 8440. TMJ and Craniofacial Pain: Advanced Theory and Principles. (3 cr; prereq undergrad TMJ course)
Differential diagnosis of TMJ and craniofacial pain and the science used in decision making.

Dent 8443. Current Literature in TMJ and Craniofacial Pain. (1 cr)

Department of Oral Sciences

Gregory R. Germaine, M.S., Ph.D., chair

Professor Emeritus

Maurice W. Meyer, D.D.S., M.S.D., Ph.D.

Professor

Dwight L. Anderson, M.S., Ph.D.
Jaroslav Cervenka, M.D., C.Sc.
Gregory R. Germaine, M.S., Ph.D.
Charles F. Schachtele, M.S., Ph.D.
Burton L. Shapiro, D.D.S., M.S.D., Ph.D.

Associate Professor

Kathleen M. Keenan, M.S., Ph.D.
Robert H. Ophaug, Ph.D., graduate program director
Bernard E. Reilly, Ph.D.
Joel D. Rudney, M.A., M.S., Ph.D.
Assistant Professor
Keith Kajander, D.D.S., Ph.D.
Ambika Mathur, M.S., Ph.D.

Dent 5200-5201-5202. Current Literature Seminars. (6 cr total)
Reading and discussion of current literature that relates basic sciences to clinical topics.

Dent 5203. Topics in Dental Biochemistry. (3 cr)
Biochemical phenomena in the oral cavity. Oral fluid and deposits, hard and soft specialized mouth tissues.

Dent 5670. Introduction to Oral Biology. (1 cr)
Major biological and pathological issues relevant to dentistry.

Dent 5675. Oral Biology: Fundamental and Applied. (2 cr)
Specialists discuss major and current problems in dentistry and oral biology.

Electives

Dent 5100. Genetics: An Introduction for Dental Students. (1 cr)

Chemical basis of heredity; cytogenetics, genetic ratios, methodology of human genetics, heredity and environment, mutation and radiation.

Dent 5677. Dental Research Training. (3 cr; hrs ar)

Following completion of the research project, students submit a written report describing their research activities.

Dent 5680. Oral Biology: Independent Study. (Cr and hrs ar)

Biomaterials Research Center

Professor Emeritus

Anna T. Hampel, D.D.S., M.S.D.

Professor

William H. Douglas, B.D.S., M.S., Ph.D., director
Edward C. Combe, Ph.D., D.Sc.

Associate Professor

Ralph DeLong, D.D.S., M.S.D., Ph.D.
Maria R. Pintado, M.P.H.

Assistant Professor

Tom W. Koriath, B.O.D., Cir. Dent., Ph.D.

Dent 5600. Introduction to Biomaterials I. (1 cr)

Physical, chemical, and mechanical properties of materials used in dentistry.

Dent 5601. Introduction to Biomaterials II. (4 cr)

Continuation of 5600 with lab exercises.

Electives

Dent 5602. Biomaterials: Independent Study. (Cr and hrs ar)

Division of Oral Pathology

Regents' Professor Emeritus

Robert J. Gorlin, D.D.S., M.S.D., D.Sc. (Hon) (Athens, Thessalonika)

Professor Emeritus

Heddie O. Sedano, D.D.S., Dr. Odont.

Professor

Richard P. Elzay, D.D.S., M.S.D., dean, School of Dentistry
Robert A. Vickers, D.D.S., M.S.D., head and director of graduate studies

Assistant Professor

Ioannis G. Koutlas, D.D.S., M.S.
Sandra Meyers, D.M.D.

Clinical Assistant Professor

Robert S. Edmunds, D.D.S., M.S.
Ann L. Norrlander, D.D.S.

Dent 5251-5252. Oral Pathology. (3 cr ea)

Recognizing, diagnosing, and managing diseases having maxillofacial, oral, or dental manifestations.

Dent 5725. Histology and Embryology. (4 cr)

Embryologic development and histologic structure of tissues in the head, face, and mouth with emphasis on clinical correlations.

