

VETERINARY MEDICINE

Our Website (<http://www.vetmed.vt.edu>)

Overview

Founded by the Virginia General Assembly in 1978, the Virginia-Maryland Regional College of Veterinary Medicine is a regional school for the professional training of veterinarians which has been built upon the strong foundations of two of the nation's leading land-grant universities: Virginia Tech in Blacksburg and the University of Maryland at College Park. The College operates three campuses, including the main campus facilities at Virginia Tech, the Virginia Tech Animal Cancer Care and Research Center in Roanoke, VA, the Avrum Gudelsky Veterinary Center at College Park, and the Marion duPont Scott Equine Medical Center in Leesburg.

Graduate Program

The graduate program leads to the M.S. and Ph.D. in biomedical and veterinary sciences. The goal of this program is to enhance the research capabilities of the graduates so that they can conduct independent research and associated societal endeavors aimed at solving biomedical problems related to veterinary medicine. These individuals will be expected to make scientific contributions in academia, research, and animal health administration.

For additional information, contact the Graduate School via e-mail at cvmgrad@vt.edu.

Web: <https://bmvs.vetmed.vt.edu/>.

Professional Program

The veterinary program offers a four-year, full-time program leading to the Doctor of Veterinary Medicine degree. Our integrated curriculum includes classroom and laboratory instruction in the first two years and early immersion in clinical rotations, followed by more-advanced classroom instruction and additional clinical rotations.

Students desiring admission to the four-year instructional program leading to the D.V.M. degree must show evidence of intellectual ability and achievement, as well as personal preparation for the curriculum and the profession. Because the number of applicants greatly exceeds the number of spaces in entering classes, only those who demonstrate such qualifications to a high degree will be selected. Most entering students will have completed three or more years at an accredited university by the time of matriculation; however, applications will be accepted from students who have completed at least 60 semester hours or 90 quarter hours of university credit by the end of the spring term of the year for which application is being made.

A number of college courses, both science and humanities, are required for application to the veterinary professional program. In addition, other professional skills are essential for success not only within the program, but in life after graduation. These skills include communication, problem-solving and critical thinking.

Since veterinary medicine also is concerned with a variety of social, environmental, and community activities, a broad cultural background is important.

Admissions inquiries should be directed to:

Mrs. Shelby Stegall - Admissions Coordinator

Admissions Office
Virginia-Maryland Regional College of Veterinary Medicine
Virginia Tech
Blacksburg, VA 24061
Phone: (540) 231-4699
E-mail: dvmadmit@vt.edu
Web: www.vetmed.vt.edu (<http://www.vetmed.vt.edu>)

Public Health Program

Virginia Tech's Public Health Program in the Department of Population Health Sciences is administered by the Virginia-Maryland College of Veterinary Medicine in partnership with the Virginia Tech Carilion School of Medicine and is accredited by the Council on Education for Public Health. The Public Health Program offers both undergraduate and graduate degrees in public health.

Undergraduate programs in public health include the Bachelor of Science in Public Health degree and an undergraduate Minor in Public Health. At the graduate level, programs include the Master of Public Health, which can be pursued as a standalone degree program, combined with another graduate degree program (e.g., DVM, MD, PhD, MS, MA), or pursued as an accelerated undergraduate to MPH degree for exceptional Virginia Tech undergraduate students from any major. Additionally, the program offers an online Graduate Certificate in Public Health.

As a whole, the Public Health Program emphasizes a One Health approach to address local and global public health concerns. The One Health concept recognizes that the health of people is connected to the health of animals and the environment. Recognition of the dynamic interdependence of human, animal, and environmental health promotes interdisciplinary collaboration among medical, veterinary, public health, and other professionals. Students gain the requisite knowledge and skills to examine the human, animal, and environmental factors that contribute to the control and prevention of disease and the promotion, enhancement, and maintenance of health. Additionally, the program is committed to addressing public health challenges and opportunities facing Central Appalachia and other areas in Southwest and Southside Virginia. These regions have a rich cultural tradition, wisdom and significant community assets while at the same time facing high rates of unemployment, poverty and limited access to health care. The program's emphasis on rural health stretches beyond regional communities into other rural areas in Virginia, the nation, and beyond.

For additional information, please contact the Public Health Program at phs@vt.edu or by phone at (540) 231-3945.

- Public Health Major (<https://catalog.vt.edu/undergraduate/veterinary-medicine/public-health-bs/>)
- Public Health Major with Pre-Medical Professions Option (<https://catalog.vt.edu/undergraduate/veterinary-medicine/public-health-major-pre-medical-professions-option/>)
- Public Health Major with Pre-Veterinary Professions Option (<https://catalog.vt.edu/undergraduate/veterinary-medicine/public-health-major-pre-veterinary-professions-option/>)

Dean: M. Daniel Givens

Interim Associate Dean for Professional Programs: Sunshine Lahmers

Associate Dean for Research and Graduate Studies: S. Ansar Ahmed

Assistant Dean for Administration: April G. Hylton

Associate Dean: Xiaoping Zhu

Professors: M. Borgarelli, V. A. Buechner-Maxwell, S. G. Clark, L.A.

Dahlgren, G. B. Daniel, M. F. Ehrich, J. L. Hodgson, L. Hungerford, O. I.

Lanz, M.L. Larson, M. S. Leib, M. Lee, D. Lindsay, H.C. McKenzie III, X. J. Meng, U. Pal, D. L. Panciera, K. D. Pelzer, J. P. Pickett, S. Pleasant, K. Redican, J. H. Rossmels, M. Seleem, S. A. Smith, D. P. Sponenberg, N. Sriranganathan, W. S. Swecker Jr., N. Tablante, N. A. White II, L. Yuan, X. Zhu and K.L. Zimmerman

Associate Professors: I. C. Allen, O. Balogh, L.E. Bartl, J. Barrett, G. Belov, A. S. Bertke, D. Blodgett, C. Byron, F. Carvallo-Chaigneau, C. Caswell, T. Cecere, B.J. Conner, J. L. Davis, N. G. Dervisis, F. Elnady, L. E. Freeman, J. M. Gohlke, D.C. Grant, P. N. Henao Guerrero, J. Q. He, I. P. Herring, K. Hosig, W. R. Huckle, S. L. Klahn, B. G. Klein, K. Lahmers, S. M. Lahmers, Y. W. Lee, X. Luo, D. Moore, N. Nanthakumar, D. Nelson, Y. A. Pan, J. Patton, P. Pithua, R. Ramirez-Barrios, G. Saunders, W. K. Scarratt, M. Shi, B. J. Smith, M.H. Theus, S. G. Witonsky, H. D. Xie, and Y. Zhang

Associate Professors of Practice: T. Burns, J. Pelzer and V. Ragan

Assistant Professors of Practice: S. Wenzel

Assistant Professors: K. Abbas, I. Athanasiadi, C. Baker, S. H. Barrett, T. Bolton, R. Calder, B. Ciepluch, A. Cohen, N.E. Cook, L. L. Corcoran, V. K. Corrigan, C. Deagle, S. M. DeMonaco, N. Duggal, S. L. Farris, M. Freeman, R. Gaji, M. Ghanem, T. E. LeCuyer, S. McDonald, G. Menicotti, P. D. Morton, D. Nelson, V.V. Paranjape, R. Parker, N. Rancilio, S. Riley, C. Rist, N. Ruktanonchai, Z. Sheng, M. Shi, R.L. Shinn, A. Smith, J. Stewart, S. A. Swanger, J. Tuohy, J.D. Weger, A. Wilkinson and J. Zambriski

