



College of HUMAN MEDICINE

Glenn C. Davis, DEAN

MISSION

The College of Human Medicine was founded in 1964 to develop and implement programs in medical education, research, and service designed to improve the system of health care within the State of Michigan, both directly and through its students and graduates. In the tradition of Michigan State University, the land grant university for the State of Michigan, the College is an educational institution and a social resource in service to the health of the people of the State. As part of this mission, the College seeks opportunities and mechanisms to integrate its academic functions with major community health organizations and systems throughout the State, creating a network of education, research, and health services.

The primary mission of the College is the education of physicians who will bring the most sophisticated scientific knowledge to bear on medical problems and health status in a humane and compassionate way, and who will take leadership roles in bringing about changes directed toward achieving equal opportunities for health care for all. A central focus of the mission of this College is the education of primary care physicians.

A commitment to this mission should become part of the education of all graduates of the College, for it is with these individuals that the responsibility rests to pass this commitment to future generations. Corollaries of this mission are (1) to recruit a diversified student body, faculty, and staff to reflect a changing society and (2) to develop and participate in systems of health care directed toward unmet needs.

The College has been organized to accomplish its mission in undergraduate, graduate, and postgraduate education by:

1. Educating physicians who can serve the needs of the State of Michigan in an exemplary fashion as characterized by: continued learning and professional renewal throughout their lives; concern for the biological, social, and emotional elements in all health problems; readiness to identify and respond to health care needs and problems in their communities; and use of the knowledge, skills, and concepts essential to quality health care and medical problem solving.
2. Generating new knowledge and assisting in its dissemination and application for the benefit of the people of the State of Michigan through education and support of faculty, students, and graduates who critically assess and contribute to the humanistic and scientific studies that are essential to the evolving basis of medical practice.
3. Helping to provide, to evaluate, and, where needed, to improve appropriate health care services and their associated delivery systems.

The College of Human Medicine provides several programs of study leading to health careers. In addition to the professional program that leads to the Doctor of Medicine degree and the program in surgery that leads to the Master of Science degree, the College offers master's and Doctor of Philosophy programs through its basic science departments and interdepartmental programs. These departments are Biochemistry and Molecular Biology, Cell and Molecular Biology, Epidemiology, Genetics, Microbiology and Molecular Genetics, Neuroscience, Pharmacology and Toxicology, and Physiology.

The clinical departments of the College are Family Practice; Neurology and Ophthalmology; Pediatrics and Human Develop-

ment; Obstetrics, Gynecology, and Reproductive Biology; Psychiatry; Medicine; Radiology; and Surgery. The College sponsors residency and fellowship programs in cardiology, hematology/oncology, internal medicine, neonatology, pediatrics, physical medicine and rehabilitation, psychiatry, and surgery.

Students who are enrolled in the professional program that leads to the Doctor of Medicine degree may elect specializations in infant studies. For additional information, refer to the statement on *Interdepartmental Graduate Specializations in Infant Studies* in the *College of Social Science* section of this catalog.

PROGRAM IN HUMAN MEDICINE

In 1991, a new four-year curriculum leading to the M.D. degree was implemented. The professional program leading to the Doctor of Medicine degree has been accredited by the Liaison Committee on Medical Education of the American Medical Association/American Association of Medical Colleges.

To achieve its educational goals, the College will:

1. Recruit students from diverse academic, geographical, racial, and ethnic origins.
2. Enact a curriculum for medical students that:
 - (a) is strongly influenced by the focus of educating primary care physicians.
 - (b) considers the understanding of human behavior and social processes, as well as the biological sciences, as basic to medicine.
 - (c) is located, to the extent possible, in communities that closely approximate the environments in which students, as physicians, will ultimately provide health care.
 - (d) considers the needs of the population which its students will ultimately serve.
 - (e) emphasizes medicine as a helping profession as well as an applied science.
 - (f) fosters student responsibility for self-learning, peer evaluation, interactive professional discussion, and decision making in groups of health professionals.
 - (g) results in the preparation of graduates to enter and complete graduate medical education.
 - (h) can be evaluated in terms of its intended accomplishments.
 - (i) can be modified based on assessment of its effectiveness.
 - (j) emphasizes preventive and health maintenance services in clinical practice.
3. Provide oversight to integrated and affiliated community residency and fellowship programs that stress goals similar to those of the medical student curriculum.
4. Promote and support graduate student and postgraduate programs in the disciplines basic to medicine.
5. Provide programs whereby physicians and other health professionals can acquire the conceptual background and skills in instruction, educational planning, evaluation, research, and administration needed to function as effective faculty members.
6. Conduct patient care programs that encourage and foster continued clinical excellence by the faculty and that provide students with examples of quality-evaluated and cost-effective patient care.
7. Sponsor, organize, and evaluate continuing education programs in medically related fields of biological, behavioral, social, educational, and clinical sciences to assist practicing physicians and other health professionals in pursuing lifelong learning objectives, often by collaborating with community organizations and physicians.

8. Collaborate with other colleges in providing educational programs and experiences that would expand the scope of health professions education in the University.

CURRICULUM

The curriculum is divided into two primary sections: the preclinical and the clinical. The preclinical curriculum is divided into two distinct, though complementary, blocks: Block 1, a discipline-based introduction to the basic biological, behavioral, social, and clinical sciences; and Block 2, an interdisciplinary, integrative experience. Enhanced learning time is an integral part of the preclinical curriculum. The clinical curriculum, or Block 3, is one in which the student concentrates primarily on acquiring the skills and content necessary to clinical medicine. Students must complete satisfactorily the requirements of Blocks 1, 2, and 3 as specified below. Block 1 normally extends over 37 weeks, Block 2 extends over 32 weeks, and Block 3 extends over 77 weeks.