Electives

Dent 5250. Oral Pathology: Independent Study. (Cr and hrs ar)

Clinical oral pathology consultations, surgical oral pathology laboratory experience, attendance at advanced educational seminars and courses in oral pathology, participation in clinic pathological investigations are available to dental students, dental hygiene and graduate students.

Department of Preventive Sciences

Carl L. Bandt, D.D.S., M.S.D., M.S., chair

Division of Dental Hygiene

See Bachelor of Science in Dental Hygiene section of this bulletin.

Division of Health Ecology

Professor

Muriel J. Bebeau, Ph.D.
David O. Born, Ph.D.
Anthony J. DiAngelis, D.M.D., M.P.H.
Leslie V. Martens, D.D.S., M.P.H., director

Associate Professor

Lester E. Block, D.D.S., M.P.H.
James R. Gambucci, D.D.S., M.P.H., graduate program director for
Advanced Education in General Dentistry
and General Practice Residency

Assistant Professor

Stephen K. Shuman, D.D.S., M.S.,
graduate program director for Oral Health Services for Older Adults

Associate Program Director

Barbara J. Smith, R.D.H., M.P.H.,
Graduate Program in Oral Health Services for Older Adults

Associate Clinical Dental Specialist

Kevin N. Nakagaki, D.D.S., General Practice Residency Program

Students are introduced to the basic principles of epidemiology and health assessment, role and practice of dentistry as a health care delivery system, and factors influencing the availability and use of health services and preventive oral health procedures and methods.

Dent 5026. Introduction to Dental Care Delivery. (3 cr)

Public need and demand for dental services, variety of practices and personnel nationally and internationally.

Dent 5027. Epidemiology, Prevention, and Dental Public Health. (3 cr)

Scientific method in dentistry.

Dent 5030. Geriatric Dentistry and Special Patient Care. (2 cr)

Current information on "special patient care," including geriatric dentistry and dentistry for the physically and mentally compromised patient.

Dent 5036. Organization and Management of Dental Practice I. (2 cr)

Skills in planning, organizing, leading, and controlling the human environment of the dental practice.

Dent 5052-5053-5054. Dental Auxiliary Utilization Clinic (Dau I-II). (2 cr total)

Specific skills in four-handed dentistry with emphasis on efficient use of chairside dental assistants.

Dent 5090. Business and Legal Aspects of a Dental Practice. (5 cr)

Essential business and legal considerations, including regulation of the profession, forms of practice, associateships, purchasing a practice, starting a practice, leases, office design, marketing, advertising, financing, malpractice and contract case law.

Dent 5091-5092-5093. Professional Problem Solving. (1 cr total)

Issues, rights, responsibilities, codes, and consequences in resolving recurrent ethical dilemmas of the student dentist.

Dent 5094-5095-5096-5097-5098-5099. Professional Problem Solving. (1 cr total)

Dent 5804-5805-5806. Emergency Clinic. (2 cr total)
Treatment planning and providing emergency dental care.

Electives

Dent 5055. Health Ecology: Independent Study. (Cr ar)
Arranged with any health ecology faculty member.

Dent 5070. Health Ecology Elective. (Cr ar)
Allows highly motivated students to receive academic credit for activities in special-interest areas.

Dent 5073. Advanced General Dentistry Elective. (Cr ar)
Block rotations of 2 to 10 weeks in selected special clinics and programs such as prisons, regional treatment centers, and migrant worker health care.

Dent 5075. Health Ecology: Dental Associateships. (Cr ar)
Individually designed reading and research course focused on dental practice, associateships, career decision making, and career tracks.

Division of Pediatric Dentistry

Professor

Michael J. Till, D.D.S., M.S.D., Ph.D.
Karlind T. Moller, M.A., Ph.D., director, Cleft Palate Program

Associate Professor

John P. Conry, B.Dent.Sc., M.S., director
Thomas Beckman, D.D.S., M.S., M.S.D.
Jacob Lee, D.D.S., graduate program director

Assistant Professor

Pamela Erickson, D.D.S., Ph.D.

Dent 5401. Pediatric Dentistry I. (1 cr)
Dentition development; restorative dentistry and pulpal therapy in the primary and permanent dentition; principles of preventive dentistry.

