VM-Biomedical Sciences VBMS

Courses

VBMS 2100 INTRODUCTION TO PUBLIC HEALTH (3) LEC. 3. Lecture and discussion of historic advances in public health leading to discussion of diseases affecting the health of people in Alabama today.

VBMS 3010 INTRODUCTION TO EPIDEMIOLOGY (3) LEC. 3. Principles of epidemiology, with emphasis on approaches for prevention/control of diseases of humans and animals. Broad applications of studies of populations will be stressed.

VBMS 3050 VETERINARY MEDICINE STUDY ABROAD (2) AAB/FLD. 30. This 2 week course is intended to introduce students to the challenges of maintaining health in domestic, wild and commercial land and marine animals through exposure to diverse ecological environments of Australia’s land and marine parks.

VBMS 3903 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 4830 GLOBAL AND COMPARATIVE HEALTH SYSTEMS (3) LEC. 3. Departmental approval. Different national approaches to providing health care for the population will be compared to the US system.

VBMS 4910 OBSERVING NEEDS IN PUBLIC HEALTH (3) LEC. 3. Through volunteer service to public health agency students will develop an understanding of the importance for volunteers to support community public health needs.

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 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. In-depth study of the gross anatomy of the ox, horse, and minor species (chicken) with inclusion of clinical relevance. In-dept 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 and preparation of the basic tissues. Light microscopy and electron micrograph preparations are used to describe and interpret morphology.

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 7050 DEVELOPMENTAL NEUROBIOLOGY (3) LEC. 3. Departmental approval. Overview of the development of the nervous system. Emphasis will be directed towards understanding sensory systems, development, plasticity and function.

VBMS 7070 ENDOCRINOLOGY (4) LEC. 4. Pr. BCHE 7200 and BCHE 7260 and BIOL 6600 or departmental approval. Molecular and cellular endocrinology and physiological regulation of hormone synthesis, secretion, and action in mammalian species. Emphasis will be placed on metabolic regulatory hormones.

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 actions and effects of drugs on human beings. Acceptable courses in biochemistry and physiology;

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 7120 MEMBRANE PHYSIOLOGY (3) LEC. 2. LAB. 3. Departmental approval. The classic and modern aspects of biological membranes. Labs include patch clamp, reconstruction of ion channels in bilayers, Langmuir-Blodgett techniques, and other methods.

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 animals are used in this course. Veterinary anatomy and/or DVM degree.

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 (3) LEC. 3. Departmental approval. An overview of neuroscience on the subcellular, cellular and system levels.

VBMS 7170 ANATOMY, PHYSIOLOGY, PHARMACOLOGY SEMINAR (1) SEM. 1. Required of all graduate students in Anatomy, Physiology, and Pharmacology.

VBMS 7180 RECEPTOROLOGY (4) LEC. 4. Pr. VBMS 7070.

VBMS 7190 VETERINARY MEDICAL COMMUNICATIONS TRAINING (1) LEC. 10. LAB. 6. SU. No P or C required. Restricted to only Biomedical Science Masters students, both degree and non-degree seeking, in the College of Veterinary Medicine. Introduce communication skills necessary to build veterinary-client relationships and trust.

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 7240 ADVANCED SCIENCE OF CANINE AND EQUINE LOCOMOTION (3) LEC. 3. Attendees will learn about the science of biomechanics, muscle physiology and how they apply to locomotion or theathletics and working dog and horse.

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 7290 GRADUATE SEMINAR (1) SEM. 1. Departmental approval. A mandatory graded seminar presentation, held in conjunction with the VBMS seminar series, presenting the resident student’s individual Master of Science degree research topic including pertinent review, hypothesis, materials, results, and discussion of findings.

VBMS 7300 AVIAN DIAGNOSTIC PATHOLOGY (1-3) LAB. 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 medical 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 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. In-depth study of food animal medical diseases of all body systems with emphasis on pathophysiologic mechanisms. Departmental approval; DVM degree.

