

# Veterinary Medicine - Biomedical Sciences - VBMS

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## Courses

**VBMS 3050 STEWARDSHIP IN THE FACE OF CLIMATE CHANGE: LESSONS FROM THE GREAT BARRIER REEF AND BEYOND (2)** AAB/FLD. 30. This 2.5 week course is intended to introduce students to the impact of global warming on the flora and fauna of a unique environment through familiarity with the challenges of maintaining health in domestic, wild and commercial land and marine animals of Australia's diverse ecological land and marine park environments. Activities will include implementation of research methods that assess health, service and outreach efforts that will maintain or improve health, and educational trips that will increase understanding of the fragility and strength of integrated yet every changing flora and fauna. A consistent focus will be the past, present and future impact of humans, and efforts intended to minimize or resolve that impact.

**VBMS 3900 REPRODUCTIVE SCIENCE AND HEALTH (3)** LEC. 3. P/C, One basic organismal biology, physiology or similar life science course. Sophomore level or higher. Foundational physiologic concepts in reproductive science linked to important animal and human reproductive health issues. May count either ANSC 3600 or VBMS 3600.

**VBMS 4980 UNDERGRADUATE RESEARCH (1-3)** RES. Directed, supervised undergraduate research in veterinary biomedical sciences (VBMS). Course may be repeated for a maximum of 9 credit hours.

**VBMS 4987 HONORS RESEARCH (1-3)** RES. Pr. Honors College. Supervised undergraduate research in veterinary biomedical science. May count either VBMS 4987 or VBMS 4997. Course may be repeated for a maximum of 9 credit hours.

**VBMS 4997 HONORS THESIS (1-3)** RES. Pr. Honors College. Undergraduate honors thesis development in veterinary biomedical science. May Count either VBMS 4987 or VBMS 4997. Course may be repeated for a maximum of 9 credit hours.

**VBMS 5100 CANCER BIOLOGY & GENETICS (3)** LEC. 3. Coreq. BIOL 5220. Biological and genetic mechanisms underlying the development of cancer with a focus on eukaryotic cell mechanisms regulating cell division and communication as well as genetic and phenotype instability. State-of-the-art genomic approaches to personalized medicine and immunotherapy will be discussed. Current literature will be used extensively. Undergraduate courses in genetics and molecular genetics are required or corequisite.

**VBMS 6100 CANCER BIOLOGY & GENETICS (3)** LEC. 3. Pr. BIOL 3003 and BIOL 5220. Biological and genetic mechanisms underlying the development of cancer with a focus on eukaryotic cell mechanisms regulating cell division and communication as well as genetic and phenotype instability. State-of-the-art genomic approaches to personalized medicine and immunotherapy will be discussed. Current literature will be used extensively. Undergraduate courses in genetics and molecular genetics are required. Additionally, completion of VBMS 7520 Eukaryotic Molecular Biology is encouraged.

**VBMS 6111 VETERINARY ANATOMY I (4)** LAB. 12. Departmental approval. Gross anatomy of the dog and cat including skeletal and muscular systems, neck, thorax, limbs, abdomen, pelvis, head, and nervous system. Credit will not be given for VMED 5111 and VBMS 6111.

**VBMS 6121 VETERINARY ANATOMY II (3)** LAB. 9. Pr. VBMS 6111 or VMED 9111. In-depth study of the gross anatomy of the ox, horse, and minor species (chicken) with inclusion of clinical relevance. In-depth presentation of a specific anatomy topics related to course material. May count either VMED 5121 or VBMS 6120.

**VBMS 7000 NEUROANATOMY (5)** LEC. 3. LAB. 4. Departmental approval. Functional morphology of nervous system from input/output through the long systems; limbic relations to endocrine and autonomic nervous system. Comparative among mammals.

**VBMS 7010 PATHWAYS TO SUCCESSFUL RESEARCH (1)** LEC. 1. An introduction to topics pertinent to performance of a successful graduate program and in the conduction of responsible research.

