College of VETERINARY MEDICINE

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In 1907, recognizing that animal agriculture was a significant part of a healthy state economy, the Michigan legislature authorized a course of study leading to the Doctor of Veterinary Medicine degree. This program, inaugurated in 1910, was the beginning of the College of Veterinary Medicine. Since that time, society has come to value animals in additional roles beyond their role in agriculture. Pets are a source of companionship and comfort for people of all ages. And the pleasure that the general public enjoys from zoos and from nature depends in large part on the well being of the animals that are found there.

The present–day College of Veterinary Medicine is the only veterinary college in the state of Michigan and one of 27 nationally. It is organized in six departments — Large Animal Clinical Sciences, Microbiology and Molecular Genetics, Pathology, Pharmacology and Toxicology, Physiology, and Small Animal Clinical Sciences — and includes the Animal Health Diagnostic Laboratory and The Veterinary Medical Center.

The College offers the programs that are listed below:

- a preveterinary program
- a professional program leading to the Doctor of Veterinary Medicine degree
- a certificate program in veterinary technology
- a Bachelor of Science degree program in veterinary technology
- graduate programs leading to the Master of Science and Doctor of Philosophy degrees
- intern and residency training programs in various clinical specialties

VETERINARY TECHNOLOGY

The American Veterinary Medical Association (AVMA) recognizes two levels of training for persons who serve as support staff for the veterinary medical profession: veterinary technician and veterinary technologist. It should be noted that the programs that are associated with the two levels of training are both described as *veterinary technology* programs. The programs that train veterinary technicians are two– or three–year programs, whereas the programs that train veterinary technologists are baccalaureate degree programs.

Veterinary technicians and veterinary technologists manage many aspects of patient care and perform diagnostic and treatment procedures as ordered by veterinarians. Their involvement enables veterinary hospitals and research or other animal care facilities to offer expanded services and to be more productive. The level of training of the veterinary technician is most appropriate for individuals who seek entry–level employment within privately owned veterinary practices. The level of training of the veterinary technologist is linked with employment in research facilities, vivariums, industry, educational institutions, pharmaceutical companies, and large–group or specialty veterinary practices.

Certificate

MSU's Certificate program in veterinary technology articulates with the Associate in Applied Science Degree program in veterinary technology that is offered by Lansing Community College (LCC) and with MSU's Bachelor of Science degree program with a major in veterinary technology. Students who are

admitted to MSU's Certificate program in veterinary technology and to LCC's Associate in Applied Science Degree program in veterinary technology will complete the following courses through LCC: one 4-credit chemistry course, one 1-credit chemistry course, one 3-credit microbiology course, one 1-credit microbiology course, one 3-credit communication course, one 4-credit composition course, one 3-credit diversity course, one 4- or 5-credit college algebra course. Students who are admitted to the Certificate and the Associate in Applied Science Degree programs in veterinary technology will complete the following courses at MSU: didactic courses in veterinary technology and clinical clerkships. The didactic course material is based on an integrative approach to anatomy, physiology, pathophysiology, pharmacology, nutrition, nursing care, disease processes, and client education. Upon completion of the didactic courses, students will complete their clerkship training at the MSU Veterinary Teaching Hospital. Through clerkships, students will have the opportunity to apply their knowledge and problem-solving skills in a functional hospital setting.

Upon completion of the requirements for MSU's Certificate in veterinary technology, students will be awarded a Certificate from MSU. Upon completion of the requirements for LCC's Associate in Applied Science Degree in veterinary technology, students will be awarded an Associate in Applied Science degree from LCC. Students who have the Certificate or the Associate in Applied Science Degree in veterinary technology will be qualified to take the National and State Board Examinations for licensure as veterinary technicians.

Enrollments in the Certificate program in veterinary technology are limited. Students are admitted for *Spring* semester *only*. Applications for admission are accepted through May 15th of the year prior to the Spring semester for which the student is applying.

The Certificate program in veterinary technology has been accredited by the American Veterinary Medical Association. For a comprehensive brochure describing the program, write to: Veterinary Technology Program, A-55 Veterinary Medical Center, Michigan State University, East Lansing, MI 48824-1316.

Bachelor of Science

Admission as a Junior

The number of students who can be admitted as juniors to the Bachelor of Science degree program in veterinary technology is limited. All persons who are interested in applying for admission as juniors to the bachelor's degree program in veterinary technology must request a special application form and detailed information regarding admission requirements and procedures from the Veterinary Technology Program, A-55 Veterinary Medical Center, Michigan State University, East Lansing, MI 48824-1316.

Applications for admission to the bachelor's degree program in veterinary technology are accepted and reviewed *only* during the *Spring* semester of each year. Persons who wish to be considered for admission to the program must submit their applications *by March 1* of the year that admission is sought. Students may be admitted to the program for Fall semester *only*.

Students who are enrolled in colleges and universities other than Michigan State University should contact MSU's Office of Admissions and Scholarships and the College of Veterinary Medicine regarding admission to the bachelor's degree program in veterinary technology as transfer students.

Minimal criteria for admission to the Bachelor of Science degree program in veterinary technology are:

1. Completion of at least 56 credits of the first two years of the bachelor's degree program in veterinary technology with a cumulative grade-point average of 2.00 or higher.
2. Completion of:
   a. Mathematics 110 or 116.
   b. Chemistry 141.
   c. The University's Integrative Studies in General Science requirement.
   d. Tier I writing course.