Dent 5402. Pediatric Dentistry II. (1 cr)
Physical and emotional development of the child; patient management; treatment of congenital disorders and traumatic dental injuries; clinical aspects of preventive, interceptive, and corrective orthodontics in the primary and mixed dentitions.

Dent 5404. Dental Care for the Handicapped. (1 cr)
Handicapping conditions frequently encountered by the general practitioner.

Dent 5409-5410-5411-5412-5413-5414. Clinical Pediatric Dentistry. (5 cr total)
Clinic-seminar program reviewing preventive and clinical topics and techniques together with diagnosis, treatment planning, and clinical treatment of pediatric patients.

Electives

Dent 5420. Pediatric Dentistry: Independent Study. (Cr and hrs ar)

Dent 5425. Treatment of the Difficult Pediatric Patient. (1 cr)
Students may be assigned an additional rotation to treat more challenging pediatric patients.

Division of Periodontology

Professor Emeritus

Richard C. Oliver, D.D.S., M.S.
Erwin M. Schaffer, D.D.S., M.S.D.

Professor

Bashar Bakdash, D.D.S., M.P.H., M.S.D., director
Carl L. Bandt, D.D.S., M.S.D., M.S.
Mark C. Herzberg, M.S., D.D.S., Ph.D.
Bruce L. Pihlstrom, D.D.S., M.S.

Associate Professor

James E. Hinrichs, D.D.S., M.S., graduate program director
Larry F. Wolff, M.A., Ph.D., D.D.S.

Assistant Professor

Bryan S. Michalowicz, D.D.S., M.S.

Clinical Dental Specialist

Eric E. Stafne, D.D.S., M.S.D.

Dent 5210-5211. Introduction to Clinical Preventive Dentistry I-II. (2 cr; 1 cr)

Clinical protocols, observation of patient care, assisting and preventive care.

Dent 5451. Periodontology Lecture I. (2 cr)

Periodontal anatomy; physiology and etiology of periodontal diseases. Clinical, histopathological, and pathogenesis of gingivitis and periodontitis, as well as the role of genetics and systemic disorders. Preventive and therapeutic procedures associated with diagnosis, prognosis, treatment planning, and initial phase of periodontal therapy.

Dent 5452. Patient Management II. (1 cr)

Lectures and small group seminars to discuss periodontal diagnosis, prognosis, treatment planning, case presentation, referral process, clinical strategies, radiographic interpretation, and role of the dentist in tobacco cessation.

Dent 5453. Periodontology Lecture III. (2 cr)

Clinical procedures associated with surgical phase of periodontal therapy. Emphasis on evaluation of periodontal treatment as well as the maintenance phase and the relationship between periodontics and other dentistry disciplines. Roles of clinical research in periodontics.

Dent 5464. Periodontology Technique Laboratory. (1 cr)

Presurgical procedures in periodontics.

Dent 5465-5466-5467-5468-5469-5470. Periodontology Clinic. (12 cr total)

Nonsurgical and surgical treatment of periodontal diseases, evaluation of periodontal therapy, implementation of maintenance programs.

Electives

Dent 5460. Periodontology: Independent Study. (Cr ar)

Dent 5475. Clinical Seminar in Periodontology. (1 cr)
Clinical case reports of patients with challenging treatment needs discussed from total care viewpoint.

Dent 5476. Periodontology Seminar. (2 cr)

Topics assigned weekly and discussed in detail using the literature as background.

Dent 5477. Bacteriology and Immunology of Periodontal Disease. (1 cr)

Bacteriology and role of possible immunological mechanisms in the pathogenesis of chronic periodontal disease discussed using current literature as background.

Dent 5478. Treatment of More Complicated Periodontal Patients. (Cr ar)

Students request assignment to patients with more complicated American Academy of Periodontology (AAP) type III and IV periodontal diseases.

Department of Restorative Sciences

Ralph DeLong, D.D.S., Ph.D., M.S., chair

Division of Endodontics

Professor Emeritus

James R. Jensen, D.D.S., M.S.D.

Associate Professor

Mahmoud El Deeb, B.D.S., M.S.D., graduate program director
Kenneth M. Hargreaves, D.D.S., M.S., Ph.D.