**VBMS 7020 MICROSCOPIC ANATOMY I (3)** LEC. 1. LAB. 4. Departmental approval. A detailed study of microscopic anatomy of basic tissues from multiple animal species. Light microscopy and electron micrograph preparations are used to describe and interpret morphology. Coursework will emphasize the dependence of morphological form on the functional demands of cells and tissue. The lectures characterize the structure and function of the four basic tissues (epithelium, connective tissue, muscle, and nerve) and organ systems. In the lab, students will examine the same structures and learn to identify tissues and organs.

**VBMS 7030 MICROSCOPIC ANATOMY II (3)** LEC. 1. LAB. 4. Departmental approval. Light microscopy and electron microscopy detailed study of the cardiovascular, hemopoietic, digestive, urinary and respiratory systems of domestic animals.

**VBMS 7040 ADVANCED PHYSIOLOGY OF REPRODUCTION (3)** LEC. 3. Pr. ANSC 3600 and BIOL 6240 or VBMS 7150.

Departmental approval. Developmental, physiological, endocrinological, cellular and molecular mechanisms regulating reproduction, with emphasis on mammalian systems.

**VBMS 7070 ENDOCRINOLOGY (4)** LEC. 4. Pr. BCHE 7200 and BCHE 7260 and BIOL 6600. Molecular and cellular endocrinology and physiological regulation of hormone synthesis, secretion, and action in mammalian species. Emphasis will be placed on the methodology and key concepts used for endocrine research.

**VBMS 7080 MOLECULAR ENDOCRINOLOGY (2)** LEC. 2. Pr. VBMS 7070. Departmental approval. Examination of the literature of hormonal synthesis, secretion and mechanism of action with emphasis on receptors, second messenger systems, and gene regulation.

**VBMS 7090 CLINICAL PHARMACOLOGY (3)** LEC. 3. Departmental approval. The principles of pharmacology in animals are addressed with a clinical perspective. The determinants of drug movement, pharmacokinetics (modeling) and pharmacodynamics, with a focus on drug-receptor interactions and their detection will be followed by a discussion of adverse drug events and selected drug categories, including cannabinoids, nonsteroidal anti-inflammatory drugs and antimicrobials. Student contributions to discussions through the review of contemporary, relevant literature is emphasized.

**VBMS 7100 ADVANCED CARDIOLOGY I (2)** LEC. 2. Graduate students in Biomedical Sciences, College of Veterinary Medicine and must have a DVM or equivalent. Topics about advanced diagnostics and therapeutics in cardiovascular disease will be discussed.

**VBMS 7130 VETERINARY MEDICINE DIAGNOSTIC ULTRASONOGRAPHY (3)** LEC. 3. Pr. (VMED 9120 or VMED 9121 or VMED 5120) and VMED 5121. The principles and practice of veterinary medical diagnostic ultrasonography as they are utilized in evaluating normal and abnormal anatomy. All animal species are used in this course. DVM degree required.

**VBMS 7140 PHYSIOLOGY I (5)** LEC. 5. Departmental approval. Cellular, Cardiovascular, Renal and Respiratory Physiology.

**VBMS 7150 PHYSIOLOGY II (4)** LEC. 4. Pr. VBMS 7140. Departmental approval. Gastrointestinal Physiology, Metabolism, Endocrinology, and Reproductive Physiology.

**VBMS 7160 NEUROSCIENCE (4)** LEC. 3. LAB. 2. Departmental approval. An overview of neuroscience on the subcellular, cellular and system levels.

**VBMS 7170 SMALL ANIMAL SOFT TISSUE SURGERY ADVANCED TOPICS (1)** LEC. Advanced topics in small animal soft tissue surgery and current literature are reviewed and discussed.

**VBMS 7180 RECEPTOROLOGY (4)** LEC. 4. Pr. VBMS 7070. Addresses structural and functional aspects of the four classes of receptors, including the mechanism of ligand binding, activation, inactivation, and their relevance to human and animal diseases. Methods used in addressing these questions will also be introduced.

