



# VETERINARY AND BIOMEDICAL SCIENCES (VBMS)

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## **VBMS 805 Introduction to Mechanisms of Disease**

**Prerequisites:** ASCI 240 or equivalent, BIOC/BIOS/CHEM 831, VBMS/BIOS 841

**Description:** Offered odd-numbered calendar years. Designed for students of biological, animal, and veterinary sciences. Introduction to general pathology emphasizing etiology, pathogenesis, morphologic features, and fundamental alterations associated with the fundamental changes of disease.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Grade Pass/No Pass Option

**Prerequisite for:** VBMS 975

## **VBMS 806 Introduction to the Principles of Biosecurity and Disease Transmission**

**Crosslisted with:** VMED 506, VBMS 406

**Prerequisites:** VBMS 406: Open to juniors or seniors who have completed LIFE 120 & LIFE 121. VBMS 806: Open to graduate students enrolled in the UNL Graduate College. VMED 506: Open to veterinary professional students.

**Description:** An introduction into biosecurity and the principles of disease transmission. Covering the concepts of infectious disease transmission with practical applications for control and prevention.

**Credit Hours:** 2

**Max credits per semester:** 2

**Max credits per degree:** 2

**Grading Option:** Grade Pass/No Pass Option

**Offered:** SPRING

## **VBMS 808 Functional Histology**

**Crosslisted with:** BIOS 408, BIOS 808, VBMS 408

**Prerequisites:** BIOS 101 and 101L or LIFE 120 and 120L; BIOS 213 or ASCI 240 or ASCI 340.

**Description:** Microscopic anatomy of the tissues and organs of major vertebrate species, including humans. Normal cellular arrangements of tissues and organs as related to their macroscopic anatomy and function, with reference to sub-cellular characteristics and biochemical processes. Functional relationships among cells, tissues, organs and organ systems, contributory to organismal well being. General introduction to pathological processes and principles underlying some diseases.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Grade Pass/No Pass Option

**Course and Laboratory Fee:** \$15

## **VBMS 811 Introduction to Veterinary Epidemiology**

**Prerequisites:** Permission

**Description:** Offered summer semester of odd-numbered years.

Introduction to concepts of epidemiology including definition and uses of epidemiology. Casual web theory of causation discussed and compared to the Henle-Koch postulates. Students use sampling methods to define population characteristics, detect disease and test hypotheses. Practical application of confidence, power, and sample size. Use of descriptive epidemiology to discuss population characteristics.

**Credit Hours:** 2

**Max credits per semester:** 2

**Max credits per degree:** 2

**Grading Option:** Grade Pass/No Pass Option

**Prerequisite for:** VBMS 920; VBMS 921; VBMS 925

## **VBMS 820 Molecular Genetics**

**Crosslisted with:** BIOS 420, BIOS 820, MBIO 420

**Prerequisites:** BIOS 201 and Senior standing

**Description:** Molecular basis of genetics. Gene structure and regulation, transposable elements, chromosome structure, DNA replication, and repair mechanisms and recombination.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Grade Pass/No Pass Option

**Prerequisite for:** AGRO 963, HORT 963, PLPT 963; BIOS 945; BIOS 964, VBMS 964; FDST 908B; PLPT 801, AGRO 801, HORT 801

## **VBMS 824 Basic Molecular Infectious Diseases**

**Crosslisted with:** VBMS 424

**Prerequisites:** BIOS 312.

**Notes:** Offered spring semester of odd-numbered calendar years.

**Description:** Introduction to the molecular, genetic and cellular aspects of microbial pathogenesis in humans and animals. Critical reviews of original scientific literature and development of manuscript and proposal writing.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Grade Pass/No Pass Option

**Offered:** SPRING

## **VBMS 830 Veterinary Anatomy I**

**Crosslisted with:** VMED 630

**Prerequisites:** For VBMS 830: none. For VMED 630: First year standing in the Professional Program in Veterinary Medicine