BLOCK 1

The basic biological science courses in Block 1 are offered jointly to students in both the colleges of Human and Osteopathic Medicine. Courses which represent the different philosophies of the two professions are offered separately. The College of Human Medicine offers Human Development and Behavior, Clinical Skills, Integrative Clinical Correlations, and Mentor Programs.

The first 37 weeks in medical school provide students with an introductory overview of the various disciplines basic to medicine. This block consists of a series of discipline-based modules which include both classroom, laboratory, and self-instructional experiences. The purpose is to expose all students to basic terminology and to help them understand basic biological, behavioral, social, and clinical principles in medical science.

The content of the basic biological science courses is presented through lecture and laboratory sessions in the individual disciplines of anatomy, biochemistry, physiology, cell biology, microbiology, pharmacology, genetics, neuroscience, and radiology.

The course on Human Development and Behavior in Society is offered in Block 1 and is an introduction to principles of human behavior across the life cycle. An Integrative Clinical Correlations course sequence is offered across Block 1. The Integrative Clinical Correlations sequence is designed to (1) demonstrate the integral relationship between the basic biological, social, and behavioral sciences and clinical medicine and (2) demonstrate the use of basic science principles in understanding the pathophysiological mechanisms of clinical problems, and in diagnosing and treating patients and their illnesses. Basic science concepts, which have already been presented in the discipline-based modules and which are identified as key concepts for integration and for clinical practice, are reinforced within a clinical context.

MENTOR PROGRAM

The mentor program includes time specifically designed for students to meet with a mentor in the first year of the preclinical curriculum. Since the College is committed to educating physicians who will bring the most sophisticated scientific knowledge to bear on medical problems and health status in a humane and compassionate way, it is important that students acquire not only the knowledge and skills necessary to practice medicine, but also the values and attitudes that all physicians should have. Values and attitudes are assimilated through the process of

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professionalization. A series of small group meetings with faculty role models in actual clinical settings focuses on that process.

The Clinical Skills courses and enhanced learning time, which extend across Blocks 1 and 2, are described later in this statement.

BLOCK 2

Block 2 consists of the Problem-Based Learning Experience, a course sequence entitled Social Context of Clinical Decisions, a Medical Humanities course and the Clinical Skills sequence. The **Problem-Based Learning Experience** is an interdisciplinary program in which patient cases serve as vehicles for learning and applying the multiple basic disciplines upon which the art and science of medicine rest. The program emphasizes small group and peer interaction to foster development of problem-solving skills along with student responsibility for self-directed study, peer teaching, and self-evaluation of strengths and weaknesses. Each problem domain contains multiple patient cases that provide the major instructional stimuli in the program. Embedded in the cases are basic biological, behavioral, and social science content; pathogenetic, pathophysiological, and psychopathological mechanisms of disease; patient management issues; medical ethics; critical analysis and medical problem solving; health care delivery; and interpersonal encounters between physicians, patients, and families of patients.

The learning format is a combination of guided self-study and small group discussion. Students meet with faculty preceptors in small groups two or three times each week to discuss patient cases. Other scheduled time each week includes clinical science, mentor group sessions, and lectures or other experiences depending on the problem domain being studied.

Learning resources for the Block 2 program are keyed to basic concepts and to patient cases. Such resources include standard textbooks, journal articles, and various self-instructional media. Resources integral to patient cases, including pathologic slides and radiographs, are included. Lectures and other experiences are offered depending on the domain being studied. Students are encouraged to develop seminars and laboratory experiences which they believe will complement their learning. Basic science and clinical faculty are available as resource individuals in addition to their roles as small-group preceptors.

The **Social Context of Clinical Decisions** course sequence offers seminar experiences across Block 2 organized around four themes: understanding basic concepts of epidemiology, developing fundamental critical analysis skills, learning about health care organizational and funding systems, and beginning to explore problems in medical ethics. At the end of this sequence, students form simulated health care policy teams and apply the basic concepts of this course sequence to a health care problem of their choosing.

The **Medical Humanities** course offers a final four-week seminar in one of three areas which students select: literature in medicine, history of medicine, and spirituality in medicine.

BLOCK 1 AND 2 CLINICAL SKILLS

This five-semester sequence introduces students to basic concepts of communication and of patient assessment. During the first year, students are introduced to the process of communication and of learning about the patient's model of and experience with illness. They learn interviewing techniques by conducting interviews with real and simulated patients. Additionally, they begin to learn the psychomotor skills of the physical examination. In Year 2, the student has advanced experiences in physical diagnosis, medical history taking, and the development of the written medical record. These experiences involve actual patients in

hospital and ambulatory settings. An experience in examining newborns and interviewing mothers of newborns is also offered. Specialized physical examination experiences are offered, including examining geriatric patients, performing a neurological examination, and integrating the various data collection and organizational skills learned throughout the sequence.

The Longitudinal Patient-Centered Experience (LPCE), coordinated primarily within Clinical Skills, begins in January of the first year. A pair of students meets about eight times during a 15-month period with a 'patient' volunteer who has a chronic illness. Students learn about health and chronic disease from the patient's point of view. Assignments are integrated into several courses.

BLOCK 1 AND 2 ENHANCED LEARNING TIME

The weekly schedule is designed such that there are hours in the week when no structured small group or large class educational experiences are scheduled in order for students to utilize this time in a variety of ways and in accordance with their own academic needs. Students have an opportunity to develop skills to learn independently, to review material, to attend additional tutorial or study sessions, and to explore an area in greater depth. The manner in which the time is utilized by each student depends upon the student's academic standing; his or her interests, skills, and talents; and the overall educational plan for the particular student.

BLOCK 3

Introductory Experience

For the Block 3 experience, students are assigned to one of the several communities affiliated with the College: Flint, Grand Rapids, Kalamazoo, Lansing, Saginaw, and the Upper Peninsula (Escanaba and Marquette). A week-long community orientation precedes the basic clerkships.