Research Professor: K. A. Horn

Research Associate Professor: A.A. Bandara, W. Eyestone, R. L. Shinn

Research Assistant Professors: I. Akhrymuk, R. Dai, J. M. Green, S. Kenney, W. Li, M. R. Prater, C. Reilly, B. Rzigalinski, K. Sunil, E. Viktorova, S. Werre and X. Yang

Research Scientist: N. Evans, W. Li and R. Silverman

Clinical Associate Professors: L.E. Bartl, K. Boes, F. Carvallo-Chaigneau, J. Cecere, J. F. Currin, M. Erskine, R.A. Funk, S.L. Klahn, T. LeRoith, M.T. Nappier and K.E. Wilson

Clinical Assistant Professors: M. Norris Adams, S. Barrett, S. Bogers, J. A. Brown, M.K. Byrnes, K. Estell, S.R. Guynn, A. Keebaugh, M. Kelleher, K. Murakami, D. R. Reeder, R. M. Rodriguez Galarza, D.N. Sawyere, M. Shepherd, H. Schramm, H. Tham and F.A. Wilkinson

Clinical Instructors: A.U. Arendse; C. Bowden, M. Brookhart, R. Carpenter, A.C. Figueiredo, M. Greer, E. MacDonald, V. Oakes, E. Schaeffer and L. Trager

Anatomy Instructor: T. Gillian

Adjunct Faculty: R. Anandakrishnan, J. Bahamonde-Azcuy, I. Becvarova, C. Bissett, M. J. Bowen, C. Broadbush, M. Byrnes, B. Costa, M. V. Crisman, L. Crofton, S. Eubank, R. Gourdie, J. C. Gutierrez Toro, Q. Han, Y. Huang, T. Hrubec, T. Johnson, J. C. Jones, L. Kang, T. M. Kerkerling, L. Lee, N. M. Lindstrom, K. MacDonald, R. MacPhail, C. J. McNeill, D.L. McRuer, P. Michalak, J. Moody, S. L. Porter, R. Prater, G. Rajagopalan, S. Rao, C. Reilly, B. Robert, A. Sage, S. Santamaria, K. Scarratt, S. Schwartz, J. Sleeman, S. J. Stahl, M. L. Tilghman, L. Tobias, R. Varghese, J. Walters and J. Weisman

Biomedical Science and Pathobiology (BMSP)

BMSP 2135 - Human Anatomy & Physiology (3 credits)

Structure and function of the human body for students preparing for professions in the health fields. 2135: body plan and organization, homeostasis, cell structure and function, histology, integumentary system, skeletal system, muscular system, nervous system and special senses. 2136: endocrine system, circulatory & cardiovascular system, lymphatic system and immunity, respiratory system, digestive system, metabolism, excretion, reproduction, and development. BMSP 2135-2136 duplicates BIOL 2405-2406; may not receive credit for both.

Prerequisite(s): (BIOL 1005 or BIOL 1006) or (BIOL 1105 or BIOL 1106) or (BIOL 1205H or BIOL 1206H)

Instructional Contact Hours: (3 Lec, 3 Crd)

BMSP 2136 - Human Anatomy and Physiology (3 credits)

Structure and function of the human body for students preparing for professions in the health fields. 2135: body plan and organization, homeostasis, cell structure and function, histology, integumentary system, skeletal system, muscular system, nervous system and special senses. 2136: endocrine system, circulatory & cardiovascular system, lymphatic system and immunity, respiratory system, digestive system, metabolism, excretion, reproduction, and development. BMSP 2135-2136 duplicates BIOL 2405-2406; may not receive credit for both.

Prerequisite(s): BMSP 2135

Instructional Contact Hours: (3 Lec, 3 Crd)

BMSP 2145 - Human Anatomy and Physiology Laboratory (1 credit)

Laboratory exercises investigating the structure and function of the human body for students preparing for professions in the health fields. 2145: body plan and organization, homeostasis, cell structure and function, histology, integumentary system, skeletal system, muscular system, nervous system and special senses. 2146: endocrine system, circulatory & cardiovascular system, lymphatic system and immunity, respiratory system, digestive system, metabolism, excretion, reproduction, and development. BMSP 2145-2146 duplicates BIOL 2414; may not receive credit for both.

Corequisite(s): BMSP 2135

Instructional Contact Hours: (3 Lab, 1 Crd)

BMSP 2146 - Human Anatomy and Physiology Laboratory (1 credit)

Laboratory exercises investigating the structure and function of the human body for students preparing for professions in the health fields. 2145: body plan and organization, homeostasis, cell structure and function, histology, integumentary system, skeletal system, muscular system, nervous system and special senses. 2146: endocrine system, circulatory & cardiovascular system, lymphatic system and immunity, respiratory system, digestive system, metabolism, excretion, reproduction, and development. BMSP 2145-2146 duplicates BIOL 2414; may not receive credit for both.

Corequisite(s): BMSP 2136

Instructional Contact Hours: (3 Lab, 1 Crd)

BMSP 4974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

BMSP 4994 - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course

Biomedical and Veterinary Science (BMVS)

BMVS 2994 - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 4014 - Animal Domestication and Genetic Resources (1 credit)

Considers the process, history, sociology and geography of animal domestication. Includes behavioral, physiologic and morphological changes incurred by domesticated stocks. Examines genetic variability of domestic species, considers breed groups and uniquely adapted breeds.

Considers reasons for erosion of genetic variability and mechanisms to counteract such erosion. International in scope. Pre: senior status or enrollment in veterinary professional curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

BMVS 4024 - Diseases of Poultry (2 credits)

Biology control and prevention of poultry diseases. Taught alternate years.

Instructional Contact Hours: (2 Lec, 2 Crd)

BMVS 4974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 4984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 4994 - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 4994H - Undergraduate Research (1-19 credits)

Honors section

Instructional Contact Hours: Variable credit course

BMVS 5005 - Emerging Infectious Diseases (1 credit)

Stand-alone, fully on-line, asynchronous distance and distributed learning course, accessible as streaming videos on the internet or on CDs. 5005: The course defines and discriminates amongst numerous factors influencing the emergence of infectious diseases. Selected emerging food-borne, bacterial, viral, zoonotic diseases of animals and humans are described and analyzed. 5006: The course expands the pathology of emerging infectious diseases. Additional viral, parasitic and zoonotic diseases of animals and humans are described and analyzed. Xenotransplantation is also discussed from the perspective of zoonotic diseases. Third year standing in the DVM curriculum, or good standing in a graduate studies program is required.

Instructional Contact Hours: (1 Lec, 1 Crd)

Course Crosslist: VM 9085

BMVS 5014 - Animal Pathology Residency (1-5 credits)

Training in diagnostic pathology through weekly rotations in the necropsy and surgical biopsy service of the teaching hospital. Students will perform necropsies and histopathologic examinations of necropsies and surgical biopsies and write diagnostic reports. The course is taken in weekly intervals of necropsy and/or surgical biopsy, with a credit hour given for each 2-week interval. Variable credit. May be repeated with a maximum of 5 hours. DVM degree required.

Instructional Contact Hours: (15 Lab, 1-5 Crd)

Repeatability: up to 5 credit hours

BMVS 5094 - Grant Writing and Ethics (3 credits)

A framework for writing clear, concise grant proposals in a team-oriented, multidisciplinary approach from concept development through submission to a funding agency. Potential ethical dilemmas that may arise in academic, industrial, or federal research settings will be discussed. PRE: Undergraduate courses in one of the following: organic chemistry (CHEM 2565/2566), cell and molecular biology (BIOL 2104), Concepts of Biochemistry (BCHM 2024), or equivalent. Graduate standing required.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: CHEM 5094, FST 5094

BMVS 5114 - Critical Skills in Biomedical Research (3 credits)

This course is intended to reach a broad population of students in biological/biomedical research programs and help them develop critical skills in analytical thinking and scientific communications. The course contents include reviews of past and current conceptual advancement, technology development, and controversial topics, in contemporary biomedical research, including but not limited to molecular & cellular biology, genomics, neurobiology, and cancer. The course also includes in-depth analyses of experimental designs and data interpretations, and important considerations for the appropriateness and limitations of experimental approaches and models. This course may be repeated up to 1 time for a total of 6 credit hours. Pre: Biochemistry, Molecular Biology, or equivalent.