**Description:** Comparative and topographic anatomy of the dog, cat, and pig.

**Credit Hours:** 6

**Max credits per semester:** 6

**Max credits per degree:** 6

**Grading Option:** Grade Pass/No Pass Option

**Prerequisite for:** VMED 631, VBMS 831

**VBMS 831 Veterinary Anatomy II****Crosslisted with:** VMED 631**Prerequisites:** VMED 630**Description:** Gross anatomy of domestic ruminants, horses, and birds. An advanced course in detailed gross anatomy incorporating intensive dissection laboratory sessions and classroom lectures.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Grading Option:** Graded**Offered:** SPRING**VBMS 840 Microbial Physiology****Crosslisted with:** BIOS 440, BIOS 840, MBIO 440, VBMS 440**Prerequisites:** BIOS 312; BIOS 314.**Description:** Molecular approaches to the study of prokaryotic cell structure and physiology, including growth, cell division, metabolism, and alternative microbial life styles.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**Course and Laboratory Fee:** \$20**VBMS 841 Pathogenic Microbiology****Crosslisted with:** BIOS 441, BIOS 841, VBMS 441**Prerequisites:** BIOS 312**Description:** Fundamental principles involved in host-microorganism interrelationships. Identification of pathogens, isolation, propagation, mode of transmission, pathogenicity, symptoms, treatment, prevention of disease, epidemiology, and methods of control.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**Offered:** SPRING**Prerequisite for:** VBMS 805; VBMS 949**Course and Laboratory Fee:** \$25**VBMS 842 Endocrinology****Crosslisted with:** ASCI 442, ASCI 842, BIOS 442, BIOS 842**Prerequisites:** A course in vertebrate physiology and/or biochemistry.**Description:** Mammalian endocrine glands from the standpoint of their structure, their physiological function in relation to the organism, the chemical nature and mechanisms of action of their secretory products, and the nature of anomalies manifested with their dysfunction.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**VBMS 843 Immunology****Crosslisted with:** BIOS 443, BIOS 843, MBIO 443, VBMS 443**Prerequisites:** BIOS 201; CHEM 251 or CHEM 261.**Description:** Fundamental consideration of cellular and humoral mechanisms of immunity, the structure and function of immunoglobulins, antigen-antibody interactions; hypersensitivity; transplantation and tumor immunity; immune and autoimmune disorders.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**Prerequisite for:** VBMS 908; VBMS 910; VBMS 948; VBMS 949**VBMS 845 Animal Physiology I****Crosslisted with:** VMED 645, ASCI 845**Prerequisites:** Undergraduate courses in biochemistry, biology and physiology.**Notes:** Primarily for students in animal or biological sciences or veterinary medicine.**Description:** Mammalian physiology and cellular mechanisms. Physiology of the cell, embryology, and neuro-sensory, neuromuscular, endocrine, and reproductive systems.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Grading Option:** Grade Pass/No Pass Option**VBMS 846 Animal Physiology II****Crosslisted with:** VMED 646, ASCI 846**Prerequisites:** ASCI/VBMS 845 or BIOS 813**Notes:** ASCI/VBMS 846/BIOS 814/VMED 646 is designed for students in animal or biological sciences or veterinary medicine.**Description:** Mammalian physiology and cellular mechanisms. Physiology of the digestive, cardiovascular, respiratory, and renal systems.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Grading Option:** Graded**VBMS 847 Interdisciplinary Concepts in Beef Production****Crosslisted with:** ASCI 847**Prerequisites:** Degree in veterinary medicine or animal science, or allied agricultural degree**Notes:** Classroom attendance is required during each of the modules. Between modules distance education technologies (laptop computer, Internet access, a computer operating system with a word processor, spreadsheet, and presentation software, email, etc.) are used and required for discussion and assignments.**Description:** The contributions and interactions of the major academic disciplines upon the production, performance, health, profitability, and sustainability of beef cow and cattle feeding operations.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 6**Grading Option:** Grade Pass/No Pass Option**VBMS 847A Interdisciplinary Concepts in Beef Production I****Crosslisted with:** ASCI 847A**Description:** The contributions and interactions of the major academic disciplines upon the production, performance, health, profitability, and sustainability of beef cow and cattle feeding operations.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**Prerequisite for:** ASCI 847B, VBMS 847B**VBMS 847B Interdisciplinary Concepts in Beef Production II****Crosslisted with:** ASCI 847B**Prerequisites:** VBMS 847A**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option

**VBMS 848 Introduction to Veterinary Biotechnology**

**Prerequisites:** 12 hours of veterinary and biomedical sciences or DVM degree, or equivalent and permission

**Description:** Information and assignments for VBMS 848 exchanged in the classroom and via Internet. Theoretical basis for emerging cellular, molecular and reproductive technologies, and their potential applications and impacts in the practice of food animal veterinary medicine.

