VETERINARY MICROBIOLOGY AND PREVENTIVE MEDICINE

Professional Program of Study

For the professional curriculum in veterinary medicine leading to the degree doctor of veterinary medicine, see Veterinary Medicine, Curriculum.

The Department of Veterinary Microbiology and Preventive Medicine provides instruction on pathogenic bacteria, fungi, and viruses and their interaction with host animal species. Principles and applications of infectious diseases, immunity to disease, diagnostic methods for infectious diseases, and vaccinology are covered. Principles and applications of epidemiology, public health, preventive veterinary medicine, regulatory veterinary medicine and food safety are also emphasized.

Graduate Study

The department offers opportunities for the degree doctor of philosophy with a major in veterinary microbiology. A specialization in preventive medicine is an option for this degree. Graduates in the Veterinary Microbiology and Preventive Medicine programs have a broad understanding of the fundamental processes involved in infectious diseases, pathogenesis and immunology. They are able to effectively establish research programs, which involve complex biological systems and disease syndromes. They are also prepared to address microbial-based social, ethical and environmental problems. Graduates acquire effective written and oral communication skills which lead to successful research and teaching careers in the medical and veterinary sciences. The department also offers work towards the master of science with majors in veterinary microbiology or veterinary preventive medicine. A non-thesis master's option is available for majors in preventive medicine. Courses are open for students majoring in other graduate programs.

Prerequisite to graduate study is completion of coursework in general microbiology, biology, biochemistry, mathematical sciences, and physics. Candidates for the majors in veterinary microbiology should possess an undergraduate degree in biomedical science with emphasis in medical microbiology or the D.V.M. degree. Candidates for the major in preventive medicine should possess the D.V.M. degree.

The department also participates in the interdepartmental majors and programs in genetics, immunobiology, and MCDB (molecular, cellular, and developmental biology; see Index).

Each graduate student must demonstrate proficiency in English composition within two semesters in residence.

Courses primarily for professional curriculum students:

V MPM 378: Case Study IV
(2-0) Cr. 2. S.
Prereq: Second-year classification in veterinary medicine
Case-based applied learning that relates to the basic science courses. Emphasis on early integration of basic and clinical science concepts.

V MPM 380: Veterinary Immunology
(2-0) Cr. 2. S.
Prereq: First-year classification in veterinary medicine
Structure and function of the immune system in animals.

V MPM 386: Veterinary Microbiology
(3-5) Cr. 5. F.
Prereq: Second-year classification in veterinary medicine
Bacteria and fungi of veterinary importance with emphasis on mechanisms of disease production and laboratory diagnostic procedures.

V MPM 387: Veterinary Virology
(3-0) Cr. 3. S.
Prereq: Second-year classification in veterinary medicine
Basic principles of animal virology. Pathogenesis of viral infections. The nature and ecology of viruses of veterinary and zoonotic importance.

V MPM 388: Public Health and the Role of the Veterinary Profession
(3-0) Cr. 3. S.
Prereq: Second-year classification in veterinary medicine
Fundamental epidemiology, zoonotic diseases, occupational health, food safety, other public health topics.

V MPM 390: Topics in Veterinary History
(1-0) Cr. 1. F.S.
An overview of the history of veterinary medicine focused primarily on disease-specific events. A review of the historical aspects of the veterinary profession's accomplishments in the discovery of the etiological origins of disease and their subsequent control will provide students with insights that are applicable to understanding and solving today's animal and human health challenges.

V MPM 409: Infectious Diseases of Wild Animals
(0-2) Cr. 1. F.S.
Prereq: Second year classification in veterinary medicine
Infectious diseases (bacterial, viral, and mycotic) of non-human primates, birds, ruminants, cold-blooded animals, marine mammals, and carnivores.*Spring only offered to UNL students.

V MPM 428: Principles of Epidemiology and Population Health
(Dual-listed with V MPM 528). (Cross-listed with VDPAM). (3-0) Cr. 3. S.
Epidemiology of disease in populations. Disease causality, observational study design and approaches to epidemiologic investigations. This course is available on campus and by distance.

V MPM 437: Infectious Diseases and Preventive Medicine
(3-0) Cr. 3. S.
Prereq: Third-year classification in veterinary medicine
Etiology, epidemiology, laboratory diagnosis, regulatory control and preventive medicine aspects of the infectious diseases of swine, sheep, goats, cattle and horses.

V MPM 486: Laboratory in Public Health
Cr. 2. Repeatable. F.S.SS.
Prereq: Fourth-year classification in veterinary medicine
Discussions, lectures, exercises and field trips related to veterinary public health.

