Course Descriptions

This is the Course Descriptions section of the 1997-1999 University of Minnesota Veterinary Medicine Bulletin.
Symbols—The following symbols are used throughout the course descriptions.

# ......... Approval of the instructor is required for registration.
Δ ........ Approval of the department offering the course is required for registration.
, .......... The comma, used in prerequisite listings, means “and.”
f,w,s,su ......... Following a course number indicate fall, winter, spring, or summer terms.

3142, 3143, 3144 .......... Series courses, separated by commas; may be entered any quarter.

5221-5222-5223 .......... Sequence courses, separated by hyphens; must be taken in order listed.

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

Elective courses available to third-year students are identified in groupings titled “Other Courses” and are listed by departments.

College of Veterinary Medicine (CVM)

Required Courses

CVM 5091-5092-5093-5094. Precepteeship. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Participation in a practice setting involving large, mixed, or small animals; equine, specialty, or other fields of veterinary medicine as approved by precepteeship program director.

CVM 5100. Orientation to Veterinary Medicine. (2 cr; prereq 1st-yr vet med)
Lectures and lab on academic policies, student support services, curriculum, student government, personal health and safety, and legal issues related to the D.V.M. program. Introduction to peer and faculty mentorship program.

CVM 5101w. Orientation to Veterinary Medicine I. (1 cr; prereq 1st-yr vet med, 5100)
Continuation of 5100. Developing academic and career skills for the veterinary profession.

CVM 5121-5122-5123f,w,s. Overview of Animal Populations I,II,III. (1 cr; prereq 1st-yr DVM or #)
Current U.S. production animal agriculture at the individual producer level. Roles veterinarians play in production animal agriculture.

CVM 5200. Small Animal Anatomy and Imaging. (7 cr; prereq 1st-yr DVM or #)
Gross anatomic structure and function correlated with radiographic and developmental anatomy. Anatomical nomenclature and principles of mammalian anatomy uses of the dog as a model species compared to the cat.

CVM 5220. Cells and Tissues. (8 cr; prereq 1st-yr DVM or #)
Microscopic and ultrastructural functional morphology of cells and tissues. Molecular function of cell organelles and integration of carbohydrate, lipid, protein, and nucleic acid metabolism.

CVM 5311-5312-5313-5314. Professional Career Development. (4-24 cr; prereq #)
Skills needed to find employment compatible with professional and lifestyle interests.

CVM 5501-5502-5503f,w,s. Clinical Skills I,II,III. (1 cr; prereq 1st-yr DVM or #)
Understanding domestic animal behavior and developing basic animal handling, restraint, diagnostic, and therapeutic skills necessary to provide safe and effective clinical assistance. Lecture, demonstration, laboratory and practical experience.

CVM 5601-5602-5603-5604. Rotations at Other Institutions. (4-24 cr; prereq 4th-yr vet med or #)
Off-site clinical rotations in selected areas of veterinary medicine.

CVM 5901. Integrative Course I. (2 cr; prereq 1st-yr DVM or #)
Case-based course that integrates veterinary professional curriculum subjects and provides a forum for practicing professional skills, including communication, ethics, and team and leadership skills.

AnSc 5404. Applied Animal Nutrition. (2 cr; prereq #)
Nutrient requirements of beef and dairy cattle, swine, horses; nutrient content of feedstuffs; protein and nonprotein nitrogen use; energy use; nutritional disorders; formation of adequate rations.

Other Courses

CVM 1100. Introduction to Veterinary Medicine. (1 cr)
History of the veterinary profession, careers within the profession, and employment trends. Information about admission to the D.V.M. program. Veterinary technology programs.

CVM 1809. Internship in Animal Hospital Practice. (4 cr; prereq #)
Labs on principles and techniques of medical and surgical nursing care, examination, diagnostic and therapeutic procedures, and applied procedures in anesthesiology and radiology. Rotations in small animal medicine and surgery, large animal medicine and surgery, anesthesiology, radiology, and intensive care.

CVM 3100. Perspectives: Interrelationships of People and Animals in Society Today. (2 cr)
(Same as PubH 3301 and 5301) Interrelationships of people and animals from several viewpoints. Social, economic, and health consequences of these relationships, including issues such as pets and people sharing an urban environment, animal rights, and the influence of differences in cultures on animal-human relationships.

CVM 5303. D.V.M. Mentorship Program. (1 cr; prereq 3rd-yr vet med)
Identify goals and career options in the veterinary profession. Practitioner presentations, senior-year clinical rotation selection, introduction to senior-year clinics.
CVM 5401-5402-5403-5404. Directed Studies. (1-12 cr; prereq 1st-, 2nd-, or 3rd-yr DVM, #)
Independent study in veterinary medicine. Study focus determined by the student and a faculty member.

CVM 5800. Problems in Veterinary Research. (5 cr; prereq #)
Develop and undertake an approved research project in the lab of a faculty member who supervises conduct of the research over a ten-week summer period. Course grade is based on performance in the lab and the quality of a written report.

CVM 5801. Veterinary Research Seminar. (1 cr; prereq #)
Fixed format seminars presented by University researchers to expose students to a range of research problems and techniques. Course grade is based on student essays critically discussing one or more of the topics presented.

Clinical and Population Sciences (CAPS)

Required Courses

CAPS 5011-5012-5013-5014. Veterinary Public Health Clinic Rotation. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Preparation for health and social responsibility roles in veterinary community medicine (rural and/or urban) and for federal accreditation. Introduction to public practice veterinarians.

CAPS 5111-5112-5113-5114. Large Animal Medicine. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Diseases of horses, cattle, and small ruminants. History taking, clinical diagnosis, patient management.

CAPS 5151. Diagnostic and Therapeutic Techniques I. (1 cr; prereq 5150 or #)
Application of general physical examination procedures, special diagnostic techniques, and therapeutic procedures for large animals.

