

# College of Veterinary Medicine

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The college was established in 1946. It offers a four-year professional program leading to the Doctor of Veterinary Medicine (DVM) degree. Applicants (<http://cvm.missouri.edu/prospective.htm>) generally have a B.S. or B.A. degree but can be admitted after completing prerequisite course requirements

The Pre-Veterinary Medical Scholars and AgScholars programs (<http://cvm.missouri.edu/pre-vet-scholars.htm>) provide early assurance of admission to the MU College of Veterinary Medicine upon satisfactory completion of undergraduate and program requirements. Students work with advisers in the college, and they observe veterinarians at work as part of the program. Students with a minimum ACT score of 30 or an equivalent SAT score are eligible to apply for the Pre-Vet Scholars Program. The required minimum ACT score for the AgScholars Program is 27 and applicants must have demonstrated experience in livestock production and health. Once at Mizzou, scholars must meet program minimum standards, including maintaining a 3.3 cumulative GPA. For more information, call the College of Veterinary Medicine at 573-884-3341.

In addition to the professional program, on-line biomedical science courses (<http://biomedonline.missouri.edu/online-programs-for-graduate-veterinary-technicians-in-veterinary-biomedical-technology>) available to undergraduate and graduate students are listed in this catalog. These can be used to fulfill the requirements of a Certificate in Biomedical Science, for a licensed veterinary technician to complete a baccalaureate degree or to earn a master's degree in biomedical sciences.

The college also provides diagnostic and patient care services for animals. The CVM has a national reputation for excellent student-to-instructor ratio and state-of-the-art facilities. The college also offers post-graduate training to interns, residents in various specialties (<http://cvm.missouri.edu/residencies.htm>) and graduate students (<http://cvm.missouri.edu/research-gradstudies.htm>).

For more information about the College of Veterinary Medicine, call (573) 882-3768. <http://cvm.missouri.edu>

## Faculty

Department of Biomedical Sciences: <http://biomed.missouri.edu/faculty-and-staff/>

Department of Veterinary Medicine and Surgery: <http://www.vms.missouri.edu/faculty.html>

Department of Veterinary Pathobiology: <http://vpbio.missouri.edu/faculty.html>

## Academic Policies

Below is a listing of policies that apply only to students admitted to the College of Veterinary Medicine. The full CVM student handbook can be found at: <http://www.cvm.missouri.edu/stuhandbook.htm>

CVM students must also abide by the University's Academic Policies that apply to all students.

The policies and procedures of the MU College of Veterinary Medicine are revised on a regular basis. Provisions regarding such policies and

procedures contained on our website are subject to change without notice. If you have questions or note errors or omissions, please contact the College. All statements concerning requirements, prerequisites, conditions or other matters are for informational purposes only, and are subject to change without notice. They are not to be regarded as offers to contract.

Course Changes (<http://catalog.missouri.edu/academicpolicies/coursechangesv>)

Deficient Academic Performance (<http://catalog.missouri.edu/academicpolicies/deficientacadperf>)

Externships (<http://catalog.missouri.edu/academicpolicies/externshipsv>)

Final Examination Week (<http://catalog.missouri.edu/academicpolicies/finalexamwkv>)

Honors Recognition (<http://catalog.missouri.edu/academicpolicies/honorsrecognitionv>)

Student Files (<http://catalog.missouri.edu/academicpolicies/studentfilesv>)

Testing Out of Courses (<http://catalog.missouri.edu/academicpolicies/testoutv>)

Transfer Students from Other Accredited Veterinary Schools (<http://catalog.missouri.edu/academicpolicies/transferv>)

Withdraw from the University (<http://catalog.missouri.edu/academicpolicies/withdrawv>)

### **BIOMED 1010: Biomedical Career Explorations**

An introduction to the variety of career possibilities within the growing field of biomedical sciences. Graded on S/U basis only.

**Credit Hour:** 1

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### **BIOMED 2001: Topics in Veterinary Biomedical Science**

May be repeated 2 times for credit. Graded on A-F basis only. Prerequisites: instructor's consent

**Credit Hour:** 1-99

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### **BIOMED 2085: Problems in Biomedical Research**

Assignment of special Topics for Research training in biomedical research.

**Credit Hour:** 1-99

**Prerequisites:** instructor's consent

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### **BIOMED 2110: Biomedical Terminology**

Life science etymology (Greek for "true meaning", means the study of word derivation) taught by classroom presentation and discussion. The course organization is based primarily on common themes of Greek and Latin terms along with historical reasons for current usage. The application of these terms is for all biomedical sciences and life sciences. Graded on A-F basis only.

**Credit Hours:** 3

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### **BIOMED 2111: Veterinary Medical Terminology**

Veterinary Medical Terminology is an extension of Biomedical Sciences 2110, Biomedical Terminology. The course organization is lecture, based primarily on domestic species and common themes of Greek and Latin

terms. In addition, major veterinary medical eponyms, acronyms, and medical and surgical instruments are included. Graded on A-F basis only.

**Credit Hour:** 1

**Prerequisites:** BIOMED 2110 or instructor's consent

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**BIOMED 2120: Essentials of Animal Handling and Physical Restraint**

Fundamentals of handling and physical restraint of domestic large and small animals, laboratory animals, and common non-domestic pets. Graded on A-F basis only.

**Credit Hours:** 2

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**BIOMED 2140: Companion Animals**

(same as AN\_SCI 2140). Companion animals form an important part of our society. They serve us, provide companionship and many become members of our families. This class focuses primarily on dogs, cats, and horses. Topics covered include: the pet industry, breeds, wellness, management, care, training, zoonotic diseases, evolution and domestication, toxicology, nutrition, reproduction, genetics, human animal interactions, companion animal enterprise, and biomedical research. Students may enroll in one of two sections: service learning section or traditional course section.

**Credit Hours:** 3

**Recommended:** sophomore standing

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**BIOMED 2210: Microbiology for the Health Sciences**

Introductory course for students in the applied health curricula. Presents biomolecules of life, enzyme interaction, physiology and structure of representative organisms. Emphasizes bacteria, viruses, fungi and protozoa of health significance. Graded on A-F basis only.

**Credit Hours:** 5

**Prerequisites:** CHEM 1100 or equivalent and instructor's consent

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**BIOMED 2230: Animal Sanitation and Disease Prevention**

Preventative measures for diseases and parasites of farm animals.

**Credit Hours:** 3

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**BIOMED 2235: Domestic Animal Behavior**

An examination of the effects of domestication on the behavior of companion and food animal species. Comparisons to similar animals in feral or wild conditions will be made. The causes, development and potential treatments of abnormal behavior will also be examined. Graded on A-F basis only.

**Credit Hours:** 3

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**BIOMED 2420: Biology of Healthy Living**

(same as PH\_THR 2420 and NEP 2420). Biology of inactivity as a casual factor in chronic disease.

**Credit Hours:** 2

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**BIOMED 2940: Internship in Biomedical Sciences**

Supervised work experience to develop technical skills and enhance student knowledge in an area of biomedical science. Not intended for more than 50% independent research. Graded on S/U basis only.

**Credit Hour:** 1-6

**Prerequisites:** sophomore standing and instructor's consent

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**BIOMED 3000: Specialty Careers for Veterinary Technicians**

Specialty careers for veterinary technicians are jobs which required knowledge and skills beyond those needed in primary care clinical veterinary practice. This course will explore veterinary technician specialties, the education required, and the advantages of advanced academic training. Course graded on A-F basis only.

**Credit Hour:** 1

**Prerequisites:** AAS degree in veterinary technology or instructor's consent required

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**BIOMED 3001: Topics in Biomedical Sciences**

Topics in Biomedical Sciences.

**Credit Hour:** 1-99

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**BIOMED 3085: Problems in Biomedical Science**

Assignment of special topics for research training in biomedical research.

**Credit Hour:** 1-99

**Prerequisites:** DVM degree and instructor's consent

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**BIOMED 3100: Biomedical Pathophysiology**

Pathophysiology is the study of changes in the body resulting from disease. This course requires knowledge of normal anatomy and physiology. A comparative approach is used involving both domestic animal and human examples. Course graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** AN\_SCI 3254 or BIO\_SC 3700 or equivalent, AAS or equivalent degree from AVMA-accredited program or instructor's consent

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**BIOMED 3200: Comparative Hematology**

Hematology is the study of blood cells in health and disease. Emphasis in this course is placed on the changes associated with disease. Transfusion medicine and coagulation disorders will also be included. Course graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** AN\_SCI 3254 or BIO\_SC 3700 or equivalent, AAS or equivalent degree from AVMA-accredited program or instructor's consent

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**BIOMED 3219: Elements of Comparative Anatomy**

This course is designed to give students an introduction to and appreciation for comparative anatomy of various species encountered in animal science, veterinary technology and veterinary medicine. Detailed and labeled photos of dissected specimens are used to aid instruction. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** five hours of biological science or zoology or equivalent or instructor's consent or an AAS degree in veterinary technology

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**BIOMED 3250: Parasitology**

(same as BIO\_SC 3250) Parasitism is considered as a fundamental type of interspecies interaction. Identifying characteristics, life cycle, and resulting disease caused by the common parasites of domestic animals, common laboratory animals, selected wildlife, and humans are described.

Special emphasis is given to parasites that can be transmitted from animals to man.

**Credit Hours:** 3

**Prerequisites:** 8 hours of biology or instructor's consent

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#### **BIOMED 3300: Animal Welfare and Ethics**

An introductory examination of ethical issues related to animal welfare, including animal use for food, research, and companionship, plus contemporary issues affecting companion animals, farm animals, and horses. Topics related to animal pain and legal status will also be discussed. Graded on A-F basis only.

**Credit Hours:** 3

**Recommended:** junior standing

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#### **BIOMED 3310: Equine Health Topics**

An in-depth examination of equine disease and health topics that are pertinent to today's horse owner and veterinarian. The course will integrate horse management practices with disease recognition, control and prevention. Students will learn how to recognize problems and when to call a veterinarian. Emerging disease problems such as West Nile Virus will be examined as well as topics of continuing concern. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** AN\_SCI 4977 or equivalent or instructor's consent

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#### **BIOMED 3320: Comparative Microscopic Anatomy**

The course will provide students with a background in the structure of body organs at the microscopic level. The material will emphasize structure-function relationship of cells and organs using material from diverse animal species, including human, that exemplify unique adaptations to environmental or physiological requirements.

**Credit Hours:** 3

**Prerequisites:** BIO\_SC 1500 or equivalent

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#### **BIOMED 3326: Comparative Pharmacology**

An introduction to terminology used in pharmacology. Mechanisms of drug administration, absorption, distribution, metabolism, and excretion are described. Treatment modalities in animals and humans are compared. Basics of drug actions and the medicolegal aspects of pharmacology are discussed.

**Credit Hours:** 3

**Prerequisites:** an AAS degree in veterinary technology or AN\_SCI 3254 or BIO\_SC 3700, or equivalent, or instructor's consent

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#### **BIOMED 4001: Topics in Biomedical Sciences**

Topics in Biomedical Sciences.