The final selection of students to be admitted to the baccalaureate degree program in veterinary technology is based on the cumulative grade-point average of all courses taken and a grade-point average calculated on all courses in mathematics, the physical and biological sciences, and veterinary technology. In addition, factors including the following ones may be considered: work experience, diversity, and residency.

Requirements for the Bachelor of Science Degree in Veterinary Technology

1. The requirements for a bachelor's degree as specified in the *Undergraduate Education* section of the University catalog; 129 credits, including general elective credits, are required for the Bachelor of Science degree in Veterinary Technology.
   The completion of Mathematics 110 or 116 that is referenced in item 2. b. below may also be used to satisfy the University mathematics requirement.
   The University's Tier II writing requirement for the Veterinary Technology major is met by completing the following courses: Veterinary Medicine 300, 301, 302; Veterinary Medicine 403 or 404. Those courses are referenced in items 2. a. and 2. c. below.

				CREDITS
2.	The following requirements for the major:			91
a.	All of the following courses (69 credits):			
	CEM	141	General Chemistry	4
	MIC	205	Allied Health Microbiology	3
	MIC	206	Allied Health Microbiology Laboratory	1
	VM	200	Veterinary Systems Biology and Medical Science I	7
	VM	201	Veterinary Systems Biology and Medical Science II	7
	VM	300	Veterinary Systems Biology and Medical Science III	7
	VM	301	Veterinary Systems Biology and Medical Science IV	7
	VM	302	Veterinary Systems Biology and Medical Science V	7
	VM	303	Anesthesiology for Veterinary Technicians	2
	VM	304	Radiology for Veterinary Technicians	2
	VM	400	Laboratory Animal Technology	2
	VM	401	Clinical and Anatomic Pathology for Veterinary Technologists	2
	VM	402	Hospital Practice Management for Veterinary Technologists	3
	VM	410	Veterinary Technology Clerkship in Anesthesiology	3
	VM	411	Veterinary Technology Clerkship in Radiology	3
	VM	412	Veterinary Technology Clerkship in Companion Animal Medicine	3
	VM	413	Veterinary Technology Clerkship in Companion Animal Surgery	3
	VM	414	Veterinary Technology Clerkship in Equine Medicine and Surgery	3
b.	One of the following courses (5 credits):			
	MTH	110	College Algebra and Finite Mathematics	5
	MTH	116	College Algebra and Trigonometry	5
c.	One of the following courses (2 credits):			
	VM	403	Companion Animal Nutrition and Behavior for Veterinary Technologists	2
	VM	404	Equine and Food Animal Nutrition and Husbandry	2
d.	*Five of the following courses* approved by the student's academic adviser (15 credits):			
	VM	450	Veterinary Technology Clerkship in Emergency Medicine	3
	VM	451	Veterinary Technology Clerkship in Cardiology	3
	VM	452	Veterinary Technology Clerkship in Neurology	3
	VM	453	Veterinary Technology Clerkship in Ophthalmology	3
	VM	454	Veterinary Technology Clerkship in Critical Care	3
	VM	460	Veterinary Technology Clerkship in Equine Anesthesiology	3
	VM	461	Veterinary Technology Clerkship in Equine Field Service	3
	VM	462	Veterinary Technology Clerkship in Advanced	

		Equine Medicine and Surgery	3
VM	470	Veterinary Technology Clerkship in Food Animal Medicine	3
VM	471	Veterinary Technology Clerkship in Production Medicine	3
VM	472	Veterinary Technology Clerkship in Food Animal Anesthesiology	3
VM	480	Veterinary Technology Clerkship in Clinical Pathology	3
VM	481	Veterinary Clerkship in Microbiology	3
VM	482	Veterinary Technology Clerkship in Necropsy	3
VM	483	Veterinary Technology Clerkship in Biomedical Research	3 to 12
VM	484	Veterinary Technology Clerkship in Zoo and Wildlife Medicine	3 to 12
VM	485	Veterinary Technology Clerkship in Special Problems	3 to 12

PREPROFESSIONAL PROGRAM for VETERINARY MEDICINE

Students who meet the requirements for admission to the University as freshmen and sophomores, as shown in the *Undergraduate Education* section of the catalog, may select the preveterinary program in the College of Veterinary Medicine as their major preference. A strong high school preparation in science, including chemistry, biology, and physics, is highly desirable. Students who are enrolled in the preveterinary program are enrolled in the Undergraduate University Division, but receive academic advising in the College of Veterinary Medicine Preveterinary Advising Center.

The courses in mathematics and natural science that are required for admission to the Professional Program in Veterinary Medicine are included in the requirements for the preveterinary program. Students who are enrolled in the preveterinary program should complete the University requirements for bachelor's degrees. Courses that are used to satisfy University requirements may also be used to satisfy certain requirements for admission to the Professional Program in Veterinary Medicine.

University regulations require that a student who has arrived at junior standing must select a major leading to a baccalaureate degree. The College of Veterinary Medicine does *not* offer a bachelor's degree program for preveterinary students. Therefore, upon reaching junior standing, students who have been enrolled in the preveterinary program and who have not been admitted to the Professional Program in Veterinary Medicine must be admitted to a major in another college in order to complete the requirements for a bachelor's degree.

Enrollments in the preveterinary program are not limited. However, because of the limitation on the number of students admitted each year to the Professional Program in Veterinary Medicine, completion of the preveterinary program does not assure admission to the professional program.