CAPS 5153. Diagnostic and Therapeutic Techniques II. (1 cr; prereq #)
Demonstration and practice of restraint of and diagnostic and therapeutic techniques for large animals.

CAPS 5160. Large Animal Medicine. (6 cr; prereq 5151 or #)
Ruminant diseases covered on a system basis.

CAPS 5161. Large Animal Medicine. (5 cr; prereq 5160 or #)
Continuation of study of ruminant diseases plus equine diseases, covered on a system basis.

CAPS 5162. Large Animal Medicine. (6 cr; prereq 5161 or #)
Continuation of equine diseases plus porcine diseases, covered on a system basis.

CAPS 5200. Clinical Virology, Immunology, Parasitology, and Toxicology. (1 cr; prereq VDM 5164, VPB 5601, VPB 5602, VPB 5701, VPB 5702, VPB 5703, # to be taken concurrently with VDM 5165)
Diagnostic techniques and their clinical application for viral and immunologic diseases; parasite identification methods and their application in preventing and controlling animal parasitisms; clinical signs, differential consideration, and diagnostic alternatives for toxicologic disorders.

CAPS 5211-5212-5213-5214. Large Animal Surgery. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Diagnostic and therapeutic management of lameness and surgical diseases of large animals (equine, bovine, small ruminants) in a hospital setting.

CAPS 5221-5222-5223-5224. Equine Lameness. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Two-week course involving clinical, didactic, and lab learning.

CAPS 5231-5232-5233-5234. Equine Podiatry. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Technical and theoretical skills necessary for working in a mixed or dairy practice involving individual cow surgical disease management.

CAPS 5251-5252-5253-5254. Equine Surgery. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Clinical rotation in the large animal hospital. Treating equine surgical and orthopedic diseases.

CAPS 5270. Economics and Practice Management. (2 cr; prereq vet med or #)
Basic economic concepts and terminology, relationship of animal health to productivity, cost/benefit relationships for disease control programs, financial return and economic analysis of livestock operations, economics of practice management, trends in livestock production.

CAPS 5271. Law and Ethics in Veterinary Medicine. (2 cr; prereq vet med or #)
Legal and ethical issues in veterinary medicine.

CAPS 5352. Large Animal Surgery. (5 cr; prereq #)
Common surgical procedures applied to large animals.

CAPS 5511-5512-5513-5514. Equine Theriogenology. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Skills in equine reproduction: teasing for estrus detection, rectal palpation and ultrasound examination of ovaries and pregnancy diagnosis, breeding management, vaginal examination, uterine culture and biopsy, intrauterine therapy, artificial insemination, semen collection and evaluation.

CAPS 5521-5522-5523-5524. Advanced Equine Theriogenology. (4-24 cr; prereq 3rd- or 4th-yr vet med or #)
Continuation of 5511-5512-5513-5514. Independent breeding; manage horse embryo transfer, interpret endometrial biopsies, cryopreserve semen, and participate in equine theriogenology cases admitted to the Veterinary Teaching Hospital.

CAPS 5531-5532-5533-5534. Dairy Palpation. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Technical skills of palpating the reproductive tract of cows per rectum.

CAPS 5541-5542-5543-5544. Dairy Theriogenology Management. (4-24 cr; prereq 5531, 5532, 5533, 5534, 3rd- or 4th-yr vet med)
Two-week rotation on embryo transfer, breeding soundness evaluation, obstetrics, and dairy herd reproductive management.

CAPS 5550. Diagnostics and Obstetrics in Theriogenology. (2 cr; prereq vet med or grad or #)
Diagnostic, therapeutic, and obstetrical procedures in theriogenology.
COURSE DESCRIPTIONS

CAPS 5551. Theriogenology Diagnostics Laboratory. (1 cr; prereq vet med or grad or #) Demonstration and lab practice in diagnostic and therapeutic procedures in theriogenology.

CAPS 5552. Veterinary Obstetrics Laboratory. (1 cr; prereq 5550 or #) Demonstration and lab practice in obstetrical procedures.

CAPS 5570. Reproductive Diseases of Domestic Animals. (5 cr; prereq 5550 or #) Physiology and pathology of reproduction, artificial insemination, abortive diseases, postpartum injuries, breeding management in domestic animals.

CAPS 5601-5602-5603-5604. Analytical Techniques in Veterinary Medicine I. (4-24 cr; prereq #) Two-week rotation dealing primarily with on-farm disease diagnostics, treatment, and control programs.

CAPS 5611-5612-5613-5614. Swine Disease Diagnostics, Therapeutics, and Prevention. (4-24 cr; prereq 3rd- or 4th-yr vet med) Two-week rotation dealing primarily with on-farm disease diagnostics, treatment, and control programs.

CAPS 5621-5622-5623-5624. Swine Production Systems. (4-24 cr; prereq 3rd- or 4th-yr vet med) American swine industry.

CAPS 5631-5632-5633-5634. Swine Nutrition. (4-24 cr; prereq 3rd- or 4th-yr vet med or DVM or grad) Nutrition and feeding of pigs.

CAPS 5641-5642-5643-5644. Swine Economics, Financial Management, and Marketing. (4-24 cr; prereq #) Manipulation, analysis, and interpretation of data from all phases of swine production using biological and financial records. Case studies used to develop diagnostic skills in identifying causes of suboptimal productivity. Financial analysis techniques used to develop cost-effective and feasible solutions to production problems, and swine marketing alternatives.

CAPS 5651. Veterinary Community Medicine. (3 cr; prereq VPB 5503, VPB 5703 or #) Principles and practices of environmental health and food hygiene; meat, poultry, milk, and other foods as they are important for animal and human health. Diseases transmitted between animals and humans.