Clerkships

Objectives for the clerkships are established by the clinical departments of the College and are met through a series of specialty and subspecialty clerkships in the respective disciplines of medicine, surgery, obstetrics and gynecology, pediatrics, psychiatry, and family medicine.

While a student may take part in elective programs in other locations, he or she must complete the required core competency experience and clerkships in the community in which he or she is assigned. The required clerkships provide the student with an opportunity to become familiar with the community's health care structure and socio-economic characteristics, and to become part of its health care system.

Core Competency Experience

During the required clerkships, students participate in the Core Competency Experience. This experience involves interdisciplinary seminars addressing core clinical competencies that have been identified by the College faculty. This experience will include, but not be limited to, primary care topics, advanced clinical skills, research and critical analysis skills, medical ethics, and social and organizational issues in medicine.

While a student may take part in elective programs in other locations, he or she must complete the required core competency experience and clerkships in the community in which he or she is assigned. The required clerkships provide the student with an

opportunity to become familiar with the community's health care structure and socio-economic characteristics, and to become part of its health care system.

ELECTIVES

Students are also required to complete 20 weeks of approved clinical electives as a part of meeting the College graduation requirements. At least 8 of the 20 weeks must be completed in the community to which the student is assigned. Students are encouraged to study broadly and/or to pursue intensively their special interests through elective programs. Elective programs may include any of the variety of courses offered by the College and University, research projects, or placements in hospitals other than those associated with Michigan State University.

Students may also take elective courses at other medical schools. The four medical schools in Michigan (MSU College of Human Medicine, MSU College of Osteopathic Medicine, University of Michigan Medical School, and Wayne State University School of Medicine) have made arrangements whereby a student may take an elective in any of the other colleges without changing enrollment or paying additional fees.

EVALUATIONS

Evaluations in the College of Human Medicine are designed to aid the student in assessing his or her own progress, and to enable the faculty to assess student progress. The system of evaluation and assessment is under continuous review to reflect the view of the College that students' performance is judged in terms of minimal criteria and that students must be able to integrate and use knowledge to solve problems. Students as well as faculty are encouraged to participate in the formulation of approaches to develop curriculum and evaluation procedures.

COMPREHENSIVE EXAMINATIONS

Students are required to pass Step 1 of the United States Medical Licensure Examinations (USMLE) prior to entry into Block 3. Students must pass Step 2 of the USMLE prior to graduation.

ADMISSION TO THE PROGRAM IN HUMAN MEDICINE

The College of Human Medicine Committee on Admissions strives to select qualified applicants who are academically, emotionally, motivationally, and socially competent and ready for the rigors of medical school and for a career in medicine. These competencies are associated with alumni who are meeting the bio-psycho-social needs of a diverse patient population. As a community-integrated medical school in Michigan, the College's mission focuses on educating physicians to meet the primary health care needs of the people of Michigan, including the state's underserved rural and inner-city areas. In preparation for serving a diverse patient population, the composition of the entering class of 106 students is representative of Michigan's general population. Students come from a variety of cultural, geographic, and ethnic backgrounds. Historically, women have comprised 49 percent, underrepresented minority students 20 percent, and Michigan residents 80 percent of the entering class. Since there is no preference for academic majors, applicants with varied academic backgrounds are represented in each entering class, including those with degrees in the natural sciences, applied sciences, arts, humanities, and social sciences.

The College of Human Medicine uses the primary application services available through the American Medical College Application Service (AMCAS). Applicants may contact their

premedical adviser, or contact AMCAS at <http://www.aamc.org> for application information. The Committee on Admissions encourages students to submit the AMCAS application in June of the year prior to anticipated enrollment, but no later than the November 15 deadline date. The Committee also requires that all applicants submit Medical College Admissions Test (MCAT) scores. The MCAT is administered twice annually, in April and August at MSU and at sites around the world. MCAT scores are valid for three years. For more information about the MCAT, applicants should contact their premedical advisers, or the MCAT Program Office, P.O. Box 4056, Iowa City, IA 52243-4056. For further information about the College of Human Medicine, request a copy of the **CHM Handbook for Premedical Students**, by contacting the College of Human Medicine, A-239 Life Sciences Building, Michigan State University, East Lansing, MI 48824, or consult the College's World Wide Web site: <http://www.chm.msu.edu/>

The College of Human Medicine Committee on Admissions evaluates applicants' AMCAS applications, including experiences and personal statements, and MCAT scores to determine who will be asked to complete the College's Secondary Application. At the same time, applicants are required to submit a minimum of three letters of evaluation. The Committee evaluates the applications to determine the most qualified applicants to advance to the next phase of the admissions process, the interview. Students are invited to Interview Day to learn more about the College of Human Medicine and to be assessed through interviews with a faculty member and a student. Interviewers are trained to assess applicants on the qualities the College associates with becoming exemplar physicians.

The Committee on Admissions makes the final admissions decisions based on the following cognitive and non-cognitive considerations:

1. Academic competence including attributes such as fulfilling the premedical requirements, grades, trend in grades, degrees earned, rigors of the degree programs, MCAT scores, research experience, and cognitive skills.
2. Emotional competence including attributes such as problem solving ability, ability to work in teams, ability to form long-term compassionate relationships, professional judgment, and self-assessment skills.
3. Motivational competence including attributes such as medical clinical experience and insights about medical ethics and humanities, health care reform, and other moral, social, political, and economic aspects of medicine.
4. Social competence including attributes such as community service, leadership, and mentoring experiences, as well as effective communication skills and sensitivity to patient concerns.