Instructional Contact Hours: (3 Lec, 3 Crd)

Repeatability: up to 6 credit hours

BMVS 5174 - Responsible Research Conduct (1 credit)

Scientific integrity and responsible conduct of research as related to studies in life sciences, physical sciences, social sciences, engineering, and humanities. Conflict of interest, human and animal subjects in research, mentor/mentee responsibilities, collaborative research, peer review, research misconduct, responsible authorship and publication, data management, sharing, and ownership, and legal issues in research. Pre: Graduate Standing.

Instructional Contact Hours: (1 Lec, 1 Crd)

BMVS 5194 - Clinical Micropathology (1 credit)

This course presents practical topics in diagnostic pathology. It covers the entire spectrum of disease processes, including the background of clinical, gross anatomic physiologic information required for integration with the microscopic changes observed to arrive at a correct diagnosis. DVM degree and permission of the instructor required.

Instructional Contact Hours: (1 Lec, 1 Crd)

BMVS 5224 - Biomedical Engineering and Human Disease (3 credits)

Comprehensive overview of a variety of human diseases, including neurological disorders, cardiovascular disease, infectious disease, and cancer, designed primarily for graduate students majoring in engineering and other related areas who have a long-term academic and professional goal in the field of biomedical engineering and life sciences. Introduction to state-of-the-art biomedical engineering approaches used for the study of early detection/diagnosis, treatment and prevention of human disease. Graduate standing required.

Prerequisite(s): BMES 5004 or BMVS 4064 or BMES 4064

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: BMES 5024

BMVS 5244 - Veterinary Pharmacology (1-5 credits)

Principles of pharmacodynamics and pharmacokinetics, including interaction of drugs with receptors; absorption, distribution and clearance; drug metabolism and drug interactions. Study of drugs by pharmacological classes, the general mechanisms of action, usefulness and side effects. Pharmaceutical calculations and prescription writing. May be repeated for a maximum of 5 credits. Pre-requisite: Graduate standing required

Instructional Contact Hours: (1-5 Lec, 1-5 Crd)

BMVS 5274 - Systems Pathology (3 credits)

This lecture only course covers the pathology and pathogenesis of specific lesions and diseases of each organ system at the gross and microscopic level. Emphasis is on diagnostic characteristics and interpretation of diseases. Pre: DVM or equivalent.

Instructional Contact Hours: (3 Lec, 3 Crd)

BMVS 5284 - Cellular Pathology (3 credits)

This course presents the mechanisms involved in cellular reaction to injury, inflammation, tissue repair and regeneration, circulatory disturbances (thrombosis, embolism, infarction, hemorrhage, edema, congestion, shock) and neoplasia and other alterations of cell growth. Emphasis will be placed upon disease processes at the cellular and tissue levels.

Instructional Contact Hours: (3 Lec, 3 Crd)

BMVS 5324 - General Neurochemistry (3 credits)

Biochemical mechanisms involved in normal and abnormal nervous system function including discussions of experimental techniques, structural components, neurotransmitters, cerebral blood flow and metabolism, sensory systems, learning, mental disorders, and neuropharmacological agents.

Prerequisite(s): (BCHM 4116 or BCHM 5124) or (BCHM 4116 or BCHM 5124)

Instructional Contact Hours: (3 Lec, 3 Crd)

BMVS 5564 - Introduction to Clinical Research (2 credits)

Design of studies in veterinary related clinical research, planning and implementation of experimental and survey data collection, management and analysis of data, evaluation of analysis and critical evaluation of published information. Instructor approval required.

Instructional Contact Hours: (2 Lec, 2 Crd)

Course Crosslist: VM 8534

BMVS 5594 - Current Technologies in Biomedical Sciences (1 credit)

Current methodologies and techniques for hypothesis-driven scientific experimentation in biomedical research, including molecular biology approaches, microscopy, animal models, molecular applications, cell culture systems, large-scale omics methodologies, bioinformatics analyses, and clinical studies. Cutting-edge and novel approaches for designing experiments and interpreting the resulting data; review of scientific literature; and important considerations for the appropriateness and limitations of specific methods, approaches, and experimental models. Pre: Graduate standing.

Instructional Contact Hours: (1 Lec, 1 Crd)

BMVS 5624 - Molecular Virology (2 credits)

The principles and mechanisms of virus replication at the molecular level including transcription, translation and posttranslational modifications of virus genes, virus interaction with host, antivirals, vaccines and host defense mechanisms against virus infections. The replication and pathogenesis mechanisms of several important DNA and RNA virus families including biothreat viruses. Graduate standing required.

Instructional Contact Hours: (2 Lec, 2 Crd)

BMVS 5764 - Aquatic Medicine and Fish Health (2 credits)

The etiology, diagnosis, pathology, pathogenesis, chemotherapy, control and management of infectious and non-infectious diseases of aquatic organisms, especially pertaining to cultured food and tropical fish. Hands on experience with water quality evaluation, diagnostic techniques and the identification of common pathogenic organisms. Pre-requisite: Second year standing in the DVM curriculum.

Prerequisite(s): VM 8364 or FIW 4514

Instructional Contact Hours: (2 Lec, 2 Crd)

Course Crosslist: VM 8494

BMVS 5794 - Clinical Neuropathology (1 credit)

This course uses necropsy tissues of clinical cases to present the mechanisms involved in neurologic disease of animals. Gross, microscopic, and radiologic approaches will be employed. Emphasis will be placed upon the correlation of clinical and pathological findings. May be repeated. Pre: Instructors approval required.

Instructional Contact Hours: (1 Lec, 1 Crd)

Repeatability: up to 4 credit hours

BMVS 5814 - Functional Morphology and Natural History of Reptiles and Birds (1 credit)

Anatomical features will be described that are unique to, or are characteristic of, each major group covered. Adaptation and successful exploitation of habitat. Use of anatomical features and functions.

Selected attributes of the groups natural history, members of the group common to the local and extended area, those commonly kept as pets. Pre-requisite: Graduate Standing required.

Instructional Contact Hours: (1 Lec, 1 Crd)

Course Crosslist: VM 8254

BMVS 5894 - Final Examination (3 credits)

Instructional Contact Hours: (3 Lec, 3 Crd)

BMVS 5904 - Project and Report (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 5944 - Seminar in Biomedical and Veterinary Sciences (1 credit)

Presentations by graduate students on current topics in Biomedical and Veterinary Sciences. Topics and responsibility for seminars is rotated among the professional departments of the college. Maximum 4 credits.

Instructional Contact Hours: (1 Lec, 1 Crd)

BMVS 5954 - Study Abroad (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 5974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 5984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 5994 - Research and Thesis (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 6014 - Veterinary Clinical Sciences Residency (0 credits)

Advanced course with training and instruction in veterinary patient management. Supervised practicum in veterinary diagnosis and therapy in a veterinary teaching hospital. Material will include development of knowledge and skills for problem solving, performance of techniques, and effective communication. Regularly scheduled rounds and conferences will supplement daily activities. 0 credit. DVM degree required.