**VBMS 7200 VETERINARY ELECTRODIAGNOSTIC TESTING (1)** LEC. 1. SU. Departmental approval. This course will cover principles of electrophysiology, electrodiagnostic testing, and pertinent electrodiagnostic literature. Modalities covered include: electromyography, nerve conduction velocity, late waves, repetitive nerve stimulation, evoked potentials, electroretinogram, electroencephalogram, and urethral pressure profile.

**VBMS 7210 RADIATION BIOLOGY (4)** LEC. 4. Exploration of biological, physical, and chemical basis of radiotherapy with emphasis on the biological effects of ionizing radiation at the cellular and molecular level. Effects of irradiation on the tumor, normal tissues, and the patient will be addressed. DVM degree; Residency in Radiation Oncology or Radiology or Small Animal Oncology and registered in the Graduate School.

**VBMS 7220 STRUCTURE AND FUNCTION OF COMPANION ANIMAL SKIN (3)** LEC. 3. The course will cover the comparative aspects of the structure and function of the skin of companion animals in healthy and diseases states.

**VBMS 7230 CUTANEOUS DISORDERS OF LARGE AND EXOTIC ANIMALS (3)** LEC. 3, IND/LEC. 9-12. In depth review of the common and uncommon dermatologic conditions affecting large animal and exotic animal species, including emphasis on those conditions considered zoonotic.

**VBMS 7250 NORMAL RADIOLOGICAL ANATOMY (3)** LEC. 3. A detailed study of the normal structure, size and position of the various organs of the cat, dog, horse, cow, and other veterinary species as they appear on plain and contrast radiographs. DVM Degree, acceptance in an established residency program.

**VBMS 7260 ADVANCED RADIOLOGY (3-5) LEC.** Detailed study of concepts and techniques of all imaging procedures. For graduate students and residents in DCS program or DVM or equivalent. Course may be repeated for a maximum of 5 credit hours.

**VBMS 7270 RADIOLOGICAL INTERPRETATIONS (1-3) LEC.** The interpretation of various diagnostic imaging modalities used in veterinary medicine and their applications in the diagnostic work-up of clinical cases presenting to the College of Veterinary Medicine. DVM Degree. Course may be repeated for a maximum of 3 credit hours.

**VBMS 7280 PHYSICS OF DIAGNOSTIC IMAGING (3) LEC.** 3. Principles of physics related to the imaging modalities of diagnostic radiology, ultrasonography, magnetic resonance imaging, scintigraphy, computed tomography, and radiation therapy. Students will study physics at the atomic level but must also develop an understanding of construction, function, and hazards of modern imaging equipment. DVM Degree.

**VBMS 7300 AVIAN DIAGNOSTIC PATHOLOGY (1-3) LAB.** 1-3. SU. Residents enrolled in the Veterinary Biomedical Sciences Avian Pathology specialty program will interpret lesions for the diagnosis of avian diseases using necropsy procedures. Focus will be placed on an integrated comparative understanding of the pathophysiology of disease in commercial poultry. Course may be repeated for a maximum of 3 credit hours.

**VBMS 7310 ADVANCED VETERINARY ANESTHESIOLOGY (1) LEC.** 1. This course will be delivered in weekly one hour lecture format. The presenter for each lecture will rotate between course students and veterinary faculty. For each hour, the presenter will be required to deliver a lecture on a topic related to the overarching subject for that semester course. The lecture will be delivered at an in-depth level utilizing currently scientific literature, text books, and other reference materials resulting in delivery of state of the art information. Graduate standing in Biomedical Sciences, College of Veterinary Medicine. Must have a DVM degree or equivalent. Course may be repeated for a maximum of 9 credit hours.

