



College of HUMAN MEDICINE

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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, the College offers a Master in Public Health (M.P.H.) degree as well as Master of Science 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 and Biostatistics, Genetics, Microbiology and Molecular Genetics, Neuroscience, Pharmacology and Toxicology, Physiology, and Translational Science and Molecular Medicine. The college also offers an undergraduate specialization in bioethics, humanities, and society.

HUMAN MEDICINE

Mission

The clinical departments of the college are Anesthesia, Emergency Medicine; Family Medicine; Neurology and Ophthalmology; Pediatrics and Human Development; 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 Infancy and Early Childhood. For additional information, refer to the statement on *Interdepartmental Graduate Specializations in Infancy and Early Childhood* 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 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 diagno-

sis, 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

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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 (Michigan State University College of Human Medicine, Michigan State University 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 advisor, 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 Michigan State University and at sites around the world. MCAT scores are valid for three years. For more information about the MCAT, applicants should contact their premedical advisors, 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 visit <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 judgement, 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 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 e-mail, 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.

SPECIALIZATION IN BIOETHICS, HUMANITIES, and SOCIETY

The Specialization in Bioethics, Humanities, and Society, which is administered by the College of Human Medicine, is available as an elective to students who are enrolled in bachelor's degree programs at Michigan State University. Students wishing to pursue careers in health-related fields may find the specialization particularly appealing. In addition, students pursuing academic programs outside health-related fields often find that the specialization complements their major. With the approval of the department and college that administer the student's degree program, the courses that are used to satisfy the requirements for the specialization may also be used to satisfy the requirements for the bachelor's degree.

The health care system regularly affects many people's daily lives. The Specialization in Bioethics, Humanities, and Society is designed to offer a comprehensive survey of the vocabularies, theories, and practices employed in the western tradition of health and healing. Students develop working vocabularies and basic intellectual concepts in the humanistic and social dimensions of health-related issues. This is accomplished through upper-level courses that address themes of health and healing from a wide variety of disciplinary perspectives. Courses in the specialization focus on the socio-cultural, historical, ethical, economic, literary, and technological dimensions of the biomedical sciences, health care delivery, and policymaking.

The specialization's interdisciplinary character fosters students' abilities to understand and question the health system from a wide variety of intellectual viewpoints. Specialization students are encouraged to range widely and deeply in their thinking about the ways the health system affects themselves and various communities. Such interdisciplinary study also promotes much-needed communication across disciplinary boundaries. Finally, several of the courses in the specialization are specifically geared to improve problem-solving skills as well as oral and written communication abilities.

Requirements for the Specialization in Bioethics, Humanities, and Society

The student must complete a minimum of five courses totaling at least 15 credits. No more than 8 of those credits may be in the same discipline. With the prior written approval of the undergraduate advisor for the specialization, courses other than those included in these requirements may be counted toward the requirements for the specialization.

1. Two of the following courses: CREDITS
6 to 8

ANP	370	Culture, Health, and Illness	3
EC	498	Economics of Health Care	3
HST	425	American and European Health Care since 1800	4
PHL	344	Ethical Issues in Health Care	4
PSY	320	Health Psychology	3
SOC	475	Sociology of Health Care Systems	3
SOC	476	Social Psychology of Health	3
In certifying the completion of the requirements for the Specialization in Health and Humanities, these courses shall be counted only once.			
Either Sociology 475 or Sociology 476, but not both of those courses, may be used to satisfy this requirement.			
2.	At least three of the following courses: 8 to 12		
ANP	270	Women and Health: Anthropological and International Perspectives	3
ANP	370	Culture, Health, and Illness	3
ANP	423	Psychological Anthropology	3
ANP	435	Issues in Latino Health: Theory and Method in Minority Health Research	3
ANP	442	Genes and Diversity	3
ANP	470	Food, Hunger and Society	3
ANP	471	The Anthropology of Alternative Medicine (D)	3
CEP	470	Disability in a Diverse Society	3
EC	498	Economics of Health Care	3
ENG	483	Literature and Medicine	3
EPI	390	Disease in Society: An Introduction to Epidemiology and Public Health	4
GEO	435	Geography of Health and Disease	3
HNF	375	Community Nutrition	3
HNF	406	Sociocultural Aspects of Food	3
HST	425	American and European Health Care since 1800	4
KIN	445	Sociocultural Analysis of Physical Activity (W)	3
LBS	331	Literature and Science	4
LBS	333	Topics in History of Science	4
LBS	334	Science, Technology and Public Policy	4
LBS	336	Gender, Science, Technology (W)	4
LBS	355	Philosophy of Technology	4
MUS	470	Music Therapy: Mental and Behavioral Disorders	3
MUS	476	Music Psychology	3
MUS	477	Psychology of Music: Research Methodology and Application	2
PHL	344	Ethical Issues in Health Care	4
PHL	380	Nature of Science	3
PHL	444	Philosophical Issues in Biomedicine	4
PHL	480	Philosophy of Science	4
PHL	484	Philosophy of Biological Science	3
PHL	485	Philosophy of Social Science	3
PSY	280	Abnormal Psychology	3
PSY	320	Health Psychology	3
SOC	368	Science, Technology and Society	3
SOC	451	Dynamics of Population	3
SOC	475	Sociology of Health Care Systems	3
SOC	476	Social Psychology of Health	3
SW	472	Social Work in Health Care	3

