Dr. Manuel A. Idrogo, director of the University Unit, Family Practice Residency Program, with Dr. Daniel Smith performs an obstetric ultrasound examination of patient Melissa Flint.
Symbols—The following symbols are used throughout the course descriptions in lieu of page footnotes:

, .......... 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.
∆ .......... Approval of the department offering the course is required for registration.
ꞌ .......... 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.
1011, 1012, 1013 .......... Series courses, separated by commas; may be entered any quarter.
1011-1012-1013 .......... Sequence courses, separated by hyphens; must be taken in order listed.

A prerequisite course listed by number only (e.g., prereq 5246) is in the same department as the course being described.

Anesthesiology (Anes)

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

Professor Emeritus
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.
Paul A. Iaizzo, Ph.D.
Chi-Chia Liao, M.D., Ph.D.

Assistant Professor
William W. Anderson, M.D., Ph.D.
Ann E. Buttermann, M.D.
Richard J. Carr, M.D.
Richard H. Cochrane, M.D.
Robert L. Gauthier, M.D.
Barbara S. Gold, M.D.
Ian K. Hasinoff, M.D.
Andrew J. Houlton, M.D.
Chris H. Kehler, M.D.
Douglas E. Koehntop, M.D.
Josephine N. Lo, M.D.
Michael J. Lyons, M.D.
Paul S. Molinari, M.D.
David T. Pizzuto, M.D.
Mark W. Stuckey, M.D.
Steven E. Swaim, 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)

John D. Lipscomb, Ph.D., professor and acting head

Professor
Ian M. Armitage, Ph.D.
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.
Henricus P. Hogenkamp, Ph.D.
James B. Howard, Ph.D.
James F. Koerner, Ph.D.
David C. LaPorte, Ph.D.
Dennis M. Livingston, Ph.D.
Matthew F. Mescher, Ph.D.
Theodore R. Oegema, Ph.D.
James B. Bardwell, Ph.D.
Stephan C. Ekker, Ph.D.
Gregg B. Fields, Ph.D.
Daniel P. Gilboe, Ph.D.
Alex Lange, Ph.D.
Laura Mauro, Ph.D.
Sharon Murphy, Ph.D.
John P. Perentesis, M.D., Ph.D.
David A. Zarkower, Ph.D.
Associate Professor
Kenneth W. Adolph, Ph.D.
Kevin H. Mayo, Ph.D.
Robert J. Roon, Ph.D.
Michel M. Sanders, Ph.D.
Paul G. Siliciano, Ph.D.
Assistant Professor
Vivian J. Bardwell, Ph.D.
Steven C. McLoon, Ph.D.
Virginia S. Seybold, Ph.D.
Robert Sorenson, Ph.D.
Janet H. Wylie, Ph.D.
Professor Emeritus
Anna-Mary Carpenter, M.D., Ph.D.
Padmakar Dixit, Ph.D.
Jonathan A. Parsons, Ph.D.
Glenn J. Giesler, Ph.D.
Morris Smithberg, Ph.D.
Professor
G. Eric Bauer, Ph.D.
Edward H. Engelman, Ph.D.
Robert F. Elde, Ph.D.
Sten L. Erlandsen, Ph.D.
Glenn J. Giesler, Ph.D.
David W. Hamilton, Ph.D.
Richard W. Linck, Ph.D.
Associate Professor
Mary E. Porter, Ph.D.
Christopher N. Honda, Ph.D.
Donald W. Robertson, Ph.D.
Assistant Professor
Electra C. Coucouvanis, Ph.D.
Jean Magney, M.S.
H. Joseph Yost, 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)
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, cytchemical 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 5304. Head and Neck Anatomy for Medical and Dental Residents. (Cr ar)

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. (Cr ar)

CBN 5501. The Extremities. (Cr ar)

CBN 5502. Head, Neck. (Cr ar)

CBN 5508. The Thorax. (Cr ar)

CBN 5509. The Abdomen. (Cr ar)

CBN 5510. Perineum, Genital-Urinary System, Pelvis. (Cr ar)

Dermatology (Derm)

Mark V. Dahl, M.D., professor and head

Derm 5182. Preceptorship in Dermatology. (Cr ar)

Derm 5183. Advanced Course in Dermatology. (Cr ar)

Advanced Credit Courses

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

Family Practice and Community Health (FPCH)

William E. Jacott, M.D., associate professor and head

Professor
Carole J. Bland, Ph.D.
Edward W. Circu, M.D.
Edmond J. Coleman, Ph.D.
Joseph M. Keenan, M.D.

Associate Professor
Sharon S. Allen, M.D., Ph.D.
Donald S. Asp, M.D.
Charles E. Boul, M.D., M.P.H.
Dwenda K. Gjerdingen, M.D.
Harold R. Iretson, Ph.D.
David J. Mersy, M.D.
James T. Pacala, M.D., M.S.
Richard L. Reed, M.D., M.P.H.
B. R. Simon Ross, Ph.D.
Sharon B. Satterfield, M.D.

Assistant Professor
Brenda L. Abraham, M.D., M.S.
Patricia Adam, M.D.
Charles R. Anderson, M.D.
Nancy Baker, M.D.
Deanna L. Bass, M.D.
Kent D. Bergh, M.D.
Linda O. Bergum, M.D.
Mark R. Bixby, 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.
Jamie Feldman, M.D., Ph.D.
Patricia K. Felton, M.D.
Carroll M. Galvin, M.D.
Gregory J. Gepner, M.D.
Gwen W. Halaas, M.D.

Peter G. Harper, M.D.
Kenneth W. Hepburn, Ph.D.
Donald R. Houge, Ph.D.
Manuel A. Idrogo, M.D.
Joel P. Jahraus, M.D.
Ronald J. Jankowski, M.D.
James W. Jessen, M.D.
Robert J. Johnson, M.D.
Patrick A. Keenan, M.D.
Kenneth N. Kephart, M.D.
William H. Klopemken, M.D.
Phillip M. Korfon, M.D., M.P.H.

Barbara A. Leone, M.D.
James P. Lewis, M.D.
Maurice L. Lindblom, M.D.
Diane Madlon-Kay, M.D.
Daniel G. Mareck, M.D.
John C. McCabe, M.D.
Catherine McGegnay, M.D.
Deborah Mielke, M.D.
Mark R. Millis, M.D.
Michael H. Miner, Ph.D.
Robert P. Nelson, M.D.
Eugene C. Ott, M.D.

James J. Pattee, M.D.
Sonia E. Patten, Ph.D.
Ellen K. Perzinski, M.D.
James F. Peters, M.D.
Kevin A. Peterson, M.D., F.R.C.S., M.P.H.
Lawrence M. Poston, M.D.
Jerome Potts, M.D.
David V. Power, M.D., M.P.H.
Timothy J. J. Ramer, M.D.
Joysthysa M. Reddy, M.D.
Christopher J. Reif, M.D., M.P.H.