**VBMS 7320 EVALUATION OF CURRENT AND EMERGING LITERATURE IN VETERINARY ANESTHESIA (1) LEC.** 1. This course will be delivered in weekly one hour lecture format. The presenter for each lecture will rotate between course students and veterinary faculty. For each hour, the presenter will be required to deliver an in-depth evaluation and summary of two medial journal manuscripts related to veterinary anesthesiology. The presenter will be required to discuss the manuscript format, study design, data analysis, results, and conclusions including discussion on the pros and cons of the study. Manuscript selection for each class will be at the discretion of the presenter and copies of the manuscripts will be made available electronically to all faculty and students of the course one week prior to the class. Graduate standing in Biomedical Sciences, College of Veterinary Medicine. Must have a DVM degree or equivalent. Course may be repeated for a maximum of 9 credit hours.

**VBMS 7330 EVIDENCE BASED EQUINE SURGERY (3) LEC.** 3. DVM and enrollment in the College of Veterinary Medicine's Equine Medicine or Surgery Residency. Provides an introduction to evidence based medicine and meta-analysis with application to topics in equine surgery.

**VBMS 7340 LARGE ANIMAL SURGERY AND MEDICINE SEMINAR (1) SEM.** 1. Departmental approval. Seminar required of all graduate students in large animal surgery and medicine. Meets at scheduled intervals each year.

**VBMS 7350 ADVANCED LARGE ANIMAL UROGENITAL SURGERY (5) LEC.** 3. LAB. 6. Departmental approval. Research in surgery. Advanced techniques for urogenital surgical procedures in large domestic animals.

**VBMS 7360 ADVANCED LARGE ANIMAL SOFT TISSUE SURGERY (5) LEC.** 4. LAB. 2. Departmental approval. Research in surgery. Advanced techniques for soft tissue surgical procedures in large domestic animals.

**VBMS 7370 ADVANCED LARGE ANIMAL ORTHOPEDIC SURGERY (5) LEC.** 3. LAB. 2. Research and advanced techniques for orthopedic surgical procedures in large domestic animals.

**VBMS 7380 ADVANCED FOOD ANIMAL MEDICINE (3) LEC.** 3. Departmental approval. In-depth study of food animal medical diseases of all body systems with emphasis on pathophysiologic mechanisms. DVM degree.

**VBMS 7400 GYNECOLOGY OF LARGE DOMESTIC ANIMALS (3) LEC.** 3. Departmental approval. Diseases and problems of the reproductive system in the female domestic animals. Normal and abnormal conditions of various species are covered. DVM degree.

**VBMS 7410 ANDROLOGY OF LARGE DOMESTIC ANIMALS (3) LEC.** 3. Departmental approval. Diseases and problems of the reproductive system in male domestic animals. DVM degree.

**VBMS 7420 SCIENTIFIC COMMUNICATION (3) LEC.** SU. Building skills towards effective and impactful communication of scientific evidence via writing, for thesis/dissertation and scientific journals, and via oral presentation.

**VBMS 7440 ADVANCED EQUINE ARTHROSCOPIC SURGERY (5)** LEC. 3. LAB. 6. Departmental approval. Research in surgery. Advanced techniques for arthroscopic surgical procedures in the horse. DVM degree.

**VBMS 7450 SELECTED TOPICS IN GRADUATE EDUCATION RESEARCH (1)** LEC. 1. SU. Departmental approval. Overview of research funding strategies, grant preparation, transfer of research technology and patents, research ethics, etc.

**VBMS 7460 MICROBIAL PATHOGENESIS (3)** LEC. 3. Departmental approval. Mechanisms of infection and disease production by bacteria, viruses, and parasites in animals.

**VBMS 7470 ADVANCED EPIDEMIOLOGY (3)** LEC. 3. Departmental approval. Advanced epidemiological techniques and their application to disease research, clinical retrospective and prospective studies, and disease outbreak investigation. Introductory statistics course

**VBMS 7480 METHODS IN IMMUNOLOGY (5)** LEC. 1. LAB. 8. Pr. VBMS 7500. Departmental approval. Theoretical concepts underlying immunological methods combined with practical hands-on immunological experimentation focused on application to research in the biological sciences.