In certifying the completion of the requirements for the Specialization in Bioethics, Humanities, and Society, Anthropology 370, Economics 498, History 425, Philosophy 344, Psychology 320, Sociology 475 and 476 shall be counted only once.

Upon completion of the requirements for the Specialization in Bioethics, Humanities, and Society as specified by the undergraduate advisor for the specialization, the student should contact that advisor and request certification for the completion of the specialization. After the certification is approved by the Dean of the College of Human Medicine, the Office of the Registrar will enter on the student's academic record the name of the specialization and the date that it was completed. This certification will appear on the student's transcript.

Student Rights and Responsibilities

Refer to the statement on *Student Rights and Responsibilities* in the *General Information, Policies, Procedures and Regulations* 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 Public Health, Master of Science and Doctor of Philosophy are offered. A Graduate Specialization in Public Health is also available. Graduate Certificates in Counterfeit Pharmaceuticals, International Public Health, Public Health, Public Health Administration, and Public Health Informatics are available. A Graduate

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Graduate Study

Certificate in Clinical Trials Research Management is a collaborative program offered by Michigan State University and Grand Valley State University.

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 public health. Doctor of Philosophy degrees are offered through the basic biological science departments.

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 Master of Science degree programs in the Departments of Epidemiology and Biostatistics, and Microbiology and Molecular Genetics 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 Arts

The Master of Arts degree is offered by the College. 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

To be admitted to a Master of Arts degree in the College of Human Medicine on regular status, an applicant must have:

1. a bachelor's degree from a recognized educational institution.
2. a cumulative grade-point average of at least 3.0 in the junior and senior years of the bachelor's degree program.

Each applicant must submit a letter directly to the academic unit that administers the program to which admission is sought, giving the applicant's academic background and reasons for pursuing advanced study.

Requirements for the Master of Arts Degree

Candidates for the Master of Arts degree plan a program of study in consultation with a graduate advisor subject to the rules of the academic unit in which the degree is sought, the college, and the University. Two patterns of study are in general use: Plan A (with thesis) and Plan B (without thesis).

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 and Biostatistics, 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 Biostatistics, 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 or arts and master of science degrees 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 master of science degree. Candidates for the master of arts degree may accumulate no more than 6 credits with a grade below 3.0 in courses that are to be counted toward 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.

MASTER OF PUBLIC HEALTH IN PUBLIC HEALTH

The Master of Public Health Degree in Public Health engages students in course work and practical training to obtain the knowledge, skills and abilities to successfully perform as a public health professional. Public health is a discipline that is distinct from clinical medicine. Public health focuses on the health status of communities and populations and emphasizes disease prevention and health promotion over treatment. Three major functions of public health include assessment, policy development and assurance. Core disciplines contributing to public health include biostatistics, epidemiology, health policy and management, social and behavioral sciences, and environmental health sciences.

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

Admission

To be considered for admission to the Master of Public Health in Public Health, an applicant must:

1. have earned a bachelor's degree from a recognized, accredited educational institution;
2. submit Graduate Record Examination (GRE), Medical College Admission Test (MCAT), Graduate Management Admission Test (GMAT) or Law School Admission Test (LSAT) scores;
3. present evidence of competency in English, assessed with Test of English as a Foreign Language (TOEFL) or Michigan English Language Assessment Battery (MELAB) scores, if English is not the first language;
4. submit three letters of recommendation;
5. submit an essay describing interest in public health, including professional career goals, and past experience with and understanding of the public health profession;
6. submit official transcripts;
7. submit a resume or curriculum vitae.