Lori A. Ricke, M.D.
Beatrice E. Robinson, Ph.D.
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. 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 four 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)

**FPCH 5511. Urban Community Ambulatory Medicine (UCAM).** (12 cr; prereq clinical medicine IV clerkship immediately before)
Sixteen weeks of primary care experience in an underserved urban community. Expands on Clinical Medicine IV by including cultural sensitivity to patient diversity, complementary and indigenous medicine, and community health.

**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 5519. Clinical Practice of Occupational Medicine.** (6 cr; prereq regis med)
Opportunity for fourth-year students interested in practicing safety, occupational health, and injury care to experience occupational medicine in a community clinical setting.

**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.** (Cr ar; prereq regis med)
Current methods and approaches to therapy and rehabilitation of chemically dependent patients.

**FPCH 5569. Obstetrics in Family Practice: A Personal and Family Perspective.** (4.5 cr; prereq 3rd- or 4th-yr regis med who are expectant parents)
Prenatal care, labor and delivery, postnatal care. Students each write a paper describing their personal experiences.

**FPCH 5580. Community Emergency Medicine.** (Cr ar; 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.
DEPARTMENTS AND COURSE DESCRIPTIONS

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 5345/5346. Analysis of Instruction and Educational Evaluation. (3 cr; prereq #)

FPCH 5596. Introduction to International and Intercultural Medicine. (4.5 cr; prereq 3rd- or 4th-yr med or FPCH resident)

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 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. (4 cr)

FPCH 5962. Clinical Hypnosis Workshop. (2 cr per workshop; prereq #)

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

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.

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 5120-5130) 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 antisepctic 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 qr; 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) Plotnikoff, Ytterberg, staff

**InMd 5095w. Clinical Medicine I: Medical Interviewing.** (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) M Pierpont, staff
Principles of genetics and their application to human diseases.

**InMd 5120su. Foundations of 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, Paulsen, staff
Fundamental concepts in the pathophysiology of respiratory, cardiovascular, neurological, and psychiatric diseases.

**InMd 5202. Pathophysiology II.** (10 cr; prereq regis med) Abrahm, 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) Huang, Levine, Kaplan, Rest, 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) Brown, staff
Introduction to principles and techniques of laboratory medicine.

**InMd 5508/5509 Clinical Medicine IV: Primary Care Medicine.** (12 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 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.
Miguel M. Azar, M.D., Ph.D.
Henry Balfour, M.D.
Ellis S. Benson, M.D.
David Brown, M.D.
Richard Bruning, M.D.
Donald P. Connelly, M.D.
Agustin P. Dalmasso, 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.
Vincent Garry, M.D.
Lael C. Gatewood, Ph.D.
Franz Halberg, M.D.
Erhard Haus, M.D., Ph.D.
Charles A. Horwitz, M.D.
Karen S. Karni, Ph.D.
John H. Kersey, M.D.
Tucker W. LeBien, Ph.D.
J. Carlos Manivel, M.D.
Jeffrey McCullough, M.D.
Takashi Okagaki, M.D., Ph.D.
John H. Orr, Ph.D.
Gundu H. R. Rao, Ph.D.
Andrew Rosenberg, Ph.D.
Dale C. Snover, M.D.
Michael Steffes, M.D., Ph.D.
Jack L. Titus, M.D.
Lee W. Wattenberg, M.D.

Clinical Professor
Alan Rose, M.D.

Associate Professor
Fred Apple, Ph.D.
Sue A. Barrow, M.D.
Aristidis S. Charonis, M.D., Ph.D.
H. Brent Clark, M.D., Ph.D.
John T. Crosson, M.D.
Lynda B. Ellis, Ph.D.
Danuta M. Giganti, Ph.D.
Helen M. Hallgren, M.S.
Betty Hirsch, Ph.D.
Jose Jessurun, M.D.
James B. McCarthy, Ph.D.
R. Scott McIvor, Ph.D.
Zoltan Posalaky, M.D.
Miriam Segall, Ph.D.
Yoji Shimizu, Ph.D.
Amy P. Skubitz, Ph.D.
William Swaim, M.D.
Michael Tsai, Ph.D.
Photini-Effie Tsilibrariy, M.D., Ph.D.
Carol L. Wells, Ph.D.
Michael J. Wilson, Ph.D.

Assistant Professor
Michael Altmann, Ph.D.
Robert Bowman, M.D.
Doris C. Brooker, M.D., M.S.
David Cherwitz, M.D.
Douglas J. Christie, Ph.D.
Gretchen Crary, M.D.
Gregg Fields, Ph.D.
Michael Glicirese, M.D.
William B. Gleason, Ph.D.
Joseph J. Goswitz, M.D.
Manuel Guzman, M.D.
Seumour Handler, M.D.
Waclaw Jaszcz, M.D., Ph.D.
Virginia Kubic, M.D., Ph.D.
David J. Lakatua, M.D.
Karen G. Lofsness, M.S.
Ronald C. McLennan, M.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.
Nancy A. Staley, M.D.
Theresa A. Steeper, M.D.
Thomas O. Swallen, M.D.
Cheryl D. Swinehart, M.S.
Keith Willard, M.D.

Physician/Assistant Professor
Scott Burger, 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 5101su. 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—Fairview-University Medical Center. (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 #) Linzie
For a description, see 5150.

LaMP 5152. Anatomic Pathology in a Hospital Setting—Veterans Affairs Medical Center. (Cr ar; prereq #) Guzman
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
For a description, see 5150.

General Courses in Clinical Pathology

LaMP 5158. Laboratory Medicine in a Community Hospital. (Cr ar; prereq #) Apple 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 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—Fairview-University Medical Center. (Cr ar; prereq #) Manivel 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 #) Linzie For a description, see 5113.

LaMP 5115. Surgical Pathology—Veterans Affairs Medical Center. (Cr ar; prereq #) Guzman For a description, see 5113.

LaMP 5119. Forensic Pathology—Medical Examiner’s Office, Hennepin County Medical Center. (Cr ar; prereq Year Three or Four) 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.

LaMP 5141. Problems in Experimental Pathology. (Cr ar; prereq #) 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. Karen Kelly, Dr. Alan Rose, Dr. Jack Titus in the cardiac pathology laboratory.

LaMP 5181. Laboratory and Clinical Hematology. (Cr ar; prereq #) Manoles 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 #)

LaMP 5211. Autopsies for Post M.D.’s. (Cr ar; prereq #)

LaMP 5213. Laboratory Medicine for Post M.D.’s. (prereq regis med, fellow spec, #)

LaMP 5765f. Hematology. (4 cr per qtr; prereq #) Lofsness Blood and blood-forming organs; blood and bone marrow from the standpoint of diagnosis and prognosis.
DEPARTMENTS AND COURSE DESCRIPTIONS

Medicine (Med)

Jonathan I. Ravdin, M.D., professor and head

Professor Emeritus
B.J. Kennedy, M.D.