CAPS 5663. International Animal Disease Problems. (1 cr; prereq #) Diagnosis, transmission, and epidemiology of animal diseases not currently present in the United States. International role of veterinarians in reducing disease and increasing world animal production.


CAPS 5691-5692-5693-5694. Epidemiology and Biostatistics. (4-24 cr; prereq #) Strengths and limitations of statistical methodologies used in veterinary medicine and epidemiology. Design of a feasible research program given constraints of funding, time, and facilities. Preparation of a detailed research proposal suitable for submission for competitive funding.


CAPS 5811-5812-5813-5814. Dairy Disease Control and Youngstock Management. (4-24 cr; prereq 3rd- or 4th-yr vet med) Common infectious diseases and parasites that limit dairy calf performance.

CAPS 5821-5822-5823-5824. Mastitis, Milking Machines, and Milk Quality. (4-24 cr; prereq 3rd- or 4th-yr vet med) Develops skills to evaluate herd mastitis problems and recommend solutions.

CAPS 5831-5832-5833-5834. Ruminant Nutrition. (4-24 cr; prereq 3rd- or 4th-yr vet med) Strongly recommended for students interested in dairy and suggested for students interested in beef. Nutrient requirements for ruminants, nutrient content of feedstuffs (primarily forages), energy use, protein and nonprotein nitrogen use, nutritional disorders, formulation of adequate rations, techniques for analyzing rations.

CAPS 5841-5842-5843-5844. Applied Dairy Nutrition. (4-24 cr; prereq 3rd- or 4th-yr vet med) Principles, techniques, goals, and objectives of providing nutritional advice, counseling, and/or assessment to a dairy farm.

CAPS 5851-5852-5853-5854. Dairy Record Analysis, Epidemiology, and Economics. (4-24 cr; prereq 3rd- or 4th-yr vet med) Evaluation of a dairy herd using biological and economic records.

CAPS 5911-5912-5913-5914. Advanced Building Design and Total Herd Evaluation. (4-24 cr; prereq 3rd- or 4th-yr vet med) Advanced housing, ventilation, equipment, and building design principles using the epidemiologic approach to promoting animal health. Integration of total animal health care, environmental control, and herd management into herd veterinary services.


CAPS 5941-5942-5943-5944. Small Ruminant Health and Production. (4-24 cr; prereq 3rd- or 4th-yr vet med) Sheep and goat production, medicine and health management.

CAPS 5951-5952-5953-5954. Directed Studies. (1-12 cr; prereq 3rd- or 4th-yr vet med) Independent study in veterinary clinical and population science. Study focus determined by the student and a faculty member.

CAPS 5961-5962-5963-5964. Swine Records. (2 cr; prereq 3rd- or 4th-yr vet med) Interpret performance measures, monitor productivity, capture data accurately and effectively, and generate reports useful in managing the production process and solving production problems in the swine industry.
CAPS 5971-5972-5973-5974. Swine Records. (2 cr; prereq 3rd- or 4th-yr vet med)
Use commercial swine farm records to solve production problems, manage production processes, optimize production efficiency, and forecast production and management activities.

Other Courses

CAPS 3502. Animal Health and Disease. (5 cr)
For nonveterinary students to give a broad understanding of veterinary science as it applies to the health and diseases of domestic animals. Emphasis on basic concepts of disease and common animal diseases that demonstrate them. How stress and management practices aggravate and create new disease conditions.

CAPS 5182. Sheep and Goat Herd Health Management. (1 cr; prereq regis vet med 3rd- or 4th-yr or grad or #)
Sheep and goat breeds and breeding, reproduction, applied nutrition, housing, preventive medicine programs, and management practices.

CAPS 5184. Equine Neonatology. (1 cr; prereq 3rd- or 4th-yr vet med or #)
Instruction, emergency duty, and practical application of principles in evaluating and treating sick equine neonates. Seasonal participation in clinically managing hospitalized foals and periodically reviewing past cases.

CAPS 5274. Orientation to the Job Market. (1 cr; prereq 5270 or #)
For senior veterinary students. Veterinary business management including choosing a practice; interviewing for an associate position; negotiating contracts, benefits, hours, covenants; law, tax, business, and financial concepts; insurance; ownership or partnership.

CAPS 5275. Diseases of Zoo Animals and Exotic Pets. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)
Diseases of and management procedures for zoo animals and exotic pets; restraint procedures, medication, diagnosis.

CAPS 5276. Advanced Zoo Animal Medicine. (1 cr; prereq 5275, 3rd- or 4th-yr vet med or #)
Adapting existing veterinarian techniques and principles to zoo animal medicine. Animal management and preventive medicine programs used in zoo animal medicine.

CAPS 5280. World Food Problems. (3 cr; prereq major in ag or vet med or nutr sci or soc sci or # grad by #)
(Same as AgEc 5790, FScN 5643, Soc 5675) Multidisciplinary approach to the social, economic, and technical problems of feeding the world’s growing population. Principles sought from the social and economic, plant, animal, and nutritional sciences for their application to food problems.

CAPS 5355. Equine Colic Management. (2 cr; prereq 1st-yr vet med)
Principles and techniques evaluating and treating equine colic cases.

CAPS 5356. Equine Colic Team. (1 cr; prereq 5355, vet med)
Four quarters of clinically managing equine colic cases and periodically reviewing past cases, success rates, and topics in related fields.

CAPS 5357. Advanced Colic Team. (1 cr; prereq 5356, vet med)
Four quarters of clinically managing cases and periodically reviewing past cases, success rates, and topics in related fields. Students act as team leaders during clinical management and assist in lab exercises for 5355.

CAPS 5575. Reproduction and Infertility in Swine. (1 cr; prereq 5570, 4th-yr vet med or grad or #)
Reproductive patterns, breeding practices, management, artificial insemination, synchronization of estrus, economics of reproductive performance, and infertility in swine.