The Admission Committee integrates the academic information, letters of recommendation, and information regarding the public health profession to make the final admissions decision based on the following considerations:

1. Academic: including attributes such as grades, trend in grades, degrees earned, rigors of the degree programs, graduate study placement scores, research experience, and cognitive skills;
2. Personal Motivation: including attributes such as public health experience and insights about public health competencies, health care reform, and other ethical, social, legal, political, and economic aspects of health;
3. Social Awareness: including attributes such as community service, experience with persons or groups unlike themselves, leadership, and mentoring experiences, as well as effective communication skills and sensitivity to community concerns.

Students may be invited to participate in on-site or telephone interviews as part of the admission process.

Requirements for the Master of Public Health in Public Health

The Master of Public Health in Public Health is available under Plan B (non-thesis). Students must complete 42 credits as specified below.

	CREDITS
1. Complete all of the following courses (18 credits):	
HM 801 Introduction to Public Health	3
HM 802 Biostatistics for Public Health	3
HM 803 Epidemiology for Public Health	3
HM 804 Public Health Administration	3

HUMAN MEDICINE

Graduate Study

HM	805	Social and Behavioral Aspects of Public Health	3
HM	806	Environmental Factors of Health	3
2. All of the following courses (6 credits):			
HM	891	Introduction to Public Health Practicum	1
HM	892	Public Health Practicum	3
HM	893	Public Health Capstone	2
3. Complete 18 credits of elective course work from a list of approved courses available through the student's academic advisor.			
4. Successfully complete a final examination or evaluation.			

GRADUATE CERTIFICATE IN CLINICAL TRIALS RESEARCH MANAGEMENT

The Graduate Certificate in Clinical Trials Research Management is a collaborative program offered by Michigan State University and Grand Valley State University. The program is offered only online and designed for experienced clinical researchers seeking additional course work or preparation for entering a clinical research trials career.

Admission

To be considered for admission to the Graduate Certificate in Clinical Trials Research Management, students must:

1. have a bachelor's or advanced degree.
2. submit official copies of transcripts from all post-secondary institutions attended.
3. provide three letters of recommendation.
4. submit a personal essay describing interest or experience in clinical trials research and career goals.
5. provide a resume or curriculum vitae.

International students must also:

1. submit evidence of English language proficiency verified by an official Test of English as a Foreign Language (TOEFL).
2. provide proof of funding if requesting an I-20.

Students who have been admitted to a master's or doctoral degree program at either University must notify both the graduate studies office and the program coordinator if they intend to seek this certificate in addition to the program for which they have been admitted.

Requirements for the Graduate Certificate in Clinical Trials Research Management

Students must complete 12 credits from the following courses:			CREDITS
<i>From Michigan State University, both of the following courses:</i>			
HM	868	Integrated Research Study Design and Informatics	3
PHM	659	Regulatory Affairs and Project Management in Clinical Research	3
<i>From Grand Valley State University, the following course:</i>			
PSM	650	Ethics and Professionalism in Applied Science	3
<i>From Grand Valley State University, one of the following courses:</i>			
AHS	692	Clinical Research Trials Capstone	3
PA	535	Grant Writing	3
STA	610	Applied Statistics for Health Professionals	3
Students who do not have two or more years of professional experience related to clinical trials research are advised to select AHS 692 as part of their program of study. If selected, AHS 692 must be taken after completion of at least two of the required courses and may be taken concurrently with the third required course.			

Transfer Credit

Because of the collaborative nature of this program, the courses listed above are the only courses that can be used to satisfy the requirements of this certificate. Courses from institutions other than Michigan State University and Grand Valley State University cannot be used in this certificate program. The certificate awarded to students will include the following statement: Collaborative Program of Grand Valley State University and Michigan State University.

GRADUATE CERTIFICATE IN COUNTERFEIT PHARMACEUTICALS

The Graduate Certificate in Counterfeit Pharmaceuticals embodies the principles of prevention in public health and tackles the emerging threat of fake legal drugs.

Requirements for the Graduate Certificate in Counterfeit Pharmaceuticals

Students must complete all of the following courses (12 credits):			CREDITS
HM	801	Introduction to Public Health	3
HM	833	Introduction to Pharmaceutical Counterfeiting and Public Health	3
HM	834	Advanced Counterfeit Pharmaceuticals Readings	3
HM	875	Applications of Open Source Information in Public Health Intelligence	3
VM	813	Special Studies in Food Safety	3

GRADUATE CERTIFICATE IN INTERNATIONAL PUBLIC HEALTH

The Graduate Certificate in International Public Health provides access to interdisciplinary study in global health issues with the opportunity to gain specific expertise in the unique challenges of international public health in the developing world, or among relevant international populations in the United States. The certificate is also designed to develop an intellectual environment that will foster the growth of research, teaching and practice in international public health.