Because admission to the Professional Program in Veterinary Medicine is competitive and the majority of successful applicants have completed at least three years of a bachelor's degree program, students who are enrolled in the preveterinary program are encouraged to plan toward a baccalaureate degree in a major consistent with their interests and alternative educational and career goals. Students in any major may apply for admission to the Professional Program. For additional information, refer to the *Professional Program in Veterinary Medicine* statement.

Requirements for the Preveterinary Program

				CREDITS
1.	All of the following courses:			39
	BCH	401	Basic Biochemistry	4
	BS	110	Organisms and Populations	4
	BS	111	Cells and Molecules	3
	BS	111L	Cell and Molecular Biology Laboratory	2
	CEM	141	General Chemistry	4
	CEM	161	Chemistry Laboratory I	1
	CEM	251	Organic Chemistry I	3
	CEM	252	Organic Chemistry II	3
	CEM	255	Organic Chemistry Laboratory	2
	MTH	116	College Algebra and Trigonometry	5
	PHY	231	Introductory Physics I	3
	PHY	232	Introductory Physics II	3
	PHY	251	Introductory Physics Laboratory I	1
	PHY	252	Introductory Physics Laboratory II	1

2. Students who are enrolled in the preveterinary program should complete the University requirements for bachelor's degrees as described in the *Undergraduate Education* section of the catalog.

   The completion of Mathematics 116 referenced in item 1. above may also satisfy the University mathematics requirement.

   Students who are enrolled in the Preveterinary Program in the College of Veterinary Medicine may complete an alternative track to Integrative Studies in Biological and Physical Sciences that consists of the following courses: Biological Science 110, 111, and 111L and Chemistry 141. The completion of Biological Science 110 and 111L satisfies the laboratory requirement. Biological Science 110, 111, and 111L and Chemistry 141 may be counted toward both the alternative track and the requirements for the preveterinary program referenced in item 1. above.

   Students who are enrolled in the preveterinary program will be required to meet the Tier II writing requirement approved for the student's major leading to the bachelor's degree.

PROFESSIONAL PROGRAM in VETERINARY MEDICINE

The professional veterinary medicine program is designed to provide an excellent basic medical education as well as clinical training in the diagnosis, treatment, and prevention of animal diseases and injuries. Graduates may pursue a variety of careers in salaried positions or become licensed as private practitioners in any state.

About three–fourths of the veterinarians in the United States are engaged in private practice. These veterinarians may be in general practices that care for the needs of all of the species of domestic animals or in practices limited to companion animals, farm animals, horses, poultry, or some other specific aspect of veterinary medicine.

Many veterinarians are employed by the U.S. Department of Agriculture for important work in livestock disease control, meat and poultry inspection, development of biological products, and prevention of the entry of foreign animal diseases. Veterinarians also find rewarding positions in public health work for the U.S. Public Health Service, the U.S. Army and Air Force, and for state, county, and local health agencies.

Some of the most exciting opportunities for veterinarians are in biomedical research for the benefit of both animals and people. Excellent research opportunities are available with colleges and universities, government agencies, biological and pharmaceutical companies, and private medical research institutions.

The professional program leading to the Doctor of Veterinary Medicine degree has been accredited by the American Veterinary Medical Association. The advanced clinical training program in surgery has been accredited by the American College of Veterinary Surgeons.

Internship and residency programs are available to qualified persons.

Admission to the Professional Program in Veterinary Medicine

A new class of students begins the four–year professional program each fall semester. Applications for admission and related materials (e.g., scores on the Medical College Admission Test or Graduate Record Examination) must be received by December 1.

Factors considered by the Admissions Committee in determining an applicant's relative competitive position are: (1) cumulative grade–point average; (2) grade-point average for required preveterinary science courses in Biochemistry, General Biology, Chemistry, Mathematics, and Physics; (3) scores on the Medical College Admission Test (MCAT) or Graduate Record Examination (GRE); (4) average credit-load per semester; (5) total credits completed; (6) an interview; (7) veterinary exposure; (8) animal exposure; (9) activities and achievements; and (10) ability to communicate through a written essay. The admission process includes a procedure that attempts to reflect the diversity of society among candidates admitted to the professional program.

Applications, regular or transfer, are reviewed by the Admissions Committee. Applicants are considered for admission in the following order of priority:

1. Residents of the state of Michigan, as defined by Michigan State University. (Since MSU is a public, tax- assisted institution, admission priority is granted to residents of Michigan.)
2. Residents of states other than Michigan, including U.S. Territories and Trust Possessions.
3. All others.

Students should complete the following requirements prior to enrollment:

1. Chemistry — 3 semester or equivalent term credits in general inorganic with laboratory; 6 semester or equivalent term credits in organic with laboratories; 4 semester or equivalent term credits in biochemistry.
2. General Physics — 8 semester or equivalent term credits, including laboratory work.
3. General Biology — 6 semester or equivalent term credits, to include principles of biological regulation, integration, and diversity; genetics; development; selected physiological topics; taxonomy and systematics; comparative physiology; and ecology.
4. College Algebra and Trigonometry — 3 semester or equivalent term credits; may substitute equivalent entry–level course, e.g., calculus.
5. Arts and Humanities — 8 semester or equivalent term credits that may include two or more of the following subject areas: history, literature, music or art history or appreciation, philosophy, religion.
6. Social Science — 8 semester or equivalent term credits that may include two or more of the following subject areas: cultural anthropology, economics, human geography, political science, psychology, sociology.
7. English — 4 semester or equivalent term credits that may include composition, reading, speech, and other communication skills.