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. Bittnerman, M.D.
Henry W. Blackburn, Jr., M.D.
Malcolm N. Bluementhal, M.D.
John Bond, M.D.
Elliott Chesler, M.D.
Jay N. Cohn, M.D.
Kent Crossley, M.D.
Gladvin Das, M.D.
Pablo Danes, M.D.
William Duane, M.D.
Gerard Fehy, M.D.
Gary Francis, M.D.
Arthur From, M.D.
Roger Gebhard, M.D.
Gordon Ginder, M.D.
Frederick Goetz, M.D.
Richard Grimm, M.D.
Ashley Haase, M.D.
Robert Hebbel, M.D.
Donald B. Hunninghake, M.D.
Harry S. Jacob, M.D.
Maynard E. Kaplan, M.D.
Robert L. Kane, M.D.
M. Colin Jordan, M.D.
Gerhard Johnson, M.D.
Donald B. Hunninghake, M.D.
Kathleen Hall, M.D.
Robert Gruninger, M.D.
Frank Grund, M.D.
Elie Gertner, M.D.
Craig Garrett, M.D.
Mary Gannon, M.D.
Juan Fried, M.D.
Martin Freeman, M.D.
Joan Fox, M.D.
Kathy Faber-Langendoen, M.D.
John Fox, M.D.
Martin Freeman, M.D.
John Fried, M.D.
Mary Gannon, M.D.
Craig Garrett, M.D.
Elle 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.
Gerald Hill, M.D., Adj.
Steven Hillson, M.D.
Alan Hirsch, M.D.
Samuel Ho, M.D.
Neal Holton, M.D.
Patrick W. Irvine, M.D.
Jeffrey Jaffe, M.D.
Anne Joseph, M.D.
Nigel Key, M.D.
Melissa King, M.D.
Susan Kline, 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.
Terese Paulson, M.D.
Craig Peine, M.D.
Thomas Pence, M.D.
Douglas Peterson, M.D.
Gregory Plotnikoff, M.D.
James Radford, M.D.
Brian Rank, M.D.
J. Bruce Redmon, M.D.
Steve Remole, M.D.
Kathryn Rice, M.D.
Kirk Rodystill, M.D.
Terry Rosborough, M.D.
Timothy Schacker, M.D.
Peter Schlesinger, M.D.
Anna Schorer, M.D.
Leonard Schlossberg, M.D.
Elizabeth Seaqist, 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.  Christine Wendt, M.D.  Med 5523. Medical Diabetes, Endocrinology, and Metabolism. (6 cr per period; offered all periods)  Robertson

Dorothy Uhlan, M.D.  Kathleen Whitley, M.D.  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.

Valerie Ulstad, M.D.  Georgia Wiesner, M.D.  Med 5524. Cardiovascular Medicine—Hennepin County Medical Center. (9 cr per period; offered all periods)  Goldsmith

Tryg Velde, M.D.  Anthony Woolley, M.D.  Six-week exposure to acute and consultative cardiology, with an emphasis on angina, acute myocardial infarction, heart failure, arrhythmias, and ECG interpretation.

Catherine Verfaillie, M.D.  Paul Yakshe, M.D.  Med 5525. Cardiovascular Medicine. (6 or 9 cr per period; offered all periods)  Bache

David Warden, M.D.  Steven Ytterberg, M.D.  Introduction to the diagnosis and management of cardiovascular disease occurring in adult patients.

James Warren, M.D.  Steven Zimmer, M.D.  Med 5526. Medical Oncology Consultation. (4.5, 6, or 9 cr per period; offered all periods; prereq 5500)  Luikart

Elective Courses

Med 5500. Medicine Externship I. (9 cr per period; offered all periods)  Miller

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 5500)  Miller

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.

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 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 5554. Fluid Electrolyte Acid-Base Metabolism. (6 cr per period; offered all periods; prereq 5500) 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—Fairview-University Medical Center. (6 cr per period; offered all periods; prereq 5500) Hostetter
Students gain proficiency in the diagnostic workup, treatment, and management of kidney patients.

Med 5561. Outpatient and Clinical Nephrology—St. Paul Ramsey Medical Center. (6 cr; offered all periods; prereq 5500) Abraham
Renal problems common to a community clinic and hospital. Renal clinics are held four 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; prereq 5500) 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) Harris
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 5573. Acute Care Internal Medicine—Veterans Affairs Medical Center. (3, 4.5, 6 cr per period; offered all periods; prereq 5500, 5501) Cohen
Students acquire skills in diagnosing and treating acute conditions encountered in internal medicine.

Med 5579. Critical Care/Medical Intensive Care Unit. (6 cr; 5501 recommended; offered all periods) Ingbar
For fourth-year students who want hands-on critical care medicine experience. Emphasizes caring for acutely ill and ventilator-dependent patients in an intensive care unit.

Med 5580. Coronary Care Unit—Veterans Affairs Medical Center. (6 cr per period; prereq 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 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 5583F.s. Fundamentals of Clinical Oncology. (6 cr per period; prereq 5500, Ped 5501) 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 5595. Musculoskeletal Problems in Primary Care Practice—Hennepin County Medical Center. (4.5 cr. per period; offered all periods; prereq 5500) Stillman
Emphasis on proper musculoskeletal examination, basic joint aspiration and injection techniques, as well as developing better interpretive skills in reviewing laboratory values and bone/joint radiographs.

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.

Med 5598. Biomedical Ethics. (4.5 or 9 cr per period; offered all periods) Miles
Independent study course. Students identify a health care ethics problem from either a clinical or public policy perspective. Each student writes a paper based on their experiences.

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.
Dwight L. Anderson, Ph.D.

Associate Professor
Kathleen Conklin, Ph.D.
Ronald Jemmerson, Ph.D.
P. Patrick Cleary, Ph.D.
Larry McKay, Ph.D.
Peter G. W. Plagemann, Ph.D.
Paul Quie, M.D.
Palmer Rogers, Ph.D.
Michael Sadowsky, Ph.D.
Patrick Schlievert, Ph.D.
James F. Zissler, Ph.D.

Ph.D.
Paul Quie, M.D.
Palmer Rogers, Ph.D.
Michael Sadowsky, Ph.D.
Patrick Schlievert, Ph.D.
James F. Zissler, Ph.D.

Ph.D.
Karen Paulson, Ph.D.
P. Patrick Cleary, Ph.D.
Larry McKay, Ph.D.
Peter G. W. Plagemann, Ph.D.
Paul Quie, M.D.
Palmer Rogers, Ph.D.
Michael Sadowsky, Ph.D.
Patrick Schlievert, Ph.D.
James F. Zissler, Ph.D.

University of Minnesota, Duluth
College of Biological Sciences

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

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

Required Courses

**MicB 5205w.** 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.

**MicB 5206s.** 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.

**MicB 5105f,w,s.** Biology of Microorganisms. (5 cr; §3103, §Biol 5013; prereq 5 cr biological sciences, Biol 5001 or §) Hanson, Sherman

Lectures, demonstrations, and laboratory exercises in taxonomy, anatomy, physiology, biochemistry, and ecology of microbes. Molecular structure in relation to bacterial function.