Requirements for the Graduate Certificate in International Public Health

Students must complete all of the following courses (15 credits):			CREDITS
HM	832	Global Public Health	3
HM	836	Comparative Global Healthcare Systems	3
HM	837	Poverty and Public Health	3
HM	838	Cultural Aspects of Public Health Practice	3
HM	839	Water and Public Health: A Global Perspective	3

GRADUATE CERTIFICATE IN PUBLIC HEALTH

The Graduate Certificate in Public Health is designed to provide students with an overview of the core disciplines, a basis for understanding the breadth and scope of the public health field. Public health differs from clinical medicine in its focus on populations and emphasis on health promotion and disease prevention. Public health activities such as health education, control of communicable diseases, application of sanitary measures and environmental monitoring contribute to the health status of communities. Core public health disciplines include biostatistics, epidemiology, health policy and management, social and behavioral sciences, and environmental health sciences.

Requirements for the Graduate Certificate in Public Health

1. Complete all of the following courses (18 credits):			CREDITS
HM	801	Introduction to Public Health	3
HM	802	Biostatistics for Public Health	3
HM	803	Epidemiology for Public Health	3
HM	804	Public Health Administration	3
HM	805	Social and Behavioral Aspects of Public Health	3
HM	806	Environmental Factors of Health	3

GRADUATE CERTIFICATE IN PUBLIC HEALTH ADMINISTRATION

The Graduate Certificate in Public Health Administration offers additional study in the area of public health administration which includes planning, organization, administration, management, evaluation and policy analysis of health and public health programs.

Requirements for the Graduate Certificate in Public Health Administration

	CREDITS
Students must complete all of the following courses (15 credits):	
HM 804 Public Health Administration	3
HM 830 Practical Applications of Public Health Law	3
HM 841 Public Health Policy	3
HM 842 Introduction to Public Health Informatics	3
HM 853 Public Health Program/Intervention Evaluation	3

GRADUATE CERTIFICATE IN PUBLIC HEALTH INFORMATICS

The Graduate Certificate in Public Health Informatics provides a systematic application of information, computer science, and technology to public health practice, research and learning.

Students who successfully complete the course work will be well positioned to compete for the Public Health Informatics Fellowship program sponsored by the Centers for Disease Control and Prevention.

Requirements for the Graduate Certificate in Public Health Informatics

	CREDITS
Students must complete all of the following courses (15 credits):	
HM 842 Introduction to Public Health Informatics	3
HM 843 Methods in Public Health Informatics	3
HM 844 Legal/Ethical Issues in Public Health Informatics	3
HM 845 Informatics and Information Technology	3
HM 846 Advanced Topics in Public Health Informatics Management	3

DEPARTMENT of ANESTHESIA

Rodney Pease, Acting Chairperson

GRADUATE STUDY

The Department of Anesthesia is administered by the College of Human Medicine with the mission of providing medical students with vital experience in airway management and the care of patients during surgery. Faculty provide hands-on training for residents from other medical specialties and for students in other health fields involving the care of surgical patients (nurse anesthetists, physician assistants, anesthesia assistants, and emergency medical technicians). Outside the surgical suites, the department collaborates with community anesthesiologists in developing continuing education programs for the benefit of physicians around the state.

DEPARTMENT of BIOCHEMISTRY and MOLECULAR BIOLOGY

Thomas D. Sharkey, Chairperson

GRADUATE STUDY

The Department of Biochemistry and Molecular Biology is administered jointly by the colleges of Human Medicine, Natural Science, and Osteopathic Medicine. 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 along with options for dual majors in a variety of disciplines. 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.

BIOMOLECULAR SCIENCE GATEWAY - FIRST YEAR

Students are encouraged to apply for admission to the Ph.D. program through the BioMolecular Science Gateway – First Year, where students choose a doctoral major from any of six Ph.D. programs: biochemistry and molecular biology, cell and molecular biology, genetics, microbiology and molecular genetics, pharmacology and toxicology, or physiology. For additional information refer to the *College of Natural Science* section of this catalog.

DEPARTMENT of EMERGENCY MEDICINE

Michael Brown, Acting Chairperson

GRADUATE STUDY

The Department of Emergency Medicine is administered by the College of Human Medicine. The department's responsibilities include preclinical and clinical medical student teaching, emergency medicine residency training, and research. Areas of clinical research and education encompass the broad spectrum of acute care ranging from pediatric emergencies to geriatrics. The research program emphasizes collaboration with other clinical departments and communities in the areas of neurological emergencies and knowledge translation. The department is affiliated with graduate medical education programs in community hospitals where the department faculty train emergency medicine residents.