VETERINARY SCHOLARS ADMISSION OPTION

This option has been established by the College of Veterinary Medicine in cooperation with the Honors College at Michigan State University in order to provide an admission avenue for students who wish to complete a bachelor's degree consisting of advanced, scholarly studies in concert with their entry to the four–year professional veterinary medical degree program. All MSU preveterinary students who are members of the Honors College may choose to participate in this program. Up to ten MSU students may be chosen each year to be granted admission to the veterinary medical program contingent upon completion of a bachelor's degree in a major of the students choice.

The following components will be considered in selecting candidates for this admission option:

1. Completion of at least 75 percent of the required preveterinary science courses.
2. Minimum 3.20 cumulative and preveterinary science grade–point averages.
3. Bachelor's degree program proposal planned in consultation with the Honors College advising staff and a departmental honors adviser and demonstrating enriched, advanced, and scholarly work in a major of the student's choice.
4. Minimum 240 hours of veterinary exposure.
5. Completion of at least 10 credits in advanced or diverse course work beyond the minimum preveterinary requirements.
6. Performance in the regular veterinary admission criteria including grade– point averages, GRE/MCAT scores, interview, veterinary exposure, extracurricular activities and achievements.
7. Personal statement describing the scholarly content of the proposed bachelor's degree program and its relevance to the individual's career and personal goals
8. Evaluations from the honors adviser in the student's degree program, a veterinarian, and an individual of the applicant's choice.

Students who wish to enter the professional veterinary medical program before earning a bachelor's degree may apply through the regular veterinary admission process

The college of Veterinary Medicine's Committee on Student Admissions selects the candidates for this option and reserves the right to modify the criteria and process.

Additional Information

For additional information concerning admission to the professional program, contact the Admissions Office, College of Veterinary Medicine, A– 128 East Fee Hall, Michigan State University, East Lansing, Michigan 48824– 1316. *Note:* Prospective applicants should maintain contact with the College's Admissions Office for current information.

Statement on Advanced Status

Rarely will students be considered for admission to the program with advanced standing.

Requirements for the Bachelor of Science Degree

1. The University requirements for the bachelor's degree as described in the *Undergraduate Education* section of this catalog.
2. Preveterinary program requirements.
3. At least 56 credits of the professional program in Veterinary Medicine.

Health Requirements for Students in the Professional Program in Veterinary Medicine

1. The student must be covered by a personal health insurance policy throughout enrollment in the program.
2. The student's tetanus vaccination must be current throughout enrollment in the program.
3. The student must have a rabies vaccination prior to participation in senior clerkships. Rabies vaccination is recommended for entering students.

Curriculum

The curriculum leading to the D.V.M. degree is primarily the responsibility of the faculty of the College. Student input to curriculum matters is through student representation on the Curriculum Committee. Continuing development of new information in health-related fields and changes within the profession demand ongoing curricular evaluation and modification. Development of the knowledge, skills, and attitudes required of a veterinarian remains the major goal of this curriculum. Efficiency in obtaining this goal requires a dynamic program that can respond through instituting newly developed concepts and techniques. For these reasons, particulars of the curriculum described herein may change in subsequent years in accordance with established College and University policies and procedures.

Requirements for the Doctor of Veterinary Medicine Degree in Veterinary Medicine

Completion of the following 163-credit, four-year professional program with a grade-point average of at least 2.00.

CREDITS

SEMESTER 1 (Fall)

ANS	511	Animal Science for Veterinarians	2
ANS	513	Animal Nutrition for Veterinarians	2
ANT	515	Comparative Veterinary Gross Anatomy	6
ANT	516	Veterinary Histology and Cell Biology	4
SCS	511	Veterinary Radiology	1
VM	511	Veterinary Perspectives I	2
VM	512	Veterinary Integrative Problem Solving I	1
			18

SEMESTER 2 (Spring)

ANT	517	Veterinary Neuroanatomy	1
MIC	561	Veterinary Immunology	2
MIC	563	Medical Bacteriology, Mycology, Parasitology and Virology	4
PSL	511	Veterinary Physiology	5
PTH	551	General Pathology	3
VM	521	Veterinary Perspectives II	2
VM	522	Veterinary Integrative Problem Solving II	3
			20

SEMESTER 3 (Fall)

MIC	565	Bacterial, Mycotic, Parasitic and Viral Diseases	6
PHM	556	Veterinary Pharmacology	5
PTH	553	Clinical and Systemic Pathology	5
VM	532	Veterinary Integrative Problem Solving III	3
VM	533	Veterinary Epidemiology	3
			22

SEMESTER 4 (Spring)

PHM	557	Veterinary Toxicology	2
VM	541	Veterinary Perspectives III	2
VM	542	Veterinary Integrative Problem Solving IV	3
VM	543	Cardiovascular Diseases	2
VM	544	Veterinary Public Health	2
VM	545	Principles of Anesthesia and Surgery	4
VM	546	Musculoskeletal Diseases	5
VM	547	Respiratory Diseases	2
			22

SEMESTER 5 (Fall)

VM	552	Veterinary Integrative Problem Solving V	3
VM	553	Theriogenology and Urinary Diseases	5
VM	554	Hematological, Oncological and Dermatological Diseases	3
VM	555	Neurological and Ophthalmological Diseases	3
VM	556	Digestive, Metabolic and Endocrinological Diseases	5
VM	557	Operative Surgery	2
			21

SEMESTERS 6 (Spring), 7 (Summer), 8 (Fall), 9 (Spring)

Students will be required to complete 60 clerkship credits. Satisfactory completion of semesters one through five of the professional curriculum is required for enrollment in any of the listed clerkships.