Minimum requirements which must be fulfilled prior to enrollment in the program in human medicine are:

1. Completion of the baccalaureate degree.
2. Completion of 8 semester credits or 12 term credits in each of the following areas with no final grade below 2.0:
 - General/Inorganic Chemistry Sequence including at least one laboratory
 - General Biology Sequence including at least one laboratory
 - Organic Chemistry Sequence including at least one laboratory
 - General Physics Sequence including at least one laboratory
 - English Writing courses which may include "Writing in the Major"
 - Humanities/Social Science Courses that focus on psychological and social theory, individual and/or group behaviors, and comparative cultures. Recommended

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Humanities/Social Science Courses include anthropology, cultural studies, economics, ethics, psychology, sociology, women's studies, and philosophy.

3. Mathematics through college algebra or one statistics course at the college level (requirement waived with Advanced Placement credit for Calculus 1 or placement above college algebra on a mathematics placement test).
4. Completion of one upper-level (junior or senior level) biological science course from the following list: biochemistry, cell biology, embryology, genetics, microbiology, molecular biology, neuroscience, or physiology.

Computer literacy including basic word processing skills, communicating by email, and navigating the World Wide Web is strongly recommended.

Students will be considered for transfer admission to the College of Human Medicine in the third year when space is available.

Student Rights and Responsibilities

Refer to the statement on *Student Rights and Responsibilities* in the *General Information* section of this catalog.

GRADUATE STUDY

The graduate programs of the College provide opportunities for advanced study with emphasis in a single discipline on the departmental level. Programs leading to the degrees of Master of Science and Doctor of Philosophy are offered.

All graduate programs of the College are designed to develop independent effort, encourage creative thinking, and educate the student in the fundamentals of basic research. Each student's program is arranged to suit his or her individual needs within the restriction that the final program must conform to one of the general patterns approved by the faculties of the department, college and the University. The College administers master's degrees in epidemiology and surgery. Doctor of Philosophy degrees are offered through the basic biological science departments.

The Department of Microbiology and Molecular Genetics is affiliated with the Doctor of Philosophy degree program with a major in ecology, evolutionary biology and behavior. For more information about the Doctor of Philosophy degree program in the Department of Microbiology and Molecular Genetics, refer to the statement on the doctoral program in the *College of Natural Science* section of this catalog.

Several colleges and departments within Michigan State University cooperate in offering the interdepartmental Doctor of Philosophy degree program with a major in neuroscience, which is administered by the College of Natural Science. For additional information, refer to the statement on the doctoral program in neuroscience in the *College of Natural Science* section of this catalog.

Students who are enrolled in master's or doctoral degree programs in the Department of Psychology may elect an Interdepartmental Specialization in Cognitive Science. For additional information, refer to the statement on *Interdepartmental Graduate Specializations in Cognitive Science* in the *College of Social Science* section of this catalog.

Students who are enrolled in the Master of Science degree program in the Department of Microbiology and Molecular Genetics may elect a Specialization in Ecology, Evolutionary Biology and Behavior. For additional information, refer to the statement on the specialization in the *College of Natural Science* section of this catalog.

Students who are enrolled in Master of Science degree programs in the Departments of Epidemiology and Microbiology and Molecular Genetics may elect a Specialization in Food Safety. For additional information, refer to the statement on the special-

ization in the *College of Veterinary Medicine* section of this catalog.

Master of Science

The Master of Science is the conventional degree for which programs are offered by the departments of Biochemistry and Molecular Biology, Epidemiology, Microbiology and Molecular Genetics, Pharmacology and Toxicology, Physiology, and Surgery.

In addition to meeting the requirements of the University as described in the *Graduate Education* section of this catalog, students must meet the requirements specified below.

Admission

Any student who possesses a bachelor's degree may apply for admission to a master's degree program. Admission is determined by the academic unit responsible for the program into which admission is sought and by the dean, after consideration of the student's record, experience, personal qualifications, and proposed program of study.

With the exception of the departments of Epidemiology and Surgery, those units of the College which offer master's degree programs are **shared** departments responsible to the College of Human Medicine and to other colleges such as Natural Science and Veterinary Medicine. Whether a student's program is administratively associated with the College of Human Medicine depends on the character of the proposed program, the nature of the student's career aspirations, and the college of the student's mentor. A student accepted by a given department for admission to the graduate program may be identified with the College of Human Medicine upon recommendation of the chairperson of that department and the concurrence of the appropriate deans. This recommendation is contingent on the relevance of the student's program and/or career aspirations to the field of human medicine.

Requirements for the Master of Science Degree

All programs of study must include a thesis for which 4 credits in master's thesis research (course number 899) are required. A maximum of 10 credits may be authorized for thesis research. In addition, an oral examination over the thesis is required. A written examination may be required. The nature of the examination is at the discretion of the academic unit responsible for the program of study.

Academic Standards

The grades required for course credit toward the master's degree are set by the academic unit responsible for the degree program. The accumulation of grades below 3.0 in more than three courses of three or more credits each removes the student from candidacy for the degree. A student who fails to meet the standards set for any program may, on recommendation of the program director and the department chairperson, be required by the dean to withdraw at the end of any semester.

Time Limit

The time limit for completion of the master's degree is six years from the beginning of the first semester in which credit was earned toward the degree.

Doctor of Philosophy

The successful completion of the Doctor of Philosophy degree requires the development in the student of scholarly ability of a very high order. This degree emphasizes research in the various disciplines represented in the College of Human Medicine. The departments of the College which offer programs leading to this degree are Biochemistry and Molecular Biology, Microbiology and Molecular Genetics, Pharmacology and Toxicology, and Physiology.

In addition to meeting the requirements of the University as described in the *Graduate Education* section of this catalog, students must meet the requirements specified below.