DEPARTMENT of EPIDEMIOLOGY and BIostatISTICS

Claudia B. Holzman, Chairperson

The Department of Epidemiology and Biostatistics offers multiple educational opportunities including Master of Science and Doctor of Philosophy degree programs with a major in epidemiology, postdoctoral research training in epidemiology and biostatistics, an epidemiology certificate program as a non-degree graduate program, and an undergraduate Specialization in Global Public Health and Epidemiology. The Department faculty also teach epidemiology and biostatistics to students pursuing medical or other graduate degrees.

Epidemiology and biostatistics are population-oriented quantitative disciplines for medical science and biomedical research; both are concerned with public health. Epidemiologists and biostatisticians work to gain increasingly definitive evidence about how to promote health and to prevent or reduce risk of disease, to delay disease onset, and to shorten or ameliorate disease-related suffering and disability. They also help to shape the practice of evidence-based medicine through methodological and substantive contributions needed for cost effectiveness and decision analysis. Epidemiology and biostatistics are both multidisciplinary endeavors involving a mastery of biological science in health, as well as an understanding of mechanisms that link population health to societal factors and to individual-level health-related behaviors.

Students who are enrolled in Master of Science degree programs in the Department of Epidemiology and Biostatistics 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.

UNDERGRADUATE PROGRAM

SPECIALIZATION IN GLOBAL PUBLIC HEALTH AND EPIDEMIOLOGY

The Specialization in Global Public Health and Epidemiology, which is administered by the Department of Epidemiology and Biostatistics, provides an opportunity for sustained study of public health and epidemiology-related topics and research. It is available as an elective to students who are enrolled in bachelor's degree programs at Michigan State University. Applications are accepted starting in January of the freshman year.

The specialization focuses on public health, rather than clinical medicine, and treats public health from a global perspective. It addresses the core principles of public health.

With the approval of the department and college that administer the student's degree program, the courses that are used to satisfy the specialization may also be used to satisfy the requirements for the bachelor's degree.

Requirements for the Specialization in Global Public Health and Epidemiology

	CREDITS
1. One of the following courses (3 or 4 credits):	
STT 200 Statistical Methods	3
STT 201 Statistical Methods	4
2. All of the following courses (13 credits):	
EPI 200 A Multidisciplinary Approach to Problems in Global Public Health and Epidemiology	3

EPI 290 History of Scientific Reasoning and Critical Thinking in Global Public Health and Epidemiology	3
EPI 390 Disease in Society: Introduction to Epidemiology and Public Health	4
EPI 490 Advanced Topics/Methods in Global Public Health and Epidemiology	3

Upon completion of the requirements for the Specialization in Global Public Health and Epidemiology, the student should contact the Chairperson of the Department of Epidemiology and Biostatistics and request certification for the completion of the specialization. After the certification is approved by the chairperson of the department and by the Dean of the College of Human Medicine, the Office of the Registrar will enter on the student's academic record the name of the specialization and the date that it was completed. This certification will appear on the student's transcript.

GRADUATE STUDY

BIostatISTICS

Master of Science

The master's degree program in biostatistics is designed to provide graduate students with essential quantitative training necessary for public health and medical research. Students completing the program will be well prepared to design experimental studies and analyze data in several areas of clinical and biomedical investigations. Required courses concentrate on the principles of study design and methods for analysis of the continuous, categorical and mixed types of biomedical data from clinical experiments and from observational studies. Elective courses are offered in analytic methods for inference from longitudinal data, genomic and genetic data, and censored data.

Admission

To be considered for admission applicants must:

1. Have a bachelor's degree including undergraduate or graduate level quantitative methods with at least two semesters of college-level calculus, a course in matrix or linear algebra, and an introductory course in statistics.
2. Demonstrate interest or experience in a public health field by submitting a statement of purpose.
3. Provide an official transcript.
4. Submit Graduate Record Examination (GRE) scores. Test results should not be older than five years.
5. Submit three letters of recommendation, one of which must be from an academic advisor from a previous program.
6. Provide Test of English as a Foreign Language (TOEFL) scores, if an international applicant. A minimum score of 90 on the internet-based test, 580 on the paper-based test or 237 on the computer-based test, or passing grade on the MSU English Language Test (MSUFLT). Scores must be no older than two years. International students with full native fluency in English are exempt.