V MPM 490: Independent Study
Cr. arr. Repeatable. F.S.SS.
Prereq: Permission of instructor and department chair

V MPM 491: CDC Epidemiology Elective Preceptorship
Cr. 6. F.S.SS.
Prereq: Written permission of instructor
Introduction to preventive medicine, public health and the principles of applied epidemiology within the working atmosphere of the Centers for Disease Control and Prevention.

V MPM 494: Zoo Preceptorship
Cr. 1-8. Repeatable. F.S.SS.
Prereq: Fourth year classification in veterinary medicine
Elective course in zoo veterinary practice under guidance of approved veterinarians.

V MPM 496: International Preceptorship
(0-40) Cr. 1-12. Repeatable. F.S.SS.
Prereq: Second-year classification in veterinary medicine
International Preceptorships and Study Abroad group programs. This course will provide opportunities for students to be involved in applied clinical, production, and/or research experiences in international locations. The course consists of 40 hour per week experiential learning opportunities. Offered on a satisfactory-fail basis only.

Courses primarily for graduate students, open to qualified undergraduates:

V MPM 501: Basic Principles of Microbiology
Cr. 3. F.
The general principles of bacteriology, immunology and virology will be discussed. The structure and function of bacteria and viruses, the mechanisms of pathogenesis, and the host response to infectious agents will be reviewed. Vaccines, their failures, and new developments in vaccine development will be explored.

V MPM 502: Microbial Genetics and Genomics
(Cross-listed with MICRO). (3-0) Cr. 3. Alt. F., offered even-numbered years.
Prereq: MICRO 302, BIOL 313
The fundamental concepts of bacterial and bacteriophage genetics including mutagenesis, mechanisms of both vertical and horizontal genetic information transfer, gene regulation, and genetic approaches to study complex cellular processes. Review and discussion of research literature to examine experimental design, methodology, and interpretation of both historical and contemporary relevance to microbial genetics.

V MPM 520: Medical Immunology I
(4-0) Cr. 4. F.
Prereq: MICRO 310 or V MPM 386, 3 credits in biochemistry
Nature of the immune system and its role in health and disease. Credit for either V MPM 520 or 575, but not both may be applied toward graduation.

V MPM 525: Intestinal Microbiology
(Cross-listed with MICRO). Cr. 3. Alt. S., offered even-numbered years.
Prereq: Micro 302, BIOL 313
Overview of commensal microbiota in the health and well-being of vertebrates. Topics include diversity of intestinal structure, microbial diversity/function, innate immune development, community interactions and metabolic diseases associated with alterations of the intestinal microbiome.

V MPM 528: Principles of Epidemiology and Population Health
(Dual-listed with V MPM 428). (Cross-listed with VDPAM). (3-0) Cr. 3. S.
Epidemiology of disease in populations. Disease causality, observational study design and approaches to epidemiologic investigations. This course is available on campus and by distance.

V MPM 536: Zoonoses and Environmental Health
(3-0) Cr. 3. Alt. S., offered odd-numbered years.
Prereq: V MPM 386, VMPM 387 and V MPM 388 or equivalent or permission of instructor
Pathogensis and control of zoonotic diseases. Factors influencing transmission and survival of pathogenic microorganisms in the environment.

V MPM 540: Livestock Immunogenetics
(Cross-listed with AN S, MICRO). (2-0) Cr. 2. Alt. S., offered odd-numbered years.
Prereq: AN S 561 or MICRO 575 or V MPM 520
Basic concepts and contemporary topics in genetic regulation of livestock immune response and disease resistance.

V MPM 542: Introduction to Molecular Biology Techniques
(Cross-listed with B M S, EEOB, FS HN, GDCB, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. F.S.SS.
Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

V MPM 542A: Introduction to Molecular Biology Techniques: DNA Techniques
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. F.S.
Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only.

V MPM 542C: Introduction to Molecular Biology Techniques: Cell Techniques
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. F.S.
Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. Offered on a satisfactory-fail basis only.

V MPM 542D: Introduction to Molecular Biology Techniques: Plant Transformation
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. S.
Includes: Agrobacterium and particle gun-mediated transformation of tobacco, Arabidopsis, and maize, and analysis of tranformants. Offered on a satisfactory-fail basis only.

V MPM 542E: Introduction to Molecular Biology Techniques: Proteomics
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. F.
Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only.

V MPM 542F: Introduction to Molecular Biology Techniques: Metabolomics
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. F.
Includes: metabolomics and the techniques involved in metabolite profiling. For non-chemistry majoring students who are seeking analytical aspects into their biological research projects. Offered on a satisfactory-fail basis only.

V MPM 542G: Introduction to Molecular Biology Techniques: Genomic
(Cross-listed with B M S, BBMB, EEOB, FS HN, GDCB, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. S.
Offered on a satisfactory-fail basis only.