CAPS 5615. Advanced Swine Disease Diagnostics, Therapeutics, and Prevention. (4 cr; prereq grad or #)
Two-week rotation dealing primarily with on-farm disease diagnostics, treatment, and control programs.

CAPS 5625. Advanced Swine Production Systems. (4 cr; prereq grad or #)
Factors affecting the biological productivity and financial competitiveness of commercial swine farms.

CAPS 5645. Advanced Swine Economics, Financial Management, and Marketing. (4 cr; prereq grad or #)
Manipulation, analysis, and interpretation of data from all phases of swine production using biological and financial records. Case studies used to develop diagnostic skills in identifying causes of suboptimal productivity. Financial analysis techniques used to develop cost-effective and feasible solutions to production problems, and swine marketing alternatives.

CAPS 5665. Monitoring and Surveillance of Disease. (Cr ar; prereq # offered odd yrs)
Techniques used to monitor disease in animal populations.

CAPS 5671. Biohazards in Veterinary Medicine. (Cr ar; prereq #)
Microbiological, toxicological, drug, and other hazards in veterinary medicine.

CAPS 5672. Perspectives: Animal-Human Relationships and Community Health. (2-3 cr; prereq #)
(Same as PubH 5303) Perspectives on cultural, psychological, ethological, and environmental aspects of the interrelationships of people and animals as they affect individual and community health.

CAPS 5673. Problems in Disease Control and Eradication. (Cr ar; prereq PubH 5330 or #; offered odd yrs)
Past and present disease control and eradication programs and factors influencing degree of success and failure. Students develop models for proposed disease control and eradication programs in the United States or a foreign country for group evaluation and analysis.

CAPS 5680. Problems in Veterinary Epidemiology and Public Health. (Cr ar; prereq 5650 or equiv or #)
Individual study arranged with a faculty member.

CAPS 5855. Advanced Dairy Record Analysis, Epidemiology, and Economics. (4 cr; prereq grad or #)
Evaluation of a dairy herd using biological and economic records.
Graduate Courses
(See the Graduate School Bulletin for course descriptions)
CAPS 5015. Advanced Veterinary Public Health (VPH) Clinic Rotation
CAPS 5115. Advanced Large Animal Medicine
CAPS 5190. Large Animal Internal Medicine I
CAPS 5191. Large Animal Internal Medicine II
CAPS 5215. Advanced Large Animal Surgery
CAPS 5225. Advanced Equine Lameness
CAPS 5235. Advanced Equine Podiatry
CAPS 5245. Advanced Bovine Surgery
CAPS 5535. Advanced Dairy Palpation
CAPS 5545. Advanced Dairy Theriogenology Management
CAPS 5615. Advanced Swine Disease Diagnostics, Therapeutics, and Prevention
CAPS 5635. Advanced Swine Nutrition
CAPS 5645. Advanced Swine Economics, Financial Management, and Marketing
CAPS 5695. Advanced Epidemiology and Biostatistics
CAPS 5715. Advanced Equine Sports and Preventive Medicine
CAPS 5815. Advanced Dairy Disease Control, Parasitology, Youngstock Management
CAPS 5825. Advanced Mastitis, Milking Machines, and Milk Quality
CAPS 5835. Advanced Ruminant Nutrition
CAPS 5845. Advanced Applied Dairy Nutrition
CAPS 5855. Advanced Dairy Record Analysis, Epidemiology, and Economics
CAPS 5915. Advanced Building Design and Total Herd Evaluation
CAPS 5925. Advanced Beef Cow/Calf Production Medicine
CAPS 5945. Advanced Small Ruminant Health and Production
CAPS 5955. Advanced Directed Studies
CAPS 5965. Advanced Veterinary Diagnostic Medicine and Housing and Management Investigations to Promote Animal Health, Productivity, and Well-Being
CAPS 8193. Advances in Clinical Immunobiology
CAPS 8194. Problems in Diagnostic Virology, Serology, and Immunology
CAPS 8195. Preventive Veterinary Medicine
CAPS 8197. Metabolic and Nutritionally Induced Diseases of Cattle
CAPS 8199. Problems in Economics of Animal Health
CAPS 8290. Advanced Veterinary Medicine
CAPS 8291. Advanced Diagnosis and Therapeutics of Animal Diseases
CAPS 8292. Seminar: Veterinary Medicine
CAPS 8293. Medical Conference
CAPS 8299. Research in Veterinary Medicine
CAPS 8390. Seminar: Veterinary Surgery
CAPS 8392. Advanced Large Animal Surgery
CAPS 8393. Problems in Large Animal Orthopedics
CAPS 8397. Large Animal Anesthesia
CAPS 8590. Advanced Diagnostic Methods in Reproductive Diseases
CAPS 8591, 8592, 8593. Advanced Endocrinology of Reproduction
CAPS 8594. Special Problems in Animal Reproduction
CAPS 8595. Seminar: Veterinary Obstetrics
CAPS 8690. Epidemiology of Zoonoses and Diseases Common to Humans and Animals
CAPS 8790. Problems in Veterinary Clinical Pharmacology and Therapeutics
CAPS 8791. Seminar in Clinical Pharmacology and Therapeutics

Small Animal Clinical Sciences (SACS)

Required Courses
SACS 5111-5112-5113-5114. Internal Medicine. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Problem-solving skills including problem definition, quality patient care, clinical skill acquisition and application, communication skills including record keeping; ethics, economics of internal medicine; referral etiquette.

SACS 5121-5122-5123-5124. Comparative Ophthalmology. (4-24 cr; prereq basic and clinical sci, 3rd- or 4th-yr vet med, #)
Diagnose and treat entry-level clinical cases.

SACS 5131-5132-5133-5134. Emergency Rotation. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Assist interns with night and weekend emergency cases.