Students with less preparation may be provisionally admitted. Credits earned in collateral course work will not count towards the degree requirements.

Requirements for the Master of Science Degree in Biostatistics

The program is available only under Plan A (with thesis). The student's program of study must be approved by the student's academic advisor and guidance committee with the approval of the Dean of the College of Human Medicine.

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 (10 credits):	
EPI 808B Advanced Biostatistics	3
EPI 826B Categorical Data Analysis	3
EPI 855 Biostatistical Modeling in Genomic Data Analysis	3
EPI 856 Statistical Consulting in Public Health	1
2. One of the following courses (3 credits):	
EPI 853B Statistical Computing	3
STT 461 Computations in Probability and Statistics	3
3. Both of the following courses (5 credits):	
EPI 810 Introductory Epidemiology	2
LCS 829 Design and Conduct of Epidemiological Studies and Clinical Trials	3
4. The following course (1 credit):	
EPI 828 Seminar in Responsible Conduct of Research	1
5. Elective courses selected from the following (17 credits):	
a. At least 8 credits from the following biostatistics courses:	
EPI 851 SAS Programming I: Essentials	1
EPI 852 SAS Programming II: Data Management and Analysis	1
EPI 858 Clinical Trials	3
EPI 920 Advanced Methods in Epidemiology and Applied Statistics	3
EPI 951 Latent Variable Modeling	3
EPI 952 Duration and Severity Analysis	3
EPI 953 Analytical Strategies for Observational Studies	3
STT 847 Analysis of Survival Data	3
b. At least 6 credits from the following statistics and econometrics courses:	
EC 821A Cross Section and Panel Data Econometrics I	3
EC 821B Cross Section and Panel Data Econometrics II	3
STT 801 Design of Experiments	3
STT 825 Sample Surveys	3
STT 850 Applied Multivariate Statistical Methods	4
STT 861 Theory of Probability and Statistics I	3
STT 862 Theory of Probability and Statistics II	3
c. At least 3 credits from the following epidemiology courses:	
EPI 812 Causal Inference in Epidemiology	3
EPI 813 Investigation of Disease Outbreaks	3
EPI 817 Epidemiology of Communicable Disease	3
Other epidemiology electives are available with approval of the student's academic advisor.	
6. The following course (4 credits):	
EPI 899 Master's Thesis Research	4

EPIDEMIOLOGY

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 advisor 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 808 Biostatistics I	3
EPI 809 Biostatistics II	3
EPI 810 Introductory Epidemiology	3
EPI 812 Causal Inference in Epidemiology	3
EPI 813 Investigation of Disease Outbreaks	3
EPI 817 Epidemiology of Communicable Diseases	3
EPI 826 Research Methods in Epidemiology	3
EPI 828 Seminar in Responsible Conduct of Research	1
EPI 851 SAS Programming I: Essentials	1
EPI 852 SAS Programming II: Data Management and Analysis	1
EPI 899 Master's Thesis Research	4
LCS 829 Design and Conduct of Epidemiological Studies and Clinical Trials	3
2. One of the following courses:	3
EPI 815 Epidemiology of Cardiovascular Disease	3
EPI 823 Cancer Epidemiology	3
3. Complete 6 credits of 800-level or above course work approved in advance by the student's guidance committee.	
4. 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 (9 credits):	
EPI 805 Readings in the Historical Roots of Epidemiological Thought	3
EPI 910 Themes in Contemporary Epidemiology	3
EPI 920 Advanced Methods in Epidemiology and Applied Statistics	3
2. Complete one of the following courses (3 credits):	
EPI 950 Advanced Biostatistical Methods in Epidemiology	3
STT 847 Analysis of Survival Data	3
3. Complete 15 credits of 800-900 level course work approved in advance by the student's guidance committee.	

HUMAN MEDICINE

Department of Epidemiology and Biostatistics

- Attendance at 80% of all presentations in the departmental epidemiology seminar series during the period of course work.
- Attendance at monthly Doctoral Journal Club meetings.
- Pass a comprehensive written examination which will cover the field of epidemiology in general and the candidate's area of special interest and study.
- Successfully complete 24 credits of Epidemiology 999 doctoral dissertation research that demonstrates original research in epidemiology and public health.
- 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 MEDICINE

William C. Wadland, Chairperson

The Department of Family Medicine provides medical students in the College of Human Medicine with both classroom and clinical education reflecting the depth and scope of family medicine. Our goal is to provide students with a foundation for their future practice, one that incorporates the values and skills of family medicine, regardless of their future career choice. To accomplish this goal the department is staffed by experienced family physicians and other health professionals with interest and experience in many different aspects of medical practice and education. Interests and activities of the department faculty cover the spectrum of primary care, and the department includes a Division of Geriatrics and Gerontology and a Preventive Medicine and Public Health Program.