**MicB 5218w.** Immunology. (3 cr; prereq Biol 5001) Jemmerson


**MicB 5234w.** Immunology and Medical Microbiology Laboratory. (3 cr; prereq 5218 or §5218, §5232 or §5222) Cleary, Jemmerson

Principles that determine outcome of host-parasite interactions. Methods basic to host defense and immunology, including immunohematological and microbiological methods for diagnosing infectious disease.

**MicB 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.

**MicB 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.

**MicB 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.

**MicB 5352s.** Applied Microbiology. (4 cr; prereq 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.

**MicB 5424s.** Biology of Viruses. (3 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.

**MicB 5425s.** Virology and Microbial Genetics Laboratory. (3 cr; prereq §5424 or equiv, Biol 5001, GCB 5022) Plagemann, Schiff, Southern

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.

**MicB 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.

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1. Microscope required. Students may obtain use of microscope by purchasing a $6.00 microscope card from the bursar.
Neurology (Neur)

Gareth Parry, M.D., professor and head

Professor Emeritus
Milton G. Ettinger, M.D.
Edward H. Lambert, M.D.

Professor
David C. Anderson, M.D.
Khurshed A. Ansari, M.D.
Gary Birnbaum, M.D.
Ronald E. Cranford, M.D.
Costantino Iadecola, M.D.
William R. Kennedy, M.D.
Arthur C. Klassen, M.D.
Lawrence Lockman, M.D.
David Rotenberg, M.D.
Joo Ho Sung, M.D.
Kenneth F. Swaiman, M.D.
Fernando Torres, M.D.
Jonathan D. Wirtschafter, M.D.

Associate Professor
James Ashe, M.D.
H. Brent Clark, M.D.
William Dobyns, M.D.
Christopher Gomez, M.D.
Karen Hsiao, M.D., Ph.D.
David Knopman, M.D.
Robert Kriel, M.D.
Myoung C. Lee, M.D.
Winfried Raabe, M.D.
Manuel Ramirez-Lassepas, M.D.
Elsa G. Shapiro, Ph.D.

Assistant Professor
Thomas Ala, M.D.
Scott Bundlie, M.D.
John G. Davenport, M.D.
William David, M.D.
John Day, M.D., Ph.D.
William H. Frey, M.D.
Frederick M. Langendorf, M.D.
Mark W. Mahowald, M.D.
J. Riley McCarten, M.D.
Hani Midani, M.D.
James A. Moriarty, M.D.
M. Elizabeth Ross, M.D., Ph.D.
John W. Tulloch, M.D.

Instructor
Mario Quinones, 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

Neur 5510. Externship in Clinical Neurology—University affiliated hospitals. (6 cr; prereq regis med) Day

Elective Courses

Neur 5120. Selected Problems in Neurology. (Cr and hrs ar; prereq regis med) Day

Neur 5124. Sleep Disorders Medicine—Externship—Hennepin County Medical Center. (Cr and hrs ar; prereq regis med) Mahowald

Neur 5542. Pediatric Neurology. (Cr and hrs ar; prereq regis med) Lockman

Advanced Credit Courses

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

Neurosurgery (NSu)

Robert E. Maxwell, M.D., Ph.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.
Walter C. Low, Ph.D.
Seth S. Rengachary, M.D.
Gaylan L. Rokowski, M.D., Ph.D.
Jonathan D. Wirtschafter, M.D.

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

Assistant Professor
Thomas A. Bergman, M.D.
M. H. Biros, M.D.
Christine M. Cox, M.D.
William F. Ganz, M.D.
Richard L. Sutton, 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

NSu 5500. Externship—Fairview-University Medical Center. (4.5 or 9 cr; prereq regis med)

NSu 5510. Externship—Veterans Affairs Medical Center. (4.5 or 9 cr; prereq regis med)

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

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

NSu 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
Leon L. Adcock, M.D.
Harry Foreman, M.D.
Konald A. Prem, M.D.
George E. Tagatz, M.D.

Professor
Emanuele Gaziano, M.D.
Joseph I. Hamel, M.D.
G. Eric Knox, M.D.
Benjamin S. Leung, Ph.D.
Mark G. Martens, M.D.
Takashi Okagaki, M.D., Ph.D., M.P.H.
Roger A. Potish, M.D.
Theodore R. Thompson, M.D.
Leo B. Twiggs, M.D.

Associate Professor
Richard P. Bendel, M.D.
Charles H. Blomquist, Ph.D.
Linda F. Carson, M.D.
Laura E. Edwards, M.D.
Jeffrey M. Fowler, M.D.
Theodore C. Nagel, M.D.
Hardin E. Olson, M.D.
Preston P. Williams, M.D.

Assistant Professor
Sarah B. Archer, M.D.
Barbara G. Assel, M.D.
Dennis B. Bealka, M.D.
Doris C. Brooker, M.D.
Linda Hammer Burns, Ph.D.
Steven E. Calvin, M.D.
M. Dwight Chen, M.D.
Laurine C. Coultrip, M.D.
Pamela D’Ascoli, M.D.
William F. Dickes, M.D.
Mohamed M. El-Zaatari, M.B.Ch.B.
Lea A. Fairbanks, 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.
Anil K. Kaul, Ph.D.
Rashmi Kaul, M.D.
Fredrick H. Kravitz, M.D.
June LaValleur, M.D.
Gary T. Lundborg, M.D.
Virginia R. Lupo, M.D.
David I. Lynch-Salamon, M.D.
Patricia A. Mills, M.D.
Judith A. Ney, M.D.
Sharon Norling, M.D.
Sue V. Petzel, Ph.D.
Kathleen M. Pflegaar, M.D.
Jon L. Pryor, M.D.
Sundaram Ramakrishnan, Ph.D.
Marcia R. Shew, M.D.
Mark L. Tzan, M.D.
Jeffrey Warshaw, M.D.
David I. Wigren, M.D.

Instructor
Jonathan A. Cosin, M.D.
Kris Ghosh, M.D.
Karuna P. Murray, 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 Fairview-University Medical Center 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

Obst 5500. Externship on the Primary Care of Women. (Cr ar; prereq regis med) Twiggs, staff
Six-week experience in clinical obstetrics and gynecology in hospitals: Fairview-University, Hennepin County, St. Paul Ramsey, North Memorial, Mercy, Southdale, St. John’s, Waconia, and 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 Moos Tower on Monday afternoons for the first week.

Obst 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.

Obst 5540. Advanced Externship in Obstetrics and Gynecology. (Cr and hrs ar; prereq 5500) Twiggs, staff
Full-time clinical experience in clinical obstetrics and gynecology at one of three hospitals: Hennepin County, St. Paul-Ramsey, or Fairview-University. Students may express hospital preference, but final assignments are made by course coordinator. Emphasis is on total care of obstetrical patients and on management of major gynecological conditions.

Obst 5560. Research in Reproduction. (Cr and hrs ar) Twiggs, staff
Topics selected for each student.

Obst 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.

Obst 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.

Obst 8217-8221. Seminar: Obstetrics and Gynecology. (Cr ar)

Obst 8222-8223. Gynecological Oncology. (Cr ar)
Ophthalmology (oph)

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

Professor Emeritus
William H. Knobloch, M.D.