REQUIRED CLERKSHIPS

SCS	611	Diagnostic Imaging Clerkship	3
SCS	648	Anesthesiology Clerkship	3
PTH	630	Diagnostic Pathology Clerkship	3
One Equine Clerkship (Large Animal Clinical Sciences 620 or 621)			3
One Food Animal Clerkship (Large Animal Clinical Sciences 630 or 631)			3
One Small Animal Medicine Clerkship (Small Animal Clinical Sciences 625 or 647)			3
One Small Animal Surgery Clerkship (Small Animal Clinical Sciences 626 or 646)			3
Elective Clerkships			9
			30

ELECTIVE CLERKSHIPS

ANT	610	Veterinary Gross Anatomy Dissection	3
ANT	611	Research Problems in Veterinary Anatomy	3
LCS	610	Problems in Large Animal Clinical Sciences	3
LCS	611	Research Problems in Large Animal Clinical Sciences	3
LCS	612	Problems in Production Medicine	3
LCS	620	Equine Medicine and Surgery Clerkship	3
LCS	621	Equine Field Service Clerkship	3
LCS	622	Advanced Equine Medicine and Surgery Clerkship	3
LCS	623	Equine Musculoskeletal Diseases Clerkship	3
LCS	624	Equine Theriogenology Clerkship	3
LCS	625	Equine Herd Health Clerkship	3
LCS	630	Food Animal Medicine and Surgery Clerkship	3
LCS	631	Introductory Food Animal Production Medicine	3
LCS	632	Advanced Food Animal Medicine and Surgery Clerkship	3
LCS	633	Dairy Production Medicine Clerkship	3
LCS	634	Swine Production Medicine Clerkship	3

LCS	640	Large Animal Anesthesia Clerkship	3
LCS	677	Veterinary Preceptorship	3
MIC	690	Veterinary Microbiology Clerkship	3
PHM	658	Research Problems in Pharmacology and Toxicology	3
PTH	631	Necropsy Clerkship	3
PTH	632	Problems in Veterinary Pathology	3
PTH	633	Transfusion Medicine	3
SCS	612	Problems in Diagnostic Imaging Clerkship	3
SCS	625	Small Animal General Medicine Clerkship	3
SCS	626	Small Animal Soft Tissue Surgery Clerkship	3
SCS	636	Problems in Soft Tissue Surgery Clerkship	3
SCS	640	Cardiology Clerkship	3
SCS	641	Ophthalmology Clerkship	3
SCS	642	Zoo and Wildlife Clerkship	3
SCS	643	Neurology Clerkship	3
SCS	644	Dermatology Clerkship	3
SCS	645	Intensive Care Unit Clerkship	3
SCS	646	Small Animal Orthopedic Clerkship	3
SCS	647	Small Animal Internal Medicine Clerkship	3
SCS	650	Advanced Cardiology	3
SCS	651	Problems in Ophthalmology Clerkship	3
SCS	653	Problems in Neurology Clerkship	3
SCS	656	Problems in Orthopedic Surgery Clerkship	3
SCS	657	Problems in Internal Medicine Clerkship	3
SCS	658	Problems in Anesthesiology Clerkship	3
SCS	690	Veterinary Molecular Biology Clerkship	3
SCS	693	Problems in Small Animal Clinical Sciences Clerkship	3
VM	611	Veterinary Externship	3
VM	690	Special Problems in Veterinary Medicine	3

Student Performance

The Committee on Student Performance monitors student performance in accordance with established College standards and offers assistance to students experiencing difficulties in the professional curriculum. An important function of this committee is to determine the reasons for student difficulties and recommend study schedules, counseling, and other means of helping the student perform in a satisfactory manner. The Committee on Student Performance may take appropriate academic disciplinary action consistent with the academic standards of the College and the *Medical Student Rights and Responsibilities* document.

Student Rights and Responsibilities

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

GRADUATE STUDY

The College of Veterinary Medicine offers graduate programs in each of six departments: Large Animal Clinical Sciences, Microbiology and Molecular Genetics, Pathology, Pharmacology and Toxicology, Physiology, and Small Animal Clinical Sciences. All of these departments are authorized to offer master's degree programs. Doctor of Philosophy degree programs are offered in all departments except Small Animal Clinical Sciences. These programs are designed primarily for those preparing themselves for positions in teaching or research. In addition, other programs, including residencies for post–D.V.M. training in recognized clinical specialties, are available.

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

Students who are enrolled in master's degree programs in the College of Veterinary Medicine may elect the master's specialization in agribusiness. For additional information, refer to the *Master's Specialization in Agribusiness Management* statement in the *Department of Agricultural Economics* statement in the *College of Agriculture and Natural Resources* 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 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.

Master of Science

For the master's degree, departments of the College of Veterinary Medicine recommend Plan A with thesis.

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

A bachelor's degree is required of all applicants for graduate study. Admission must be approved by the department in which the applicant proposes to do the major work. Scholastic record, experience, personal qualifications, and area of subject–matter interest are considered by the department in determining the applicant's acceptability.