**Credit Hour:** 1-99

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#### **BIOMED 4010: Life Sciences Research: Models and Methods**

(cross-leveled with BIOMED 7010, V\_BSCI 7010). A review of basic laboratory animal and non-animal research models and procedures commonly used in the life sciences area in academia and drug/chemical industry. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** Biology or Cell Biology; junior standing required

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#### **BIOMED 4100: Veterinary Clinical Chemistry**

(cross-leveled with V\_PBio 7100). This course is designed to hone the skills of the practicing veterinary technician, veterinary student, or veterinarian and assumes some basic knowledge of normal serum chemistry and urinalysis results. The review of normal will be minimal and emphasis will be placed on clinical serum chemistry and urinalysis findings associated with diseases. The graduate level course will include discussion of ancillary tests and more extensive case interpretations.

**Credit Hours:** 3

**Prerequisites:** An AAS or equivalent degree in veterinary technology from an American Veterinary Medical Association accredited programs; Undergraduate physiology on mammals (AN\_SCI 3254, BIO\_SC 3700, or equivalent

**Recommended:** BIOMED 2110 and BIOMED 3200 or instructor's consent

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#### **BIOMED 4110: Veterinary Cytology**

(cross-leveled with V\_PBio 7110). This course of Veterinary Cytology is designed to hone the skills of the practicing Veterinary Technician, Veterinary Student, or Veterinarian and assumes some basic knowledge of microscope usage and normal hematology. The review of normal cells will be minimal and emphasis will be placed on findings associated with inflammatory and neoplastic diseases. The graduate level course will include discussion of ancillary tests, special stains and treatment alternatives. The focus will be on canine and feline diseases but some common equine and bovine disease. Prerequisites: An AAS or equivalent degree in veterinary technology from an American Veterinary Medical Association-accredited program, or instructor's consent

**Credit Hours:** 2

**Recommended:** BIOMED 3200 and BIOMED 2110

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#### **BIOMED 4120: Principles of Toxicology**

(cross-leveled with V\_PBio 7120). This course will provide an introduction to the general principles of toxicology, including the history and scope of the field; risk assessment and management; mechanisms of toxicology; the disposition of toxicants; non-target organ-directed toxicity; toxic responses of specific target organs; and various toxicological application, such as environmental toxicology.

**Credit Hours:** 3

**Prerequisites:** one year of college chemistry and biology, each or instructor's consent

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#### **BIOMED 4200: Veterinary Public Health and Community Practice**

Veterinary Public Health is the field of veterinary medicine that deals with food production and safety, zoonosis (animal to human) disease control, prevent and control of environmental contamination, and the role of animals in society. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** AN\_SCI 3254 or BIO\_SC 3700 or equivalent, AAS or equivalent degree from AVMA-accredited program or instructors consent

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#### **BIOMED 4210: Animal Issues in Disasters**

(cross-leveled with V\_PBio 7210). This course describes the various aspects of responding to disasters that involve animals. Government involvement, legal requirements, effects on the human-animal bond,

preparation for disasters of different kinds, and impacts on animal-related businesses will be discussed.

**Credit Hour:** 1

**Prerequisites:** an AAS in veterinary technology from an American Veterinary Medical Association accredited program, or equivalent training, or instructor's consent

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**BIOMED 4300: Clinical Veterinary Neurology**

Clinical veterinary neurology will review the neurologic examination, common neurologic diseases and techniques to properly care for the neurologic patient. The course organization is based primarily on neuroanatomic localization of disease. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** AAS in Veterinary Technology or BIOMED 3219 and 3100 or instructor's consent; junior or senior standing

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**BIOMED 4320: Fundamentals of Small Animal Emergency and Critical Care**

(cross-leveled with V\_BSCI 7320). This course will provide students with the knowledge and skills to assist in small animal medical emergency and critical care facilities.

**Credit Hours:** 3

**Prerequisites:** An AAS in veterinary technology from an American Veterinary Medical Association accredited program, or equivalent training, or instructor's consent

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**BIOMED 4333: Veterinary Cell Biology**

(same as V\_BSCI 5506). Course material stresses cell biology as related to animal health and medical issues. A comprehensive course overviewing molecular and biochemical issues of cell function especially as related to medicine and the underlying molecular causes of disease.

**Credit Hours:** 4

**Prerequisites:** BIO\_SC 1500, or equivalent, 1 course in biochemistry or 4 credit hours in chemistry; or instructor's consent

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**BIOMED 4400: Veterinary Surgical Nursing**

Veterinary Surgical Nursing will enable the student to properly identify, care for, and maintain surgical equipment. The course will also prepare the student to learn surgical anatomy as well as the potential complications of common clinical setting surgeries. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** BIOMED 2111, BIOMED 3219, and BIOMED 3100, or instructor's consent

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**BIOMED 4410: Small Animal Physical Rehabilitation**

This course will review the science of veterinary rehabilitation, assessment of rehabilitation patients, and the techniques used to treat these patients. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** AAS degree in veterinary technology or BIOMED 2110 or HTH\_PR 2190 or equivalent, plus BIOMED 3219 or PTH\_AS 2201 or equivalent, or instructor's permission

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**BIOMED 4500: Equine Critical Care and Nursing**

This course provides advanced information for veterinary technicians, veterinary assistants, and pre-veterinary students wishing to enhance and focus their understanding of equine critical care and nursing concepts. Course graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** AN\_SCI 2095 and AN\_SCI 3254 or BIO\_SC 3700 or equivalents, AAS or equivalent degree from AVMA-accredited program or instructor's consent

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**BIOMED 4510: Equine Clinical Anatomy: Forelimbs**

(cross-leveled with V\_BSCI 7510). Basic foundation in selected aspects of equine clinical anatomy from veterinary technicians, pre-veterinary students, and other students wishing to enhance their understanding of anatomical structures of the horse's forelimbs.

**Credit Hour:** 1

**Prerequisites:** five hours of biologic science or zoology, or equivalent, or instructor's consent, or an AAS or equivalent degree in veterinary technology from an American Veterinary Medical Association accredited program

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**BIOMED 4520: Equine Clinical Practice**

This course is an introduction to a common medical conditions of the horse. Emphasis will be placed on the presenting complaint and the veterinarians approach to diagnosis, treatment, and prognosis.

**Credit Hour:** 1

**Prerequisites:** BIOMED 2110, BIOMED 2111 and AN\_SCI 4977 or their equivalents, or an associate's degree in veterinary technology, or instructor's consent

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**BIOMED 4993: Internship in Veterinary Medical Technical Specialties**

Supervised work experience in the MU Veterinary Medical Teaching Hospital of affiliated veterinary medical specialty practices or in MU laboratory animal facilities to develop technical skills and knowledge relevant to becoming a specialist in veterinary medical technology. A written report and oral presentation are required. Graded on S/U basis only.

**Credit Hour:** 1-6

**Prerequisites:** junior standing, an AAS degree from an AVMA accredited veterinary technical program or its equivalent, and instructor's consent

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**BIOMED 7010: Life Sciences Research: Models and Methods**

(same as V\_BSCI 7010; cross-leveled with BIOMED 4010). A review of basic laboratory animal and non-animal research models and procedures commonly used in the life sciences area in academia and drug/chemical industry. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** Biology or Cell Biology

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**BIOMED 9090: Research - Biomedical Sciences**

Research hours for BMS doctoral students continuous enrollment. Graded on S/U basis only.

**Credit Hour:** 1-99

**Prerequisites:** instructor's consent

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**BIOMED 9434: Gonadal Function**

(same as AN\_SCI 9434). Survey of current and in-depth mechanisms involved in ovarian, testicular, and epididymal function. Emphasis will be given to comparative differences in gonadal functions among domestic animals.

**Credit Hours:** 3

**Prerequisites:** AN\_SCI 4314 or equivalent, a course in endocrinology, and biochemistry or cell biology

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**LAB\_AN 8085: Problems in Laboratory Animal Medicine**

Advanced studies not expected to terminate in a thesis.

**Credit Hour:** 1-99

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**LAB\_AN 8090: Research in Laboratory Animal Medicine**

Research expected to terminate in a thesis. Graded on a S/U basis only.

**Credit Hour:** 1-99

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**LAB\_AN 8450: Research in Laboratory Animal Medicine**

Research not expected to terminate in a thesis. Graded on S/U basis only.

**Credit Hour:** 1-99

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**LAB\_AN 9085: Topics in Laboratory Animal Medicine**

Courses on various specialized topics in laboratory animal medicine or comparative medicine given on an as needed basis; content depends on faculty expertise and student need.

**Credit Hour:** 1-99

**Prerequisites:** instructor's consent

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**LAB\_AN 9087: Seminar in Laboratory Animal Medicine**

Theme-oriented seminars and discussions in the field of laboratory animal medicine, comparative medicine or related areas. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** departmental consent

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**LAB\_AN 9437: Pathology of Laboratory Animals**

Pathogenesis, pathology and diagnosis of naturally occurring diseases in animals used in research.

**Credit Hours:** 4

**Prerequisites:** departmental consent

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**LAB\_AN 9468: Laboratory Animal Biology**

Anatomy, taxonomy, reproduction, genetics, nutrition, and behavior of common laboratory animals. Emphasis is placed on mice and rats, including genetically-engineered models with comparative discussions on other laboratory animals. Prerequisites: departmental consent

**Credit Hours:** 4

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**LAB\_AN 9469: Laboratory Animal Resource Management**

Policies, standards and regulations in the care and use of laboratory animals, including colony management, animal procurement, cost accounting, facility design, and supervisory skills.

**Credit Hours:** 4

**Prerequisites:** departmental consent

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**LAB\_AN 9475: Methodology of Animal Experimentation**

Topics include experimental design, applied biostatistics, concepts of animal modeling.

**Credit Hours:** 3

**Prerequisites:** departmental consent

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**LAB\_AN 9476: Grant and Manuscript Writing for Biomedical Researchers**

Topics include experimental design applied biostatics and writing effective grant proposals and scientific manuscripts. Methods include lecture, discussion and assignments including an individual grant proposal which will be reviewed by a mock study section.

**Credit Hours:** 3

**Prerequisites:** LAB\_AN 9475; instructor's consent

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**LAB\_AN 9477: Laboratory and Project Management**

This course will provide graduates with professional development skills and career guidance including instruction in laboratory and project management. Topics will include job searching, start-up considerations, equipping a lab, personnel management and budget management. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** enrollment in Comparative Medicine Area Program or approval of course coordinator

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**VMED\_I 5120: Full-Time Enrollment**

Full-Time Enrollment

**Credit Hour:** 16-99

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**VMED\_I 5190: Full-Time Enrollment**

Full-Time Enrollment

**Credit Hour:** 16-99

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**V\_BSCI 5011: Veterinary Anatomy**

In-depth study of the structure of the horse, ox, sheep, goat, pig and avian species. (Instructional periods 3 and 4).

**Credit Hours:** 3

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**V\_BSCI 5012: Veterinary Anatomy with Laboratory**

Continuation of V\_BSCI 5011. In-depth study of the structure of the horse, ox, sheep, goat, pig and avian species. (Instructional periods 3 and 4).

**Credit Hours:** 3

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**V\_BSCI 5020: Developmental Anatomy**

Provides a comprehensive and rational interpretation of the intricate mechanisms of normal development to better understanding the complex anatomy of the adult. A substantial portion will be dedicated to commonly encountered congenital abnormalities for each major organ system.