**VBMS 7500 CELLULAR AND MOLECULAR IMMUNOLOGY (3)** LEC. Departmental approval. Current literature in immunobiology, emphasis on cellular/ biochemical/genetic basis of immune response.

**VBMS 7520 EUKARYOTIC MOLECULAR BIOLOGY (3)** LEC. 3. Genetic mechanisms regulating genomes and gene expression by which eukaryotic cells replicate, communicate and differentiate. Current literature will be used extensively.

**VBMS 7530 EXPERIMENTAL TECHNIQUES IN MOLECULAR AND CELL BIOLOGY (3)** LEC. 2. LAB. 6. Nucleic acid detection/ amplification/sequencing, primer design, CRISPR, transfection, protein/ antibody chemistry, flow cytometry, immunofluorescence microscopy, fluorochromes, radioisotopes, centrifugation, and cell culture will be discussed.

**VBMS 7540 CURRENT TOPICS IN MOLECULAR VIROLOGY (3)** LEC. 3. Pr. (VBMS 7520 or BIOL 5230 or BIOL 6230). Departmental approval. Viral gene expression and evasion of host defense mechanisms.

**VBMS 7550 ADVANCED GENERAL PATHOLOGY (1-3)** LEC. SU. Departmental approval. Structured examination of current textbooks and literature related to the pathologic basis of veterinary diseases. Open to residents in anatomic and clinical pathology and other post-DVM students with special approval. Course may be repeated for a maximum of 3 credit hours.

**VBMS 7570 DIAGNOSTIC PATHOLOGY (1-3)** LEC. SU. Diagnosis of animal diseases using necropsy procedures and histopathology. Required every semester of all graduate students and residents in pathology. DVM degree. Course may be repeated for a maximum of 3 credit hours.

**VBMS 7580 SURGICAL PATHOLOGY (1-3)** LEC. SU. Histopathologic diagnosis of surgical biopsy or necropsy specimens. Available to residents in anatomic and clinical pathology. Course may be repeated for a maximum of 3 credit hours.

**VBMS 7600 ADVANCED CLINICAL PATHOLOGY I (3)** LEC. 3. Pr. VMED 5230 or VMED 9230. Departmental approval. The lymphohematopoietic system. Normal components and evaluation of disease states.

**VBMS 7610 ADVANCED CLINICAL PATHOLOGY II (3)** LEC. 3. Departmental approval. Laboratory evaluation of organ function; disease pattern recognition.

**VBMS 7620 DIAGNOSTIC ONCOLOGY (3)** LEC. 3. Pr. VMED 9220. Departmental approval. Principles of gross and microscopic interpretation of animal neoplasms using basic and specialized techniques.

**VBMS 7630 BASIC AND CLINICAL ONCOLOGY (3)** LEC. 3. Comparative aspects of the etiology, pathophysiology, diagnosis and treatment of cancer.

**VBMS 7640 MECHANISMS OF DISEASE (3)** LEC. 3. Pr. VMED 9220. Departmental approval. Understanding of disease through in-depth discussion of pathophysiology of various disease processes, disorders and diagnostic modalities. Focus will be placed on an integrated comparative understanding of the pathophysiology of disease in major veterinary species as it pertains to current and historically significant disease, as well as emerging diseases. Emphasis is placed on the morphologic, molecular and genetic aspects of disease processes.

**VBMS 7650 VETERINARY DERMATOPATHOLOGY I (1-3)** LEC. SU. This course aims to share theoretical and practical foundations on dermatopathology with residents in the Anatomic Pathology and/or Veterinary Dermatology program(s). The lectures will consist of 1-hour long Powerpoint presentations or case discussions on relevant integumentary diseases, with summarized clinical features and a particular focus on the histopathology perspective of cases that usually warrant biopsy. At the end of the course, it is expected that residents learn the fundamental terminologies used in dermatopathology, in addition to pattern recognition of major cutaneous diseases that afflict domestic animals. Course may be repeated for a maximum of 3 credit hours.