Professor
Donald J. Doughman, M.D.
Edward J. Holland, M.D.
Jay H. Krachmer, M.D.
Jonathan D. Wirtschafter, M.D.

Associate Professor
J. Douglas Cameron, M.D.
Dale S. Gregerson, Ph.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.
Agnes S. Huang, M.D.
Susan Keirstead, Ph.D.
Arthur W. Walsh, M.D.
Martha M. Wright, M.D.
Terri L. Young, M.D.

Elective Courses

Oph 5100. Introduction to Ophthalmic Pathology.
(1 cr; prereq #)

Oph 5180. Externship in Ophthalmology.
(4.5 cr; prereq #)

(Cr ar)

Advanced Credit Courses

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

Orthopaedic Surgery (OrSu)

James W. Ogilvie, M.D., professor and interim head

Professor Emeritus
James H. House, M.D.

Professor
James R. Gage, M.D.
Ramon B. Gustilo, M.D.
Jack L. Lewis, Ph.D.
Edward McElfresh, M.D.
Theodore E. Oegema, Ph.D.
Roby C. Thompson, Jr., M.D.

Associate Professor
Robert F. Premer, M.D.

Associate Professor Emeritus
Robert F. Premer, M.D.

Associate Professor
Elizabeth A. Arendt, M.D.
Denis Clohisy, M.D.
Steven E. Koop, M.D.
Richard F. Kyle, M.D.
Ensor E. Transfeldt, M.D.

Assistant Professor
Joan E. Bechtold, Ph.D.
Daniel Buss, M.D.
Edward Y. Cheng, M.D.
Leo J. de Souza, M.D.
Stephen England, M.D.
Timothy A. Garvey, M.D.
Robert F. LaPrade, M.D.
Tom Novacheck, M.D.
Matthew Putnam, M.D.
Deborah Quanbeck, M.D.
Hanny J. Robinson, Jr., M.D.
Mark W. Rodosky, 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

OrSu 5180. Orthopaedics I.
(Cr ar; prereq regis med)

OrSu 5185. Orthopaedics II—Externship in Orthopaedic Surgery.
(Cr ar; prereq regis med)

OrSu 5186. Research Problems in Orthopaedic Surgery.
(Cr ar; prereq regis med)

OrSu 5188. Externship in Orthopaedic Surgery and Fractures—Gillette Children’s Hospital, St. Paul.
(Cr ar; prereq regis med)

OrSu 5190. Externship in Orthopaedic Surgery and Fractures—Veterans Affairs Medical Center.
(Cr ar; prereq regis med)

OrSu 5191. Orthopaedic Externship—Hennepin County Medical Center.
(Cr ar; prereq regis med jr or sr)

OrSu 5192. Preceptorship in Orthopaedic Surgery.
(Cr ar; prereq regis med jr or sr)

OrSu 5194. Orthopaedic Externship—Centennial Lakes Medical Center.
(Cr ar; prereq regis med)

OrSu 5195. Orthopaedics for the Generalist—UMD Department of Family Medicine.
(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.

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.
Peter A. Sant, Ph.D.

Associate Professor
John H. Anderson, M.D., Ph.D.
Lawrence R. Boies, Jr., M.D.
Richard P. DiFabio, Ph.D.
Markus Gapany, M.D.
George S. Goding, Jr., M.D.
Peter A. Hilger, M.D.
David B. Horn, M.D.
Eric Javel, Ph.D.
Samuel C. Levine, M.D.
Students are introduced to clinical otolaryngology through a lecture series on common and serious problems, including epistaxis, emergency airways, otitis media, and sinusitis. During rotations with faculty at related facilities, students see and participate in caring for a full range of head and neck problems. The faculty emphasize anatomic, physiologic, and pathologic changes in the ears, nose, and throat. Differential diagnosis and appropriate examination and evaluation are emphasized. Students have opportunities to experience surgical otolaryngology.

Elective Courses

Otol 5200. Surgical Specialty: Otolaryngology. (Cr ar)

Otol 5501. Acting Internship—ENT. (Cr ar)

Otol 5503. Research in Basic Science—ENT. (Cr ar)

Advanced Credit Courses

Otol 5970. Directed Studies. (Cr ar)

Pediatrics (Ped)

James Moller, M.D., professor and interim head

Assistant Professor

Kathleen A. Daly, M.P.H., Ph.D.

Gail Donaldson, Ph.D.

Timothy Doyle, Ph.D.

David D. Hamlar, D.D.S., M.D.

Lisa L. Hunter, Ph.D.

Mario J. Imola, D.D.S., M.D.

Rick M. Odland, M.D., Ph.D.

Robert Schlauch, Ph.D.

Gary E. Schnitker, M.D.

Edward Szachowicz II, M.D., Ph.D.

James White, M.D.

Christopher Wyllie, Ph.D.

Associate Professor

John Bass, M.D.

Elizabeth Braunlin, M.D., Ph.D.

Blanche Chavers, M.D.

Amos Deinard, M.D.

William Dobyns, M.D.

Rolf Engel, M.D.

David Fisher, M.D.

Michael Georgioeff, M.D.

Imad Haddad, M.D.

Peter Hesslein, M.D.

David Ingbar, M.D.

Mathur Kannan, B.V.Sc., Ph.D.

Clifford Kashtan, M.D.

Daniel Kohan, M.D.

Kim Krabill, M.D.

Samuel Levine, M.D.

Mark C. Mammel, M.D.

Joseph Neglia, M.D., M.P.H.

Charles Oberg, M.D.

John Perentes, M.D.

Charles Peters, M.D.

Mary Ella Pierpont, M.D., Ph.D.

Warren Regelmann, M.D.

Gary Remafedi, M.D., M.P.H.

Leon Satran, M.D.

Krishna Saxena, M.D.

Sarah Jane Schwarzenberg, M.D.

Elsa Shapiro, Ph.D.

Xiao Ou Shu, M.D., M.P.H.

Clark Smith II, M.D.

John Wagner, M.D.

O. Douglas Wangensteen, 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.

Gail Brotman-Kagan, M.D.

Becky Murray Carpenter, M.D.

Pi-Nian Chang, Ph.D.

Raul Cifuentes, M.D.

J. Michael Coleman, M.D.

David N. Cornfield, M.D.

Timothy Culbert, M.D.

Diana Cutts, M.D.

Gladwin Das, M.D.

Stella M. Davies, M.D., M.B.B.S., Ph.D.

Theora Dodd, Ph.D.

Ralph Faville, M.D.

Gary Fifield, M.D.

John Garcia, M.D.

Catherine Gatto, M.D.

Darryl Geetz, Ph.D., L.P.

Joanne Hilden, M.D.

Marjorie Hogan, M.D.

J. Margaret Horrobin, M.D.

Laura Hoyt, M.D.

Harumi Jyonouchi, M.D.

Deepak Kamat, M.D.

Andrew Lasky, M.D.

Carolyn Levitt, M.D.

Jeffrey Lobas, M.D.

Peter Loewenson, M.D.

Jamie Lohr, M.D.

Richard Lusksy, M.D.

Dawn Martin, M.D.