The department participates in most of the college's interdisciplinary programs, directs a required clinical clerkship in family medicine, offers a variety of preclinical electives including nutrition, and includes fourth-year electives in Sports Medicine and Geriatrics. The department is also integrally involved in the Mentor Program and in the clinical skills courses.

Active clinical practices that combine patient services and medical education are maintained by the department at the Clinical Center on the Michigan State University campus, as well as clinical sites in and around all our affiliated College of Human Medicine campuses.

The department is active in graduate Family Medicine education through its affiliated residencies in community hospitals across the state. The Integrated Program (TIP) provides senior medical students an opportunity to work intensively with a College of Human Medicine affiliated family medicine residency program. Competitive scholarships are available to support TIP students.

Departmental faculty are engaged in extramurally supported research focusing on prevention, self care, geriatrics and long-term care, and medical informatics. Support for research includes grants from the National Institutes of Health (NIH), Health Resources and Services Administration (HRSA), major foundations, and insurance carriers. The department is nationally ranked among the top departments in research funding for primary care medical schools.

DEPARTMENT of MEDICINE

Francesca Dwamena, Acting Chairperson

The Department of Medicine has major responsibilities for providing students with clinical experience in general clinical medicine and the medical specialties including 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 research projects and collaborate actively with faculty in other departments and affiliated institutions in communities. These programs are based in university educational facilities with laboratories in the Life Sciences I Building and the Clinical Center. Clinical research is also conducted at the MSU Breslin Oncology Center. Clinical education is also conducted in affiliated community hospitals. The Department of Medicine is dedicated to advancing the practice of medicine while embracing diversity, challenge and opportunity.

DEPARTMENT of MICROBIOLOGY and MOLECULAR GENETICS

Walter Esselman, 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 molecular genetics 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.

BIOMOLECULAR SCIENCE GATEWAY - FIRST YEAR

Students are encouraged to apply for admission to the Ph.D. program through the BioMolecular Science Gateway – First Year, where students choose a doctoral major from any of six Ph.D. programs: biochemistry and molecular biology, cell and molecular biology, genetics, microbiology and molecular genetics, pharmacology and toxicology, or physiology. For additional information refer to 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 lead is through the College of Osteopathic Medicine. It offers dually accredited residency programs in neurology; fellowship programs in neuro-ophthalmology, stroke, neuro-intervention, neuro-physiology, and neuro-epidemiology; and clinical and research programs for medical and graduate students. The department received approval in 2002 for American Osteopathic Association (AOA) and Accreditation Council for Graduate Medical Education (ACGME) certification for the neurology residency. It also acts as Michigan State University's Osteopathic Postgraduate Training Institution for statewide osteopathic residencies in neurology and ophthalmology.

Its broad research portfolio is supported by multiple National Institutes of Health (NIH) grants and other extramural funding. Major themes of the department's research are to use the eye as a model for brain disease. It also has major research interest in stroke, neuro-intervention, neuro-degenerative disease, epilepsy and demyelinating disease. The department shares research and clinical faculty with affiliated clinical and research laboratories on the MSU campus and statewide. The clinical responsibilities of the department are fulfilled by on-campus neurologists, neuro-ophthalmologists, and ophthalmologists who have sub-specialty training in a number of difference disciplines of neurology. To enrich its research, clinical and educational programs, the department also collaborates with numerous clinicians statewide, nationally and internationally. MSU's International Neurology, Psychiatry and Epidemiology Programs (INPEP) are administered through this unit and has outposts in several countries in sub-Saharan Africa.

DEPARTMENT of OBSTETRICS, GYNECOLOGY, and REPRODUCTIVE BIOLOGY

Richard E. Leach, 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 women's health, including genetic, social cultural and environmental influences.

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 across its seven community campuses. The faculty participates in graduate obstetric-gynecologic education through its four affiliate residency programs across the state. Research activities in the areas of human reproduction, gynecologic oncology, health services delivery, and community health problems related to women's health issues comprise the breadth of the department's research.