**VBMS 7660 VETERINARY DERMATOPATHOLOGY II (1-3)** LEC. SU. This course aims to share theoretical and practical foundations on dermatopathology with residents in the Anatomic Pathology and/or Veterinary Dermatology program(s). The lectures will consist of 1-hour long PowerPoint presentations or case discussions on relevant integumentary diseases, with summarized clinical features and a particular focus on the histopathology perspective of cases that usually warrant biopsy. At the end of the course, it is expected that residents learn the fundamental terminologies used in dermatopathology, in addition to pattern recognition of major cutaneous diseases that afflict domestic animals. Course may be repeated for a maximum of 3 credit hours.

**VBMS 7680 PATHOLOGY SEMINAR (1)** LEC. 1. Pr. VMED 9220. Departmental approval. Weekly conference to discuss gross and histologic pathology in animal tissues. Open to residents in anatomic and clinical pathology. Course may be repeated for a maximum of 3 credit hours.

**VBMS 7690 READINGS IN IMMUNOLOGY AND INFECTIOUS DISEASE (1-3)** LEC. 1-3. To familiarize students with current scientific literature in immunology and infectious diseases and the methods employed. Course may be repeated for a maximum of 6 credit hours.

**VBMS 7710 ADVANCED EUKARYOTIC MOLECULAR BIOLOGY (3)** LEC. 3. Pr. VBMS 7520. Current literature in molecular mechanisms of information transfer and regulation in eukaryotes.

**VBMS 7720 DEVELOPMENTAL MOLECULAR BIOLOGY (3)** LEC. 3. Pr. VBMS 7520. Genetic mechanisms by which eukaryotes differentiate from single cells to complex multicellular organisms will be covered. Important examples of biomedical dysfunction will be used to illustrate developmental pathways. Current literature will be used extensively.

**VBMS 7750 GRADUATE COLLOQUIUM IN VETERINARY CLINICAL SCIENCE (1)** CLN. 1. SU. Departmental approval. Forum to present topics relevant to the students clinical and research interests. This a mandatory seminar for graduate students in the Department of Clinical Science. DVM degree Course may be repeated for a maximum of 5 credit hours.

**VBMS 7760 ADVANCED VETERINARY NEUROSURGERY (4)** LEC. 1. LAB. 3. Enrolled in the CVM's MS or PHD program. Veterinary neurosurgery. All aspects of veterinary neurosurgery will be covered. Content delivery is via didactic lecture, small group discussion, and skills laboratories.

**VBMS 7770 ADVANCED SMALL ANIMAL GENERAL SURGERY (3)** LEC. 2. LAB. 3. Application of critical thinking skills to perioperative plans and tasks. DVM or VMD degree, or equivalent.

**VBMS 7780 VETERINARY WOUND MANAGEMENT AND RECONSTRUCTIVE SURGERY (4)** LEC. 2. LAB. 2. Techniques in veterinary wound management and reconstructive surgery in large and small animals. DVM degree or equivalent.

**VBMS 7790 SMALL ANIMAL ORTHOPEDICS (5)** LEC. 5. Review of orthopedic diseases in small animals, interactive review of recent literature and advanced laboratory sessions intended for residents in small animal surgery. DVM degree or equivalent.

**VBMS 7800 ADVANCED SMALL ANIMAL NEUROLOGY (3)** LEC. 3. Advanced study of neurodiagnostics and non-surgical therapy of neurological disorders in small domestic animals.

**VBMS 7810 ADVANCED SMALL ANIMAL MEDICINE I (5)** DSL/LEC. Departmental approval. Special study of the causes, methods of diagnosis, treatment and control of non-surgical urogenital diseases of small animals. DVM degree.