**Credit Hours:** 0.5

**Prerequisites:** 1st year Veterinary students

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**V\_BSCI 5021: Developmental Anatomy**

Provides a comprehensive and rational interpretation of the intricate mechanisms of normal development to better understanding the complex anatomy of the adult. A substantial portion will be dedicated to commonly encountered congenital abnormalities for each major organ system.

**Credit Hours:** 0.5

**Prerequisites:** 1st year Veterinary students

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**V\_BSCI 5051: Veterinary Gastrointestinal**

Continuation of V\_BSCI 5504. Physiology of the gastrointestinal tract, exocrine pancreas and liver. Lecture and lab designed to emphasize principles important to the practice of veterinary medicine.

**Credit Hours:** 2

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**V\_BSCI 5052: Veterinary Endocrinology and Reproductive Physiology**

Continuation of Veterinary Biomedical Science 5051. Comparative endocrinology and reproductive biology.

**Credit Hours:** 2

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**V\_BSCI 5100: Veterinary Neuroscience**

A laboratory and lecture-based course emphasizing the applied anatomy and physiology of the nervous system of domestic animals.

**Credit Hours:** 2

**Prerequisites:** first year Veterinary students

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**V\_BSCI 5500: Veterinary Anatomy with Laboratory**

Correlative study of the anatomy of domestic and laboratory animals in which the developmental and gross anatomy are integrated. A segment is devoted to neuroanatomy. Dissection includes the dog, cat and common laboratory animals. (Instructional periods 1 and 2).

**Credit Hours:** 4

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**V\_BSCI 5502: Veterinary Microscopic Anatomy with Laboratory**

A study of microscopic anatomy including cytology, histology of basic tissues and microscopic anatomy of cardiovascular, urinary, respiratory systems and the special senses and integument. (Instructional periods 1 and 2).

**Credit Hours:** 3

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**V\_BSCI 5503: Veterinary Microscopic Anatomy**

Particular attention to digestive systems, endocrine organs and reproductive systems. (Instructional period 3).

**Credit Hours:** 2

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**V\_BSCI 5504: Veterinary Physiology**

This course is designed to provide an opportunity and motivation for the student to acquire an understanding of the physiological principles on which rational therapy in medical practice is based. Topics include: Cellular Neurophysiology, Muscle, Cardiovascular, Renal and Respiratory Physiology. The course also encourages the student to apply these principles in solving problems so that it becomes habitual for him or her

to think in terms of "mechanisms of action" as he or she approaches a problem in disturbed physiology.

**Credit Hours:** 5

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**V\_BSCI 5506: Veterinary Molecular and Cellular Biology**

(same as V\_BSCI 7333) A comprehensive course overviewing molecular and biochemical issues of cell function especially as related to medicine and the underlying molecular causes of disease.

**Credit Hours:** 4

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**V\_BSCI 5507: Veterinary Pharmacology with Laboratory**

General principles of pharmacy, pharmacokinetics, and pharmacodynamics, with emphasis on drugs affecting the central and autonomic nervous system, cardiovascular and hematologic systems.

**Credit Hours:** 3

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**V\_BSCI 5508: Veterinary Pharmacology**

Continuation of V\_PBIO 5507. Antiseptics, autocoids, hemostatics and anticoagulants, fluid and electrolytes, reproductive, endocrine, and gastrointestinal drugs.

**Credit Hours:** 2

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**V\_BSCI 5509: Veterinary Toxicology**

(Same as V\_BSCI 8509) Local and various systemic clinical responses of domestic animals to foreign chemicals including metals, pesticides, water-and food-borne agents, biotoxins, industrial and plant toxins. The principles, mechanism(s) of action, diagnosis, prevention and treatment of chemical intoxications are also presented.

**Credit Hours:** 3

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**V\_BSCI 7302: Cytology, Histology, and Organology of Domestic Animals I**

Detailed study of the structure and function of the cell, basic tissues (epithelium, connective tissue, muscle, nervous tissue) and several organ systems (cardiovascular, lymphatic, integument, digestive, visual, auditory) of domestic mammals and birds.

**Credit Hours:** 3

**Prerequisites:** background in biological sciences, instructor's consent

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**V\_BSCI 7303: Cytology, Histology and Organology of Domestic Animals II**

Detailed study of the liver, gallbladder, and pancreas, urinary system, respiratory system, endocrine glands, female reproductive system, placenta, male reproductive system, and integument (hoof and claw) of domestic mammals and birds.

**Credit Hours:** 2

**Prerequisites:** V\_BSCI 7303 and instructor's consent

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**V\_BSCI 7307: Embryology and Development of Domestic Animals**

Developmental anatomy of domestic animals. Special written report and/or review required.

**Credit Hours:** 2

**Prerequisites:** background in biological science and departmental consent

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**V\_BSCI 7333: Veterinary Cell Biology**

(same as V\_BSCI 5506). Course material stresses cell biology as related to animal health and medical issues. A comprehensive course overviewing molecular and biochemical issues of cell function especially as related to medicine and the underlying molecular causes of disease.

**Credit Hours:** 4

**Prerequisites:** instructor's consent

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**V\_BSCI 7510: Equine Clinical Anatomy: Forelimbs**

(cross-leveled with BIOCHM 4510). Basic foundation in selected aspects of equine clinical anatomy for veterinary technicians, pre-veterinary students, and other students wishing to enhance their understanding of anatomical structures of the horse's forelimbs.

**Credit Hour:** 1

**Prerequisites:** A bachelor's degree in a biological science or veterinary technology, or DVM degree, or instructor's consent

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**V\_BSCI 8010: Comparative Anatomy of Cardiovascular System**

The systemic and pulmonary circulation. The heart and vessels in detail. One midterm exam and final paper. Laboratory included.

**Credit Hour:** 1

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**V\_BSCI 8085: Problems in Veterinary Biomedical Science**

Selected problems and/or topics for advanced study in special areas to meet needs of individual students.

**Credit Hour:** 1-99

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**V\_BSCI 8090: Research in Veterinary Biomedical Science**

Open to graduate students with requisite preparation. Research expected to be presented as a thesis. Graded on a S/U basis only.

**Credit Hour:** 1-99

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**V\_BSCI 8100: Veterinary Neuroscience**

A laboratory and lecture based course emphasizing the applied anatomy and physiology of the nervous system of domestic animals.

**Credit Hours:** 2

**Prerequisites:** Restricted to first year veterinary students or graduate students

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**V\_BSCI 8200: Multidisciplinary Approaches to Biomedical Sciences**

The goal of this course is to aid the student in developing a multidisciplinary philosophy to problem solving in biomedical research. Methods used in molecular, biochemical, cellular, tissue, organ, and whole animal studies will be emphasized.

**Credit Hours:** 2

**Prerequisites:** instructor's consent

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**V\_BSCI 8410: Seminar in Veterinary Biomedical Science**

Presentation and discussion of investigations and topics in veterinary anatomy-physiology or related fields, by qualified students, instructors, and guests.

**Credit Hour:** 1

**Prerequisites:** departmental consent

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**V\_BSCI 8420: Veterinary Physiology**

This course is designed to provide an opportunity and motivation for the student to acquire an understanding of the physiological principles on which rational therapy in medical practice is based. Topics include: Cellular Neurophysiology, Muscle, Cardiovascular, Renal and Respiratory Physiology. The course also encourages the student to apply these principles in solving problems so that it becomes habitual for him or her to think in terms of "mechanisms of action" as he or she approaches a problem in disturbed physiology.

**Credit Hours:** 5

**Prerequisites:** BIOCHM 4270 and BIOCHM 4272

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**V\_BSCI 8421: Veterinary Physiology**

Continuation of V\_BSCI 8420. Physiology of the gastrointestinal tract, exocrine pancreas, liver, endocrine system and reproduction.

**Credit Hours:** 4

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**V\_BSCI 8509: Veterinary Toxicology**

(Same as V\_BSCI 5509) Local and various systemic clinical responses of domestic animals to foreign chemicals including metals, pesticides, water-and food-borne agents, biotoxins, industrial and plant toxins. The principles, mechanism(s) of action, diagnosis, prevention and treatment of chemical intoxications are also presented. Graded A-F only.

**Credit Hours:** 3

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**V\_BSCI 9090: Research in Veterinary Biomedical Sciences**

Research in Veterinary Biomedical Sciences. Graded on S/U basis only.

**Credit Hour:** 1-99

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**V\_BSCI 9425: Microvascular Circulatory Function**

(same as MPP 9434). An in-depth study of microcirculatory structure and function in various tissues with emphasis on recent developments in the understanding of the mechanisms involved in nutrient supply, edema formation, lymphatic function and fluid balance.

**Credit Hours:** 3

**Prerequisites:** V\_BSCI 8420 and V\_BSCI 8422 or Mammalian Physiology or equivalent

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**V\_BSCI 9431: Control of Energy Metabolism**

(same as MPP 9431). This advanced elective is in a lecture/discussion format using primary literature to explore how cells organize and regulate metabolism to meet energy demands.

**Credit Hour:** 1-3

**Prerequisites:** instructor's consent

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**V\_BSCI 9435: Molecular Exercise Biology**

(same as MPP 9435). Integrated adaptations of adipose tissue, blood vessels, bone, brain, heart, immune, liver, microbiome, and skeletal muscle to physical training during life. Lifecourse emphasis will be placed upon the role of physical activity during growth and aging in increasing and decreasing, respectively, cardiovascular fitness and strength fitness. The roles of the level of cardiovascular and strength fitness in slowing the onset of chronic diseases and death will be one outcome of the curriculum. Graded on A-F basis only.

**Credit Hours:** 3

**Recommended:** Introductory physiology and molecular biology

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**V\_BSCI 9462: Hormone Action**

(same as BIOCHM 9462). A lecture course with weekly assigned readings. Topics will include: a description of selected polypeptide, steroid and other hormones and their biological effects; receptors; second messengers; protein phosphorylation in hormone mediation; growth factors; cellular oncogenes.

**Credit Hours:** 2

**Prerequisites:** BIOCHM 7272

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**V\_BSCI 9467: Neural Cardiorespiratory Control**

(same as MPP 9437). Course objectives include developing a general understanding of CNS mechanisms in the regulation of the cardiovascular and respiratory system, including autonomic, neurohumoral and body fluid homeostatic mechanisms, gaining knowledge of the major advances and topics in the field and becoming familiar with some of the methods used to study CNS cardiorespiratory regulation. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** instructor's consent

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**V\_M\_S 6001: Topics in Veterinary Medicine**

Current topics, infrequently-taught courses, or new courses not yet designated by a permanent course number. Some sections may be graded A-F only or S/U only. Course instructor consent prior to enrollment is required.

**Credit Hour:** 0.5-6

**Prerequisites:** Restricted to Veterinary Medicine students

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**V\_M\_S 6005: Clinical Skills**

A hands -on laboratory class to provide experience with handling and examining Horses, Cattle, Small ruminants and Camelid species, Cats and Dogs for veterinary students.

**Credit Hours:** 0.5

**Prerequisites:** first year veterinary students. Graded on S/U basis only

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**V\_M\_S 6006: Clinical Skills**

A hands -on laboratory class to provide experience with handling and examining Horses, Cattle, Small ruminants and Camelid species, Cats and Dogs for veterinary students. Graded on S/U basis only.