Admission

Admission may be granted to a student who has a record acceptable to the department and to the College. A master's degree in an appropriate subject-matter field may be required, but the completion of a master's degree is not a guarantee of admission. Some of the departments require applicants to submit Graduate Record Examination scores. Normally, an average of 3.00 in all previous academic work is required for admission to regular status. Admission to provisional status may be used to indicate incomplete records, incomplete interpretation of available records, grade point average below 3.00 but with additional evidence of good capacity, or minor deficiencies in subject-matter training. Those units of the College which offer Doctor of Philosophy degree programs are *shared* departments responsible to the College of Human Medicine and to other colleges such as Natural Science and Veterinary Medicine. Whether a student's program is administratively associated with the College of Human Medicine depends on the character of the proposed program, the nature of the student's career aspirations and the college of the student's mentor. A student accepted by a given department for admission to the graduate program may be identified with the College of Human Medicine upon recommendation of the chairperson of that department and the concurrence of the appropriate deans. This recommendation is contingent on the relevance of the student's program and/or career aspirations to the field of human medicine.

Academic Standards

In the College of Human Medicine the minimum standards of academic performance for a doctoral candidate are:

1. A 3.00 average in all academic work is required for graduation.
2. Grades of 2.0 or lower in no more than three courses required for graduation.

Dual Degree Medical Scientist Training Program

The Dual Degree Medical Scientist Training Program is a special program for students who want to earn both a professional medical doctoral degree (Doctor of Medicine) and a graduate research doctoral degree (Doctor of Philosophy). The program seeks to meet a national need for physicians who are proficient in research as well as in medicine, and who will pursue careers as faculty members in medical schools and research institutions.

The program is designed to select, educate, and train highly motivated students having outstanding research and academic qualifications. Trainees pursue medical and graduate studies in parallel, meet regularly with peers in seminars, and engage in medical and graduate level courses and clerkships, as well as in research with highly qualified mentors.

A student who is interested in this program should contact the office of the associate dean for research and graduate study in the College of Human Medicine.

For additional information, refer to the statement on *Special Programs* in the *Graduate Education* section of this catalog.

DEPARTMENT of BIOCHEMISTRY and MOLECULAR BIOLOGY

William L. Smith, Chairperson

GRADUATE STUDY

The Department of Biochemistry and Molecular Biology is administered jointly by the colleges of Human Medicine, Natural Science, and Osteopathic Medicine. All three of these colleges offer Master of Science and Doctor of Philosophy degree programs with majors in biochemistry and molecular biology. In addition, the College of Natural Science offers a Doctor of Philosophy degree program with a major in biochemistry and molecular biology—environmental toxicology. For additional information about the department and its graduate degree programs, refer to the statement on the *Department of Biochemistry and Molecular Biology* in the *College of Natural Science* section of this catalog.

DEPARTMENT of EPIDEMIOLOGY

Nigel S. Paneth, Chairperson

The Department of Epidemiology offers a Master of Science and Doctor of Philosophy degree program with a major in epidemiology and offers courses in epidemiology for students in the Doctor of Medicine degree program.

Epidemiology is the study of the distribution and determinants of disease in populations for the purpose of disease prevention. Its central concerns are measurement of the distribution of health states in the population at large (descriptive epidemiology) and the ascertainment of risk factors for these health states (analytic epidemiology). Epidemiology is thus the research and evaluation arm of public health. It also informs the practice of clinical medicine through methodological contributions to decision analysis, cost effectiveness, and clinical epidemiology. Epidemiology is a biologically-based discipline that interacts with, and depends upon, advances in the understanding of disease mechanisms. It is also quantitative, integrating population perspectives, sampling probabilities, measurement error, and approaches to control of bias and confounding into research design and interpretation.

Students who are enrolled in Master of Science degree programs in the Department of Epidemiology may elect a Specialization in Food Safety. For additional information, refer to the statement on the specialization in the *College of Veterinary Medicine* section of this catalog.

Master of Science

The master's degree program in epidemiology is designed to produce individuals competent to undertake research in epidemiology and to participate in epidemiologic work as a part of public health practice. Required core courses concentrate on the population approach to disease, quantification of disease frequency, approaches to acute disease outbreaks, relevant biostatistical techniques, sources of health data, research design and analysis, and the development of skills in epidemiologic judgment. Specialized elective courses are offered in epidemiologic aspects of heart disease, cancer, reproductive health, and communicable diseases.

Admission

A bachelor's degree is required for admission to the program.

Requirements for the Master of Science Degree in Epidemiology

The program is available only under Plan A (with thesis). The distribution of credits within the student's program is determined by the student's academic adviser and guidance committee with the approval of the Dean of the College of Human Medicine. The guidance committee determines the form, scope, and time of required examinations.

In addition to meeting the requirements of the University and of the College of Human Medicine, the student must complete at least 40 credits distributed as follows:

	CREDITS
1. All of the following courses:	31
EPI 810 Introduction to Descriptive and Analytical Epidemiology	3
EPI 812 Causal Inference in Epidemiology	3
EPI 813 Investigation of Disease Outbreaks	3
EPI 826 Research Methods in Epidemiology	3
EPI 827 The Nature and Practice of Scientific Integrity	3
EPI 851 SAS Programming I: Essentials	1
EPI 852 SAS Programming II: Data Management and Analysis	1
EPI 853 SAS Programming III: Research Data Analysis Using SAS	1
EPI 899 Master's Thesis Research	4
LCS 829 Design and Conduct of Epidemiological Studies and Clinical Trials	3
STT 421 Statistics I	3
STT 422 Statistics II	3
2. At least 9 credits from the following courses:	9
EPI 814 Nutritional Epidemiology	3
EPI 815 Epidemiology of Cardiovascular Disease	3
EPI 816 Reproductive and Perinatal Epidemiology	3
EPI 817 Epidemiology of Communicable Diseases	3
EPI 818 The Epidemiology of Zoonotic Diseases	3
EPI 819 Spatial Epidemiology and Medical Geography	3
EPI 820 Evidence-Based Medicine	3
EPI 821 Epidemiology of the Health and Cognitive Status of the Elderly	3
EPI 822 Environmental Epidemiology	3
EPI 823 Cancer Epidemiology	3
EPI 824 Reproductive Epidemiology	3
EPI 825 Epidemiologic Modeling	3
3. Pass an oral examination in defense of the thesis.	