VBMS 7390 ADVANCED EQUINE MEDICINE (3) LEC. 3. Departmental approval. Detailed etiology, symptoms, pathogenesis, treatment, and prevention of the medical diseases affecting the various systems and organs of the equine, bovine, ovine, and porcine species.
VBMS 7400 GYNECOLOGY OF LARGE DOMESTIC ANIMALS (3) LEC. 3. Diseases and problems of the reproductive system in the female domestic animals. Normal and abnormal conditions of various species are covered. Departmental approval; DVM degree.

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

VBMS 7420 ADVANCED VETERINARY ANESTHESIOLOGY (4) LEC. 4.

VBMS 7430 HEALTH MAINTENANCE OF FOOD ANIMALS (3) LEC. 5. Departmental approval. Research in production medicine. Principles of production medicine to enhance animal health and productivity.


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 BACTERIAL PATHOGENESIS (3) LEC. 3. Pr. VBMS 7510 or BIOL 4520. Departmental approval. Molecular and cellular basis of virulence of bacterial pathogens of 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. Departmental approval. Theoretical concepts underlying immunological methods combined with practical hands-on immunological experimentation focused on application to research in the biological sciences.

VBMS 7490 DIAGNOSTIC TECHNIQUES IN VETERINARY MICROBIOLOGY (4) LEC. 1. LAB. 9. Departmental approval. Techniques used in modern diagnostic microbiology laboratories.

VBMS 7500 CELLULAR AND MOLECULAR IMMUNOLOGY (3) LEC. Pr. BIOL 6500. Departmental approval. Current literature in immunobiology, emphasis on cellular/ biochemical/genetic basis of immune response.

VBMS 7510 QUALITY SYSTEMS IN HEALTH SCIENCES (3) LEC. 3. Overview of regulations, standards, and foundational principles for quality systems and processes illuminating the application to health sciences.

VBMS 7520 EUKARYOTIC MOLECULAR BIOLOGY (3) LEC. 3. Genetic mechanisms 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, protein/antibody chemistry, flow cytometry, photo/electron microscopy fluorochromes, radioisotopes, centrifugation, cell/embryo culture.

VBMS 7540 CURRENT TOPICS IN MOLECULAR VIROLOGY (3) LEC. 3. Pr. VBMS 7520 and BIOL 6260. Departmental approval. Viral gene expression and evasion of host defense mechanisms.

VBMS 7550 PATHOLOGY (1-3) LEC. SU. Departmental approval. Diagnostic interpretation of lesions and test results. Special topics or current issues in pathology to meet the particular needs of students. DVM degree or equivalent; Course may be repeated for a maximum of 3 credit hours.

VBMS 7560 GENERAL PATHOLOGY (4) LEC. 3. LAB. 3. Fundamental alterations of disease. Departmental approval; Satisfactory courses in histology and physiology.

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 specimens. Required every semester for all graduate students and residents in pathology. DVM degree. Course may be repeated for a maximum of 3 credit hours.
VBMS 7590 AVIAN PATHOLOGY (4) LEC. 4. Departmental approval. Comparative avian pathology emphasizing cause, pathogenesis and lesions associated with diseases; differential diagnosis and diagnostic procedures to confirm a diagnosis.

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. Pr. VBMS 5230. Departmental approval. Laboratory evaluation of organ function; disease pattern recognition.

VBMS 7620 DIAGNOSTIC ONCOLOGY (3) LEC. 3. Pr. VMED 5220 or 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 5220 or VMED 9220. Departmental approval. VMED 5220 or equivalent.

VBMS 7650 VETERINARY PROTOZOOLOGY AND ENTOMOLOGY (3) LEC. 3. Departmental approval. Current topics in immunology, physiology, molecular biology, pathogenicity, etc. of selected protozoal and arthropod parasites.