Upon admission, the master's student is classified in one of two categories:

1. *Regular status:* for those who have an undergraduate grade–point average of 3.00 or above and are otherwise qualified to undertake a master's program.
2. *Provisional status:* for those who have some remediable inadequacy of qualifications or subject–matter preparation.

Requirements for the Master of Science Degree

Up to 10 credits may be allowed for thesis research (course number 899). The distribution of credits among major and minor areas is determined by the student's major department.

Residence

A minimum of 9 credits must be earned in residence on campus unless a department specifies more than 9 credits.

Time Limit

For the master's degree, the student must complete all requirements within six calendar years from the beginning of the first semester in which credit was earned toward the degree.

Doctor of Philosophy

Doctor of Philosophy degree programs are offered in anatomy, large animal clinical sciences, microbiology, pathology, pharmacology, 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 to a doctoral program requires the approval of the department in which the applicant's major work is to be done.

The doctoral student is classified in one of two categories:

1. *Regular status:* for those who have a grade–point average in prior graduate work of 3.00 or above and who are otherwise qualified to undertake a doctoral program.
2. *Provisional status:* for those who have some remediable inadequacy of qualifications.

Dual Degree Programs in the College of Veterinary Medicine

Students who are enrolled in the Doctor of Veterinary Medicine degree program may be granted approval to pursue simultaneously either a research–focused Master of Science degree or a Doctor of Philosophy degree. For additional information, interested students should refer to the *Requirements for a Joint Master's Degree and Medical Degree* or *Special Programs* statements in the *Graduate Education* section of this catalog. They should also contact the Associate Dean for Academic Programs and the Associate Dean for Research and Graduate Studies in the College.

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 veterinary doctoral degree (Doctor of Veterinary Medicine) and a graduate research doctoral degree (Doctor of Philosophy). The program seeks to meet a national need for veterinarians who are proficient in research as well as in veterinary medicine, and who will pursue careers as faculty members in veterinary medical school and research institutions.

The program is designed to select, educate, and train highly motivated students having outstanding research and academic qualifications. Trainees pursue veterinary medical and graduate studies in parallel, meet regularly with peers in seminars, and engage in veterinary medical-level 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 Studies in the College of Veterinary Medicine.

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

Post–D.V.M. Clinical Education Programs

Internships. The Department of Small Animal Clinical Sciences offers 13–month rotating internships designed to provide general clinical training for the post–D.V.M. student and a basis for further education in a specialty area.

Residencies. Residencies designed to meet the training requirement for board certification are offered in a variety of clinical specialties by the departments of Small Animal Clinical Sciences, Large Animal Clinical Sciences, and Pathology. Concurrent work toward an advanced degree is possible.

MULTIDEPARTMENTAL DOCTORAL DEGREE PROGRAMS IN ENVIRONMENTAL TOXICOLOGY

The College of Veterinary Medicine offers Doctor of Philosophy degree programs with majors in Anatomy—Environmental Toxicology, Microbiology—Environmental Toxicology, Pathology—Environmental Toxicology, Pharmacology and Toxicology—Environmental Toxicology, and Physiology—Environmental Toxicology. For additional information about these programs, refer to the statement on *Multidepartmental Doctoral Programs in Environmental Toxicology* in the *Graduate Education* section of this catalog.

DEPARTMENT of LARGE ANIMAL CLINICAL SCIENCES

Frederik J. Derksen, Chairperson

The Department of Large Animal Clinical Sciences offers courses for students in the professional program in Veterinary Medicine. Post–D.V.M. programs are offered which lead to the Master of Science degree in large animal clinical sciences and provide training in AVMA–recognized specialty areas. The department also offers a Doctor of Philosophy degree program with a major in large animal clinical sciences.

GRADUATE STUDY

Master of Science

The principal objectives of the Master of Science program are to introduce candidates to research and to prepare them for positions requiring advanced education. Opportunities are available in veterinary and medical colleges, animal and veterinary science departments, industrial research and development, U. S. Public Health Service, U. S. Food and Drug Administration, U.S. Department of Agriculture, and private business organizations or practices.

The master's degree student is usually required to develop a course of study which requires writing a thesis based upon original research (Plan A). In rare instances, a student may be permitted to elect a non–thesis (Plan B) course of study upon recommendation of the guidance committee and the approval of the department's faculty.

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

Admission

The candidate must possess a Doctor of Veterinary Medicine degree or an equivalent degree and be accepted by the graduate faculty of the department.

Requirements for the Master of Science Degree in Large Animal Clinical Sciences

The student must complete 30 credits under either Plan A (with thesis) or Plan B (without thesis).

Students majoring in large animal clinical sciences may elect to support the major field with courses in two or three additional areas. Supporting and minor courses may be in anatomy, pathology, physiology, pharmacology, bacteriology, virology, immunology, mycology, parasitology, nutrition, animal science, statistics, chemistry, genetics, or education.

Academic Standards

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

Doctor of Philosophy

The Doctor of Philosophy degree program is designed to provide veterinary medical graduates the experience and training necessary to develop an integrative approach to animal disease research. The program emphasizes the development of a firm scientific background in fundamental and basic biomedical sciences, in–depth knowledge in an area of veterinary science, and the conduct of in–depth original research.

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

Admission

Applicants for admission must hold a Doctor of Veterinary Medicine degree or another medical degree and have a grade–point average of at least 3.00 in two previous years of graduate or professional study. At least one year of clinical experience is recommended. A Master of Science degree is not required.