Doctor of Philosophy

The objective of the Ph.D. degree program is to provide students with the epidemiological and biostatistical skills that will enable them to undertake the highest levels of clinical and epidemiologic research. The program trains students to participate both in public health activities such as health planning, disease control, and community health education and in research into the causation of disease.

Admission

To be considered for admission to the program:

1. an applicant must have earned a master of science or a master of public health in epidemiology degree with at least 40 credits.
2. applicants who earned their master of science or master of public health in epidemiology at an institution other than Michigan State University will be evaluated individually by the department to determine if any additional collateral course work will be required. Credits earned in collateral courses will not count toward the Ph.D. in Epidemiology.
3. submit GRE (Graduate Record Examination) scores, or MCAT scores.
4. present evidence of competency in English (TOEFL or MELAB scores) with their application if their native language is not English.
5. submit three letters of recommendation.
6. submit a statement of purpose.
7. submit official transcripts.

Applicants with strong academic records who are in the process of completing a master of science or a master of public health in epidemiology may be admitted on a provisional basis. The first 40 credits applied towards the completion of a master of science or a master of public health in epidemiology may not be counted toward the Ph.D. in Epidemiology.

In addition to meeting the requirements of the University and the College of Human Medicine, students must meet the requirements specified below.

Requirements for the Doctor of Philosophy Degree in Epidemiology

	CREDITS
1. Complete the following core courses (12 credits):	
EPI 805 Readings in the Historical Roots of Epidemiological Thought	3
EPI 910 Themes in Contemporary Epidemiology	3
EPI 915 Advanced Survival Analysis	3
EPI 920 Advanced Methods in Epidemiology and Applied Statistics	3
2. Complete five of the following seminar courses (15 credits):	
Courses must be approved in advance by the students guidance committee and cannot duplicate those previously taken. Any additional master's epidemiology course can be substituted as an elective course.	
EPI 806 Workshop in History of Public Health	3
EPI 925 Modeling in Epidemiology I	3
EPI 930 Modeling in Epidemiology II	3
EPI 935 Research Proposal Development	3
EPI 940 Epidemiological Consultations	3
EPI 945 Molecular Epidemiology	3
EPI 950 Advanced Topics in Biostatistics	3
SOC 986 Survey Research Techniques	3
STT 825 Sample Surveys	3
STT 842 Categorical Data Analysis	3
3. Attendance at 80% of all presentations in the departmental epidemiology seminar series during the period of course work. Submission of a written review of seminars attended is required.	
4. Pass a comprehensive written examination which will cover the field of epidemiology in general and the candidate's area of special interest and study.	
5. Successfully complete 24 credits of Epidemiology 999 doctoral dissertation research that demonstrates original research in epidemiology and public health.	
6. Successful oral defense of the dissertation.	

Academic Standards

A student who fails the comprehensive examination or the final oral defense of the dissertation may repeat either examination only once, within six months of the first examination.

DEPARTMENT of FAMILY PRACTICE

William C. Wadland, Chairperson

A major goal of the Department of Family Practice is to provide the students of the College of Human Medicine with both classroom and clinical education concerning the wide variety of concepts and topics relevant to the practice of Family Medicine in the 2000s and beyond. To accomplish this goal the department is staffed by family physicians and other health professionals with interest and experience in many different aspects of medical practice. Medical ethics, gerontology, nutrition, evidence-based medicine, and smoking cessation, and health education are some of the fields in which the department has special expertise.

To accomplish its educational goals, the department offers a variety of elective courses, participates in virtually all of the College's interdisciplinary programs, and directs a required clinical clerkship. Courses in fields such as nutrition are offered as electives to preclinical students. The department is integrally involved in the Mentor Program and in the Clinical Skills courses.

Active clinical practices which combine patient services and medical education are maintained by the department at the Clinical Center on the MSU campus and at Sparrow Hospital in Lansing.

The department is active in graduate family practice education through its residency program offered in collaboration with Sparrow Hospital and its affiliated residencies in eight other community hospitals across the state. In addition to its educational and patient care activities, the department is involved in research and scholarly work in a number of areas. Investigations of various aspects of medical education, the provision of medical services, the impact of patient education programs, geriatric care and education, and smoking cessation are among research projects currently being conducted by the Department of Family Practice.

DEPARTMENT of MEDICINE

Donald J. DiPette, Chairperson

The Department of Medicine has major responsibilities for providing students with clinical experience in general clinical medicine as well as basic science correlations, patient interviewing, and physical and laboratory diagnosis and problem solving. Graduate programs in medical education have been developed in a number of affiliated hospitals where the department makes significant contributions to training medical residents and subspecialty fellows, and to continuing education for practicing physicians in the communities. Faculty members are actively involved in personal and intradepartmental research projects and collaborate with faculty in other departments and affiliated institutions in communities. These programs are based in university educational facilities, and the research and medical specialty laboratories of the department in the Life Sciences I Building and community affiliated hospitals. Expanded clinical research and educational programs are being carried out in the Clinical Center ambulatory care facility.

The Department of Medicine is dedicated to a broad, interdisciplinary outlook in all of its programs which emphasizes the unity of the medical sciences, health care, and scholarship.