Instructional Contact Hours: (0 Lec, 0 Crd)

BMVS 6064 - Advanced Topics in Veterinary Medicine (1-6 credits)

Students will critically review and actively participate in discussion of current and important historic veterinary and comparative medical literature relevant to students residency specialty. DVM degree is required. May be repeated with different content for a maximum of 12 credit hours.

Instructional Contact Hours: (1-6 Lec, 1-6 Crd)

Repeatability: up to 12 credit hours

BMVS 6074 - Clinical Topic Rounds (1-6 credits)

Practical, advanced training in specialty medicine. Students will participate in critical reviews of cases and current literature applicable to selected cases. Relevant information will include advanced diagnostic and therapeutic techniques applicable to the specialty and species being studied. An in-dept knowledge of the pathophysiology of animal disease processes and clinical problem solving will be developed. Students will be expected to gain an understanding of the general problem area to be studied and critically evaluated current literature and application to the case(s) being studied. DVM degree is required. May be repeated with different content for a maximum of 12 credit hours.

Instructional Contact Hours: (1-6 Lec, 1-6 Crd)

Repeatability: up to 12 credit hours

BMVS 6084 - Veterinary Speciality Clinics (3 credits)

Practical, advanced training in specialty medicine. Students will learn advanced diagnostic and therapeutic techniques applicable to the specialty and species being studied. An in-depth knowledge of the pathophysiology of animal disease processes and clinical problem solving will be developed. Students will be given responsibility for case management with faculty guidance. DVM degree is required. May be repeated for a maximum of 12 credits with different content.

Instructional Contact Hours: (3 Lec, 3 Crd)

Repeatability: up to 12 credit hours

BMVS 6094 - Board Certification Topics (1 credit)

Structured preparation for the specialty examinations associated with residency programs and board certification. Topics will vary depending on the particular learning objectives required by the clinical discipline. Pre-requisite: Graduate standing and clinical resident in the Virginia Maryland Regional College of Veterinary Medicine. May be repeated for up to 6 credit hours with different content.

Instructional Contact Hours: (1 Lec, 1 Crd)

Repeatability: up to 6 credit hours

BMVS 6534 - Mechanisms of Disease in Veterinary Medicine (3 credits)

Advanced study of topics concerning the pathophysiology, diagnosis, and current therapy of diseases in Veterinary Medicine. Pre: DVM or equivalent, or consent of instructor. May be repeated to a maximum of 18 credits.

Instructional Contact Hours: (3 Lec, 3 Crd)

Repeatability: up to 18 credit hours

BMVS 6714 - Immunology in Health & Disease (3 credits)

Analysis of emerging, cutting edge and paradigm changing concepts of cellular and molecular immunology in human and animal health and disease. Innate immunity, adaptive immunity, developmental immunology, autoimmunity, immunodeficiency, cancer immunology, and transplantation immunology.

Prerequisite(s): BIOL 5734 or BCHM 5124

Instructional Contact Hours: (3 Lec, 3 Crd)

BMVS 6724 - Mol Mech of Path Bacteria (3 credits)

Molecular mechanisms employed by pathogenic bacteria to cause infection. Classical and contemporary methods for studying host-pathogen interactions at the molecular level. Hypothesis-driven scientific experimentation in pathogenic bacteriology.

Prerequisite(s): BIOL 5634 or BIOL 5674

Instructional Contact Hours: (3 Lec, 3 Crd)

BMVS 6984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

BMVS 7994 - Research and Dissertation (1-19 credits)

Instructional Contact Hours: Variable credit course

Population Health Sciences (PHS)

PHS 1004 - BSPH Essentials (1 credit)

Introduction to the Department of Population Health Sciences and the Public Health curricula requirements. Introduces students to experiential learning opportunities, undergraduate research, ethical behaviors and career paths within the discipline. Exploration of programs, services and resources to enhance awareness of opportunities and support systems available for student success including academic advising and career planning. Intended for Public Health majors in their first semesters, either as incoming freshmen, transfer students or change of major students.

Instructional Contact Hours: (1 Lec, 1 Crd)

PHS 1514 - Personal Health (3 credits)

Fundamental health content and theory to provide students with constructive health information necessary to meet current and future personal health needs. Special emphasis on wellness and health promotion.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 1984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 2004 - Introduction to Public Health (3 credits)

Examination of how public health core disciplines of epidemiology, health policy and administration, health behavior, and environmental health work together in addressing public health problems. Special emphasis on the history of public health, the public health infrastructure and role of health informatics in public health.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 2974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 2974H - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 2984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 2994 - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 2994H - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 3014 - Introduction to Environmental Health (3 credits)

Overview of environmental health, examining local, national, and international frameworks. Environmental factors that affect human health, including major classes of chemical, biological, and physical exposures from different environmental media (air, water, food, and soil). Special emphasis on toxicology and epidemiology methodologies used at the individual (mechanistic) level and at the population level to determine environmental causes of disease. Find the most appropriate prevention or control measure to minimize adverse health outcomes.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 3044 - Global Health Issues (3 credits)

Students will get an overview of the determinants of health and how health status is measured. Students will also review the burden of disease, who is most affected by different disease burdens, risk factors, and key measures to address the burden of disease in cost-effective, doable, sustainable, and fair ways. Special attention will be paid throughout the course to health systems issues. The course will cover key concepts and frameworks but be practical in orientation. The course will be global in coverage but will focus on low- and middle-income countries, the health of the poor, and health disparities. The course will pay particular attention to the linkages between health and development. Pre: Junior standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 3064 - Public Health Seminar (1 credit)

Current topics in public health research, policy and practice, including biostatistics, epidemiology, health policy, environmental health, social and behavioral medicine, infectious diseases, and public health education. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

PHS 3074 - Public Health Professional and Practicum Prep (1 credit)

Preparation for the public health profession and practicum experience. Covers the necessary skills to become a successful public health professional. Students will explore and prepare for public health practicum and career opportunities by assessing interests, creating resume/CV, identifying practicum placement opportunities and future career opportunities and completing necessary placement materials. Communication, ethical considerations, leadership and teamwork, professional skills along with the development of tailored resume/CV, cover letters, interviewing and networking will be covered. P/F only. Pre: Junior Standing.

Prerequisite(s): PHS 2004

Instructional Contact Hours: (1 Lec, 1 Crd)

PHS 3534 - Drug Education (3 credits)

Interpretation of multidimensional (social, psychological and physiological) scientific data regarding drugs. The major drug categories will be covered with special emphasis on substance misuse and abuse.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 3634 - Epidemiologic Concepts of Health and Disease (3 credits)

Designed to give students in the health sciences a basic understanding of the modern concepts regarding health and disease as well as skills in organizing epidemiological data, disease investigation and surveillance. Includes a survey of terms, concepts, and principles pertinent to epidemiology. Lifestyles of populations and the relationships between lifestyles and health status are studied.

Prerequisite(s): STAT 2004 or STAT 3005 or STAT 3604 or STAT 3615

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: HNFE 3634

PHS 3654 - Equity in Rural Health (3 credits)

Exploration of the socioeconomic, behavioral, biological, environmental and other factors that impact human health and contribute to health disparities. Introduction to concepts surrounding rural health equity, including: (i) defining rurality; (ii) identifying social determinants of health; (iii) reviewing the history of the US public health systems and policies tasked with improving rural health; (iv) describing critical health disparities impacting rural communities (such as cardiovascular disease, cancer, mental health and substance use disorders), and the drivers of these disparities; and, (v) (v) assessing health of special populations living in rural communities, such as maternal, newborn, adolescent and child health, aging populations, migrant populations, and LGBTQ + populations (vi) discussing the assessment, planning, policies, and interventions which can be implemented to improve the health of rural communities at the population level.