SACS 5141-5142-5143-5144. Clinical Nutrition/Internal Medicine. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Answers to client questions about feeding practices for the normal dog and cat; nutritional aspects of medical patients and use of therapeutic diets.
SACS 5151-5152-5153-5154. Community Practice. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Clinical experience using preventive health, behavior, and communication skills. Basic small animal husbandry. Client education resources. Importance of teamwork regarding the practice environment, referral cases, and community involvement. Selected pet bird and pocket pet appointments.

SACS 5161-5162-5163-5164. Clinical Oncology Rotation. (4-24 cr; prereq #)
Oncology referrals from local veterinarians. Assist in treatment decisions and therapeutic options for new cases and management of ongoing chemotherapy and radiation therapy patients. Emphasis on basic principles of oncology and patient care.

SACS 5170. Small Animal Medicine. (4 cr; prereq #)
Etiology, pathophysiology, diagnosis, prognosis, and treatment of disorders of various companion animal body systems. Fundamental principles of diagnosis and treatment. Polysystemic disorders including nutritional abnormalities, immune-mediated diseases, infectious diseases, intoxications, and neoplasia.

SACS 5171. Small Animal Medicine. (4 cr; prereq 5170 or #)
Continuation of 5170.

SACS 5172. Small Animal Medicine. (5 cr; prereq 5171 or #)
Continuation of 5171.

SACS 5181-5182-5183-5184. Clinical Small Animal Cardiology. (4-24 cr; prereq 5170, 5171, 5172, #)
Students actively participate in the clinical evaluation and management of cardiopulmonary disease. Students perform physical examinations, electrocardiograms, and echocardiograms in addition to interpreting radiographs and participating in group case discussions.

SACS 5192. Diagnostic and Therapeutic Techniques. (2 cr; prereq 3rd- or 4th-yr vet med)
Demonstrate and apply diagnostic procedures for and restraint of animals. Discuss therapeutic regimens and demonstrate therapeutic procedures.

SACS 5211-5212-5213-5214. Small Animal Surgery. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Diagnostic skills; clinical and technical surgical skills; quality patient care; economics related to surgical practice.

SACS 5221-5222-5223-5224. Elective Surgery Rotation. (4-24 cr; prereq 4th-yr vet med, #)
Practice in elective surgeries such as ovariohysterectomies, neuters, declaws, and hernia repairs for small animals.

SACS 5231-5232-5233-5234. Advanced Clinical Oncology Rotation. (4-24 cr; prereq #)
Students play integral, hands-on role in clinical oncology service. Routine diagnostic procedures; ultrasound-guided aspirations; core, bone marrow, and lymph node biopsies. Monitor and treat chemotherapy and radiation therapy patients.

SACS 5241-5242-5243-5244. Comparative Dermatology. (4-24 cr; prereq #)
Interpret histories, identify clinical problems, and develop differential diagnoses and diagnostic and treatment plans for clinical patients. Diagnostic procedures.

SACS 5260. The Problem-Oriented Medical System. (1 cr; prereq #)
Fundamentals of problem definition and solution. Problem-oriented system of diagnosis and therapy, with emphasis on the problem-oriented medical record.

SACS 5311-5312-5313-5314. Anesthesiology. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Preoperative evaluation; restraint; sedation; anesthesia, management, and post-operative care of canine, feline, and occasional exotic animal cases.

SACS 5321-5322-5323-5324. Small Animal Critical Care Medicine. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Individual case contact and nursing, assistance in the SAICU, rounds review of SAICU cases. CPR, nutrition, fluid therapy, respiratory care, shock. Rostering in the SAICU allows case contact with critical patients during assigned time blocks.

SACS 5341-5342-5343-5344. Large Animal Anesthesia. (4 cr; prereq 3rd- or 4th-yr vet med)
Students participate in large animal anesthetic cases and learn principles of sedation and local and general anesthesia. Primarily for students with equine and food animal interests.

SACS 5350. Principles of Veterinary Surgery. (5 cr; prereq VPB 5126 or #)
Basic materials necessary for clinically managing large and small animal surgical patients. Aseptic technique, patient evaluation, physiologic responses of body systems to surgery, repair and healing of tissue, surgical anatomy.

SACS 5351. Veterinary Surgery. (5 cr; prereq CVM 5350 or #)
Common surgical procedures applied to small animals.

SACS 5380. Anesthesiology and Critical Care. (3 cr; prereq 5170 or #)
Principles and application of anesthesia. Managing severely injured patient.

SACS 5411-5412-5413-5414. Radiology. (4-24 cr; prereq 3rd- or 4th-yr vet med)
Positioning of animals, standard survey radiograph techniques and special procedures, interpretive skills.

SACS 5451. Veterinary Radiology I. (1 cr; prereq #)
Radiographic interpretation of normal systems.

SACS 5452. Veterinary Radiology II. (3 cr; prereq 5451 or #)
Principles of radiography and radiographic interpretation of abnormal systems.

SACS 5501-5502-5503-5504. Clinical Small Animal Theriogenology. (4-24 cr)
Collect and complete reproductive histories of companion animals, interpret vaginal cytology specimens in female dogs. Measure/interpret serum progesterone concentrations in planning breeding management. Dystocia management. Brucella canis testing in dogs. Collect and evaluate canine serum.
COURSE DESCRIPTIONS

**SACS 5901-5902-5903-5904. Zoo, Exotic, Raptor, and Companion Birds. (4-12 cr; prereq 4th-yr vet med or #)**
Disease prevention/husbandry practice. Treating injured, orphaned, and diseased wild animals, including avian, mammalian, and reptilian species. Clinical experience with companion birds. Restraint, application of anesthesia procedures, collecting diagnostic samples for various raptors.

**SACS 5951-5952-5953-5954. Directed Studies. (1-12 cr; prereq #)**
Independent study in veterinary science. Study focus determined by the student and a faculty member.