Applicants must submit an autobiographical sketch, a statement of interest and objectives, and three letters of recommendation from individuals capable of judging their academic capabilities and accomplishments. The department's Graduate Study–Research Committee reviews applications for admission and recommends persons for admission to the department chairperson. The admissions decision is based upon the applicant's academic record and professional goals, the letters of recommendation, and space and faculty availability.

Requirements for the Doctor of Philosophy Degree in Large Animal Clinical Sciences

The doctoral program is divided into three phases: Phase I culminating with a qualifying examination, Phase II culminating with a comprehensive examination, and Phase III culminating with the completion and defense of the dissertation. There is no foreign language requirement.

Phase I consists of fundamental and basic biomedical sciences courses in which the student must demonstrate a high degree of competence. The student must complete 15 credits of inorganic chemistry, organic chemistry, biochemistry, and physiologic chemistry. No fewer than 3 credits must be in biochemistry. The student must also complete no fewer than 3 credits of statistics and no fewer than 6 credits in courses emphasizing mechanisms of animal disease. In order to continue in the doctoral program, the student must pass a qualifying examination formulated and conducted by the qualifying examination committee.

Phase II consists of at least 13 credits in an area of veterinary science chosen by the student. The 13 credits must be in courses at the 400 level or above. At least 8 of the 13 credits must be in courses at the 800 level or above, and it is recommended that these credits be from one of the following departments: anatomy, physiology, pharmacology and toxicology, microbiology, pathology, statistics and probability, or community health science. With the agreement of the department that administers the courses, the 8 credits may contribute to a minor from that department, but a minor is not required for the program.

The comprehensive examination is given by the student's guidance committee toward the end of Phase II when the student has completed most of the required courses. The examination consists of two parts: an oral examination and the presentation of a dissertation proposal. The oral examination is designed to evaluate the student's depth of knowledge in his or her chosen area of veterinary science and includes, but is not limited to, material from the required courses. The student must pass the oral examination before he or she may present the dissertation proposal. The proposal must be presented no earlier than 15 days, and no later than 45 days, after the student has passed the oral examination.

Phase III consists of conducting animal disease research, completing the dissertation, and defending the dissertation.

Academic Standards

A candidate may not receive more than three grades below 3.0 in courses required for the degree.

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 Veterinary Medicine, Human Medicine, Natural Science, and Osteopathic Medicine. All four of these colleges offer Master of Science and Doctor of Philosophy degree programs with majors in microbiology. 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 PATHOLOGY

Willie Reed, Acting Chairperson

GRADUATE STUDY

The Department of Pathology is administered jointly by the colleges of Veterinary Medicine, Human Medicine, and Osteopathic Medicine. Study for the Master of Science or Doctor of Philosophy degree with a major in pathology may be administered by any one of the three colleges referenced above. Study for the Doctor of Philosophy degree with a major in pathology–environmental toxicology is administered by the College of Veterinary Medicine.

Residency Training in Veterinary Pathology

The veterinary residency program is designed to provide post–D.V.M. advanced training for proficiency in the practice of pathology. Scheduled rotational assignments are available in the areas of necropsy, clinical pathology, and surgical pathology. Residents also receive experience in teaching and are exposed to the research activities of the department. Residents must identify their area of interest in either clinical pathology or anatomic pathology. Appointments are for a 2 to 4 year period depending on the background and career objectives of the individual resident. Annual evaluations are conducted, and reappointments are contingent on the student's performance.

Pathology for Graduate Students in Related Fields

Students majoring in related fields may elect to take supportive courses in pathology. Such students are expected to have an adequate background in biochemistry, microbiology, physiology, gross anatomy, and histology. Also, due to limited facilities, permission must be obtained from the department chairperson prior to enrollment.

PATHOLOGY

Graduate education and research may be directed to either human or animal pathology. Major areas of research in pathology provide the basis for advanced degree programs. These areas include toxicologic pathology, oncology, neuropathology, hematology in a broad sense, immunopathology, pathology of infectious diseases, reproductive and cardiovascular pathology, and pathology of animal models for human disease. Comparative aspects of disease processes may encompass a variety of species, including humans and domestic or wild mammals and birds, and may emphasize anthropozoonoses dealing with diseases transmissible across species lines. An interdisciplinary approach to problem solving will be applied in all instances where indicated.

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

Admission

With few exceptions, the graduate student majoring in pathology will have a professional degree in some branch of medicine. Students holding a bachelor's degree and seeking graduate training in pathology are advised to inquire about possible openings before going through the process of formal application. The doctoral candidate will usually have, in addition, a master's degree in a medical or paramedical science; however, possession of a master's degree does not guarantee admission to a doctoral program.

Academic Standards

In all graduate study programs in pathology, the student is expected to assume much responsibility. In research, particularly, the qualified student must demonstrate ability to independently plan, initiate, and carry to completion the project which the student undertakes.

Master of Science

Requirements for the Master of Science Degree in Pathology

The student must complete 30 credits under Plan A (with thesis). The student is required to prepare a manuscript judged by the academic adviser and the director of the sis research as suitable to submit for publication in an appropriate scientific journal.

Residence

A minimum of 10 semester credits must be acquired in residence.

Doctor of Philosophy

Requirements for the Doctor of Philosophy Degree in Pathology

The student is required to prepare a manuscript judged by the academic adviser and director of dissertation research as suitable to submit for publication in an appropriate scientific journal.