Prerequisite(s): PHS 2004

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 3964 - Practicum (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 3984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 4014 - Public Health Program Planning and Evaluation (3 credits)

Fundamental of public health program development, implementation and evaluation. Basic processes, approaches and interventions that identify and address the major health-related needs and concerns of populations. Pre: Junior Standing

Prerequisite(s): PHS 2004 and HNFE 2664

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 4044 - Public Health Policy and Administration (3 credits)

Evolution and analysis of public health policy in the United States. Public health and care systems. Administrative concepts central to public health such as human resources, strategic planning, controlling, directing, leadership and health law. Junior Standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 4054 - Concepts in One Health (3 credits)

Dynamic interdependence of human, animal and environmental health; theoretical foundations of One Health; One Health research methods for assessing animal-human linkages; One Health operationalization in human medicine, veterinary medicine and public health; policies and practices related to One Health; and capacity building and public engagement; One Health and traditional Medical Model approaches to health problems. Pre: Junior standing.

Prerequisite(s): PHS 3014 and PHS 3634

Pathway Concept Area(s): 3 Reasoning in Social Sciences, 4 Reasoning in Natural Sci., 11 Intercultural&Global Aware.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 4064 - Modeling Infectious Diseases (3 credits)

Mathematical modeling of infectious diseases; simple epidemic models, risk structure and modeling risk structure, multi-pathogen models, multi-host models, temporal seasonal models, spatial models, stochastic dynamics and modeling for public health policy. Pre: Junior Standing.

Prerequisite(s): MATH 1014 or MATH 1025 or MATH 1225 or MATH 1524

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 4074 - Practicum in Public Health (2 credits)

Application of Public health theories, concepts and data in a work setting; comprehensive, structured experience requires student to demonstrate professional competencies and ethical behavior while working closely with a supervisor in a public health practice setting. Pass/Fail Only. Pre: Senior standing.

Prerequisite(s): PHS 3074 and PHS 2004 and PHS 3014 and PHS 3634

Instructional Contact Hours: (2 Lec, 2 Crd)

PHS 4094 - Appalachian Community Research (3 credits)

Undergraduate participatory community research as applied to issues of cultural heritage, sustainability, and identity. Students engage in projects defined by community groups and organizations as being critical to their well-being, continuity, or growth. Emphasis is on developing concepts of civic professionalism and developmental democracy.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: APS 4094, SOC 4094

PHS 4174 - Capstone in Public Health (2 credits)

The capstone in Public Health course is designed for Public Health students to integrate and synthesize knowledge gained for the undergraduate BSPH core curriculum. Students will apply the knowledge gained from the core BSPH courses to analyze, explain and address public health problems. Class deliverables will focus on public health case studies and the 10 Essential Public Health services (EPHS). This course serves as the BSPH program culmination course. Pre: Senior Standing.

Prerequisite(s): PHS 2004 and PHS 3014 and PHS 3634 and PHS 3074

Instructional Contact Hours: (2 Lec, 2 Crd)

PHS 4974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 4974H - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 4984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 4994 - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 4994H - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 5004 - Foundations of Public Health (1 credit)

Foundational principles of public health, including history, core functions and essential services. Public health ethics and values. Career opportunities in the public health core disciplines. Biologic determinants of health. Global and One Health frameworks for health and health professionals. Pre: Graduate standing.

Instructional Contact Hours: (1 Lec, 1 Crd)

PHS 5014 - Environmental Health (3 credits)

Exploration of major environmental health concepts and issues, environmental policies and regulations. Topics include world population and pressures on the environment, healthy environment; environmental determinants of public health, including biological, physical and chemical factors; environmental factors affecting disease vectors and their control; air and water quality; waste management; the built environment, work environments and recreational area; food protection and safety; occupational health; tools for environmental evaluation, planning and safety. Pre: Graduate Standing or permission from the instructor.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: VM 7014

PHS 5024 - Epidemiology and Quantitative Methods in Public Health Lab (1 credit)

Statistical skills needed to conduct epidemiologic and public health research including descriptive statistics, bivariate statistics, and regression. Reading and writing code. Manipulate, analyze, and visualize public health data using statistical software. Probability, confidence intervals, and significance. Statistical power. Pre: Graduate standing.

Corequisite(s): PHS 5026

Instructional Contact Hours: (3 Lab, 1 Crd)

PHS 5025 - Epidemiology and Quantitative Methods in Public Health (3 credits)

5025: Investigation and analysis of dynamics and determinants of disease in communities and populations. Philosophy, assessment, and application of public health science, ethics, study design, data analysis, and epidemiologic measures. 5026: Basic ideas, methods, and measures of epidemiology. Statistical knowledge and skills to analyze and interpret data from epidemiologic studies. Introduction to common statistical packages. Evaluation of scientific evidence from literature. Identify and minimize major potential sources of error in epidemiologic studies. Pre: Graduate standing for 5025.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5026 - Epidemiology and Quantitative Methods in Public Health (3 credits)

5025: Investigation and analysis of dynamics and determinants of disease in communities and populations. Philosophy, assessment, and application of public health science, ethics, study design, data analysis, and epidemiologic measures. 5026: Basic ideas, methods, and measures of epidemiology. Statistical knowledge and skills to analyze and interpret data from epidemiologic studies. Introduction to common statistical packages. Evaluation of scientific evidence from literature. Identify and minimize major potential sources of error in epidemiologic studies. Pre: Graduate standing for 5025.

Prerequisite(s): PHS 5025

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5034 - Health Behavior and Health Education (3 credits)

This course has two main purposes: (1) to familiarize students with historical, theoretical and methodological aspects of health psychology, and (2) to acquaint health education students with the social, psychological, and cultural determinants of health behaviors which form the underpinnings of health education practice.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5044 - Public Health Policy and Administration (3 credits)

Multiple dimensions of the health policy-making process including the roles of ethics and evidence. Analyzing health policies for their impact on public health and health equity. Examining the structure and function of health care models nationally and globally. Constitutional basis for public health. Applying principles of planning, organizing, directing, staffing, and budgeting to public health agencies. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: HNFE 5694

PHS 5054 - Public Health Leadership and Interprofessionalism (2 credits)

Fundamentals of public health leadership and management using a systems-thinking lens. Decision-making, change management, shared vision, and communication. Strategic planning and public health ethics. Negotiation role-playing. Models of team effectiveness. Team building applied to working on public health and interprofessional teams. Collaborative leadership, personal leadership styles, and self-reflection. Diversity and cultural competency in the public health setting as a leader. Pre: Graduate standing.