V MPM 575: Immunology
(3-0) Cr. 3. S.
Prereq: MICRO 310
An examination of humoral and cellular immune function as well as the interaction of the cells and factors of the immune system that result in health and disease. Micro 475L optional. Credit for either Micro 575 or V MPM 520, but not both, may be applied toward graduation.

V MPM 586: Medical Bacteriology
(Cross-listed with MICRO). (4-0) Cr. 4. F.
Prereq: Permission of instructor
Bacteria associated with diseases of vertebrates, including virulence factors and interaction of host responses.

V MPM 586L: Medical Bacteriology Laboratory
(0-6) Cr. 2. F.
Prereq: credit or enrollment in V MPM 586 or V MPM 625
Procedures used in isolation and identification of pathogenic bacteria, including molecular and genetic techniques used in research.

V MPM 587: Animal Virology
(4-0) Cr. 4.
Prereq: Permission of instructor
Principles of animal virology. Biology of viruses associated with diseases of veterinary importance, including mechanisms of pathogenesis.

V MPM 590: Special Topics
Cr. 1-5. Repeatable. F.S.SS.
Prereq: Permission of instructor

V MPM 596: International Preceptorship
(0-40) Cr. 1-12. Repeatable. F.S.SS.
Prereq: Admission to graduate college
International Preceptorships and Study Abroad Group programs. This course will provide opportunties for students to be involved in applied clinical, production, and/or research experiences in international locations. The course consists of 40 hour per week experiential learning opportunties. Offered on a satisfactory-fail basis only.

V MPM 599: Creative Component
Cr. arr.
Prereq: Nonthesis M.S. Option only
A written report based on laboratory research, library reading, or topics related to the student's area of specialization and approved by the student's advisory committee.

Courses for graduate students:

V MPM 604: Seminar
(1-0) Cr. 1. Repeatable. F.
Offered on a satisfactory-fail basis only.

V MPM 608: Molecular Virology
(Cross-listed with MICRO, PL P). (3-0) Cr. 3. Alt. F., offered even-numbered years.
Prereq: BBMB 405 or GDCB 511
Advanced study of virus host-cell interactions. Molecular mechanisms of viral replication and pathogenesis.

V MPM 615: Molecular Immunology
(Cross-listed with BBMB, MICRO). (3-0) Cr. 3. Alt. F., offered odd-numbered years.
Prereq: BBMB 405 or BBMB 506 and BBMB 507
Current topics in molecular aspects of immunology: T and B cell receptors; major histocompatibility complex; antibody structure; immunosuppressive drugs and viruses; and intracellular signaling pathways leading to expression of genes that control and activate immune function.

V MPM 625: Mechanisms of Bacterial Pathogenesis
(Cross-listed with MICRO). (4-0) Cr. 4. Alt. S., offered odd-numbered years.
Prereq: Credit in Biochemistry and Microbiology
Review of current concepts in specific areas of microbial pathogenesis including the genetic basis for bacterial disease, genetic regulation and control of virulence factors and their mechanisms of action, and host-pathogen interactions at the cellular and molecular levels. The application of microbial genetics to understanding pathogenesis will be included.

V MPM 629: Advanced Topics in Cellular Immunology
(2-0) Cr. 2. Alt. S., offered even-numbered years.
Prereq: V MPM 520 or V MPM 575
Current topics and literature in cellular immunology. Topics include thymocyte development and selection, T cell interactions with antigen presenting cells, and lymphocyte effector functions.

V MPM 660: Pathogenesis of Persistent Infections
(Cross-listed with V PTH). (2-0) Cr. 2. Alt. S., offered odd-numbered years.
Prereq: Permission of instructor
Study of current knowledge related to host pathogen interactions during persistent and chronic infections by bacteria, viruses and parasites.

V MPM 690: Current Topics
Cr. 1-3. Repeatable. F.S.SS.
Prereq: Permission of instructor
Colloquia or advanced study of specific topics in a specialized field.

V MPM 690A: Current Topics: Immunology
Cr. 1-3. Repeatable. F.S.SS.
Prereq: Permission of instructor
Colloquia or advanced study of specific topics in a specialized field.

V MPM 690B: Current Topics: Infectious Diseases
Cr. 1-3. Repeatable. F.S.SS.
Prereq: Permission of instructor
Colloquia or advanced study of specific topics in a specialized field.

V MPM 698: Seminar in Molecular, Cellular, and Developmental Biology
(Cross-listed with BBMB, GDCB, MCDB, MICRO). (2-0) Cr. 1-2. Repeatable. F.S.
Student and faculty presentations.

V MPM 699: Research
Cr. arr. Repeatable.