DEPARTMENT of MICROBIOLOGY and MOLECULAR GENETICS

Jerry B. Dodgson, Chairperson

GRADUATE STUDY

The Department of Microbiology and Molecular Genetics is administered jointly by the colleges of Human Medicine, Natural Science, Osteopathic Medicine, and Veterinary Medicine. All four of these colleges offer a Master of Science degree in microbiology and a Doctor of Philosophy degree in microbiology and molecular genetics. In addition, the College of Veterinary Medicine offers a Doctor of Philosophy degree program with a major in microbiology—environmental toxicology. For additional information about the department and its graduate degree programs, refer to the statement on the *Department of Microbiology and Molecular Genetics* in the *College of Natural Science* section of this catalog.

DEPARTMENT of NEUROLOGY and OPHTHALMOLOGY

David Kaufman, Chairperson

The Department of Neurology and Ophthalmology, established July 1, 2000, is an outgrowth of the former neuro-ophthalmology unit that has existed on campus since 1986. The Department of Neurology and Ophthalmology is jointly administered by the College of Osteopathic Medicine and the College of Human Medicine. The department helps form osteopathic residency consortiums in ophthalmology and neurology, and fellowship programs in neuro-ophthalmology and refractive surgery. There are also active clinical and research programs.

The department's broad research program is supported in part by National Institute of Health (NIH) grants and other extra-mural funding. A current focus of this research is directed at diseases such as multiple sclerosis, Alzheimer's disease, optic neuritis, anterior ischemic optic neuropathy, stroke, and Parkinson's disease. A major theme of the department's research is to use the eye as a model for brain disease. The department also collaborates with other affiliated basic neuroscience research laboratories on the MSU campus. The clinical responsibilities of the department are fulfilled by on-campus neurologists and neuro-ophthalmologists that have sub-specialty training in a number of different disciplines of neurology. To enrich its research, clinical and educational programs, the Department also collaborates with numerous clinicians statewide.

The Department of Neurology and Ophthalmology Neurology Residency program welcomed its first resident on July 1, 2001. This new residency program has been structured to provide progressive, resident-centered education in clinical and academic neurology. The program will integrate extensive exposure to all aspects of clinical neurology with a firm understanding in underlying scientific principles and the methods of clinical investigation.

DEPARTMENT of OBSTETRICS, GYNECOLOGY, and REPRODUCTIVE BIOLOGY

Joseph F. Marshall, Chairperson

The Department of Obstetrics, Gynecology, and Reproductive Biology is comprised of a diverse faculty committed to the broad, integrated medical and surgical care of women's health throughout their lifespan. The faculty participates in the educational, research and service goals of the College of Human Medicine to enhance understanding of reproductive physiology, including the physiologic, social, cultural, environmental and genetic factors that influence women's health. This perspective provides a unique opportunity to address gender-specific health care concerns with regard to reproductive and non-reproductive issues. Primary and preventive counseling and education are essential components of the obstetric-gynecologic medicine necessary to advance the individual and community-based health of women of all ages.

Within this framework, the department's responsibilities are to provide educational experiences to medical students during the pre-clinical and clinical years, develop and contribute to programs of graduate and continuing medical education, conduct research, and promote optimal women's health within the community. To accomplish its educational goals, the department participates in the College's interdisciplinary programs and directs the required and elective clinical courses. In addition to the required curriculum, courses are offered to students in the areas of advanced obstetrics and gynecology, perinatology, gynecologic oncology, and reproductive endocrinology. The faculty participates in graduate obstetric-gynecologic education through its affiliate residency program offered by Sparrow Hospital as well as through obstetric-gynecologic residencies across the community campuses. Research activities in the areas of medical education, health services delivery, and community health problems related to women's health issues comprise the research focus of the department.

DEPARTMENT of PEDIATRICS and HUMAN DEVELOPMENT

Marsha D. Rappley, Acting Chairperson

The Department of Pediatrics and Human Development is made up of a diverse faculty who share a common concern with all aspects of human growth and development, both normal and abnormal. The department has educational responsibilities at all levels in the curriculum of the College of Human Medicine. Its faculty participate in courses which relate biological, behavioral, and clinical sciences to the development of the human organism from conception through maturity, to senescence and death. The departmental faculty direct the college course in human development and behavior and contribute to the interdisciplinary problem-solving exercises of the College. In addition, faculty organize and supervise selected clinical experiences with infants, older children, and their families. The department also has re-

sponsibility for general pediatric and pediatric subspecialty clerkships in the clinical medical curriculum. The department participates actively in graduate medical education through four pediatric residency programs affiliated with the University, and through involvement in resident and continuing education programs. In addition, faculty members work with students in other graduate programs in the University. Individual faculty members of the department participate in patient care and render medical consultation services in their respective subspecialty areas. The research endeavors of the department members and the services to the College of Human Medicine and the community at-large are in comparable areas; all are ultimately directed toward creating a healthier, better functioning society by improving the total health and life experience of the child and family.

DEPARTMENT of PHARMACOLOGY and TOXICOLOGY

Jay I. Goodman, Acting Chairperson

GRADUATE STUDY

The Department of Pharmacology and Toxicology is administered jointly by the colleges of Human Medicine, Osteopathic Medicine, and Veterinary Medicine. All three of these colleges offer Master of Science and Doctor of Philosophy degree programs with majors in pharmacology and toxicology. In addition, the College of Veterinary Medicine offers a Doctor of Philosophy degree program with a major in pharmacology and toxicology—environmental toxicology. For additional information about the department and its graduate degree programs, refer to the statement on the *Department of Pharmacology and Toxicology* in the *College of Osteopathic Medicine* section of this catalog.

Students who are enrolled in Master of Science degree programs in the Department of Pharmacology and Toxicology may elect a Specialization in Food Safety. For additional information, refer to the statement on the specialization in the *College of Veterinary Medicine* section of this catalog.