Dent 5624. Endodontics Technique. (2 cr)

Seminars and lab exercises.

Dent 5625. Endodontics. (2 cr)

Pulp biology, diagnosis and treatment of pulp and periapically involved teeth.

Dent 5626-5627-5628. Endodontics Clinic. (1 cr; 1 cr; 2 cr)

Principles of diagnosis and treatment of pulp and periapically involved teeth. Seminars, clinical demonstrations, and practical experience with clinical patients.

Electives

Dent 5630. Endodontics: Independent Study. (Cr and hrs ar)

Division of Operative Dentistry

Associate Professor

Gary L. Hill, D.D.S., M.S., director
Thomas D. Larson, D.D.S., M.S.D.
Craig B. Phair, D.D.S., M.S.
Omar A. Zidan, B.D.S., H.D.D., M.S.D., Ph.D.,
graduate program director

Clinical Dental Specialist

Chester J. Schultz, D.D.S., M.S.D., M.A.

Coordinator of Undergraduate Hospital Education

Charles F. Bungum, D.D.S.

Dent 5150-5151-5152. Operative Dentistry I-II-III.

(2 cr; 2 cr; 1 cr)

Nomenclature of operative dentistry, cavity design and classification, composition of materials, instrumentation, and basis of techniques.

Dent 5153-5154-5155. Operative Dentistry Laboratory I-II-III.

(4 cr; 4 cr; 3 cr)

Techniques and principles of cavity preparation, manipulation of restorative materials, instrumentation.

Dent 5160. Operative Dentistry IV. (1 cr)

Clinical applications and modifications of basic operative techniques. Direct esthetic techniques and materials.

Dent 5161-5162-5163. Operative Dentistry Clinic. (4 cr; 3 cr; 3 cr)

Application of basic operative techniques and materials in clinical setting.

Dent 5164. Operative Dentistry V. (1 cr)

Reading, interpreting, and discussing scientific literature relevant to operative dentistry.

Dent 5165-5166-5167. Operative Dentistry Clinic. (4 cr; 3 cr; 3 cr)

Applying basic and advanced operative techniques and materials in clinical setting.

Dent 5642-5643-5644. Hospital Dentistry Rotation. (2 cr total)

Managing hospitalized patients, operating room protocol, admission and discharge of patients, and ambulatory patients.

Electives

Dent 5158. Operative Dentistry: Independent Study. (Cr and hrs ar)

Dent 5173. Clerkship in Operative Dentistry. (2 cr)

Assist preclinical faculty in teaching operative dentistry techniques and procedures.

Dent 5175. Esthetic Dentistry Clinic. (1 cr)

Review literature and learning model and treat patients clinically using direct bonded composites for problems such as diastema closures, alignment discrepancies, discoloration. Student must identify patient to be treated. Involves one-to-one clinical teaching.

Division of Prosthodontics

Professor Emeritus

James L. Donahue, D.D.S.
Richard J. Goodkind, D.M.D., M.S.D.
Robert Jeronimus, D.D.S.
Andrew T. Morstad, D.D.S., M.S.D.
Frederick W. Noble, D.D.S.
Hubert Serr, D.D.S.

Professor

Harvey L. Colman, D.D.S., M.S.D.

Associate Professor

Gary C. Anderson, D.D.S., M.S.
James L. Baker, D.D.S., M.S.D.
James R. Holtan, D.D.S., graduate program director
Paul S. Olin, D.D.S., director

Assistant Professor

William Larson, D.D.S., M.S.
Marie Joycelyn Lua, M.S., D.M.D.
Christopher Sasik, D.D.S.

Clinical Dental Specialist

David J. Clay, D.D.S., M.S.D.
Gary Cook, D.D.S., M.S.D.
James E. Schreiner, D.D.S., M.S.D.

Dent 5000-5001-5002. Fixed Prosthodontics Technique

Lectures. (1 cr; 2 cr; 1 cr)

Lab techniques and fundamentals of tooth preparation.

Dent 5003-5004-5005. Fixed Prosthodontics Laboratories.