Nancy Mendelsohn, M.D.

Ann Mertens, Ph.D.

Christopher L. Meyer, M.D.

Antoinette Moran, M.D.

Paul Orchard, M.D.

Andrew Ozolins, M.D.

Angela Panoskaltsis-Mortari, Ph.D.

Basavapatna S. Rajagopal, Ph.D.

Michael Reiff, M.D.

Frank Rimelli, M.D.

Thomas Rollowicz, M.D.

Gerald Rosen, M.D.

Julie Ross, Ph.D.

Kumud Sane, M.D.

Marc Shew, M.D., M.P.H.

Michael Shreve, M.D.

Stephen Smith, M.D.

Joseph Sockalosky, M.D.

Julia Steinberger, M.D.

Michael Steinbich, Ph.D.

Michael Sweeney, M.D.

David Thompson, M.D.

Linda Thompson, M.D.

John D. Tobin, M.D.

Rachel Trockman, M.D.

Albert Tsai, M.D.

Richard K. Vehe, M.D.

Michael Vespasiano, M.D.

Beverly Wical, M.D.

Judith Zier, M.D.

Instructor

Cathryn Angel, M.D.

Marjorie F. Ankel, M.D.

Arthur A. Beisang III, M.D.

Stephen Blythe, M.D.

Raye-Ann deRegnier, M.D.

T. Bruce Ferrara, M.D.

Cheryl Gale, M.D.

Jennifer Gobel, M.D.

Sixto Guiang, M.D.

Erik Hagen, M.D.

Julie Hauer, M.D.

Vivian R. Husnik, M.D.

Elizabeth Ingulli, M.D.

Nancy Kammer, M.D.

Anne Kelly, M.D.

Paul Kubic, M.D.

Edward “Chip” Martin, M.D.

Carlos Millia, M.D.

Judson Reaney, M.D.

Andrew Sagan, M.D.

Kevin Sheridan, M.D.

Janet West, M.D.

Laurel Wills, M.D.
Pediatrics is concerned with the basic aspects of human developmental biology both in the prenatal period and postnatal life. 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 growth and developmental aspects are learned through the Student as Physician tutorials. With a faculty tutor, the student examines children with various pediatric conditions and problems.

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 affiliated 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

Ped 5501. Pediatric Externship. (Cr ar) Provides opportunities to work with children and their families as inpatients and in ambulatory settings.

Ped 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.

Ped 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.

Ped 5534. Pediatric Cardiology at the University. (Cr ar) Evaluation of children with cardiac symptoms or murmurs, establish diagnosis, develop plans and counsel parents.

Ped 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.

Ped 5536. Pediatric Hematology/Oncology/Bone Marrow Transplantation at the University. (Cr ar) Introduction to hematologic and oncologic problems on inpatient and outpatient children.

Ped 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.

Ped 5538. Pediatric Gastroenterology and Nutrition. (Cr ar) Allows the student to see inpatient and outpatient children with gastrointestinal or nutritional problems.

Ped 5539. Neonatal Medicine Externship. (Cr ar) Student assumes the responsibility of a first-year resident in the management of premature and term infants.

Ped 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.

Ped 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.

Ped 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.

Ped 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.

Ped 5553. Adolescent Medicine. (Cr ar) Major health concerns of youth. Participate in a variety of ambulatory settings.


Ped 5560. Research/Special Problems in Pediatrics. (Cr ar) Perform clinical or basic research with a pediatric faculty member.

Ped 5565. Pediatric Immunology. (Cr ar) Function as an acting intern of the pediatric immunology service, providing consultation and assessment of both inpatients and outpatients.
Pharmacology (PhCl)

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

Professor Emeritus
Gilbert J. Manning, Ph.D.
Jack W. Miller, Ph.D.
Akira E. Takemori, Ph.D.

Professor
Bianca Conti-Fine, M.D.
Esmal El-Fakahany, Ph.D.
Patrick E. Hanna, Ph.D.
Jordan L. Holtzman, Ph.D., M.D.
Donald B. Hunninghake, M.D.
Ping-Yee Law, Ph.D.
Paul R. Pentel, M.D.
Alan R. Sinaiko, M.D.
Norman E. Sladek, Ph.D.
Sheldon B. Sparber, Ph.D.
Fath M. Uckun, M.D., Ph.D.
George L. Wilcox, Ph.D.
W. Gibson Wood III, Ph.D.
Ben G. Zimmerman, Ph.D.

Associate Professor
Earl W. Dunham, Ph.D.
Kenneth M. Hargreaves, D.D.S., Ph.D.
Rita B. Messing, Ph.D.
Louise M. Nutter, Ph.D.
Robert F. O’Dea, M.D., 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.

Required Courses
Phcl 5110. Pharmacology. (2 cr; prereq regis med or #) Hunninghake
Phcl 5111f.w. Pharmacology. (7 cr [3 cr f, 4 cr w]; prereq 5110 or #) Hunninghake

Elective Courses
Phcl 5109. Problems in Pharmacology. (Cr ar; hrs ar; prereq #)

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

Associate Professor
Emeritus
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.

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
PMed5410. Adult Rehabilitation Medicine. (Cr ar; prereq regis med)
PMed5411. Pediatric Rehabilitation Medicine. (Cr ar; prereq regis med)
PMed5412. Physical Medicine and Rehabilitation—Veterans Affairs Medical Center. (Cr ar; prereq regis med)

PMed5415. Private Practice in Physical Medicine and Rehabilitation in Duluth. (Cr ar; prereq regis med)

PMed 5418. Rehabilitation Medicine—Hennepin County Medical Center. (Cr ar)

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.
Joseph DiSalvo, 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
W. Dale Branton, Ph.D.
Janet M. Dubinsky, Ph.D.
Martha Flanders, Ph.D.
Jurgen F. Fohlmeister, Ph.D.
Paul A. Iaizzo, Ph.D.
Stephen Katz, Ph.D.
Scott M. O'Grady, Ph.D.
John W. Osborn, Ph.D.
Winfried A. Raabe, M.D.
Douglas Wangensteen, Ph.D.

Assistant Professor
Vincent A. Barnett, Ph.D.
Linda M. Boland, Ph.D.
Eric A. Newman, 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 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 muscle physiology and 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

Phsl 5110w. Human Physiology. (3 cr; prereq anatomy, biochemistry)

Phsl 5111s. Human Physiology. (4 cr; prereq 5110)

Phsl 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

Phsl 5113f,w,s. Problems in Physiology. (Cr and hrs ar; prereq 5111 or #)

Topics assigned for readings or lab study; conferences.

Phsl 5201f. Computational Neuroscience I—Membranes and Channels. (5 cr; prereq 5112 or equiv)

Comprehensive examination of membrane and ion channels using UNIX workstations to simulate their properties. Topics include the Hodgkin-Huxley model, non-linear dynamic systems, voltage and ligand gated ion channels, impulse propagation.