Instructional Contact Hours: (2 Lec, 2 Crd)

PHS 5064 - Public Health Program Development and Evaluation (3 credits)

Development and evaluation of public health education and infectious disease programs. Health equity, systems thinking, and cultural responsiveness throughout the program development and evaluation cycle. Assessment of community health needs. Engagement of diverse stakeholders. Effective public health program design. Development of evaluation plans to assess processes, outcomes, and impacts. Relationship between program development, ongoing evaluation, and improvement. Communication of evaluation findings to stakeholders. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: VM 7064

PHS 5204 - Principles of Community Health Education (3 credits)

Public health issues and concepts are analyzed and evaluated in relationship to existing principles of health education.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5224 - Comp Health Systems (3 credits)

Comprehensive examination of the structure and function of worldwide healthcare and public health systems. National health services with central funding, social insurance programs, decentralized systems, and private insurance systems. Pre-requisite: Graduate Standing required.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5234 - Methods of Community Health Engagement (3 credits)

This course is designed to present core concepts, models, methods, strategies and challenges in the process of working with communities to improve community-identified population health needs. This course presents an overview of models for community organizing and community capacity building and provides students the opportunity to apply classroom concepts "in the field" through working with community partners and the development and presentation of a group Needs Assessment in collaboration with the community partner. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5244 - Sexual Health and Human Rights (3 credits)

Sexual and reproductive health from human development, public health, and critical feminist perspectives, with special attention to human rights issues. Sexually transmitted infections; HIV/AIDS; unintended pregnancy; population policies; eugenics; sexual and reproductive rights; positive sexuality, sex education; and health promotion. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: HD 5244, WGS 5244

PHS 5254 - Social Epidemiology and Health Inequities (3 credits)

Social determinants of health through the life-course. Relationship of social injustice to public health. Interplay of major social factors such as poverty, race and gender to influence health domestically and globally. Application of social epidemiology to a range of health outcomes. Inform effective solutions to health inequities. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: HD 5254

PHS 5314 - Infectious Disease Epidemiology (3 credits)

Dynamics and determinants of infectious diseases and their assessment on the molecular to population continuum in a systems based approach. Infectious disease transmission mechanisms; population susceptibilities; environmental, social, cultural and economic contributors to infectious disease propagation; detection and surveillance; geographic information systems; epidemiologic study design; and infectious disease modeling.

Prerequisite: Graduate Standing required

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: VM 7314

PHS 5324 - Pub Hlth Infect Contrl & Prev (3 credits)

Assessment, policies, and procedures for control and prevention of infectious diseases in communities and populations. Sources, transmission mode, and local community to international dissemination of infectious disease agents; antimicrobial and chemical resistance; vaccine development, safety, and coverage; community and hospital based needs and interventions; and regulatory frameworks. Pre: Graduate Standing required.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: VM 9324

PHS 5334 - Principles of Infectious Diseases (3 credits)

Principles of infectious diseases important for local, national, and global public health. Bacterial, viral, fungal, and parasitic pathogens; mechanisms of disease; host immune response to pathogens. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: VM 9334

PHS 5344 - Neglected and Emerging Infectious Diseases in Public Health (3 credits)

Neglected infectious diseases and their association with marginalized populations and factors including poverty, social and health inequities, water, sanitation and hygiene, and urbanization. Critical factors for emergence/re-emergence of infectious diseases in populations and regions, including geopolitical challenges, zoonotic and vector impacts. Evaluate studies and global responses to neglected and emerging infectious diseases to inform the development of One Health interventions. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: VM 9344

PHS 5704 - Drinking Water & Health (3 credits)

Drinking water contamination and associated health outcomes. Programs to improve safe water access. Viral, bacterial, protozoal, and helminthic pathogens. Heavy metals, pesticides, and other contaminants. Drinking water treatment and supply in rural areas. Study designs for health outcome assessment. Field-based intervention trials. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: CEE 5704

PHS 5714 - Health of the Elderly (3 credits)

The health needs and problems of the elderly, the implications for those working with the elderly, and possible health care delivery systems.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5724 - Ethical Foundations of Public Health (3 credits)

Methods for ethics decision-making in public health and health policy, exploration of theoretical foundations of ethical public health practice, methods for identifying ethical challenges and ethical dilemmas, skills for managing ethical ambiguity, differences and similarities between professional ethics, research ethics, clinical ethics, and public health ethics, key historical events in public health that led to ethical and policy requirements, decision-making frameworks to analyze public health ethical challenges, current writings in public health ethics literature, well-reasoned written and oral arguments for a course of action to address public health ethics dilemmas. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5904 - Project and Report (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 5924 - Capstone in Public Health (3 credits)

Synthesis of coursework and practicum experience into a final comprehensive product which integrates knowledge and skills acquired in all core classes, specific MPH concentration courses and practicum experience for developing, implementing and evaluating a public health program; tests students ability to effectively analyze a public health problem and develop an intervention toward a solution to the problem. Pre-requisite: Graduate standing; completion of 39 hours of MPH coursework including enrollment in or completion of public health practicum.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5934 - Public Health Integrative Learning Experience (3 credits)

Culminating experience required for the MPH degree. Integration of program foundational and concentration-specific competencies. Team-based public health educational and professional experience. Addressing a public health challenge. Working with a mentor from an external stakeholder organization. Producing individual high-quality written deliverable. Reflection on the learning experience. Team presentation of project. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

PHS 5935 - Preparation for Public Health Practice (1 credit)

Preparation for the public health profession. Covers the necessary skills to become a successful public health professional. 5935: Exploration of Public Health Practice Experience (PHPE) placement opportunities. PHPE goals, objectives, and competencies. PHPE products that align with academic and professional goals. PHPE learning contract. Institutional review board (IRB) protocols. Communications and professionalism skills. Academic poster and e-portfolio design. Work/life balance strategies. 5936: Examination of professional preparation for careers in public health. Job search strategies, resume/CV and cover letter writing, interviewing, and networking. Workplace skills, including professional communication, group process, leadership/supervision skills, working with the media, and survey design and data presentation. Personal/professional growth strategies, including salary and benefits negotiation, debt management, and time management. Grant writing. Pre: Graduate standing; 5935 for 5936. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

PHS 5936 - Preparation for Public Health Practice (1 credit)

Preparation for the public health profession. Covers the necessary skills to become a successful public health professional. 5935: Exploration of Public Health Practice Experience (PHPE) placement opportunities. PHPE goals, objectives, and competencies. PHPE products that align with academic and professional goals. PHPE learning contract. Institutional review board (IRB) protocols. Communications and professionalism skills. Academic poster and e-portfolio design. Work/life balance strategies. 5936: Examination of professional preparation for careers in public health. Job search strategies, resume/CV and cover letter writing, interviewing, and networking. Workplace skills, including professional communication, group process, leadership/supervision skills, working with the media, and survey design and data presentation. Personal/professional growth strategies, including salary and benefits negotiation, debt management, and time management. Grant writing. Pre: Graduate standing; 5935 for 5936. Pass/Fail only.

Prerequisite(s): PHS 5935

Instructional Contact Hours: (1 Lec, 1 Crd)

PHS 5964 - Practicum (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 5974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 5984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

PHS 8984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

Professional Program Courses

Professional program courses leading to the D.V.M. degree carry the veterinary medicine (VM) prefix. For updated information on the DVM Curriculum, please see our website at: <http://www.vetmed.vt.edu/academics/dvm/dvm-curriculum.asp>.

VM 7014 - Environmental Health (3 credits)

Exploration of major environmental health concepts and issues, environmental policies and regulations. Topics include world population and pressures on the environment, healthy environment; environmental determinants of public health, including biological, physical and chemical factors; environmental factors affecting disease vectors and their control; air and water quality; waste management; the built environment, work environments and recreational area; food protection and safety; occupational health; tools for environmental evaluation, planning and safety. Pre: Graduate Standing

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: PHS 5014

VM 7064 - Public Health Program Development & Evaluation (3 credits)

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: PHS 5064

VM 7314 - Infectious Disease Epidemiology (3 credits)

Dynamics and determinants of infectious diseases and their assessment on the molecular to population continuum in a systems based approach. Infectious disease transmission mechanisms; population susceptibilities; environmental, social, cultural, and economic contributions to infectious disease propagation; detection and surveillance; geographic information systems; epidemiologic study design; and infectious disease modeling. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: PHS 5314

VM 8000 - Small Animal Behavioral Medicine (1 credit)

Behavioral medicine of the dog and cat; ontogeny of behavior, basic obedience and housetraining, aggression, anxiety, compulsive disorders, elimination problems, psychopharmacology. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8004 - The Animal-Human Relationship (2 credits)