**Credit Hours:** 0.5

**Prerequisites:** first year veterinary students

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**V\_M\_S 6010: Evaluated Veterinary Preceptorship**

This required co-op style course provides the student with practical exposure and experience in nonacademic veterinary medicine. Duration of 2-6 weeks. Graded on S/U basis only.

**Credit Hour:** 1-99

**Prerequisites:** VM-3 standing

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**V\_M\_S 6020: Veterinary Radiology with Laboratory**

Introduces through lectures and demonstrations the principles of radiographic examination and interpretation of disease processes of domestic animals. Instructional period 8.

**Credit Hours:** 2

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**V\_M\_S 6030: Veterinary Anesthesiology with Laboratory**

Basic principles of anesthesiology for any species of domestic and exotic animals. Instructional period 9.

**Credit Hours:** 2

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**V\_M\_S 6040: Companion Animal Medicine with Laboratory**

Covers basic principles of veterinary internal medicine and selected subdisciplines. Instructional period 9.

**Credit Hours:** 4

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**V\_M\_S 6050: Small Animal Medicine**

Didactic presentations regarding pathophysiology, diagnosis and therapeutic management of organ system diseases in small animals.

**Credit Hours:** 2.5

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**V\_M\_S 6060: Small Animal Surgery with Laboratory**

Basic principles including suture materials, suture patterns, operative techniques, wound healing, and body system approach to soft tissue surgery conditions.

**Credit Hours:** 2

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**V\_M\_S 6071: Small Animal Surgery**

Continuation of V\_M\_S 6060 lectures, focusing primarily on orthopedics.

**Credit Hours:** 2

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**V\_M\_S 6072: Optional Surgery and Anesthesia Laboratory**

Designed to teach entry-level surgical and anesthesia skills using models, live animals, and cadavers. This laboratory is offered as a substitute to V\_M\_S 6073 for students who wish to gain anesthesia and surgical experience with live tissues. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** V\_M\_S 6060

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**V\_M\_S 6073: Fundamental Surgery Laboratory**

Designed to teach entry-level surgical skills using models and cadavers. Canine cadavers will be substituted for pigs in the first two celiotomy laboratories. Students will not anesthetize pigs but will observe clinical anesthesia by following one clinical case from start to finish. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** complete V\_M\_S 6060

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**V\_M\_S 6081: Food Animal Medicine and Surgery**

Covers the important diseases of cattle, goats, sheep, camelids, and swine recognition, management and prevention of diseases are stressed.

**Credit Hours:** 2.5

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**V\_M\_S 6082: Food Animal Medicine and Surgery**

Continuation of V\_M\_S 6081. Covers the important diseases of cattle, goats, sheep, camelids, and swine recognition, management and prevention of diseases are stressed.

**Credit Hours:** 2

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**V\_M\_S 6090: Small Animal Emergency and Critical Care with Laboratory**

Basic principles of emergency and critical care of companion animals, and body system approach to emergency and critical care.

**Credit Hour:** 1

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**V\_M\_S 6110: Theriogenology**

Reproductive function, estrous cycle manipulation, and breeding of individual domestic animals and herds. Pathogenesis, diagnosis and management (medical and surgical) of common reproductive disorders.

**Credit Hours:** 3

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**V\_M\_S 6120: Veterinary Ophthalmology**

Covers examination, diagnostic procedures and treatment of important eye diseases of domestic animals.

**Credit Hour:** 1

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**V\_M\_S 6130: Fundamentals of Veterinary Business Management**

To realistically present to the second-year veterinary student a basic explanation of the essential need for strong base of knowledge pertaining to business and management in order to be successful in the veterinary profession.

**Credit Hour:** 1

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**V\_M\_S 6140: Nutrition with Laboratory**

Nutrition of companion and food producing animals and nutritional principles important to veterinary medicine. Subjects presented include feeding of animals for maintenance of healthy conditions during all life stages, evaluation of foods and supplements, and methods of diet formulation and evaluation.

**Credit Hour:** 1.5

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**V\_M\_S 6151: Equine Medicine and Surgery**

Covers the fundamentals of diseases of the equine species. Case Management approaches are utilized to provide examples of disease conditions.

**Credit Hours:** 2

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**V\_M\_S 6152: Equine Medicine and Surgery I**

Continuation of V\_M\_S 6151. Covers the fundamentals of diseases of the equine species. Case Management approaches are utilized to provide examples of disease conditions.

**Credit Hour:** 1.5

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**V\_M\_S 6400: Food Animal Medicine and Surgery I**

Clinical Rotation. Technical, diagnostic and therapeutic procedures common to the practice of large animal medicine and surgery. Experience in the operation of a large animal hospital and farm outpatient practice.

**Credit Hours:** 6

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**V\_M\_S 6411: Small Animal Internal Medicine**

Clinical rotation in small animal internal medicine for veterinary degree students. Students will obtain history and conduct physical examination of client-owned dogs and cats. After reviewing findings with faculty, they will perform diagnostic tests and carry out treatments. Graded on A-F basis only. May be repeated for credit.

**Credit Hour:** 1-99

**Prerequisites:** the entire pre-clinical curriculum of the CVM must be completed before taking this course; that is, students must have successfully completed the DVM curriculum through instruction period 12. Restricted to students in years 3 and 4 of the DVM curriculum

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**V\_M\_S 6412: Small Animal Community Practice**

Clinical rotation in small animal general medicine and surgery for veterinary degree students. Students will obtain history and conduct physical examination of client-owned dogs and cats. After reviewing findings with faculty, they will perform diagnostic tests and carry out treatments. The entire course may not be repeated for credit but smaller sections may with approval.

**Credit Hour:** 1-99

**Prerequisites:** the entire pre-clinical curriculum of the CVM must be completed before taking this course; students must have successfully completed the DVM curriculum through instructional period 12. Restricted to students in years 3 and 4 of the DVM curriculum

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**V\_M\_S 6413: Small Animal Behavior and Dermatology**

The Small Animal Behavior and Dermatology Rotation is designed to give students experience in the evaluation and management of dogs and cats with behavioral problems and to provide students with hands-on experience in the evaluation, diagnosis and management of dermatology cases. During the rotation the student will develop skills in history taking, behavioral evaluations, dermatology examinations and diagnostic procedures and in the management of behavioral and dermatology cases. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** Restricted to third- and fourth-year Veterinary Medicine students

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**V\_M\_S 6420: Equine Medicine and Surgery I**

Clinical rotation. Technical, diagnostic and therapeutic procedures common to equine practice. Emphasis on fundamental principles.

**Credit Hours:** 6

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**V\_M\_S 6430: Small Animal Surgery I**

Diagnostic procedures and surgical techniques applicable to companion animal surgery. Practical experience in the operation of a small animal surgical practice. Six times per year.

**Credit Hours:** 6

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**V\_M\_S 6432: Small Animal Soft Tissue Surgery**

Clinical rotation. Diagnostic procedures and surgical techniques applicable to companion animal soft tissue surgery. Practical experience in the operation of a small animal soft tissue surgical practice.

**Credit Hours:** 2

**Prerequisites:** completion of Vet Med years 1 and 2 and specifically V\_M\_S 6072 or V\_M\_S 6073

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**V\_M\_S 6434: Small Animal Orthopedic Surgery**

Clinical rotation. Diagnostic procedures and surgical techniques applicable to companion animal orthopedic surgery. Practical experience in the operation of a small animal orthopedic surgical practice. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** completion of Veterinary Medicine years 1 and 2

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**V\_M\_S 6436: Veterinary Neurology/Neurosurgery**

Clinical rotation. A hands-on applied clinical rotation to provide experience in examination and diagnosis of domestic animals with neurologic disease.

**Credit Hours:** 2

**Prerequisites:** completion of preclinical curriculum of Veterinary Medicine years 1 and 2. Restricted to VM3 and VM4 students

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**V\_M\_S 6441: Clinical Radiology I**

Clinical rotation. Fundamentals of radiology: indications for use, techniques, pathophysiologic alterations, interpretation of results, patient aftercare, protective measures against radiation hazards.

**Credit Hours:** 3

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**V\_M\_S 6442: Clinical Anesthesiology I**

Clinical rotation. Fundamentals of anesthesiology: indications for use techniques, pathophysiologic alterations, and interpretations of results, patient aftercare.

**Credit Hours:** 3

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**V\_M\_S 6450: Theriogenology I**

Clinical rotation. Practical experience in reproductive techniques, obstetrics, breeding soundness and herd reproductive problems.

**Credit Hours:** 2

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**V\_M\_S 6460: Clinical Ophthalmology I**

Clinical rotation. Practical application in problem solving and medical and surgical management of eye conditions of domestic animals.

**Credit Hours:** 2

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**V\_M\_S 6480: Cardiology**

Cardiology

**Credit Hours:** 2

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**V\_M\_S 6490: Small Animal Specialty Medicine I**

Clinical rotation in small animal oncology. Taught in the clinical setting using animals presented to the VMTH for evaluation and treatment of oncologic diseases.

**Credit Hours:** 2

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**V\_M\_S 6700: Food Animal Medicine and Surgery II Elective**

Additional food animal experience located off-site or on-site under special circumstances.

**Credit Hour:** 2-6

**Prerequisites:** V\_M\_S 6400. Consent required

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**V\_M\_S 6710: Small Animal Medicine II Elective**

Clinical rotation offered to VM3 and VM4 students. Opportunity for concentrated study and experience in medical areas. Enrollment subject to approval of course coordinator.

**Credit Hour:** 2-6

**Prerequisites:** The entire pre-clinical curriculum of the CVM must be completed before taking this course

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**V\_M\_S 6711: Small Animal Internal Medicine Elective Clinical or Research Rotation**

Clinical rotation in SAIM to focus on either clinical diagnostics and therapy, or research relevant to clinically important issues of pet animals.

**Credit Hours:** 2

**Prerequisites:** Veterinary curriculum up until the clinical rotations; must be VM3 or VM4 students

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**V\_M\_S 6712: Private Practice Small Animal Internal Medicine Elective**

Clinical rotation. Improve critical thinking skills in disease diagnosis and management for internal medicine of dogs and cats. Clinical rotation off-site at Associated Veterinary Specialists. Teaching by cases seen by AVS clinician on duty. Student participation determined by supervising clinician.

**Credit Hours:** 2

**Prerequisites:** All required VM1 and VM2 courses. VM3 or VM4 standing required

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**V\_M\_S 6713: Shelter Medicine Elective at the Humane Society of Missouri**

Comprehensive shelter medicine rotation at Humane Society of Missouri.

**Credit Hour:** 2-6

**Prerequisites:** Restricted to VM3 and VM4 students

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**V\_M\_S 6720: Equine Medicine and Surgery II Elective**

Clinical rotation. Continuation of V\_M\_S 6420. Open to VM3 and VM4 students, subject to approval of course coordinator. Opportunity for concentration in specific area of interest.

**Credit Hour:** 2-6

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**V\_M\_S 6730: Small Animal Surgery II Elective**

Opportunity for concentration study and advanced surgical experience.

**Credit Hour:** 3-6

**Prerequisites:** V\_M\_S 6430 or equivalent

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**V\_M\_S 6732: Small Animal Soft Tissue Surgery II Elective**

Clinical rotation. Opportunity for concentrated study and advanced soft tissue surgical experience.