DEPARTMENT of PHYSIOLOGY

William S. Spielman, Chairperson

GRADUATE STUDY

The Department of Physiology is administered jointly by the colleges of Human Medicine, Natural Science, Osteopathic Medicine, and Veterinary Medicine. All four of these colleges offer Master of Science and Doctor of Philosophy degree programs with majors in physiology. In addition, the College of Veterinary Medicine offers a Doctor of Philosophy degree program with a major in physiology—environmental toxicology. For additional information about the department and its graduate degree programs, refer to the statement on the *Department of Physiology* in the *College of Natural Science* section of this catalog.

DEPARTMENT of PSYCHIATRY

Christopher Colenda, Chairperson

The Department of Psychiatry is administered jointly by the Colleges of Human Medicine and Osteopathic Medicine. The department plays a major role in integrating the behavioral sciences with the biological sciences and with clinical science elements of the professional programs of these colleges. The department's responsibilities include: preclinical and clinical medical student teaching, psychiatry residency training, professional continuing medical education, patient care, and research. Areas of research emphasis include health services and policy research, addictions psychiatry, geriatric psychiatry, child psychiatry and functional neuroimaging; collaborating in graduate medical and psychiatric education with affiliated institutions; developing programs of continuing education for physicians and contributing to continuing education programs for other mental health care disciplines; and developing research programs including some in collaboration with other clinical departments, and others with basic behavioral science departments.

DEPARTMENT of SURGERY

Carol A. Slomski, Acting Chairperson

The Department of Surgery is committed to the advancement of knowledge and skill in the management of surgical problems and disease. Education of students, residents, fellows, and continuing medical education programs are conducted in an environment where assurances of quality care, concerns for individual welfare, and cost containment are modeled. Research programs in the Department of Surgery focus on basic laboratory, clinical science, and educational projects which will enhance our primary goals and augment the surgical education programs. The Department of Surgery has major involvement with student graduate-professional programs, resident graduate education programs in surgery, and continuing medical education programs in the six clinical locations affiliated with the College of Human Medicine.

GRADUATE STUDY

The Department of Surgery offers a multidisciplinary Master of Science degree program with a major in surgery. The program is designed to enable students to obtain the knowledge and competence needed to carry out surgical research in such areas as shock and metabolism, and surgical nutrition. Only Plan A (with thesis) is available.

Students must meet the requirements as specified by the University and College, as well as the requirements given below. The distribution of credits within each student's program of study will be determined by the student's major adviser and guidance committee with the approval of the department chairperson and the dean. The guidance committee will determine the form, scope, and time of required examinations.

Admission

The program can accommodate a limited number of capable individuals with a strong commitment to scientific research. Persons who apply for admission to the program should be second-year surgery residents. A medical degree and a valid license to practice medicine in the State of Michigan are required for admission to the program. The applicant's scholastic record, experience, personal and professional qualifications, and demonstrated interest in learning research skills are also considered in the admissions decision.

Requirements for the Master of Science Degree in Surgery

	CREDITS
1. The following surgery courses:	
SUR 801 Shock and Metabolism	6
SUR 802 Clinical Surgical Anatomy	6
SUR 803 Enteral and Parenteral Nutrition	4
SUR 804 Research Design and Statistics	3
SUR 890 Seminars in Research	3
SUR 899 Master's Thesis Research	12
The research for and preparation of the master's thesis must be completed on the Michigan State University campus in East Lansing.	
2. Electives chosen from courses offered by the departments of Anatomy, Biochemistry, Food Science and Human Nutrition, Pathology, Pharmacology and Toxicology, Physiology, and Statistics and Probability.	

Academic Standards

A second semester of grades averaging below 3.00 constitutes withdrawal from the program.

Residence

A minimum of 10 credits must be earned in residence on campus.

DIVISION OF HUMAN PATHOLOGY

The Division of Human Pathology is administered by the colleges of Human Medicine and Osteopathic Medicine.

OFFICE of MEDICAL EDUCATION RESEARCH and DEVELOPMENT

William A. Anderson, Director

The Office of Medical Education Research and Development (OMERAD) is a multidisciplinary unit within the College of Human Medicine. The unit's mission is to improve medical education through instruction, research, consultation, administrative service and outreach. Faculty work collaboratively with health care professionals both on campus and in the College of Human Medicine's affiliated community campuses.

OMERAD is committed to providing excellent instruction for undergraduate, graduate and postgraduate learners. The unit also develops and evaluates college educational programs, and serves as a college leader in the application of computer and distance learning technology. OMERAD's research mission is to create new knowledge by assessing existing practices in medical education, and developing and evaluating educational innovations. The unit's consultation mission involves collaborating with health care professionals to design, evaluate and disseminate educational innovations. The unit's faculty provide instructional support for the college's educational programs, and serve in leadership roles in college, University, and national professional organizations. OMERAD's outreach mission is to disseminate innovative educational products, and to serve as a national center for the preparation of new medical faculty.

OMERAD faculty and support staff have expertise in education, psychology, sociology, management, and computer science. Specialized research facilities include a faculty- computing laboratory, reference library, training center and experimental classroom.

The CENTER for ETHICS and HUMANITIES in the LIFE SCIENCES

Thomas Tomlinson, Director

The Center for Ethics and Humanities in the Life Sciences is administered jointly by the colleges of Human Medicine, Natural Science, Nursing, Osteopathic Medicine, and Veterinary Medicine. The center also shares interests and maintains contact with the College of Arts and Letters and the College of Social Science.

Since 1977, the center has coordinated teaching and research on health care issues viewed from the perspectives of the traditional humanities disciplines. Drawing from other campus departments as well as its own staff, the center fosters the study of ethics, philosophy, history, literature, and religion as these disciplines relate to practice and policy in the health professions. Faculty representing the full range of disciplines referenced above participate in teaching and research activities.

In addition to its on-campus activities, the center is responsible for clinical and continuing education in medical humanities at various teaching hospitals around the state.