**Other Courses**

**SACS 5180. Critical Care Team. (2 cr; prereq 2nd- or 3rd- or 4th-yr vet med or #)**
Instruction, rostered duty in the critical care unit, and practical application of principles and practices related to critically ill patients. Clinically managing hospitalized patients in the critical care unit and periodic review of past cases.

**SACS 5250. Small Animal Dermatology. (1-2 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Pathogenesis, clinical features, diagnosis, and therapy of skin diseases of companion animals.

**SACS 5251. Comparative Clinical Veterinary Dermatologic Pathology. (1-2 cr; grad or #)**
Microscopic pathology of basic dermatologic reactions and variable disease states.

**SACS 5255. Diseases of the Urinary System. (2 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Etiology, pathophysiology, clinical and lab findings, diagnosis, prognosis, and treatment of urinary system disorders. Case-oriented format with student participation in discussion emphasized.

**SACS 5256. Diseases of the Liver and Pancreas. (2 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Etiopathogenesis, diagnosis, and treatment of hepatic and pancreatic diseases in companion animals.

**SACS 5257. A Clinician’s Analysis of Urinalysis. (1 cr; prereq completion of first 3 yrs of veterinary curriculum)**
Interpret urinalysis findings in patients with a variety of disorders of various body systems.

**SACS 5271. Hospital Management. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Managing a small animal hospital. Emphasizes zoning restrictions, employee supervision, drug purchases, facilities, and fees.

**SACS 5285. Canine Clinical Neurology. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Anatomic and physiologic bases for neurologic examination of the dog. Emphasis on a clinical approach to neurology, illustrated with case materials.

**SACS 5330. Wild Bird Medicine. (2 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Important aspects of avian anatomy and physiology. Diseases common to wild birds and surgical repair of common injuries and fractures.

**SACS 5360. Small Animal Orthopedics. (2-3 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Small animal orthopedic problems and surgical procedures to correct them.

**SACS 5396. Independent Study in Veterinary Medicine. (2 cr; prereq #)**
Independent study, by arrangement, in a clinical specialty area of veterinary medicine.

**SACS 5398. Independent Research in Veterinary Anesthesiology. (1-6 cr; prereq vet med or grad or #)**
Controlled study, prospective, and retrospective models of evaluation defined, critiqued, and used for experimental design and data collection. Analysis of data collection to validate research methods.

**SACS 5453. Special Procedures in Veterinary Radiology. (2 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Contrast agents and procedures used to examine various body systems or anatomical areas.

**SACS 5454. Roentgenology Bone—Large Animals. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Roentgen signs of common bone diseases of large animals. Emphasizes the horse.

**SACS 5455. Roentgenology Bone—Small Animals. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #)**
Roentgen signs of common bone diseases of small animals.

**SACS 5505. Advanced Clinical Theriogenology. (4-24 cr; prereq #)**
Collect reproductive histories and interpret vaginal cytology specimens in bitch. Brucella canis testing in bitch and dog. Collect and evaluate canine serum.

**SACS 5572. Reproductive Patterns and Infertility in the Dog and Cat. (1 cr; prereq CAPS 5570, 3rd- or 4th-yr vet med or grad or #)**
Reproductive patterns, breeding management, artificial insemination, and infertility in dogs and cats.

**SACS 5802. Residency in Veterinary Dermatology. (Cr ar; prereq #)**
Rotations in veterinary dermatology clinics and review of dermatopathology slides submitted to the Veterinary Diagnostic Lab. Rotations through veterinary internal medicine, human dermatology service (Medical School), and dermatology journal club.

**SACS 5812. Companion Animal Oncology. (2 cr; prereq DVM or equiv; offered spring alt yrs)**
Biologic behavior, treatment, and prognosis of various neoplastic disorders.

**SACS 5955. Advanced Directed Studies. (1-8 cr; prereq #)**
Independent, advanced study in veterinary science. Study focus determined by the student and a faculty member.

**Graduate Courses**

(See the Graduate School Bulletin for course descriptions)

**SACS 8180. Advanced Clinical Neurology**

**SACS 8190. Comparative Cardiovascular Diseases**
VETERINARY DIAGNOSTIC MEDICINE

SACS 8191. Advanced Comparative Electrocardiology
SACS 8192. Special Cardiology Clinics
SACS 8196. Internal Medicine in Small Companion Animals
SACS 8197. Advanced Dermatologic Clinics
SACS 8198. Problems in Veterinary Comparative Dermatology
SACS 8200. Directed Studies in Veterinary Comparative Dermatology
SACS 8290. Advanced Veterinary Medicine
SACS 8291. Advanced Diagnosis and Therapeutics of Animal Diseases
SACS 8292. Seminar: Veterinary Medicine
SACS 8293. Medical Conference
SACS 8295. Comparative Veterinary Medical Ophthalmology
SACS 8296. Comparative Veterinary Surgical Ophthalmology
SACS 8297. Advanced Clinical Veterinary Ophthalmology
SACS 8298. Research in Veterinary Ophthalmology
SACS 8299. Research in Veterinary Medicine
SACS 8390. Seminar: Veterinary Surgery
SACS 8391. Advanced Small Animal Surgery
SACS 8394. Surgery of the Gastrointestinal System
SACS 8396. Advanced Veterinary Anesthesia
SACS 8398. Research in Veterinary Anesthesia
SACS 8399. Seminar: Veterinary Anesthesia
SACS 8410. Surgical Physiology
SACS 8420. Neurosurgery
SACS 8430. Thoracic and Cardiovascular Surgery
SACS 8471. Therapeutic Radiology
SACS 8480. Seminar: Veterinary Radiology
SACS 8483. Abdominal Roentgenology
SACS 8484. Urologic and Gynecologic Roentgenology
SACS 8485. Thoracic Roentgenology
SACS 8490. Advanced Veterinary Radiology
SACS 8491. Fundamentals of Nuclear Medicine
SACS 8492. Radiation Biology