Phsl 5202w. Computational Neuroscience II—Cells and Circuits. (5 cr; prereq an understanding of UNIX, 5201 or equiv)

Comprehensive investigation of the computational properties of single neurons and locally connected cell networks. Topics include linear cable theory, compartmental modeling of single neuron properties, spatio-temporal interactions between synaptic inputs in neuronal dendritic trees, 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.

Phsl 5203s. Computational Neuroscience III—Neural Systems and Information Processing. (5 cr; prereq 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.

Phsl 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.

Phsl 5460f, 5461wr. Cellular and Molecular Neuroscience. (3 cr each; prereq biochem)

Contemporary cellular and molecular approach to studying the nervous system. Topics include gene structure and regulation, cloning and molecular strategies to study gene function, ion channels and membrane excitability, synaptic transmission, receptor structure and function, and signal transduction.
Phsl 5552f,w,s. Readings in Physiology. (Cr and hrs ar)
Topics selected for each student; written reviews prepared and discussed.

Phsl 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.
James Halikas, M.D.
Boyd Hartman, M.D.
Dorothy Hatsuakami, Ph.D.
Thomas Kiresuk, Ph.D.
Jerome Kroll, M.D.
Thomas B. Mackenzie, M.D.
Richard Magraw, M.D.
Michael Popkin, M.D.
Joseph Westermeyer, M.D., Ph.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 Edwardsen, M.D.
Patricia Farris, Ph.D.
William Frey, M.D.
John Heefner, M.D.
Thomas Hurwitz, M.D.
Young-Ho Kang, M.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.
Thomas Wiener, M.D.
Marlin Wiemer, Ph.D.
Janet Zander, M.D.

Associate Professor
Eduardo Colon, M.D.
Sheila Specker, M.D.
Suck Won Kim, M.D.
Dawn J. Koehler, Ph.D.
Gabe Maletta, M.D., Ph.D.
William Meller, M.D.
Richelle Moen, Ph.D.
Mark Willenbring, 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 neuropsychology, 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; addictive behavior; the neurobiology of memory, language, emotion, and attention; health care organization and financing; 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—Anoka State Hospital, Hennepin County Medical Center, St. Paul-Ramsey Medical Center, Fairview-University Medical Center, Veterans Affairs Medical Center.** (Cr ar; Year Three) Eckert

**Elective Courses**

- **AdPy 5516. St. Mary’s Extended Care Center: Alcoholic Treatment Unit—St. Mary’s ECC.** (4.5 or 9 cr; prereq regis med) Mann
- **AdPy 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., director

**Associate Professor**
- Jonathan Jensen, M.D.
- George Realmuto, M.D.
- Carrie Borchardt, M.D.

**Elective Courses**

- **CAPy 5201. Diagnostic Practicum in Child and Adolescent Psychiatry—Fairview-University Medical Center.** (Cr ar; prereq #; A-F only) Realmuto
- **CAPy 5203. Child and Adolescent Psychiatry for Psychology Interns—Fairview-University Medical Center.** (Cr ar; prereq #) Realmuto

  Experience in assessment and therapeutic interventions with children, adolescents, and families in child and adolescent psychiatric setting.

- **CAPy 5204. Diagnostic Methods in Child, Adolescent, and Family Psychiatry—Fairview-University Medical Center.** (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.

**CAPy 5520f,w.s. Outpatient Clinical Child and Adolescent Psychiatry for Primary Care Physicians—Fairview-University Medical Center.** (Cr ar; prereq med, #; not offered period 5; hrs ar) Realmuto

  Supervised diagnostic and therapeutic experiences in an outpatient setting.

**CAPy 5522. Clinical Inpatient Child and Adolescent Psychiatry—Fairview-University Medical Center.** (Cr and hrs ar) Borchardt

  Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary child psychiatric unit with emphasis on group and milieu therapies.

**CAPy 5602f,w. Introductory Readings in Child, Adolescent, and Family Psychiatry and Research Methods—Fairview-University Medical Center.** (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 Center. It prepares future practitioners, researchers, and teachers across the broad field of public health. For more information, contact the Student Services Center, School of Public Health, 420 Delaware Street S.E., Box 819, Minneapolis, MN 55455 (612/626-3500 or 1-800-774-8636; e-mail sph-uofm@greg2.sph.umn.edu)

**Administrators**

- Edith D. Leyasmeyer, Ph.D., M.P.H., dean
- Jonathan Jensen, M.D.
- George Realmuto, M.D.

**Professors**

- Harry Lando, Ph.D.
- Chap T. Le, 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.
- Alessandro Menotti, M.D., Ph.D.
- Ira Moscovice, Ph.D.
- David Murray, Ph.D.
- James Neaton, Ph.D.
- Cheryl Perry, Ph.D.
- Phyllis Pirie, Ph.D.
- Michael Resnick, Ph.D.
- Ken Sexton, Sc.D.
- Robert Veninga, Ph.D.
- Donald Vesley, Ph.D.
- James Vincent, Ph.D., Sc.D.
- Alexander Wagenaar, Ph.D., M.S.W.

**Associate Professors**

- Mila A. Aroskar, Ed.D.
- Lester Block, D.D.S., M.P.H.
Bradley Carlin, Ph.D.
Thomas Choi, Ph.D.
Tim Church, Ph.D., M.S.
Patrick Elmer, Ph.D.
Michael Finch, Ph.D.
John Finnegann, Jr., Ph.D.
Jean Forster, Ph.D., M.P.H.
Susan Gerberich, Ph.D.
Patricia Grambusch, Ph.D.
Ian Greaves, M.D.
Sun-Wei Guo, Ph.D.
Lawrence Kushi, Sc.D.
Alan Lisson, M.D.
Leslie Lytle, Ph.D.
Paul McGovern, Ph.D.
John Nyman, Ph.D.
Joan Patterson, Ph.D.
Tom Sellers, Ph.D.
Eyal Shahar, M.D.
Mary Story, Ph.D.
Deborah Swackhammer, Ph.D.
William Thomas, Ph.D.
Lance Waller, Ph.D.
Carolyn Williams, Ph.D.
Simone French, Ph.D.

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

Biostatistics
Community Health Education
Environmental Health
Epidemiology
Health Services Research and Policy
Health Services Research, Policy and 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.
David Hunter, M.D.
Christopher Kuni, M.D.
Carol Coleman-Steensom, M.D.
James Crowe, M.D.
René duCret, M.D.
Simon Efange, Ph.D.
Christopher Engeler, M.D.
Michael Garwood, Ph.D.
Marvin E. Goldberg, M.D.
Bruce Hammer, Ph.D.
Xiaoping Hu, Ph.D.
E. Russell Ritenour, Ph.D.
Arthur Stillman, M.D.
Stephen Strother, M.D.
Stephen Trenkner, M.D.
Charles Truwit, M.D.
Zeev Vlodaver, 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.
Brian Fiedler, M.D.
David Finlay, M.D.
Richard Geise, Ph.D.
Tom Gilbert, M.D.
David Gross, M.D.
Frank Grund, M.D.
Bruce Hasselquist, Ph.D.

Professor Emeritus
Eugene Gedgaudas, M.D.