(3 cr; 4 cr; 2 cr)

Demonstrations of clinical and lab procedures. Exercises in casting, soldering, and constructing bridges and porcelain crowns.

Dent 5006. Fixed Prosthodontics I. (1 cr)

Treatment planning for abutments, retainers, and pontics.

Dent 5007. Fixed Prosthodontics II. (1 cr)

Design principles for porcelain fused to metal restorations, pontic designs, occlusion.

Dent 5010-5011-5012. Fixed Prosthodontics Clinic. (4 cr; 3 cr;

3 cr)

Diagnosis, design, and construction of fixed prosthodontic cases.

Dent 5015-5016-5017. Fixed Prosthodontics Clinic. (4 cr; 3 cr;

3 cr)

Dent 5212. Introduction to Comprehensive Clinics. (1 cr)

Dent 5550. Removable Prosthodontics Lecture I. (2 cr)

Use of prosthetic dental materials and principles of complete denture fabrication.

Dent 5551. Removable Partial Dentures Lecture. (2 cr)

Design principles and fabrication of removable partial dentures.

Dent 5554. Removable Prosthodontics Laboratory I. (3 cr)

Complete denture fabrication.

Dent 5555. Removable Partial Dentures Laboratory. (2 cr)

Design and fabrication of removable partial dentures.

Dent 5559-5560. Special Prosthodontics. (2 cr total)
Complete denture prosthesis correlated with students' accumulated knowledge from basic and clinical sciences.

Dent 5562-5563-5564. Removable Prosthodontics Clinic. (9 cr total)

Clinical practice in complete and partial removable denture prosthodontics.

Dent 5565-5566-5567. Removable Prosthodontics Clinic. (6 cr total)

Dent 5648-5649. Oral Anatomy I-II. (6 cr total)
Tooth morphology, nomenclature, classification, charting, calcification, and eruption sequences; mouth growth and development.

Dent 5751. Occlusion. (3 cr)
Examination, diagnosis, and treatment of occlusal problems.

Electives

Dent 5008. Porcelain Veneers. (1 cr)
Review literature and treat patients using bonded porcelain veneers. Student must identify patient to be treated.

Dent 5009. Fixed Prosthodontics: Independent Study. (Cr and hrs ar)

Dent 5553. Removable Prosthodontics: Independent Study. (Cr and hrs ar)

Dent 5568. Review of Partial Removable Prosthetics. (1 cr; hrs ar)
Treatment planning, case analysis, overlay dentures.

Dent 5569. Seminar: Restorative Dentistry. (Cr and hrs ar)
Clinical approach to crown and bridge, operative, periodontic, and removable prosthetic dentistry; technical procedures and biological concepts.

Dent 5573. Treatment of the Difficult Prosthodontic Patient. (1 cr)
Work with faculty treating occlusal plane problems, occlusion discrepancies, opposing bridgework, and reconstructions.

Dent 5575. Overview of Implants Used in Dentistry. (1 cr)

Dent 5577. Review of Complete Denture Prosthetics. (1 cr)

Dent 5654. Oral Anatomy: Independent Study. (Cr and hrs ar)

Program of Patient Management

Professor

Ronald E. Geistfeld, D.D.S.

Clinical Dental Specialist

Richard T. Ford, D.D.S., M.A.

Clinical Assistant Dental Specialist

Richard D. Nadeau, D.D.S.

Dent 5157. Patient Management II. (2 cr)
Process and skill development for comprehensive treatment planning. Facilitate treatment planning within the schools; Comprehensive Care Clinics; applications in private practice settings.

Dent 5180-5181-5182. Patient Management III. (2 cr; 1 cr; 1 cr)
Educational setting (clinic) for students to integrate, apply, and develop skills taught in 5809, 5810, 5811, and 5157.

Dent 5184-5185-5186. Patient Management IV. (2 cr; 1 cr; 1 cr)
See 5180-5181-5182.

Dent 5850-5851-5852-5853. Treatment Planning Clinic. (4 cr total)

Devise initial plan from established database; make case presentation to patient; develop final treatment plan, including financial arrangements; document informed consent; develop sequenced appointment plan for managing patient's dental needs.