**Credit Hours:** 1-2

**Min credits per semester:** 1

**Max credits per semester:** 2

**Max credits per degree:** 2

**Grading Option:** Grade Pass/No Pass Option

**VBMS 852 Molecular Virology and Viral Pathogenesis**

**Prerequisites:** Graduate standing.

**Notes:** Offered even-numbered calendar years.

**Description:** Introduction to virology with emphasis on molecular biology and pathogenesis. Concepts of virus replication strategies, virus-host interactions and virus pathogenesis.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Grade Pass/No Pass Option

**Prerequisite for:** VBMS 949; VBMS 950

**VBMS 899 Masters Thesis**

**Prerequisites:** Admission to masters degree program and permission of major adviser

**Credit Hours:** 1-10

**Min credits per semester:** 1

**Max credits per semester:** 10

**Max credits per degree:** 99

**Grading Option:** Grade Pass/No Pass Option

**VBMS 901 Diagnostic Techniques**

**Description:** Application of the principles of pathology to current problems in the diagnostic laboratory.

**Credit Hours:** 1-10

**Min credits per semester:** 1

**Max credits per semester:** 10

**Max credits per degree:** 10

**Grading Option:** Grade Pass/No Pass Option

**VBMS 908 T Cell Biology: Repertoire and Effector Functions**

**Prerequisites:** BIOS 843

**Notes:** Offered even-numbered calendar years.

**Description:** Analysis of the literature of the cellular and molecular biology of T cell recognition and effector functions. Subject areas: Scientific Methodologies; Antigen Presentation; T Cell Receptor and Coreceptor; Thymic Structure and Self/Nonself Discrimination; T Cell Regulation; Allergy and Autoimmune Diseases; and T-Cell-Mediated Inflammation and Cytokine Network.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Grade Pass/No Pass Option

**VBMS 909 Seminar**

**Credit Hours:** 1-4

**Min credits per semester:** 1

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Pass No-Pass

**VBMS 910 Topics in Immunology**

**Prerequisites:** VBMS 843 or BIOS 843

**Description:** Basics of immunology; critical analysis of reports taken from scientific literature of immunology.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Grade Pass/No Pass Option

**VBMS 919 Regulation of Eukaryotic Gene Expression**

**Prerequisites:** 1) BIOC 818 or 820; 2) BIOC 832; and 3) BIOC 838 or BIOS 837 or related laboratory experience

**Notes:** Offered even-numbered calendar years.

**Description:** Basic mechanisms regulating gene expression in eukaryotes during various physiological states. Emphasis on understanding specific and unique mechanisms in mammalian systems. Techniques used to study gene regulation.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Grade Pass/No Pass Option

**VBMS 920 Measurement of Animal Disease and Production**

**Prerequisites:** VBMS 811

**Notes:** Offered odd-numbered calendar years.

**Description:** Measurements of disease and production, the basic tenants of epidemiology, taught in detail including incidence density, risk rates, morbidity, mortality, cause specific rates, and life tables. Methods and implications of measuring disease at the farm, regional, and national levels. Sampling strategies and the impact of these on the standard error of the estimate. Implications and biases of using retrospective production data versus prospective data. Clinical epidemiology which includes definition of tests in veterinary medicine, individual and herd level sensitivity and specificity, receiver operating characteristics curves, positive and negative predictive values, serial and parallel interpretation of tests, Kappa statistics, and issues of precision, validity, and accuracy.

**Credit Hours:** 2

**Max credits per semester:** 2

**Max credits per degree:** 2

**Grading Option:** Grade Pass/No Pass Option

**Prerequisite for:** VBMS 921; VBMS 925

**VBMS 921 Analytic Observational Studies in Veterinary Epidemiology**

**Prerequisites:** VBMS 811 and 920

**Notes:** Offered odd-numbered calendar years.

**Description:** Design, implementation, and analysis of cross-sectional, cohort, and case-control studies and field trials. Limitations, biases, implications of the results, and current uses of each. Evaluation of these methods as used in the scientific literature. Analyses includes chi-square tests, Cochran Chi-square tests, and epidemiologic measures of strength of association, effect, and total effect. Design, implementation, analysis and interpretation of field trials taught specifically as they relate to the practitioner.