VBMS 7660 VETERINARY HELMINTHOLOGY (3) LEC. 3. Departmental approval. Current topics in immunology, physiology, biochemistry, molecular biology, epidemiology, and pathogenicity of selected helminth parasites.

VBMS 7670 PATHOLOGY PARASITIC DISEASES (3) LEC. 2. LAB. 2. Pr. VBMS 7560. Departmental approval. Gross and microscopic pathology of parasitic diseases of veterinary importance.

VBMS 7680 PATHOLOGY SEMINAR (1) LEC. 1. Pr. VMED 5220 or VMED 9220. Departmental approval. Weekly conference to discuss gross and histologic pathology in animal tissues.

VBMS 7690 READINGS IN IMMUNOLOGY AND INFECTIOUS DISEASE (1) LEC. 1. SU. Pr. BIOL 6500 or VBMS 7500. To familiarize students with current scientific literature in immunology and the methods employed. Or equivalent.

VBMS 7700 COMBINATORIAL BIOCHEMISTRY AND PHAGE DISPLAY (4) LEC. 1. LAB. 6. In-depth study of combinatorial biochemistry and phage display as a tool for development of new drugs, vaccines and diagnostics for veterinary medicine.


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 7730 APPLIED CYTOLOGY (2) LEC. 2. Systematic review of normal and abnormal cytologic findings in veterinary species. Participation in a residency training program at the Auburn University College of Veterinary Medicine.

VBMS 7740 CLINICAL VETERINARY MICROBIOLOGY (1) LEC. 1. SU. Directed discussion group reviewing the current, clinical scientific literature in veterinary microbiology and veterinary infectious disease research. Course may be repeated for a maximum of 5 credit hours.

VBMS 7750 GRADUATE COLLOQUIUM IN VETERINARY CLINICAL SCIENCE (1) CLN. 1. 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 (5) LEC. 3. LAB. 2. 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 (3-5) LEC. Departmental approval. Special study of the causes, methods of diagnosis, treatment and control of non-surgical urogenital diseases of small animals. DVM degree; Course may be repeated for a maximum of 5 credit hours.

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

**VBMS 7840** ADVANCED SMALL ANIMAL MEDICINE IV (3-5) LEC. Departmental approval. Molecular biology lectures and techniques related to diagnostic and research application to clinical problems in small animal veterinary medicine. DVM degree; 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. Course may be repeated for a maximum of 6 credit hours.

**VBMS 7860** INTRODUCTION TO PUBLIC HEALTH (3) DSL. 3. The course will provide an overview of the fascinating history of public health issues and accomplishments, with an emphasis on 1800-2010. Students will receive a comprehensive introduction to Public Health core principles, regulatory agencies, and programs. Emphasis is given to the interdisciplinary and integrative nature of Public Health policies and practices which address and dovetail with the One Health triad of humans, animals, and the environment/ecosystem.

**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 7910** ADVANCED EQUINE CRITICAL CARE I (2) LEC. 2. Introduce students to the mechanisms of disease, state of the art knowledge/procedures & treatment of conditions relevant to the critical equine patient.

**VBMS 7920** ADVANCED EQUINE CRITICAL CARE II (2) LEC. 2. Introduce students to the mechanisms of disease, state of the art knowledge/procedures & treatment of conditions relevant to the critical equine patient.

**VBMS 7946** EPIDEMIOLOGY AND ONE HEALTH (3) LEC. 3. This course will review the principles of epidemiology as they apply to the One Health Initiative. Emphasis will be placed on the rich history of the discipline and how it applies to the one health concept.

**VBMS 7950** GRADUATE SEMINARS IN VETERINARY CLINICAL SCIENCES (1) SEM. 1. SU. Departmental approval. Presentation of thesis research. DVM degree

**VBMS 7970** RESEARCH PROBLEMS IN BIOMEDICAL SCIENCES (1-5) RES. 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 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 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.

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