Contributing Departments

Biochemistry (MdBc)

MdBc 5201. Biochemistry for Dental Students. (4 cr)
Chemical properties, biosynthesis, catabolism, structure, and function of biomolecules. Fundamental aspects of molecular biology and metabolic regulation.

MdBc 5202. Biochemistry for Dental Students. (3 cr)
Physiological chemistry with emphasis on biological processes that occur in human tissue and fluid compartments.

Cell Biology and Neuroanatomy (CBN)

CBN 5103. Human Histology. (7 cr)
Microscopic structure; cytochemical and functional aspects of cells, tissues, and organs.

CBN 5107. Gross Anatomy for Dental Students: Extremities. (4 cr)
Dissection of human cadavers (upper and lower extremities) supplemented with lectures, readings, and consideration of clinical problems. Includes embryology and radiographic anatomy.

CBN 5108. Gross Anatomy for Dental Students: Torso. (4 cr)
Continuation of CBN 5107, to include thorax, abdomen, and pelvis.

CBN 5109. Gross Anatomy for Dental Students: Head And Neck. (4 cr)
Continuation of CBN 5108, to include head and neck.

CBN 5110. Neuroscience for Dental Students. (1.5 cr)
Structure and function of the central nervous system. Correlation between morphology and physiology.

Laboratory Medicine and Pathology (LaMP)

LaMP 5099. General Pathology for Dental Students. (2 cr)

LaMP 5100. Systemic Pathology for Dental Students. (3 cr)
Lectures, self-study with recitations (histopathology, microfiche).

Microbiology (MicB)

MicB 5201. Microbiology for Dental Students. (8 cr)
Nature and diversity of microorganisms; microbial structure and function; metabolism and growth; genetics and virology; principles of sterilization and disinfection; chemotherapy; host-parasite relationships; fundamentals of immunology; pathogenic bacteria, fungi, and viruses; ecology of oral microorganisms; microbiology of dental caries and periodontal disease.

Pharmacology (Phcl)

Phcl 5103. Pharmacology for Dental Students. (5 cr)
Pharmacologic principles and actions of drugs.

Physiology (Phsl)

Phsl 5100. System Physiology. (5 cr)
Principles of physiology, circulation, respiration, digestion, excretion, metabolism, and endocrine gland function.

Phsl 5101. Neuroscience for Dental Students. (1.5 cr)
Principles of nervous function studied through neuroanatomy and neurophysiology.

Freshman Liberal Education Requirements

(effective fall 1994 and later for freshmen enrolling with fewer than 39 credits)

A liberal education introduces you to the modes of inquiry and subject matter of the major branches of knowledge, including the factual information and theoretical or artistic constructs that form their foundations; the "ways of knowing" — the kinds of questions asked and how insight, knowledge, and data are acquired and used; the changes over time of their central ideas or expressive forms; and the interrelationships among them and with human society in general. To these ends, study by all undergraduate students on the Twin Cities campus is guided by a common framework.

The Diversified Core Curriculum

Physical and Biological Sciences. Comprehension of physical and biological principles; understanding of and ability to use the methods of scientific inquiry — the ways in which scientists investigate physical and biological phenomena; and appreciation of the importance of science and the value of a scientific perspective.

Requirement: A minimum of three courses totaling at least 12 credits, including one course with a laboratory or field experience in the physical sciences and one course with a laboratory or field experience in the biological sciences.

History and Social Sciences. Knowledge of how historians and social scientists describe and analyze human experiences and behavior; study of the interrelationships among individuals, institutions, structures, events, and ideas; understanding of the roles individuals play in their historical, cultural, social, economic, and political worlds.

Requirement: A minimum of three courses totaling at least 12 credits, including one course with historical perspective.

Arts and Humanities. Understanding of approaches to the human condition through works of art, literature, and philosophy; knowledge of how artists create and humanistic scholars think; ability to make aesthetic judgments.

Requirement: A minimum of three courses totaling at least 12 credits including courses in two of the following: literature, philosophical perspective, and visual or performing arts.