Exploration of the animal-human relationship and its impact on animal and human welfare. Five themes; animal cognition; animals in service roles, shelter medicine and management, animal laws, and wildlife-human interface. Communication of health-related topics to other professionals and general public. Pre: 3rd year standing in the DVM program. P/F only. Design Lab Studio

Instructional Contact Hours: (1 Lec, 2 Lab, 2 Crd)

VM 8020 - Equine Diagnostic Techniques for Digestive, Nervous and Integumentary System (1 credit)

Diagnostic and therapeutic techniques commonly used in equine practice involving the gastrointestinal, neurological and integumentary systems. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio (2L,1C)

Corequisite(s): VM 8030, VM 8696

Instructional Contact Hours: (2 Lab, 1 Crd)

VM 8024 - Descriptive Embryology (1 credit)

A brief introduction to the early stages of development in common domestic animals. Covers the period from fertilization of the oocyte to initiation of organogenesis. Also introduces concepts on the mechanisms of development and the teratogenic effects of exogenous factors. Includes an introduction to the phenomenon of multiple pregnancies in different species, and comparative patterns of placentation. This course provides an overview of the cellular events immediately preceding and following fertilization, as well as a synopsis of general developmental features of gastrulation, placentation, and ontogeny of selected body systems. Completion of the course should greatly assist students in understanding various anatomical aspects of the adult animal body, as well as common congenital malformations. Pre: first-year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8030 - Special Topics in Equine Clinical Practice Lab (1 credit)

Clinical techniques for evaluation of the ophthalmological, neurological, odontological and gastro-enteric systems of horses. Techniques for preventive medicine of teeth. Castration and wound management. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (2 Lab, 1 Crd)

VM 8060 - Compassionate End of Life Care (2 credits)

Ethical implications and communication nuances regarding euthanasia of animals. Euthanasia techniques, mechanism of action of drugs, pre-anesthesia sedation and anesthesia protocols, routes of administration of euthanasia drugs and regulatory requirements of controlled substances including those in the American Veterinary Medical Association (AVMA) Guidelines for Euthanasia of Animals. Client bereavement, pet memorialization, after care services and compassion fatigue. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8070 - Fundamentals of Veterinary Diagnostics (2 credits)

Fundamentals of veterinary diagnostic testing. Application of diagnostic reasoning in test selection and result interpretation. Select test methodology in the major diagnostic areas. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8110 - Sensing and Seeing (10 credits)

Neural, ocular and cutaneous structure and function required for locomotion, vision, touch, and hearing. Diagnosis and treatment of common diseases of domestic animals that limit function of sensing and seeing. Normal and abnormal integument of domestic animals. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (8 Lec, 3 Lab, 10 Crd)

VM 8130 - Special Topics in Equine Problem Solving (2 credits)

Application of clinical reasoning skills to diagnose, treat and manage diseases of horses involving the gastrointestinal, nervous, reproductive, ocular and integumentary systems. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8154 - Food Animal Product Safety for Veterinarians (2 credits)

History, development and enforcement of laws and regulations that affect the food animal processing industry and consumers of animal products. Comprehensive approach to microbiological and physical foodborne hazard identification, testing and sampling. Foodborne hazard prevention and control, including Hazard Analysis and Critical Control Points systems. Pre-requisite: Third year standing in DVM curriculum

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8164 - The Normal Animal (10 credits)

Normal individual behavior, social behavior, and management of domestic species. Normal domestic animal body structure and function including skeletal and neuromuscular organization, body cavities and gross and radiographic anatomy of structures within those cavities. Foundational knowledge of cell structure, differentiation and physiology, pharmaceuticals that influence cellular physiology. Clinical Skills required for veterinarians. Pass/Fail Only. Pre: Graduate Standing.

Instructional Contact Hours: (8 Lec, 4 Lab, 10 Crd)

VM 8174 - Dealing with Threats (10 credits)

Bacterial, viral, parasitological, toxicological agents of disease in domestic animals; mechanisms of disease production. Immunological responses to infectious agents and immune-mediated diseases. Pathological and clinic- pathological responses of domestic species to insult. Principles of epidemiological evaluation, diagnosis, treatment, control and prevention of common threats to domestic species. Pass/Fail Only.

Instructional Contact Hours: (8 Lec, 6 Lab, 10 Crd)

VM 8194 - The Next Generation (9 credits)

Anatomy, physiology, pharmacology and medical aspects associated with conception, embryonic and fetal development, gestation, delivery, and lactation, as well as neonatal development, disorders and management. Surgical and medical management of fertility will also be covered, to include hands-on surgical experience performing canine ovariectomy. Pass/Fail only.

Instructional Contact Hours: (7 Lec, 6 Lab, 9 Crd)

VM 8204 - Healthy Populations (7 credits)

Principles of epidemiology, biosecurity, population dynamics preventative health management of populations. One Health, the role of veterinarians in the diagnosis and prevention of zoonotic diseases, food security, food safety, food defense, meat hygiene, antimicrobial usage and prevention of antimicrobial resistance. Surgical and medical management of fertility including canine ovariectomy. Pass/Fail only.

Instructional Contact Hours: (6 Lec, 3 Lab, 7 Crd)

VM 8214 - Small Animal Medicine (3 credits)

Clinical features and pathophysiology of common diseases of the endocrine, gastrointestinal, hepatobiliary, hematologic, urinary, and respiratory systems of dogs and cats. Diagnosis and treatment of these diseases. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (3 Lec, 3 Crd)

VM 8224 - Problem Solving in Public and Corporate Veterinary Practice (2 credits)

Public veterinary practice skills for veterinarians working in public and corporate practice. Communication with the media and stakeholders, methods for group decision-making, and frameworks for problem solving, including SWOT (Strengths, Weaknesses, Opportunities and Threats) Analysis, Risk Analysis, and the PESTLE framework. Government infrastructure and regulations related to infectious disease management in animal populations, emergency management, public health and animal welfare. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8244 - Zoo Mammal Comparative Morphology (1 credit)

Anatomy and physiology of zoo mammals. Functional evolutionary adaptations of morphological features of these mammals. Adaptations for locomotion, alimentation, thermoregulation and reproduction. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8254 - Functional Morphology of Birds (1 credit)

Anatomical features will be described that are unique to, or are characteristic of, each major group covered. Adaptation and successful exploitation of habitat. Use of anatomical features and functions. Selected attributes of the groups natural history, members of the group common to the local and extended area, those commonly kept as pets. Pre-requisite: Graduate Standing required.