The minimum number of credits required for the degree depends principally upon the student's educational background and level of scholarly attainment. Those students who are well advanced in training or who have had considerable professional experience in pathology and can submit bona fide evidence of scholarship and attainment may not be required to take as many as the usual 40 credits of course work beyond the master's degree.

PATHOLOGY—ENVIRONMENTAL TOXICOLOGY

Doctor of Philosophy

For information about the Doctor of Philosophy degree program in pathology–environmental toxicology, refer to the statement on *Multidepartmental Doctoral Programs in Environmental Toxicology* in the *Graduate Education* section of this catalog.

DEPARTMENT of PHARMACOLOGY and TOXICOLOGY

Kenneth E. Moore, Chairperson

The Department of Pharmacology and Toxicology is administered jointly by the colleges of Veterinary Medicine, Human Medicine, and Osteopathic 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.

DEPARTMENT of PHYSIOLOGY

William S. Spielman, Chairperson

The Department of Physiology is administered jointly by the colleges of Veterinary Medicine, Human Medicine, Natural Science, and Osteopathic 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 SMALL ANIMAL CLINICAL SCIENCES

Curtis W. Probst, Chairperson

The Department of Small Animal Clinical Sciences offers courses designed to meet the needs of the professional program in veterinary medicine, the post–D.V.M. clinical training programs that provide the basis for specialty board certification, and the graduate program leading to the Master of Science degree.

GRADUATE STUDY

Master of Science

The department offers advanced studies leading to the Master of Science degree. The program is designed primarily for graduate veterinarians in the residency training program in the department.

Emphasis in the program is placed on clinically oriented research which is well supported by the facilities available and the clinical case volume. Graduates of this program will find opportunities in all areas of practice, teaching, and research.

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

Admission

The candidate must possess a Doctor of Veterinary Medicine degree or its equivalent and have the potential qualifications for graduate study. Licensure to practice veterinary medicine in the State of Michigan is usually required.

Requirements for the Master of Science Degree in Small Animal Clinical Sciences

The student must complete 30 credits under Plan A (with thesis).

Supporting courses may be taken in such areas as anatomy, pathology, physiology, pharmacology, microbiology, immunology, nutrition, parasitology, statistics, virology, chemistry, and animal genetics.

Academic Standards

Three grades below a 3.0 in graduate courses will remove a student from degree candidacy.

Transfer Credits

As many as 9 semester credits of graduate work (excluding research and thesis credits) may be transferred from other institutions, upon approval of the department chairperson, the Associate Dean for Research and Graduate Studies, and the student's guidance committee.

Post–D.V.M. Clinical Training Programs

These programs are supported by the clinical service activities of a highly specialized faculty utilizing the facilities and support staff of The Veterinary Teaching Hospital.

Internships

The department offers thirteen–month rotating internships designed to provide general clinical training for the post—D.V.M. student as well as to provide a basis for further specialty training. Selection of trainees is normally made through the National Internship–Residency Matching Program.

Residencies

Residencies designed to meet the training requirements for specialty board certification are currently offered in dermatology, internal medicine, and surgery. The dermatology residency is two years in length and the others are three years in length with yearly evaluation of progress and continuance based on trainee performance. Concurrent work toward the Master of Science degree is encouraged. Selection of trainees is normally accomplished through the National Internship-Residency Matching Program.

INSTITUTE FOR ENVIRONMENTAL TOXICOLOGY

Lawrence J. Fischer, Ph.D., Director

The Institute for Environmental Toxicology was established to facilitate and coordinate the varied programs in departments and colleges across campus related to toxic substances. These programs address almost all aspects of environmental toxicology with particular focus on adverse effects of chemical contaminants on living organisms. Research spans a broad range from studies of biochemical mechanisms of toxicity to studies on the distribution and fate of chemicals in various environmental media.

The Institute serves as the MSU focal point for addressing questions relating to toxic substances in the environment. It initiates and supports multidisciplinary research, education, and training as well as provides information and technical assistance to the public.

Through its colleges, MSU makes study in the area of environmental toxicology available to graduate students.

ANIMAL HEALTH DIAGNOSTIC LABORATORY

Willie M. Reed, Director

The Animal Health Diagnostic Laboratory was established to provide a complete animal disease diagnostic service for Michigan veterinarians and animal owners. The primary objective of the service is efficient food production and a safer food supply and environment.

Expertise is provided in the areas of endocrinology, bacteriology, mycology, nutrition, pathology, toxicology, and virology.

Faculty are jointly appointed with academic departments and participate in teaching and research programs.

The laboratory has been accredited by the American Association of Veterinary Laboratory Diagnosticians.

VETERINARY TEACHING HOSPITAL

The Veterinary Teaching Hospital (VTH) provides the environment for the clinical instruction of veterinary technology and veterinary medicine students, as well as interns and residents. The VTH also provides facilities for the research activities of postdoctoral students, residents, and faculty. The VTH comprises nine sections (Anesthesiology, Clinical Pathology, Equine, Food Animal, Production Medicine, Radiology, Small Animal Medicine, Small Animal Surgery, and Intensive Care) and delivers care to over 18,000 hospitalized patients annually. Faculty in the VTH are appointed in the departments of Large Animal Clinical Sciences, Small Animal Clinical Sciences, Pathology, Physiology, Anatomy, or Microbiology and Molecular Genetics. The Hospital has been accredited by the American Animal Hospital Association.