**Credit Hours:** 2

**Prerequisites:** V\_M\_S 6432 and completion of year VM1 and VM2

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**V\_M\_S 6734: Small Animal Orthopedic Surgery II Elective**

Clinical rotation. Opportunity for concentrated study and advanced orthopedic surgical experience.

**Credit Hours:** 2

**Prerequisites:** completion of VM years 1 and 2

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**V\_M\_S 6736: Veterinary Neurology/ Neurosurgery-Elective**

A hands-on applied clinical rotation to provide experience in examination and diagnosis of domestic animals with neurologic disease.

**Credit Hours:** 2

**Prerequisites:** completion of preclinical curriculum of Veterinary Medicine years 1 and 2. Restricted to VM3 and VM4 students

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**V\_M\_S 6741: Clinical Radiology II Elective**

Clinical rotation. Continuation of V\_M\_S 6441.

**Credit Hour:** 1-99

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**V\_M\_S 6742: Clinical Anesthesiology II Elective**

Clinical rotation. Continuations of V\_M\_S 6442. This course will focus on anesthetizing and monitoring the more challenging anesthetic cases during rotation. Required projects include a review paper on a relevant topic of choice, a written case report and assistance in research activities.

**Credit Hour:** 1-99

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**V\_M\_S 6743: Radiology - Special Imaging Elective**

Introduction to special imaging modalities including ultrasound, computed tomography, magnetic resonance and nuclear scintigraphy with emphasis towards small animal patients. A major part of the course will be devoted to recognition and interpretation of abdominal ultrasound. Graded on A-F basis only. Prerequisites: V\_M\_S 6020; VM III and VM IV

**Credit Hour:** 2-3

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**V\_M\_S 6744: Veterinary Radiation Oncology -Clinical Elective**

Training in radiation therapy planning, treatment execution, and case management. Develop a better understand of the radiation therapy patient, including side effects of therapy and expected outcomes, that will position them to be quality collaborators on radiation therapy cases as referring veterinarians. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** completed and passed the preclinical veterinary curriculum

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**V\_M\_S 6750: Theriogenology II Elective**

Continuation of V\_M\_S 6450. Opportunity for concentrated study and experience. An elective, subject to approval of course coordinator and faculty member(s) who supervise student's work.

**Credit Hour:** 1-99

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**V\_M\_S 6751: External Food Animal Service and Theriogenology Teaching Program**

Additional options for off-site clinical training in Theriogenology and Food Supply Veterinary Medicine beyond the core curriculum.

**Credit Hour:** 1-99

**Prerequisites:** V\_M\_S 6081, V\_M\_S 6082, V\_M\_S 6110, and VM3 or VM4 students

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**V\_M\_S 6760: Small Animal Nutrition**

Clinical rotation designed to allow students to gain hands-on experience with canine and feline nutrition.

**Credit Hours:** 2

**Prerequisites:** V\_M\_S 6140. Restricted to VM3 or VM4

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**V\_M\_S 6770: Herd Health Management and Nutrition II Elective**

Concentrated study/experience in feed lot, dairy, cow/calf swine herd agribusiness enterprises applicable to veterinary practice.

**Credit Hour:** 2-6

**Prerequisites:** V\_M\_S 6400 and VM-4 status

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**V\_M\_S 6800: Clinical Ophthalmology II Elective**

Clinical rotation offered to VM 3 and VM 4 students. Opportunity for concentrated study and experience. Subject to approval of course coordinator and faculty member(s) who supervise student's work.

**Credit Hour:** 1-99

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**V\_M\_S 6810: Cardiology II Elective**

Cardiology course consists of a three-week clinical rotation in the small animal clinic. Duties include primary care receiving and patient care with clinical case work-up. Additional responsibilities include attendance at clinical rounds and participating in related clinical activities.

**Credit Hour:** 1-99

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**V\_M\_S 6820: Small Animal Emergency and Critical Care**

Clinical rotation offered to VM 3 and VM 4 students. Opportunity for concentrated study and experience in small animal emergency and critical care.

**Credit Hour:** 1-99

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**V\_M\_S 6821: Small Animal Emergency Critical Care Elective**

Clinical rotation providing focused experience in care management and issues pertinent to small animal emergency and critical care. Graded on A-F basis only. May be repeated for credit.

**Credit Hour:** 2-6

**Prerequisites:** Restricted to levels VM 3 or VM 4

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**V\_M\_S 6830: Food Animal Production Medicine**

Clinical rotation will focus primarily on beef, dairy, and swine with emphasis on preventive medicine by looking at the herd incorporating spreadsheet and the date base application analysis. The course participants will visit various operations and write reports to the producer, which will enhance their farms.

**Credit Hour:** 1-99

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**V\_M\_S 6850: Clinical Oncology**

Clinical rotation in small animal oncology. Taught in the clinical setting using animals presented to the VMTH for evaluation and treatment of oncologic diseases.

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**Credit Hour:** 1-99

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**V\_M\_S 6920: Equine Techniques Elective**

This course provides an opportunity for equine oriented veterinary students wishing to enhance their understanding of the clinical techniques used in equine veterinary medicine and gain hands on practical experience in selected clinical techniques. It is offered as a 2 credit, 2 week elective clinical rotation.

**Credit Hours:** 2

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**V\_M\_S 6986: Advanced Clinical Neurology and Neurosurgery**

This is a supplement to neurology taught in the small animal course to improve preparedness for clinical practice. Topics include neurolocalization techniques, electrodiagnostic and CT/MR interpretation, wider exposure to differential diagnosis, and neurosurgical principals.

**Credit Hour:** 1

**Prerequisites:** Passing grade in V\_M\_S 6040

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**V\_M\_S 6987: Problem-Based Learning Clinic Preparation**

This course is designed to prepare the VM 3 student about to enter clinics for a systematic approach to a clinical case. Emphasis will be placed on developing focused problem and differential lists, and logical choices of diagnostic tests. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** VM 3 level

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**V\_M\_S 6988: Small Animal Clinical Nutrition**

Application of nutritional principles to prevention and management of common diseases of dogs and cats. Including review of nutrients, commercial and home diets, and basic pathophysiology of nutritional aspects of disorders seen in companion animal practice.

**Credit Hour:** 1

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**V\_M\_S 6989: Advanced Oncology of Animals**

Expanded discussion of veterinary oncology topics not covered in the oncology section V\_M\_S 6050. Important for veterinary students who intend to enter private or academic practice and manage oncology cases, specific tumor types, diagnostic tools, and treatment modalities.

**Credit Hour:** 1

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**V\_M\_S 6990: Zoological Medicine**

Interested students of Zoological Medicine would significantly broaden their understanding of this discipline and increase the likelihood they could enter zoological veterinary practice or a zoological veterinary medical residency. Graded on A-F basis only

**Credit Hours:** 2

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**V\_M\_S 6991: Advanced Equine Lameness with Laboratory**

Learn to recognized forelimb and hind limb lameness through diagnostic techniques for localization of lameness. Gain practical experience in limb support for sever musculoskeletal injuries. One surgical laboratory using equine cadaver limbs to illustrate and practice common distal limb surgeries.

**Credit Hour:** 1

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**V\_M\_S 6992: Small Animal Endoscopy**

Small Animal Endoscopy

**Credit Hour:** 1

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**V\_M\_S 6993: Advanced Veterinary Anesthesia**

Advanced Veterinary Anesthesia

**Credit Hour:** 1

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**V\_M\_S 6994: Advanced Techniques in Small Animal Surgery with Laboratory**

Course designed for students who want exposure to small animal surgical techniques above and beyond the experience gained from the basic surgical training in V\_M\_S.

**Credit Hour:** 1

**Prerequisites:** V\_M\_S 6072; limited enrollment

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**V\_M\_S 6995: Clinical Cardiology**

Students will utilize a combination of lectures, hands on laboratories, and problem based clinical correlates covering cardiovascular physical examination, radiographic and electrocardiographic interpretation, and the pathophysiology and management of congenital and acquired cardiac diseases.

**Credit Hour:** 1

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**V\_M\_S 6996: Advanced Dermatology**

This is a lecture course that will supplement and expand upon the canine and feline dermatology principles covered in the general pathology and small animal medicine courses. Graded on A-F basis only.

**Credit Hour:** 1

**Prerequisites:** V\_M\_S 6050

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**V\_M\_S 6997: Food Animal Diagnostic Exercises**

Discussion based course designed to integrate and review didactic coursework to increase knowledge of livestock diseases. A list of appropriate differential diagnoses will be generated for each problem.

**Credit Hour:** 1

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**V\_M\_S 6998: Small Animal Behavioral Medicine**

Small Animal Behavioral Medicine

**Credit Hour:** 1

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**V\_M\_S 6999: Food Animal Surgery Laboratory**

Routine food animal surgical procedures laboratory.

**Credit Hour:** 1

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**V\_M\_S 7301: Topics in Veterinary Medicine and Surgery**

Organized study of select topics.

**Credit Hour:** 1-99

**Prerequisites:** junior standing and instructor's consent

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**V\_M\_S 7303: Advanced Topics in Veterinary Anesthesia**

(same as V\_M\_S 6993).

**Credit Hour:** 1

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**V\_M\_S 7304: Advanced Equine Surgery**

The purpose of the course is to aid in the preparation of the resident for Board certification in the American College of Veterinary Surgeons.

**Credit Hours:** 2

**Prerequisites:** a DVM or equivalent degree, acceptance to the graduate school, acceptance to the residency program, and instructor approval

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**V\_M\_S 7320: Fundamentals of Small Animal Emergency and Critical Care**

(cross-leveled with BIOMED 4320). This course will provide students with the knowledge and skills to assist in a small animal medical emergency and critical care facility.

**Credit Hours:** 3

**Prerequisites:** a bachelor's degree in biological science or veterinary technology, or DVM degree, or instructor's consent

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**V\_M\_S 7328: Introductory Radiation Biology**

(same as RADIOL 7328, NU\_ENG 7328, BIO\_SC 7328).

**Credit Hours:** 3

**Prerequisites:** junior standing Sciences/Engineering; one course in biological sciences and physics/chemistry; or instructor's consent

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**V\_M\_S 7351: Advanced Surgical Techniques**

Special application to large, small animals.

**Credit Hour:** 1-99

**Prerequisites:** D.V.M

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**V\_M\_S 7355: Advanced Techniques in Radiology**

Special application to domestic animals.

**Credit Hour:** 1-99

**Prerequisites:** D.V.M

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**V\_M\_S 7370: Orthopaedic Biomechanics**

(same as BIOL\_EN 7370). Engineering sciences will be leverage to create a comprehensive study of orthopaedic biomechanics. The tissue mechanics of bone and soft tissue will be studied along with applying structural analysis of the musculoskeletal system. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** ENGINR 1200, BIOL\_EN 3170; departmental consent

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**V\_M\_S 7385: Problems in Veterinary Medicine and Surgery**

Studies in specific areas of veterinary medicine and surgery.

**Credit Hour:** 1-99

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**V\_M\_S 7510: Equine Clinical Anatomy: Forelimbs**

Basic Foundation in selected aspects of equine clinical anatomy for veterinary technicians, pre-veterinary students, and other students wishing to enhance their understanding of anatomical structure of the horse's forelimbs.