**Credit Hours:** 2

**Max credits per semester:** 2

**Max credits per degree:** 2

**Grading Option:** Grade Pass/No Pass Option

**VBMS 925 Critical Reading of the Epidemiology Literature****Prerequisites:** VBMS 811 or 920; or permission**Notes:** May be repeated for credit.**Description:** Analysis of current epidemiology and animal health literature. Critical evaluation of study design, methods of analysis, biases, field applicability, and basis for conclusions.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 4**Grading Option:** Grade Pass/No Pass Option**VBMS 930 Advanced Food Animal Production Medicine****Prerequisites:** Permission**Notes:** Offered spring semester of even-numbered calendar years.**Description:** Inter-relationships between animal health, disease, and well-being as they relate to the productivity and profitability of food animal production units. Integrates aspects of veterinary medicine, animal science, and agricultural economics. General concepts related to cattle, swine and sheep production systems, followed by specific issues that relate to different species.**Credit Hours:** 2**Max credits per semester:** 2**Max credits per degree:** 2**Grading Option:** Grade Pass/No Pass Option**VBMS 942 Genetics, Genomics, and Bioinformatics of Prokaryotes****Crosslisted with:** BIOS 942**Description:** Prokaryotic gene regulation, DNA exchange, DNA recombination and repair, comparative prokaryotic genomics and computer-based methods of analysis.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**VBMS 944 Immunovirology****Prerequisites:** Permission; organic chemistry; biochemistry; immunology and/or concepts in virology and virolopathogenesis**Description:** Pathogenic microbiology recommended. Description of virus and immune system interactions, with emphasis on mouse and human models. Mechanism of antigen presentation of viral proteins and relationship to health and disease. Analysis of the hosts immune response to selected viral infections of the major systems: neural, respiratory, gastrointestinal and immune.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**VBMS 948 Concepts in Experimental Immunology****Prerequisites:** BIOS 843**Description:** Recent advances in immunological techniques and review of conventional methods.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**VBMS 949 Vaccinology****Prerequisites:** VBMS/BIOS 841; BIOS 843, VBMS 843; VBMS/BIOS 852**Description:** Analysis of the theory and mechanisms involved in the development of efficacious vaccines. Microbiological and immunological aspects as well as the manufacturing and regulatory aspects of vaccine development.**Credit Hours:** 2**Max credits per semester:** 2**Max credits per degree:** 2**Grading Option:** Grade Pass/No Pass Option**VBMS 950 Medical Molecular Virology****Prerequisites:** BIOS/CHEM/BIOC 431/831 and 432/832; VBMS 852**Description:** Current topics in molecular virology relevant to the natural history and pathogenesis of viral diseases of humans and animals.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**VBMS 951 Advanced Molecular Infectious Diseases****Prerequisites:** BIOC 832 or equivalent; 18 hours of biological, biomedical and/or veterinary sciences, including fundamental microbiology and genetics**Notes:** VBMS 824 and 843 or equivalent recommended. Offered spring semester of even-numbered years.**Description:** Molecular and cellular aspects of microbial pathogenesis. Key literature, synthesis of scientific problems into research proposals.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**VBMS 964 Signal Transduction****Crosslisted with:** BIOS 964**Prerequisites:** BIOS 820.**Description:** Molecular basis of genetics in eukaryotes. Gene structure and regulation, transposable elements, chromosome structure, DNA replication and repair mechanisms and recombination.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Grade Pass/No Pass Option**VBMS 975 Seminar in Veterinary Histopathology****Prerequisites:** VBMS 805, or equivalent and permission**Notes:** May be repeated for credit.**Description:** Descriptive veterinary histopathology covering diseases of all body systems in animal species including domestic, laboratory, wildlife, birds, fishes, reptiles, and amphibians. Source material is worldwide in scope.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Grading Option:** Grade Pass/No Pass Option**VBMS 996 Research on Selected Problems in Veterinary Science****Credit Hours:** 2-10**Min credits per semester:** 2**Max credits per semester:** 10**Max credits per degree:** 10**Grading Option:** Grade Pass/No Pass Option



**VBMS 998 Special Topics in Veterinary Science**

**Prerequisites:** Permission

**Description:** The subject will be dependent on student demand and availability of staff. Reviews of specialized subject areas.

**Credit Hours:** 1-10

**Min credits per semester:** 1

**Max credits per semester:** 10

**Max credits per degree:** 10

**Grading Option:** Grade Pass/No Pass Option