**VBMS 7820 ADVANCED SMALL ANIMAL MEDICINE II (3-5)** LEC. 3. Departmental approval. Special study of the causes, methods of diagnosis, treatment and control of non-surgical gastrointestinal diseases of small animals. DVM degree. Course may be repeated for a maximum of 5 credit hours.

**VBMS 7830 ADVANCED VETERINARY ONCOLOGY (3)** LEC. 3. SU. Departmental approval. Special study of veterinary oncology and general tumor biology. DVM degree required. Course may be repeated for a maximum of 6 credit hours.

**VBMS 7840 ADVANCED CRITICAL CARE MEDICINE I: PATHOPHYSIOLOGY (2)** LEC. 2. Advanced topics in veterinary critical care are discussed. Topics include pathophysiology, pharmacology, and specific therapy of critical illness. Graduate standing in Biomedical Sciences, College of Veterinary Medicine. Course may be repeated for a maximum of 5 credit hours.

**VBMS 7850 ADVANCED VETERINARY MEDICAL SPECIALTY TRAINING (1-4)** LEC. 1. LAB. 2. SU. Advanced veterinary medical specialty training is provided to residents and board-eligible veterinary trainees with hands-on instruction in clinical activities commensurate with the board-certification expectation of various veterinary medical specialties. Up to 3 hours may be used toward BMS degree program, course may be repeated for a maximum of 6 credit hours.

**VBMS 7860 SPECIAL TOPICS IN COMPARATIVE OPHTHALMOLOGY (1)** LLB/ST1. SU. This weekly 1 hour course will consist of chapter reviews of veterinary ophthalmology and equine ophthalmology. House officers will develop and present power point slides outlining assigned chapters. Course assignments will also include reading and presenting journal articles from the required list for board preparation, as well as taking mock boards practice journal and image recognition questions.

**VBMS 7870 ADVANCED VETERINARY OPHTHALMOLOGY: OPHTHALMIC MEDICINE (3)** LEC. 3. Advanced ophthalmology with emphasis on diagnosis, pathophysiology and treatment of ocular diseases of domestic animals. DVM degree or equivalent.

**VBMS 7880 ADVANCED VETERINARY OPHTHALMOLOGY: OPHTHALMIC MEDICINE (3)** LEC. 1. LAB. 6. Pr. VBMS 7870. Advanced ophthalmology with emphasis on ophthalmic surgery.

**VBMS 7890 ADVANCED VETERINARY OPHTHALMOLOGY: OPHTHALMIC BASIC SCIENCES (3)** LEC. 3. Advanced ophthalmology with emphasis on diagnosis, pathophysiology and treatment of ocular diseases of domestic animals. DVM degree or equivalent.

**VBMS 7900 VETERINARY OPHTHALMIC PATHOLOGY (1)** LLB. This course aims to share theoretical and practical foundations on ocular pathology with residents in the Anatomic Pathology and/or Veterinary Ophthalmology program(s). The lectures will consist of 1-hour long PowerPoint presentations on significant ocular/orbital abnormalities, with summarized clinical features and a particular focus on the histopathology perspective of cases that usually warrant biopsy, enucleation, evisceration, or orbital exenteration. At the end of the course, it is expected that residents build acquaintance with the fundamental terminologies used in ocular pathology, in addition to the recognition of major pathologic processes of the ocular/orbital structures.

**VBMS 7930 ADVANCED SMALL ANIMAL ORTHOPEDICS: AXIAL SKELETON (2)** LEC. 2. Advanced topics in small animal orthopedics are discussed. Topics include anatomy, pathophysiology, pharmacology, and medical/surgical therapy of axial skeletal disease in small animals.

**VBMS 7940 CURRENT TOPICS IN IMMUNOBIOLOGY (1)** LEC. 1. The focus of this journal club is to discuss recently published advanced research topics in immunobiology research field pertaining to graduate student's research work. Course may be repeated for a maximum of 12 credit hours.

