### VETERINARY AND BIOMEDICAL SCIENCES (VBMS)

**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:* 3  
*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 206 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

**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 313 or 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, VBMS 441H
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
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 206; CHEM 251 or CHEM 255 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 852; 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

VRMS 846 Animal Physiology II
Crosslisted with: VMED 646, ASCI 846
Prerequisites: ASCI/VMMS 845 or BIOS 813
Notes: ASCI/VMMS 846 BIOS 814/VMMS 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

VBMS 847B Interdisciplinary Concepts in Beef Production II
Crosslisted with: ASCI 847B
Prerequisite for: ASCI 847B, VBMS 847B

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
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: 3
Grading Option: Grade Pass/No Pass Option

VBMS 852 Molecular Virology and Viral Pathogenesis
Prerequisites: BIOS 843
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 viropathogenesis  
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 946 Advanced Molecular Infectious Diseases  
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 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: BIOS 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 954 Animal Production Systems Technology  
Prerequisites: VBMS 824 and 843 or equivalent recommended. Offered spring semester of even-numbered years.  
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 955 Research on Selected Problems in Veterinary Science  
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: 2-10  
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