**Credit Hour:** 1

**Prerequisites:** A bachelor's degree in a biological science or veterinary technology, or DVM degree, or instructor's consent

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**V\_M\_S 8021: Neurology Journal Review**

Weekly journal review and seminar on current topics in veterinary neurology, related clinical disciplines and basic neurosciences. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** DVM degree

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**V\_M\_S 8022: Internal Medicine Clinicopathologic Conference**

Advanced discussion of small animal medicine cases with an emphasis on pathophysiology and clinicopathologic findings. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8023: Internal Medicine Journal Review**

Resident led review of the current veterinary internal medicine literature. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8024: Medicine-Surgery-Pathology Conference**

This is a case-based course in which clinical and pathological findings of interesting cases from the VMTH are presented by those who treated and interpreted the case. Dogs, cats, cows, horses, and small ruminants are included with occasional non-traditional species. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8025: Equine Medicine Journal Review**

Aid Residents in preparing for board certification in ACVIM and ACVS. Articles pertaining to current equine veterinary literature are reviewed on a weekly basis. Participants select, distribute articles to group prior to meeting, then present short review with a discussion following. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8026: Surgery Journal Review**

Resident led review of the current veterinary surgical peer-reviewed literature. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8027: Food Animal Medicine Journal Review**

Critical review of the scientific literature with a focus on ACVIM board preparation. May also be used as a forum for information exchanged relevant to ACVIM board preparation. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8028: Cardiovascular Medicine Journal Review**

Resident led review of the current veterinary cardiovascular medicine literature. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8029: Emergency and Critical Care Journal Review**

This course will concentrate on review of emergency and critical care literature. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** DVM degree

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**V\_M\_S 8030: Seminars in Vet. Med. & Surgery: Ophthalmology Pathology Seminar**

Review of clinical cases presented in two formats: histopathology slides and kodachrome slides. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** DVM degree or equivalent and acceptance into an ophthalmology residency program

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**V\_M\_S 8031: Sem. in Vet. Med & Surgery: Ophthalmology Seminar & Journal Review**

Weekly journal review and seminar on current topics in veterinary ophthalmology, review of pertinent literature in human ophthalmology, and review of ophthalmic texts. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** DVM or equivalent degree and acceptance into the ophthalmology residency program

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**V\_M\_S 8032: Seminars in Veterinary Anesthesiology**

A journal review will focus on advances in veterinary anesthesiology, pharmacology, and physiology. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** DVM and graduate school enrollment or instructor's consent

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**V\_M\_S 8033: Seminars in Clinical Sciences-Equine Surgery Journal Review**

Journal review will focus on advances in equine surgery and will consist of a review of recent manuscripts pertaining to equine surgery in current journals and review of pertinent book chapters. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** DVM degree and instructor's consent

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**V\_M\_S 8034: Seminars in Veterinary Radiology**

This journal review will focus on advances in veterinary radiology, ultrasound and alternate imaging. Current and past literature will be reviewed weekly and will be chosen by the class coordinator. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** DVM and graduate school enrollment or instructor's consent

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**V\_M\_S 8035: Current Topics in Veterinary Clinical Nutrition**

Review and critical analysis of recently published articles in veterinary nutrition and discussion of aspects relevant to clinical application and management of veterinary patients. Can be repeated for a total of six credit hours. Graded on a S/U basis only.

**Credit Hour:** 1

**Prerequisites:** Restricted to Graduate Veterinary Medicine majors or instructor's consent

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**V\_M\_S 8036: Advanced Physiology of the Dog and Cat**

To understand advanced medical physiology: cell physiology, muscle function, cardiac and circulatory physiology, renal function, distribution of fluid in the body, functions of red and white blood cells, mechanisms of hemostasis, resistance to infection and pulmonary physiology. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** Instructor's consent

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**V\_M\_S 8040: Advanced Small Animal Clinical Nutrition**

Advanced study of veterinary clinical nutrition in the dog and cat. Includes review of applied biochemistry, nutrients, and feeding principles along with pathophysiology and nutritional management of common diseases. May be repeated for credit. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** Introductory Veterinary Nutrition

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**V\_M\_S 8041: Current Topics in Dairy Production Medicine**

The course will focus on the presentation, evaluation and discussion of contemporary scientific peer-reviewed literature published in indexed journal related to current concepts on dairy production medicine. Participating students will be aimed to critically review current research publication with special emphasis on study design, hypothesis and objectives. Through the analysis of results and discussion, concepts of dairy production medicine will be imparted. Graded on A-F basis only.

**Credit Hours:** 2

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**V\_M\_S 8090: Research in Veterinary Medicine and Surgery (Thesis)**

Thesis research. Graded on a S/U basis only.

**Credit Hour:** 1-99

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**V\_M\_S 8400: Clinical Veterinary Regulatory Medicine and Public Health**

(same as P\_HLTH 8400). The goal of this course is to familiarize the student with clinical aspects of veterinary public health/regulatory medicine.

**Credit Hours:** 2

**Prerequisites:** Must be enrolled in MPH (veterinary public health concentration) or DVM curriculum

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**V\_M\_S 8401: Topics in Veterinary Clinical Sciences**

Current topics, infrequently-taught courses, or new courses not yet designated by a permanent course number. Some sections may be graded A-F only or S/U only.

**Credit Hour:** 1-3

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**V\_M\_S 8402: Seminar in Veterinary Clinical Sciences**

Graduate seminars and conferences with a focus on current literature within a specialty area. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8405: Comparative Respiratory Pathophysiology**

A consideration of clinical pathophysiology of the respiratory system relative to diseases of the thorax and clinical anesthesiology.

**Credit Hour:** 1

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**V\_M\_S 8406: Topics in Veterinary Medicine and Surgery**

Current topics, infrequently taught courses, or new courses not yet designated by a permanent course number.

**Credit Hour:** 1-99

**Prerequisites:** must be a DVM or be enrolled in the Veterinary curriculum; instructor's consent

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**V\_M\_S 8410: Veterinary Medicine and Surgery Research Seminar**

Current research in veterinary medicine and surgery. Literature reviews and presentation or original graduate student research. Graded on S/U basis only.

**Credit Hour:** 1

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**V\_M\_S 8411: Clinical Veterinary Endocrinology**

A 2-hour course for post-DMV graduate students. It will focus on clinically relevant physiology, pathophysiology, and diagnostic evaluation of hormone systems.

**Credit Hours:** 2

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**V\_M\_S 8413: Equine Internal Medicine**

The purpose of the course is to aid in the preparation of the Resident for board certification in the American College of Veterinary Internal Medicine-LAIM. Current concepts in the pathophysiology, diagnosis and management of medical disorders of horses.

**Credit Hours:** 2

**Prerequisites:** DVM degree or equivalent

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**V\_M\_S 8415: Advanced Veterinary Neurology**

Basic neuroscience as it relates to clinical neurology and the pathophysiology of diseases of the brain, spinal cord, peripheral nerve and muscle in domestic animals. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** DVM degree

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**V\_M\_S 8416: Advanced Veterinary Internal Medicine: Cardiovascular Medicine**

Pathologic, pathophysiologic, hemodynamic and pharmacological mechanisms of important to the diagnosis, assessment, management and research of cardiovascular diseases of animals.

**Credit Hours:** 3

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**V\_M\_S 8417: Advanced Veterinary Internal Medicine - Clinical Oncology**

Provides graduate students in the clinical and basic sciences alike with a working knowledge of the biological mechanisms of cancer development and progression and the related approaches to cancer prevention and therapy. It is assumed that students will have a strong background in biology as a foundation for discussion.

**Credit Hours:** 2

**Prerequisites:** DVM or equivalent degree recommended

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**V\_M\_S 8418: Advanced Veterinary Internal Medicine: Food Animal Medicine**

Current concepts in the pathophysiology, diagnosis and management of medical disorders, diseases of the limbs, and infectious diseases of cattle and food producing animals.

**Credit Hours:** 2

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**V\_M\_S 8419: Advanced Topics in Cancer Biology and Clinical Oncology**

This course will provide students with a knowledge base in cancer cell biology that may be applied to the practice of clinical oncology. Monthly clinically-oriented seminars by invited speakers will be preceded by a weekly in-depth review of the basic science related to the seminar topic.

**Credit Hours:** 2

**Recommended:** MD or DVM

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**V\_M\_S 8421: Advanced Veterinary Surgery: Small Animal Surgery**

Current concepts in the pathophysiology, diagnosis and management of surgical disease of the dog and the cat. Includes laboratories of advanced surgical techniques.

**Credit Hour:** 2-4

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**V\_M\_S 8423: Comparative Arthrology**

Lectures and discussion covering anatomy, physiology, biomechanics, pathophysiology, and clinical aspects of mammalian diarthrodial joints.

**Credit Hours:** 3

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**V\_M\_S 8425: Advanced Veterinary Surgery: Equine Surgery**

Current concepts in the pathophysiology, diagnosis and management of surgical disorders of the horse. Taught yearly as sections A, B, C. Repeatable to a maximum of 10 credit hours (individual sections may be taken once).

**Credit Hour:** 2-4

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**V\_M\_S 8426: Advanced Veterinary Surgery - Ophthalmic Surgery**

Surgery labs consisting of 2-4 hours of surgical instruction per week. Graded on A-F basis only.

**Credit Hour:** 2-4

**Prerequisites:** DVM or equivalent degree and acceptance into the ophthalmology residency program

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**V\_M\_S 8431: Research Methods and Data Analysis**

A consideration of research methods, data analysis, and practical approaches to analyzing data sets derived from veterinary and biomedical studies.

**Credit Hours:** 2

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**V\_M\_S 8432: Applied Statistics and Informatics**

Educate students in the practical application of statistics and information research tools. Students will learn about application of statistical modeling to biomedical research. They will be trained to use statistical software

programs and then use those skills to analyze data sets. Additionally, students will learn about the use of informatics systems for researching scientific questions, data searching, and data dissemination. At the end of the course successful students should be able to develop and perform statistical analyses appropriate for most basic research study designs. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** DVM or equivalent degree and enrollment in a veterinary residency program unless an exception is approved by the course coordinator

**Recommended:** Successful completion of a general statistics course is highly recommended prior to taking this course

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**V\_M\_S 8435: Veterinary Clinical Sciences: Clinical Immunology**

Advanced concepts in veterinary immunology and immunopathology.

**Credit Hours:** 2

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**V\_M\_S 8436: Veterinary Clinical Sciences: Clinical Pharmacology**

Advanced concepts in veterinary clinical pharmacology, pharmacokinetics, and anesthesiology.

**Credit Hour:** 1

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**V\_M\_S 8437: Advanced Topics in Veterinary Medicine (Nuclear Medicine)**

An in-depth review of veterinary nuclear medicine. Includes the physics of nuclear medicine, common imaging techniques, common radiopharmaceuticals, radiopharmaceutical kinetic evaluation and some common physiological applications.

**Credit Hour:** 1

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**V\_M\_S 8439: Advanced Veterinary Ultrasonography**

Advanced concepts in veterinary ultrasonography; including ultrasound and Doppler physics, instrumentation, examination methodology, and interpretation of studies.