Veterinary Diagnostic Medicine (VDM)

Required Courses
VDM 5011-5012-5013-5014. Veterinary Hospital Necropsy. (2-12 cr; 3rd- or 4th-yr vet med)
VDM 5111-5112-5113-5114. Diagnostic Medicine. (2-12 cr; prereq 3rd- or 4th-yr vet med)
Applying principles and techniques of the basic and clinical medical sciences to veterinary diagnostic medicine.
VDM 5121-5122-5123-5124. Directed Studies. (1-12 cr; prereq #)
Independent study in veterinary science. Study focus determined by the student and a faculty member.
VDM 5164. Toxicology of Poisonous Plants. (1 cr; prereq VPB 5401 or #)
Toxicology and identification of poisonous plants.
VDM 5165. Veterinary Toxicology. (3 cr; prereq VPB 5401 or #)
Toxicology of minerals, pesticides, herbicides, venoms, and miscellaneous toxins. Recognition, diagnosis, and treatment of animal poisons.
VDM 5503. Diagnostic Pathology. (3 cr; prereq VPB 5502 or #)
Gross and microscopic changes associated with specific infectious and noninfectious diseases of domestic animals.
VDM 5611-5612-5613-5614. Advanced Veterinary Toxicology. (4-24 cr; prereq 5164, 5165 or #)
Clinical, diagnostic, mechanistic, and therapeutic aspects of Biotoxins, organic and inorganic toxins that affect livestock, poultry, wildlife, and companion animals or present a potential threat to the public health.

Other Courses
VDM 5001. Ecotoxicology. (3 cr; prereq Biol 1005 or equiv, Chem 1001)
Toxicology, the ecosphere, and the environment.

Graduate Courses
(See the Graduate School Bulletin for course descriptions)
VDM 5511. Swine Disease Diagnosis
VDM 5521. Surgical Pathology
VDM 5522. Diagnostic Pathology
VDM 5524. Problems in Diagnostic Pathology
VDM 5620. Scientific Writing and Speaking
VDM 5622. Problems in Diagnostic Virology
VDM 5851. Seminar: Diagnostic Medicine
VDM 8503. Advanced Diagnostic Pathology
VDM 8602. Colloquium in Virology
VDM 8792. Seminar in Veterinary Toxicology
Veterinary PathoBiology (VPB)

Required Courses

VPB 5021-5022-5023-5024. Clinical Hematology and Cytology. (2-12 cr; prereq 3rd- or 4th-yr vet med) Applying principles and techniques of the basic and clinical medical sciences to hematology and cytology.

VPB 5031-5032-5033-5034. Clinical Microbiology. (2-12 cr; prereq 3rd- or 4th-yr vet med) Applying principles and techniques of veterinary clinical and diagnostic microbiology.

VPB 5126. Veterinary Anatomy II. (5 cr; prereq VPB 5100 or #) Comparative anatomy with emphasis on the pelvis, reproductive system, limbs, and head from a morphodynamic and radiographic approach. Species covered include horse, domestic ruminants, swine, dog, cat, and bird.

VPB 5310. Animal Physiology. (4 cr; prereq VPB 5308 or #) Physiology of the endocrine and reproductive systems of domestic animals.

VPB 5400. Veterinary Pharmacology and Therapeutics I. (3 cr; prereq VPB 5310 or equiv or #) (Same as NSc 5400) General principles of drug action, disposition, and use, focusing on drug action in the central and peripheral nervous systems. Topics include pharmacology of autonomic drugs, local anesthetics, parenteral general anesthetics, tranquilizing agents, analeptics, anticonvulsants, and neuromuscular blockers.

Veterinary applications.

VPB 5401. Veterinary Pharmacology and Therapeutics II. (5 cr; prereq VPB 5310, VPB 5400 or #) Pharmacology of cardiopulmonary drugs (i.e., inhalational anesthetics, antiarrhythmic agents, cardiac glycosides), anti-inflammatory agents (i.e., NSAIDS, corticosteroids, antihistamines), and drugs affecting fluid and electrolyte homeostasies (e.g., diuretics, gastrointestinal drugs).

Veterinary applications.

VPB 5402. Veterinary Pharmacology and Therapeutics III. (3 cr; prereq VPB 5401 or #) Pharmacology of sulfonamides, nitrofurans, arsenicals, antibiotics, coccidiodists, and other antiprotozoan drugs and antifungal agents, anthelmintics, and other anti-infectious drugs. Principles and applications in preventing and treating microbial and parasitic diseases of domestic animals.

VPB 5502. Systemic Veterinary Pathology. (6 cr; prereq VPB 5501 or #) Reaction of specific systems to injury emphasizing basic response capabilities of the tissue or organ, with materials illustrating gross and microscopic changes.

VPB 5504. Veterinary Clinical Pathology. (4 cr; prereq VPB 5503 or #) Technique, application, and interpretation of basic lab tests applied to clinical diagnosis.

VPB 5550. Laboratory Animal Medicine. (2 cr; prereq VPB 5502 or #) Care and management of lab animals. Diseases, nutrition, zoonoses, gnotobiotics, restraint, anesthesia, and environmental practices.

VPB 5601. Veterinary Parasitology I. (4 cr; prereq VPB 5501 or #) Helminth parasites and parasitic diseases of animals with emphasis on principles of control.

VPB 5602. Veterinary Parasitology II. (4 cr; prereq VPB 5601 or #) Systematic and biologic study of protozoan and arthropod parasites of animals. Emphasis on their relationships to diseases and principles of parasite control.

VPB 5702. Pathogenic Bacteria and Fungi. (5 cr; prereq VPB 5701 or equiv or #) Animal pathogens with emphasis on basic infection mechanisms.