Mathematical Thinking. Acquisition of mathematical modes of thinking; ability to evaluate arguments, detect fallacious reasoning, and evaluate complex

reasoning chains; appreciation of the breadth of applications of mathematics and its foundations.

Requirement: A minimum of one course totaling at least four credits.

The Designated Themes of Liberal Education

The designated themes of liberal education offer a dimension to liberal learning that complements the diversified core curriculum. Each of the themes focuses on an issue of compelling importance to the nation and the world, the understanding of which is informed by many disciplines and interdisciplinary fields of knowledge.

Requirement: A minimum of six courses (or five courses if one includes an approved practicum), including one course in each of the following:

Cultural Diversity. Understanding of the roles gender, ethnicity, and race play in structuring the human experience in and developing the social and cultural fabric of the United States.

International Perspectives. Comprehension of the ways in which you are part of a rapidly changing global environment dominated by the internationalization of most human endeavors.

Environment. Knowledge of the interaction and interdependence of the biophysical systems of the natural environment and human social and cultural systems.

Citizenship and Public Ethics. Reflection on and determination of a clearer sense of your present and future civic relationships and your obligations to the community.

Writing Skills

The ability to communicate effectively is a hallmark of a liberally educated individual and a key to a successful and satisfying life. To encourage refining of writing skills, the liberal education curriculum includes both writing courses and writing across the curriculum.

Requirement: All students will complete the writing requirement specified by the college awarding their baccalaureate degree.

You may satisfy the liberal education requirements with a number of courses and credits different from those of other students because some courses serve multiple goals in the curriculum; e.g., some courses will satisfy a diversified core requirement and a designated theme requirement, and other courses will satisfy the requirements for each of two themes. Thus, you may satisfy the designated theme requirements with a smaller number of courses than is stated in the requirement. Each quarter, the *Class Schedule* will publish the requirements and list all courses that satisfy them. In addition, the *Class Schedule* will list which of these courses are offered that quarter and which are tentatively scheduled for the subsequent quarters during the academic year.

RESOURCE GUIDE

School of Dentistry and Division of Dental Hygiene Offices

Office of the Dean
Dr. Richard P. Elzay
Dean, School of Dentistry
15-209 Moos Tower
612/625-9982

Office of Educational Research, Planning, and Development
Dr. Thomas D. Larson
Director
15-238 Moos Tower
612/625-9945

Office of Enrollment Management
Ms. Gale L. Shea
Director
15-106 Moos Tower
612/625-7149

Ms. Laura Boland
Recruitment coordinator
15-106 Moos Tower
612/624-6960

Dental Hygiene Office
Dr. Kathleen J. Newell
Director
9-436 Moos Tower
612/625-9121

School of Dentistry Departments

Clinical Systems
Dr. Harvey Colman
Director
8-434 Moos Tower
612/625-0653

Diagnostic/Surgical Sciences
Dr. William Liljemark
Chair
7-194 Moos Tower
612/624-5938

Oral Sciences
Dr. Gregory Germaine
Chair
17-252 Moos Tower
612/624-0478

Preventive Sciences
Dr. Carl Bandt
Chair
7-368C Moos Tower
612/625-5169

Restorative Sciences
Dr. Ralph DeLong
Chair
8-426 Moos Tower
612/625-0968

School of Dentistry Resources

Equal Opportunity/Affirmative Action
Dr. Kate Hathaway
6-320 Moos Tower
612/624-6946

Office of Student Financial Aid
Ms. Rose Miskowicz
2-693 Moos Tower
612/624-1665

Student Affairs Support Program
Learning and academic skills counselor
2-693 Moos Tower
612/625-0612

Health Sciences Minority Program
Ms. Jaki Cottingham-Zierdt
Director
1-125 Moos Tower
612/624-9400