Professor
Kurt Amplatz, M.D.
Robert Boudreau, M.D., Ph.D.
David Hunter, M.D.
Christopher Kuni, M.D.

Associate Professor
Howard Ansel, M.D.
Carroll Arnett, M.D.

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

Walter Hildebrandt, M.D.
Stephen Hite, M.D.
Jeremy Hollerman, M.D.
Michael Jerosh-Herold, Ph.D.
Edith Kang, M.D.
Seong-Gi Kim, Ph.D.
John Knoedler, M.D.
Charlens Krenzke, M.D.
Steven Krueckeberg, M.D.
Bert Larson, M.D.
Haiyung Liu, Ph.D.
Robert Low, M.D.
Robert Miller, M.D.
William Mize, M.D.
Paul Mulcahy, M.D.
Gwen Nazarian, M.D.
Mary Jo Nelson, M.D.
Patrick O’Brien, M.D.
Richard Patterson, M.D.
Leland Previtt, M.D.
Shashikant Sane, M.D.
Warren Stanchfield, M.D.
Martin Strandness, M.D.
David Swanson, M.D.
Joseph Tashjian, M.D.
Saul Taylor, M.D.
Joaquim Vieira, M.D.
Dawn Voegeli, M.D.
Neil Wasserman, 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 Efange, Ph.D.

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

Elective Courses

Rad 5101. Externship: Diagnostic Radiology—
Fairview-University Medical Center. (Cr ar; prereq regis med)

Rad 5102. Externship: Diagnostic Radiology—
Veterans Affairs Medical Center. (Cr ar; prereq regis med)

Rad 5103. Externship: Diagnostic Radiology—
Hennepin County Medical Center. (Cr ar; prereq regis med)

Rad 5105. Externship Diagnostic Radiology—St.
Lukes-Duluth. (Cr ar; prereq regis med)

Rad 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., Ph.D., professor and chair

Regents’ Professor Emeritus
Richard L. Varco, M.D., Ph.D.

Professor
R. Morton Bolman III, M.D.
Henry Buchwald, M.D., Ph.D.
Michael D. Caldwell, M.D., Ph.D.
Frank B. Cerra, M.D.
Bruce L. Cunningham, M.D.
John P. Delaney, M.D., Ph.D.
John E. Foker, M.D., Ph.D.
Robert L. Goodale, M.D., Ph.D.
Rainer W. G. Gruessner, M.D., Ph.D.
Allen S. Levine, Ph.D.
Arthur J. Matas, M.D.
Donald G. McQuarrie, M.D., Ph.D.
J. Ernesto Molina, M.D., Ph.D.
William D. Payne, M.D.
David G. Reynolds, Ph.D.
Yoshio Sako, M.D., Ph.D.
Sara J. Shumway, M.D.
David E. R. Sutherland, M.D., Ph.D.
John Weigelt, M.D., D.V.M.
Carol L. Wells, Ph.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.
Hovard K. Helseth, M.D.
James T. Lee, M.D., Ph.D.

Charles D. Mills, Ph.D.
Nancy L. Reinsmoen, Ph.D.
Jorge L. Rodriguez, M.D.
Lynn D. Solem, M.D.
Herbert B. Ward, M.D., Ph.D.
Michael A. West, M.D., Ph.D.

Assistant Professor
Gregory J. Beilman, M.D.
David Borgstrom, M.D.
John L. Clark, M.D.
Kendra K. Gealow, Ph.D.
Kristin Gillingham, Ph.D.
Angelika C. Gruessner, Ph.D.

Bernhard J. Hering, M.D.
Thomas J. Johnson, M.D.
Elmer H. Kaspender, M.D.
Nicole Kirchhoff, D.V.M.
George H. Landis, M.D.
Brett K. Levay-Young, Ph.D.
Michael A. Maddaus, M.D.
Michael McGonigal, M.D.
Soon J. Park, M.D.
Steven M. Santilli, M.D., Ph.D.

Warren V. Schubert, M.D.
Raymond E. Sicard, M.D.
Richard G. Strate, M.D.
Jerald R. Sultz, M.D.
Karen R. Wasiluk, Ph.D.
Catherine M. Wittgen, M.D.
Lucile E. Wrenshall, M.D., Ph.D.

Instructor
Paul Druck, M.D.
Alan C. Farney, M.D., Ph.D.
Stanley Williams

Surg 5502. Externship in the Surgical Intensive Care Unit—Fairview-University Medical Center and affiliated hospitals. (Cr ar; prereq 5500)
Abrams, Barke, Beilman, Wittgen
In-depth patient care experience in the management of the critically ill and injured.

Surg 5503. Research Problems in Surgery—Fairview-University Medical Center. (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.

Surg 5504. Externship in Hospital Base Nutrition—Fairview-University Medical Center. (Cr ar) Abrams
Direct experience in hospital base parenteral and enteral nutrition is provided in this multidisciplined patient care service consisting of a medical director, pharmacist, nurse clinician, and dietician.

Surg 5509. Externship in Burn Management—St. Paul Ramsey Medical Center. (Cr ar) Solem, Ahrenholz
Direct experience in the physiology and management of burns.

Surg 5510. Advanced Surgery Externship: Subinternship—Fairview-University Medical Center. (Cr ar) Maddaus
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.

Surg 5522. Plastic and Reconstructive Surgery—Fairview-University Medical Center and affiliated hospitals. (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.

Colon and Rectal Surgery

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

Surg 5523. Externship in Colon and Rectal Surgery—Fairview-University Medical Center and affiliated hospitals. (Cr ar) Buls, Gemlio, 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 presents 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.
Chung Kyu Kim Lee, M.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
Kathryn E. Dusenbery, M.D.
Bruce Gerbi, Ph.D.
Patrick Higgins, Ph.D.

Assistant Professor
Kwan H. Cho, M.D.
Kathryn E. Farniok, M.D.
Warren A. McGuire, M.D.

Elective Courses
TRad 5170f. Radiological Physics. (3 cr)
TRad 5171w. Medical Nuclear Physics. (3 cr)
TRad 5172s. Radiation Biology. (3 cr)
TRad 5173w. Physics of Radiation Therapy. (3 cr)
TRad 5174s. Physics of Diagnostic Radiology. (3 cr)
TRad 5340f,w,s,su. Special Problems in Radiation Therapy. (Cr ar)
TRad 5505f,w,s,su. Externship in Radiation Therapy. (Cr ar; prereq regis med)
TRad 5507f,w,s,su. Advanced Externship in Radiation Therapy. (Cr ar; prereq regis med)
TRad 5508f,w,s,su. Special Problems in Radiation Biology. (Cr ar)
TRad 5512f,w,s,su. Dosimetry of Internal and External Radiation. (1 cr)
TRad 5540f,w,s,su. Special Problems in Radiological Physics. (Cr ar)
TRad 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)

John Hulbert, M.D., professor and chairman

Associate Professor
Cesar Ercole, M.D.
Richard Evans, M.D.

Assistant Professor
Jon Pryor, M.D.

Elective Course
Urol 5200. Surgical Specialties: Urology. (Cr ar; prereq regis med)