VPB 5703. Veterinary Virology. (4 cr; prereq VPB 5701 or equiv or #) Basic virology techniques with emphasis on viral and rickettsial agents causing animal diseases.

VPB 5704. Avian Diseases. (3 cr; prereq VPB 5703 or #) Diseases of poultry and caged and aviary birds.

VPB 5721-5722-5723-5724. Poultry Health Rotations. (4-24 cr; prereq #) Diagnosing and preventing poultry diseases; performance evaluation; troubleshooting and disease treatment; processing, inspection, and food safety.

VPB 5780. Applied Immunology. (1 cr; prereq vet med or grad or #) Principles of immunology and their clinical application.

Other Courses

VPB 3103. General Microbiology. (3-5 cr; not open to vet med students; prereq 10 cr chem, 4 cr biol sci) Morphology, taxonomy, genetics, physiology, and ecology of microorganisms. Practical application of fundamental principles of microbiology to other phases of science and industry.

VPB 5110. Cytogenetic Evaluation of Animal Diseases. (1 cr; prereq 3rd- or 4th-yr vet med or grad or #) Five lectures dealing with using cytogenetics in animal disease diagnosis and methods of lab preparation and analysis of chromosomes. Five lab periods devoted to preparing prophase spreads of chromosomes, staining and photographing them, and preparing karyograms for analysis.

VPB 5140. Vertebrate Microanatomy. (1-6 cr; prereq #) Microscopic structure and cytochemical and functional aspects of cells, tissues, and organs of representative vertebrates. Four units: basic tissues (2 cr); gastrointestinal tract (1 cr); respiratory and integumentary systems (1 cr); and excretory, reproductive, and endocrine systems (2 cr). Depending on background and interest, students may register for any or all units.
VPB 5320w. Avian Physiology. (3 cr; prereq AnSc 3301 or 5 cr systemic physiology or equiv, #; offered even yrs)
Wild and domestic bird physiology.

VPB 5460w. Neurochemical Communication. (3 cr; prereq biochem)
(Same as NSc 5460 and MdBc 5460) Electrophysiology and biochemistry of neuronal signaling and its manipulation of pharmacological agents, in context of historical findings and current research techniques. Information on most systems (e.g., autonomic and central nervous) in context of specific transmitter systems wherever practical. Two objective, short-answer examinations.

VPB 5461w. Cellular and Molecular Neuroscience. (3 cr; prereq biochem)
Contemporary cellular and molecular approach to studying the nervous system. Gene structure and regulation, cloning and molecular strategies to study gene function, ion channels and membrane excitability, synaptic transmission, receptor structure and function, signal transduction.

VPB 5533. Directed Studies in Veterinary Pathobiology. (Cr ar; prereq 4th-yr vet med, #)
Principles, methods, and lab exercises for selected pathobiological research problems. Study conducted under faculty supervision.

VPB 5603s. Parasites of Wildlife. (2 cr; prereq VPB 5601, VPB 5602 or #; offered odd yrs)
Epidemiology and disease potential of some of the more significant helminth, arthropod, and protozoan parasites of regional wild mammals and birds. Term paper required.

VPB 5707. Poultry Disease Control. (3 cr; not open to vet med students; prereq AnSc 1100, Biol 1106, VPB 3103 or equiv)
General anatomy; physiology of digestion and reproduction; prevention and control of important poultry diseases.

VPB 5709. Preventive Avian Medicine. (1-2 cr; prereq 4th-yr vet med or grad or #)
Preventive avian disease programs and management practices. Visits to poultry and aviary establishments.

VPB 5748. Problems in Veterinary Microbiology and Public Health. (Cr ar; prereq VPB 5703 or equiv; #)

Graduate Courses
(See the Graduate School Bulletin for course descriptions)

VPB 5149. Topics of Organology

VPB 5444. Muscle Contraction

VPB 5513. Pathology of Wildlife Diseases

VPB 5520. Advanced Veterinary Clinical Pathology

VPB 5523. Pathology of Spontaneous Diseases of Laboratory Animals

VPB 5524. Pathology of Spontaneous Diseases of Poultry

VPB 5720. Advanced Clinical Microbiology

VPB 5920. Independent Research in Veterinary Biology

VPB 5950. Directed Studies

VPB 8111. Histologic and Ultrahistologic Techniques

VPB 8113. Research Propositions in Morphology

VPB 8135. Comparative Veterinary Neurology

VPB 8136. Experimental Comparative Veterinary Neurology

VPB 8149. Research in Veterinary Anatomy

VPB 8150. Research Problems in Veterinary Anatomy

VPB 8349. Research in Physiology

VPB 8448. Problems in Veterinary Pharmacology

VPB 8449. Neurotoxicity of Organophosphorus Insecticides

VPB 8450. Drug-Receptor Interactions

VPB 8460. Neuro-Receptor Interactions

VPB 8500. Seminar: Veterinary Pathology

VPB 8501. Advanced Veterinary Basic Pathology

VPB 8502. Advanced Systemic Pathology

VPB 8504. Seminar: Advanced Veterinary Histopathology

VPB 8530. Oncology

VPB 8531. Hospital Pathology

VPB 8532. Comparative Neuropathology

VPB 8533. Problems: Pathology

VPB 8534. Problems: Clinical Pathology

VPB 8550. Seminar: Veterinary Biology

VPB 8601. Advanced Veterinary Parasitology

VPB 8602. Advanced Veterinary Parasitology

VPB 8611. Immunity and Parasitic Infections: Protozoa and Arthropods

VPB 8612. Immunity to Parasitic Infections: Helminths

VPB 8648. Problems in Veterinary Parasitology

VPB 8700. Seminar: Veterinary Microbiology

VPB 8720. Advanced Veterinary Microbiology

VPB 8721. Immunodiagnostic Techniques for Avian Diseases

VPB 8724. Advanced Veterinary Diagnostic Microbiology