University Resources

Boynton Health Service
410 Church St. S.E., Minneapolis
612/625-8400

Disability Services
30 Nicholson Hall
612/626-1333, voice or TTY

Housing Services
Comstock Hall East
612/624-2994

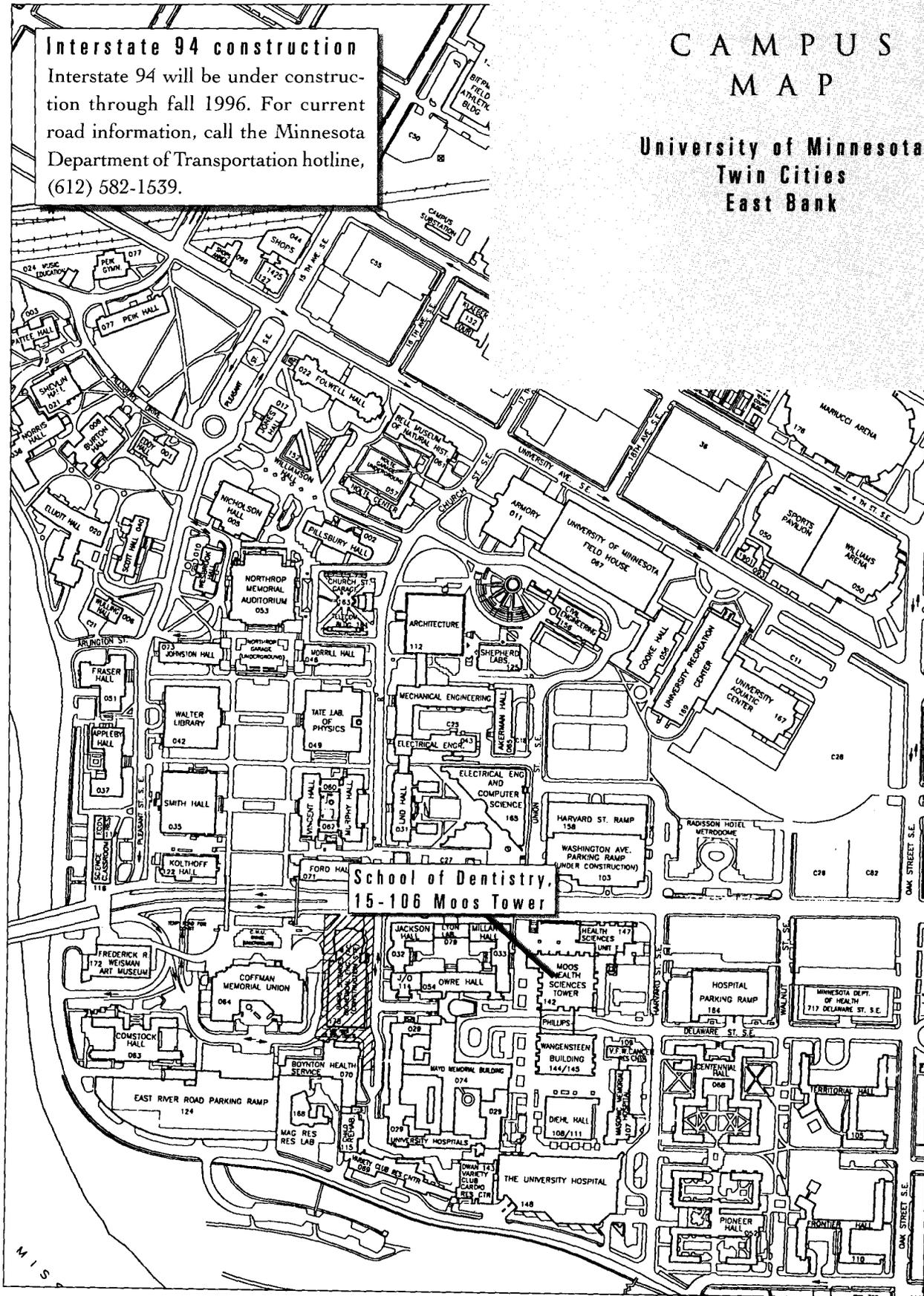
Parking Services
300 Transportation and Safety Building
612/626-PARK

Transit Services
301 Transportation and Safety Building
612/625-9000

Interstate 94 construction
 Interstate 94 will be under construction through fall 1996. For current road information, call the Minnesota Department of Transportation hotline, (612) 582-1539.

CAMPUS MAP

University of Minnesota
 Twin Cities
 East Bank



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