**Credit Hour:** 2-3

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**V\_M\_S 8440: Adv Veterinary Clinical Sciences: Advanced Clinical Ophthalmology**

Case-based discussion course. Graded on A-F basis only.

**Credit Hour:** 1-3

**Prerequisites:** DVM or equivalent degree and acceptance into the ophthalmology residency program

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**V\_M\_S 8445: Veterinary Critical Care and Emergency Medicine**

Advanced study of veterinary critical care and emergency medicine and surgery focusing on current research and literature as well as clinical application.

**Credit Hour:** 2-3

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**V\_M\_S 8450: Research in Veterinary Medicine and Surgery (non-thesis)**

Non-Thesis research.

**Credit Hour:** 1-99

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**V\_M\_S 8485: Problems in Veterinary Clinical Sciences**

Supervised individuals studies arranged with a faculty member and approved by the advisory committee. Some sections may be graded A-F only or S/U only.

**Credit Hour:** 1-3

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**V\_M\_S 8487: Nuclear Medicine**

Principles of radiation detection instrumentation, monitoring radiological safety and diagnostic procedures used on veterinary nuclear medicine.

**Credit Hours:** 3

**Prerequisites:** one year College Physics, D.V.M. degree, and departmental consent

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**V\_M\_S 8488: Radiation Therapy**

Intermediate level course to review basic and advanced concepts in radiation biology, radiation physics, and clinical application of ionizing radiation for the treatment of cancer Teletherapy, brachytherapy and radiation oncology are covered.

**Credit Hours:** 3

**Prerequisites:** A basic course in radiation physics/dosimetry, radiation biology and medical oncology. One year college physics, DVM degree and departmental consent

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**V\_M\_S 8489: Veterinary Radiographic Physics**

In depth review of the fundamental principles of radiographic physics, with an emphasis on preparation for the American college of Veterinary Radiology board examination. Graded on an S/U basis only.

**Credit Hour:** 1

**Prerequisites:** DVM and graduate school enrollment or instructor's consent

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**V\_M\_S 9090: Research in Veterinary Medicine and Surgery**

PhD Dissertation research. Graded on S/U basis only.

**Credit Hour:** 1-99

**Prerequisites:** instructor's consent

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**V\_PBio 3551: Introduction to Immunology I**

Comprehensive introduction to the basic principles of immunology. The course is designed for undergraduates majoring in biology, biochemistry or health professions. Introduction to cells and organs of the immune system, innate and adaptive immunity, development, activation and effector functions of lymphocytes, hypersensitivity, host response to infection and vaccination, autoimmunity and tumor immunology. Introduction to Immunology 1. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** BIO\_SC 2300

**Recommended:** BIO\_SC 2200

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**V\_PBio 3554: Introduction to Virology**

Comprehensive introduction to the basic principles of virology. The course is designed for undergraduates majoring in biology, biochemistry, or health professions. The course covers general virology including the molecular structure of viruses, the multiplication strategies of the major virus families, and viral latency, persistence, and oncology. The major families of the bacterial, plant, and animal viruses are discussed. Human



viruses and infectious diseases are emphasized. Viral immunology, viral defenses, viral vaccines and antiviral compounds will also be addressed. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** BIO\_SC 2300

**Recommended:** BIO\_SC 3750

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**V\_PBIO 4787: Historical, Societal and Ethical Topics in Medicine and Biomedical Research**

(cross-leveled with V\_PBIO 7787). Advances in medicine, genetics, reproduction and technologies underpinning biomedical research can have profound implications not only scientifically but in terms of societal and ethical impact. Using several historical events such as the establishment of the first immortal cell line, the Tuskegee syphilis study, the eugenics movement in the United States and the cloning of Dolly the sheep as starting points, we will explore the historical, societal and ethical context and issues surrounding these events and relate them to current ethical and moral questions that have been generated by recent scientific and medical progress. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** B or better in BIO\_SC 2300 and BIO\_SC 2200

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**V\_PBIO 5511: Veterinary Immunology**

(same as V\_PBIO 8451). Basic immunology techniques. Topics include innate and adaptive immunity, development of the immune system, induction and expression of the immune response, structure and function of antibodies, antigen-antibody reactions, the major histocompatibility complex, aspects of immunology in disease.

**Credit Hour:** 1.5

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**V\_PBIO 5512: Veterinary Immunology**

(same as V\_PBIO 8451). Continuation of V\_PBIO 5511.

**Credit Hour:** 1.5

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**V\_PBIO 5552: Veterinary Bacteriology with Laboratory**

Classification and properties of pathogenic bacteria and fungi of animals; relationship to public health; considers pathogenesis, immunology of infection. Instructional period 5.

**Credit Hours:** 3

**Prerequisites:** enrollment in the College of Veterinary Medicine

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**V\_PBIO 5553: Veterinary Bacteriology II**

Continuation of V\_PBIO 5552. Instructional period 6.

**Credit Hours:** 2.5

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**V\_PBIO 5554: Veterinary Virology**

(same as V\_PBIO 8454). Classification and properties of viruses. Considers the etiologic, pathologic and immunologic aspects of viral diseases of animals. Instructional periods 6 and 7.

**Credit Hours:** 2.5

**Prerequisites:** enrollment in the College of Veterinary Medicine

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**V\_PBIO 5555: Epidemiology and Biostatistics with Laboratory**

(same as V\_PBIO 8455). This course introduces students to methods of determining the influence of disease on populations and how this information is applied to individual animals. Biostatistics and evidence based medicine are also discussed in this course. The knowledge gained in this course is applied to reading professional literature during the course. Instructional period 4.

**Credit Hours:** 2

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**V\_PBIO 5557: Veterinary Parasitology with Laboratory**

(same as V\_PBIO 8457). Parasites and parasitic diseases of ruminants, horses, swine, dogs, cats, poultry and other animals. Includes classification, morphology, and bionomics of protozoa, helminths, and arthropods. Instructional period 6.

**Credit Hours:** 3

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**V\_PBIO 5558: Veterinary Public Health**

(same as V\_PBIO 8458). In this course students are introduced to the wide range of veterinary involvement in maintaining and assuring human health, nationally and globally. Topics discussed include: agencies such as USDA, FDA, CDC, food safety and meat inspection, veterinary responsibility in identifying diseases, legal issues of drug use, and zoonotic diseases. Instructional period 7.

**Credit Hours:** 2

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**V\_PBIO 5575: Veterinary Pathology with Laboratory**

General Pathology. Tissue reactions to various disease agents in domestic animals. Instructional period 5.

**Credit Hours:** 3

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**V\_PBIO 5576: Veterinary Systemic and Special Pathology with Laboratories**

Special and systemic pathology. Tissue reactions to disease in special systems in domestic animals. Instructional period 6.

**Credit Hours:** 3

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**V\_PBIO 5577: Veterinary Systemic and Special Pathology II with**

Follows the general pathology and continues the systemic pathology taught in V\_PBIO 5576. The course, consisting of daily lectures and weekly laboratories, covers disease, mainly in domestic animals, of the following systems or organs: cardiovascular, respiratory, lymphoid, cutaneous, mammary, ophthalmic, and otic. Instructional period 7.

**Credit Hours:** 3

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**V\_PBIO 5578: Veterinary Clinical Pathology with Laboratory**

Physiologic basis, interpretation and clinical application of laboratory assays in hematology, chemistry, cytology, and urinalysis, utilization of laboratory methods to define pathological states and to diagnose disorders of domestic animals. Instructional period 8.

**Credit Hours:** 3

**Prerequisites:** enrollment in College of Veterinary Medicine

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**V\_PBIO 5579: Veterinary Genomics**

Study of genomes, an organism's entire set of the genetic information. Used for detection of pathogen genomes, and markers for mutation causing inherited disease. Instructional period 5.

**Credit Hour:** 1

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**V\_PBIO 5580: Introduction to Veterinary Informatics with Laboratory**

Introduces concepts of veterinary informatics and development of core informatics competencies necessary for successful veterinary practice. The knowledge and skills in this course address topics such as data retrieval, information evaluation, medical records, practice management, communication skills and telemedicine. Instructional period 5.

**Credit Hour:** 1

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**V\_PBIO 5601: Animals in Emergencies & Basic Emergency Response Training for Vet Students**

This course will enable veterinary and graduate students to understand their role in society during disasters and credential as responders. Graded on A-F basis only.

**Credit Hour:** 1

**Prerequisites:** Students must be enrolled in the College of Veterinary Medicine and pursuing a DVM degree or be a student pursuing an MPH degree. Instructor consent required for non-veterinary graduate students seeking MPH degrees

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**V\_PBIO 5991: Introduction to Avian Medicine**

Introduction to Avian Medicine

**Credit Hour:** 1

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**V\_PBIO 5995: Foundations in Veterinary Research and Discovery**

This course will introduce veterinary students to concepts of research including hypothesis development, experimental design, data interpretation, grantsmanship, responsible conduct of research, biomedical research careers and presentation and publication methods.

**Credit Hours:** 2

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**V\_PBIO 6010: Laboratory Animal Medicine**

Principles of Veterinary Medicine applied to laboratory animals as pets and in research. Husbandry, handling and clinical techniques, diseases, and use as disease models are discussed. Instructional period 8.

**Credit Hour:** 1.5

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**V\_PBIO 6647: Diagnostic Pathology and Special Species Medicine**

Application of laboratory techniques used to diagnose disease by macroscopic, microscopic, biochemical, microbiologic, and toxicologic findings. Case method of teaching. Domestic avian species and laboratory animals included. Six times yearly.

**Credit Hours:** 8

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**V\_PBIO 6676: Laboratory Animal Medicine and Management Elective**

Elective offered 3rd- and 4th-year students, subject to approval of course coordinator and supervising faculty. Concentrated study/experience

in laboratory animal disease(s)/colony management. Available to veterinarians as a continuing education program.

**Credit Hour:** 2-6

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**V\_PBIO 6678: Epidemiology and Community Health**

Elective covering advanced aspects of epidemiology and community health. Emphasizes problem solving and is designed to meet needs of the individual student. Instructional period arranged.

**Credit Hour:** 2-6

**Prerequisites:** V\_PBIO 5558 or instructor's consent

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**V\_PBIO 6679: Diagnostic Pathology and Special Species Medicine**

Third- and fourth-year students. Elective. Approval of coordinator and supervisory staff. Continuation of V\_PBIO 6647 with more depth. Available to D.V.M.'s as part of continuing education program.

**Credit Hour:** 2-6

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**V\_PBIO 6684: Research Techniques in Veterinary Pathobiology**

Research Techniques in Veterinary Pathobiology

**Credit Hour:** 1-6

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**V\_PBIO 7100: Veterinary Clinical Chemistry**

(cross-leveled with BIOMED 4100). This course is designed to hone the skills of the practicing veterinary technician, veterinary student, or veterinarian and assumes some basic knowledge of normal serum chemistry and urinalysis results. The review of normal will be minimal and emphasis will be placed on clinical serum chemistry and urinalysis findings associated with diseases. The graduate level course will include discussion of ancillary tests and more extensive case interpretations.