**VBMS 7960 VETERINARY NEURORADIOLOGY (1)** LEC. 1. SU. Departmental approval. This course will cover fundamental concepts and principles of imaging modalities commonly used in veterinary neurology, namely MRI, CT, & radiography. Course material includes imaging of common neurologic lesions including congenital, neoplasia, trauma, vascular, inflammatory, and infectious diseases.

**VBMS 7970 RESEARCH PROBLEMS IN BIOMEDICAL SCIENCES (1-5)** RES. Departmental approval. Research problems for graduate students, under supervision of faculty, in variety of specialized disciplines related to the biomedical sciences. Faculty approval. Course may be repeated for a maximum of 15 credit hours.

**VBMS 7980 NON-THESIS PROJECT (1-3)** LEC. SU. Departmental approval. Non-thesis project, to be determined by faculty advisor and student's graduate advisory committee. DVM degree

**VBMS 7990 RESEARCH AND THESIS IN BIOMEDICAL SCIENCES (1-10)** MST. Credit to be arranged. Course may be repeated with change in topics.

**VBMS 8000 ADVANCED SMALL ANIMAL EMERGENCY AND CRITICAL CARE LITERATURE REVIEW (1)** LEC. 1. SU. Review of current literature pertaining to Small Animal Emergency and Critical Care. Review includes group discussion of study design, procedural and physiologic concepts, statistical analysis, and relevance of outcomes.

**VBMS 8010 EMERGING PEDAGOGIES IN ANATOMIC PATHOLOGY (1-3)** LLB. SU. The overall objective of this course is to expose Graduate Teaching Assistants (GTA) to pedagogy strategies related to general pathology with specific emphasis on competency-based medical education for second-year veterinary students. Trainees will be introduced to diverse classroom dynamics, such as case- and problem-based laboratories, flipped classroom, and other collaborative learning techniques.

**VBMS 8360 ADVANCED EQUINE MEDICINE I: GI DISEASE (2)** LEC. 2. Advanced topics in equine gastrointestinal disease are discussed. Topics include pathophysiology, pharmacology, and specific therapy of GI disease in horses. Graduate standing in Biomedical Sciences, College of Veterinary Medicine. Must have DVM or equivalent.

**VBMS 8370 ADVANCED EQUINE MEDICINE II: RENAL/ENDOCRINE (2)** LEC. 2. Advanced topics in equine renal and endocrine disease are discussed. Topics include pathophysiology, pharmacology, and specific therapies. Graduate standing in Biomedical Sciences, College Veterinary Medicine. Must have DVM or equivalent.

**VBMS 8380 ADVANCED EQUINE MEDICINE III: NEUROMUSCULAR (2)** LEC. 2. Advanced topics in equine neuromuscular disease are discussed. Topics include pathophysiology, pharmacology, and specific therapies. Graduate standing in Biomedical Sciences, College Veterinary Medicine. Must have DVM or equivalent.

**VBMS 8390 ADVANCED EQUINE MEDICINE IV: CARDIORESPIRATORY (2)** LEC. 2. Advanced topics in equine cardiorespiratory disease are discussed. Topics include pathophysiology, pharmacology and specific therapies. Graduate standing in Biomedical Sciences, College Veterinary Medicine. Must have DVM or equivalent.

**VBMS 8480 EXPERIMENTAL METHODS IN VETERINARY MEDICINE (3)** LEC. 3. Departmental approval. This course is intended to provide the biomedical sciences graduate student with the necessary tools to design and analyze a straightforward Masters-level veterinary biomedical research study, and interpret common statistical methods in the veterinary biomedical literature. Students will review and discuss examples from the veterinary research literature and acquire experience performing analysis using commonly available software packages.

**VBMS 8950 BIOMEDICAL SCIENCES SEMINAR (1)** SEM. 1. SU. Recent advances in biochemistry, cell biology and molecular biology will be critically presented and discussed by graduate faculty and students. Course may be repeated for a maximum of 10 credit hours.

**VBMS 8990 RESEARCH AND DISSERTATION (1-10)** DSR. Course may be repeated with change in topics.