DEPARTMENT of PEDIATRICS and HUMAN DEVELOPMENT

Renuka Gera, Acting Chairperson

The Department of Pediatrics and Human Development is made up of 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 responsibility 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, three fellowship programs, 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

William F. Jackson, Acting Chairperson

GRADUATE STUDY

The Department of Pharmacology and Toxicology is administered jointly by the colleges of Human Medicine, Osteopathic Medicine, and Veterinary Medicine. The College of Veterinary Medicine is the primary administrative unit. All three colleges offer a Master of Science degree program in Laboratory Research in

HUMAN MEDICINE

Department of Pharmacology and Toxicology

Pharmacology and Toxicology, a Master of Science and Doctor of Philosophy degree program in Pharmacology and Toxicology, and a Graduate Certificate in Safety Pharmacology. A Master of Science degree in Integrative Pharmacology is also available for professional laboratory personnel. 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.

BIOMOLECULAR SCIENCE GATEWAY - FIRST YEAR

Students are encouraged to apply for admission to the Ph.D. program through the BioMolecular Science Gateway – First Year, where students choose a doctoral major from any of six Ph.D. programs: biochemistry and molecular biology, cell and molecular biology, genetics, microbiology and molecular genetics, pharmacology and toxicology, or physiology. For additional information refer to the *College of Natural Science* section of this catalog.

DEPARTMENT of PHYSIOLOGY

David L. Kreulen, Acting 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.

BIOMOLECULAR SCIENCE GATEWAY - FIRST YEAR

Students are encouraged to apply for admission to the Ph.D. program through the BioMolecular Science Gateway – First Year, where students choose a doctoral major from any of six Ph.D. programs: biochemistry and molecular biology, cell and molecular biology, genetics, microbiology and molecular genetics, pharmacology and toxicology, or physiology. For additional information refer to the *College of Natural Science* section of this catalog.

DEPARTMENT of PSYCHIATRY

Jed Gary Magen, 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, geriatric psychiatry, child psychiatry and functional neuroimaging, **neurocognitive dysfunctions secondary to malaria and AIDS**; collaborating in graduate medical and psychiatric education with affiliated institutions; developing programs on 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

Marc D. Basson, Chairperson

The Department of Surgery is committed to providing state of the art, quality, evidence based, cost effective and patient oriented care to our community. We build on our existing strengths in medical student and resident education with the use of simulation and in linking our student and resident programs in our six community campuses. We foster a culture of inquisitiveness where we seek the answers to surgical problems through clinical studies and in the laboratory. Finally, we value the collegiality of our students, residents, faculty and staff as we educate the physicians and surgeons of the future.

DEPARTMENT of TRANSLATIONAL SCIENCE and MOLECULAR MEDICINE

Jack Lipton, Acting Chairperson

GRADUATE STUDY

The Department of Translational Science and Molecular Medicine (TSMM) is administered by the College of Human Medicine with the mission to catalyze the collaborations of basic science researchers and clinicians endeavoring to understand the origins of disease and developing effective disease treatments. The faculty members of TSMM specialize in translational research aimed at improving the lives of those who suffer from disease or injury. Department activities include preclinical and translational medical

research, mentor-based education for doctoral graduate and medical students as well as clinicians committed to patient-oriented research. The members of the department provide collaborative research opportunities and resources to our colleagues at MSU and healthcare research and delivery partners throughout Michigan. The faculty are committed to community outreach and education to patient populations and the public, in order to illustrate how biomedical research positively affects the lives of people in Michigan and across the world. TSMM is not a discipline specific department and by design can host translational researchers across many fields. Current disease-specific areas of research include: Parkinson's Disease, Alzheimer's Disease, Traumatic Brain Injury, Biomarker Discovery for Psychiatric Disorders and Neurotoxicology of Drugs of Abuse.

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

Brian Mavis, 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 educators and health care professionals on both preclinical sites 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 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 educa-

tion, 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 serves 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, and training center.

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 by the College of Human Medicine. The unit brings together a multidisciplinary team of scholars to address conceptual, theoretical, and practical aspects of the field of bioethics. The center also shares interests and holds various teaching commitments in the colleges of Arts and Letters and Social Science.

Since 1977, the center has engaged in bioethics teaching, research and outreach viewed from the perspectives of the traditional liberal arts and social sciences. In addition to its on-campus activities, the center is responsible for clinical and continuing education in bioethics at various teaching hospitals around Michigan. The center fosters study of the humanities and social sciences as they relate to bioethics practice and policy in the health professions.

The College of Human Medicine offers an undergraduate specialization in Bioethics, Humanities, and Society. The specialization is jointly administered with the College of Arts and Letters and the College of Social Science. The College of Human Medicine is the primary administrative unit.

For additional information on the specialization, refer to the statements referenced in the *College of Human Medicine* section of this catalog.