**Credit Hours:** 3

**Prerequisites:** A BS or BSA in veterinary technology or DVM

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**V\_PBIO 7110: Veterinary Cytology**

(cross-leveled with BIOMED 4110). This course of Veterinary Cytology is designed to hone the skills of the practicing Veterinary Technician, Veterinary Student, or Veterinarian and assumes some basic knowledge of microscope usage and normal hematology. The review of normal cells will be minimal and emphasis will be placed on findings associated with inflammatory and neoplastic diseases. The graduate level course will include discussion of ancillary tests, special stains and treatment alternatives. The focus will be on canine and feline diseases but some common equine and bovine disease.

**Credit Hours:** 2

**Prerequisites:** DVM or equivalent degree or instructor's consent

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**V\_PBIO 7120: Principles of Toxicology**

(cross-leveled with BIOMED 4120). This course will provide an introduction to the general principles of toxicology, including the history and scope of the field; risk assessment and management; mechanisms of toxicology; the disposition of toxicants; non-target organ-directed toxicity; toxic responses of specific target organs; and various toxicological application, such as environmental toxicology.

**Credit Hours:** 3

**Prerequisites:** BS in Biology, Biochemistry, or equivalent, or permission of instructor

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**V\_PBio 7210: Animal Issues in Disasters**

(cross-leveled BIOMED 4210). Animal Issues in Disasters describes the various aspects of responding to disasters that involve animals. Government involvement, legal requirements, effects on the human-animal bond, preparation for disasters of different kinds, and impacts on animal-related businesses will be discussed.

**Credit Hour:** 1

**Prerequisites:** a bachelor's degree in a biological science or veterinary technology, or DVM degree, or instructor's consent

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**V\_PBio 7787: Historical, Societal and Ethical Topics in Medicine and Biomedical Research**

(cross-leveled with V\_PBio 4787). Advances in medicine, genetics, reproduction and technologies underpinning biomedical research can have profound implications not only scientifically but in terms of societal and ethical impact. Using several historical events such as the establishment of the first immortal cell line, the Tuskegee syphilis study, the eugenics movement in the United States and the cloning of Dolly the sheep as starting points, we will explore the historical, societal and ethical context and issues surrounding these events and relate them to current ethical and moral questions that have been generated by recent scientific and medical progress. Graded on A-F basis only.

**Credit Hours:** 2

**Prerequisites:** Consent of Instructor

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**V\_PBio 8090: Thesis Research in Veterinary Pathobiology**

Open to graduate students with requisite preparation. Research on specific animal diseases, prevention and treatment. Graded on a S/U basis only.

**Credit Hour:** 1-99

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**V\_PBio 8401: Topics in Veterinary Pathobiology**

Courses with lectures in various topics in veterinary pathobiology will be given on a trial basis, depending on faculty expertise and student demand. Credit hours are usually 1 or 3. Specialized topics will be covered.

**Credit Hour:** 1-99

**Prerequisites:** instructor's consent

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**V\_PBio 8410: Seminar in Veterinary Pathobiology**

Discussion of current research methods in veterinary pathobiology.

**Credit Hour:** 1

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**V\_PBio 8411: Seminar in Histopathology**

Discussion of current research and/or case studies in pathology of diseases of domestic animals, laboratory animals and avian species. Team taught.

**Credit Hour:** 1

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**V\_PBio 8421: Advanced Epidemiology**

(same as F\_C\_MD 8421).

**Credit Hours:** 3

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**V\_PBio 8430: Comparative Pathology**

(same as PTH\_AS 8000). Biochemical and morphologic lesions related to the mechanism of disease expression in plants and animals.

**Credit Hours:** 3

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**V\_PBio 8431: Research Methods and Data Analysis**

Specific assignments on diagnostic methods including surgical pathology, necropsies, toxicology.

**Credit Hour:** 2-4

**Prerequisites:** departmental consent

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**V\_PBio 8432: Advanced Histopathology**

Advanced microscopic study of pathological tissues.

**Credit Hours:** 5

**Prerequisites:** departmental consent

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**V\_PBio 8433: Veterinary Oncology**

History and molecular biology of neoplasia; laboratory for discussion of practical aspects of diagnosis.

**Credit Hours:** 2

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**V\_PBio 8434: Advanced Clinical Pathology**

Lecture/tutorial teaching; pathogenesis of clinical laboratory abnormalities in the common domesticated species. Emphasis is placed on mechanisms of disease and pathophysiology of the changes seen in each organ system.

**Credit Hours:** 3

**Prerequisites:** departmental consent

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**V\_PBio 8435: Advanced Microscopy in Veterinary Clinical Pathology**

Recognition and pathogenesis of abnormalities found via microscopic analysis of blood smears or cytology.

**Credit Hour:** 1

**Prerequisites:** V\_PBio 5578 and departmental consent; DVM or current enrollment in veterinary curriculum

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**V\_PBio 8436: Pathogenic Mechanisms in Veterinary Pathobiology**

This course will include disease mechanisms, described at the cellular and molecular level, which result in tissue morphologic (gross and microscopic) and clinical abnormalities. Examples of discussion topics include soluble mediators of inflammatory processes, host-agent interactions, and host defense mechanisms.

**Credit Hours:** 3

**Prerequisites:** instructor's consent

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**V\_PBio 8437: Pathology of Laboratory Animals**

Gross and microscopic study of spontaneous and naturally occurring diseases in laboratory animals.

**Credit Hours:** 4

**Prerequisites:** departmental consent

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**V\_PBio 8438: Primatology**

Disease and pathology of primates.

**Credit Hours:** 3

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**V\_PBIO 8441: Topics in Veterinary Pathobiology**

Subjects appropriate to veterinary pathobiology and/or epidemiology, taught on a one-time basis or infrequently. May include highly specialized topics. Specific course must be approved by departmental faculty.

**Credit Hour:** 1-3

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**V\_PBIO 8442: Advanced Veterinary Pathogenic Bacteriology**

Study of pathogenic bacteria causing animal disease. Pathogenic mechanisms and host-parasite relationships are emphasized. Laboratory procedures for isolation and identification of pathogens are included.

**Credit Hours:** 3

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**V\_PBIO 8443: Viral Infection and Immunity**

Study of virus infection at the level of the intact animal. Includes immunology of domestic animal species.

**Credit Hours:** 3

**Prerequisites:** graduate standing and instructor's consent

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**V\_PBIO 8445: Vectors and Vector-borne Diseases**

This course will focus on arthropod vectors (insects and ticks) and the medically important pathogens / diseases that they transmit, including arboviruses, bacteria, protozoa and nematodes. An emphasis will be on the interactions between the vectors and disease-causing pathogens. Topics include: introductions to systematics, anatomy, physiology, life cycles, and ecology of vectors and classification and biology of the pathogens responsible for such diseases as dengue, yellow fever, malaria, leishmaniasis, lymphatic filariasis, etc. The focus will be not only on specific pathogen-vector interactions but also on big picture topics / discussions of vector competence, insecticide resistance, vector control (including genetically modified insects) and other current issues in vector biology research. Students will learn how these important vector-borne diseases are transmitted, how they are spread and introduced into new regions, and what control strategies exist or are currently under development. Students will realize what impact vector-borne diseases have on global human and animal health as well as develop and hone critical thinking skills.

**Credit Hours:** 3

**Prerequisites:** Graduate standing in the Life Sciences

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**V\_PBIO 8446: Advanced Immunology and Immunopathology**

Study of the immune system at the level of the intact animal. Includes a discussion of immunity-infectious diseases.

**Credit Hours:** 3

**Prerequisites:** MICROB 4304 and instructor's consent

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**V\_PBIO 8447: Oncogenic Animal Viruses**

Biology of RNA- and DNA-containing animal tumor viruses and their in vitro and in vivo interactions with host cells.

**Credit Hours:** 3

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**V\_PBIO 8448: Molecular Methods in Nucleic Acids**

The course will focus on the most recent developments in technology related to eukaryotic and prokaryotic molecular biology and as analysis a manipulation of nucleic acids and their application to define structure, function and biosynthesis of macromolecules.

**Credit Hours:** 3

**Prerequisites:** instructor's consent

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**V\_PBIO 8450: Non-Thesis Research in Veterinary Pathobiology**

Research not expected to terminate in dissertation.

**Credit Hour:** 1-99

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**V\_PBIO 8451: Introduction to Immunology**

(same as V\_PBIO 5511 and V\_PBIO 5512). Fundamentals of immunology as applied to domestic animals.

**Credit Hours:** 3

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**V\_PBIO 8452: Cell and Molecular Electron Microscopy**

Lecture class that describes the use of electron microscopy (transmission and scanning) in biomedical research. Students receive hands-on experience by completing a laboratory project.

**Credit Hours:** 4

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**V\_PBIO 8454: Domestic Animal Virology**

(cross-leveled with V\_PBIO 5554). Classification and properties of viruses. Considers the etiologic, pathologic and immunologic aspects of viral diseases of animals. Instructional periods 6.

**Credit Hours:** 2.5

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**V\_PBIO 8455: Epidemiology and Biostatistics**

Graduate level introduction to veterinary epidemiology and bio-statistics.

**Credit Hour:** 2-3

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**V\_PBIO 8457: Animal Parasitology**

(same as V\_PBIO 5557).

**Credit Hour:** 3-5

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**V\_PBIO 8458: Veterinary Public Health**

(same as V\_PBIO 5558).

**Credit Hours:** 2

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**V\_PBIO 8468: Laboratory Animal Biology**

Taxonomy, anatomy, physiology, nutrition and behavior of laboratory animals including non-human primates and less common species are covered. Genetics, gnostobiology, housing and production are also presented.

**Credit Hours:** 4

**Prerequisites:** instructor's consent

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**V\_PBIO 8552: Veterinary Pathogenic Bacteriology and Mycology I**

This course deals with the bacterial pathogens of animals emphasizing the pathogenesis and pathology of the diseases, diagnostic problems,

appropriate treatments and prevention measures. Course graded A-F only.

**Credit Hours:** 3

**Prerequisites:** instructor's consent

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**V\_PBIO 8553: Veterinary Pathogenic Bacteriology and Mycology II**

This course deals with the bacterial pathogens of animals emphasizing the pathogenesis and pathology of the diseases, diagnostic procedures, appropriate treatments and prevention measures. Graded on A-F basis only.

**Credit Hours:** 2.5

**Prerequisites:** V\_PBIO 5552 or V\_PBIO 8552 and instructor's consent

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**V\_PBIO 8601: Animals in Emergencies & Basic Emergency Response Training for Vet Students**

This course will enable veterinary and graduate students to understand their role in society during disasters and credential as responders. Graded on A-F basis only.

**Credit Hour:** 1

**Prerequisites:** Students must be enrolled in the College of Veterinary Medicine and pursuing a DVM degree or be a student pursuing an MPH degree. Instructor consent required for non-veterinary graduate students seeking MPH degrees

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**V\_PBIO 8641: Introduction to Research Ethics**

This course provides students with a brief overview of many of the ethical issues that confront today's scientist. It is important that scientist think about and develop their abilities to make well-reasoned responses to ethical problems.

**Credit Hour:** 1

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**V\_PBIO 9090: Area Veterinary Pathobiology Dissertation Research**

Dissertation Research for PhD students. May be repeated for credit. Graded on S/U basis only.

**Credit Hour:** 1-99

**Prerequisites:** departmental consent

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