Instructional Contact Hours: (1 Lec, 1 Crd)

Course Crosslist: BMVS 5814

VM 8264 - Small Animal Nutrition (1 credit)

Practical feeding guidelines for companion animals. Special consideration also given to the relationship of diet to nutrient excesses and deficiencies that result in clinical disorders. Diagnosis, treatment, and prevention of metabolic disorders of companion animals will be discussed.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8294 - Small Animal Surgical Diseases and Techniques (2 credits)

Clinical features, pathophysiology and diagnosis of common small animal surgical diseases. Anatomically relevant structures, techniques, complications, and emergency resuscitation plans for common surgeries. Oncological and reconstructive surgeries. Preoperative, surgical and postoperative care. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (1 Lec, 2 Lab, 2 Crd)

VM 8360 - Food Animal Clinical Techniques (1 credit)

Techniques for physical examination, handling and restraint of food animals. Common diagnostic techniques including necropsy. Beef quality assurance programs including pharmaceutical and regulatory requirements. Pain relieving procedures. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Corequisite(s): VM 8615

Instructional Contact Hours: (2 Lab, 1 Crd)

VM 8364 - Veterinarians and Public Policy (2 credits)

Formulation and implementation of veterinary public policy at the international, national, state, professional association, and consumer level. Discussion of the formulation of legislation, regulation, guidance and resolutions. Roles of science, law, politics, economics, societal values, and stakeholder influence in forging veterinary public policy. Moral and ethical dimensions of veterinary public policy making. Focus on the formulation, role and impacts of public policy relative to the practice of private and public veterinary medicine. Pre: Graduate standing. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8384 - Food Animal Nutrition (1 credit)

Practical feeding guidelines for food animals. Relationship of diet to nutrient excesses and deficiencies and resulting clinical disorders. Diagnosis, treatment and prevention of metabolic disorders of food animals. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8394 - Equine Nutrition (1 credit)

The course is designed to provide practical feeding guidelines for different classes of horses. The relationship between nutrition and clinical disorders of the horse is explored including their nutritional management. Students will be expected to complete a problem-solving nutrition project during the course.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8464 - Topics in Veterinary Public Health (2 credits)

Contributions of veterinary science to human health and well-being. Water quality and animal agriculture; antimicrobial use in animal populations and the impact on human health; environmental aspects of emerging and zoonotic infectious diseases; zoonoses of global importance; prioritization methods for infectious diseases; food safety, security and defense; socioeconomic impacts of animal disease; Human-Animal interaction/Human-Animal bond. Pass/Fail only. Pre: Graduate standing.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8484 - Food Animal Clinical Pharmacology (1 credit)

Therapeutic principles and their application for drugs in food animals. Drug labeling and extra-label drug use. Application of regulations regarding the Animal Medicinal Drug Use Clarification Act, Veterinary Feed Directive, growth promotants and implants. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8494 - Aquatic Medicine and Fish Health (2 credits)

The etiology, diagnosis, pathology, pathogenesis, chemotherapy, control and management of infectious and non-infectious diseases of aquatic organisms, especially pertaining to cultured food and tropical fish. Hands on experience with water quality evaluation, diagnostic techniques and the identification of common pathogenic organisms. Pre-requisite: Second year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 2 Crd)

Course Crosslist: BMVS 5764

VM 8504 - Developing the Public Veterinary Practitioner (2 credits)

Principles of outbreak investigation, descriptive epidemiology, and disaster management in the control of infectious animal disease outbreaks; risk analysis; literature review methods; design of disease surveillance, prevention and control programs; principles of animal welfare; and global veterinary capacity building. Topics discussed within the context of state and federal government agencies, corporate/industry, and clinical institutions. Emphasis on communication, teamwork and leadership skills. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8524 - Equine Clinical Problem Solving (2 credits)

Equine clinical cases in a problem-oriented format. Causes and diagnoses of common equine clinical problems, diagnoses tests, test result interpretation, therapeutic regimen prescription, treatment monitoring plans. Pre: third-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8534 - Introduction to Clinical Research (2 credits)

Design of studies in veterinary related clinical and epidemiologic research, planning and implementation of experimental and survey data collection, management and analysis of data, evaluation of analysis and critical evaluation of published information. Pre: second-year standing in DVM curriculum.

Instructional Contact Hours: (2 Lec, 2 Crd)

Course Crosslist: BMVS 5564

VM 8564 - Breathing and Circulating (10 credits)

Structure, function and dysfunction of the cardiovascular, hemolymphatic and respiratory systems including gross, radiographic and microscopic anatomy; pathogenesis, pathophysiology, diagnosis, treatment and prevention of common diseases; general anesthesia of veterinary patients. Pass/Fail only.

Instructional Contact Hours: (9 Lec, 3 Lab, 10 Crd)

VM 8574 - Food Animal Theriogenology (1 credit)

Reproductive management for herds of food animal species including cattle, sheep, goats and pigs. Emphasis on clinical aspects of reproductive management. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (2 Lab, 1 Crd)

VM 8584 - Eating and Eliminating (10 credits)

Gastrointestinal, hepatobiliary, endocrine, renal, urogenital tract disease in domestic animals; congenital, degenerative, drug-induced, allergic, nutritional, neoplastic, immune-mediated, infectious, traumatic, toxic, vascular causes. Oral and abdominal anatomy. Nutrition. Clinical signs, diagnosis, treatment, and prevention of common diseases of domestic species. Pass/Fail only.

Instructional Contact Hours: (9 Lec, 3 Lab, 10 Crd)

VM 8594 - Wildlife Medicine (1 credit)

The course will include discussions on the regulations and ethics covering the rehabilitation and release of native wildlife. Lectures will cover the major infectious diseases, parasites, toxicities, injuries and other problems of wildlife. Common treatments, methods and equipment used to care for and rehabilitate these animals will be discussed. Species covered will include native mammals, wild songbirds, and raptors. Pre: second-year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8604 - Small Animal Emergency Medicine (2 credits)

Topics and techniques for small animal emergency and critical care. Diagnosis and treatment of emergent systemic disease, traumatic injuries, toxicological emergencies and shock. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (1 Lec, 2 Lab, 2 Crd)

VM 8610 - Food Animal Population Medicine (2 credits)

Concepts of production diseases of food animals at the herd level. Includes diagnostic, therapeutic and prevention strategies. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8615 - Food Animal Medicine and Surgery (3 credits)

8615: This course will provide in-depth information on the common disorders of the major body systems of cattle, sheep, goats and pigs. Clinical signs, diagnostic tests, and treatments for disorders of individual animals will be emphasized. 8616: The course will include treatment of the individual animal and herd problems, preventative aspects of herd problems, and the regulatory and health aspects of herd management. Emphasis is on the production medicine aspects of herd and flock management. Pre: Third-year standing in the DVM curriculum.

Instructional Contact Hours: (3 Lec, 3 Crd)

VM 8664 - Beyond Private Practice: Veterinary Careers and Pathways (1 credit)

Exploration of veterinary career opportunities in federal and state governments; zoological, wildlife, aquatic, and conservation medicine; animal-related industries; academia and research; and emerging opportunities. Focus on pathways and processes used to determine career choice. Emphasizes development of resumes, interviewing and negotiating for public and corporate careers. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8665 - Becoming a Veterinary Professional (2 credits)

Introductory professional development for veterinarians, including the principles of oral clinical communication (communication with clients, colleagues and general public), clinical written communication (medical records, case reports, referrals), collaboration (inter and intra professional), reflective practice, intercultural awareness, ethics and law, animal welfare, career development, professionalism, foundational practice management, literature seeking and evidence based medicine, and management of self, team, finance and career. Enrolled in DVM degree. Pre: Graduate standing. P/F only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8666 - Becoming a Veterinary Professional (2 credits)

Further exploration of professional development with an emphasis on more difficult communication topics, revisiting career development, finance, legal and ethical issues at a deeper level. Create a community and social context to provide, identify and facilitate learning from professional role models. Enrolled in a DVM degree. Graduate standing. P/F only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8667 - Becoming a Veterinary Professional (2 credits)

Build a professional identity through exploration of medical errors, team communication skills, communication of diagnostic and treatment plan, outcomes and financial consideration. Professional development through exposure to multiple professional, ethical and cross-cultural scenario and cases. Enrolled in a DVM degree. Graduate standing. P/F only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8670 - Special Topics in Equine Clinical Practice (2 credits)

Current and in-depth information on common diseases of horses including their pathophysiology, diagnosis, treatment, clinical management and control. Advanced topics in neurology, gastroenterology, ophthalmology, urology, oncology, and dermatology. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8680 - Equine Clinical Practice: Breathing, Circulating and Moving (2 credits)

Current and in-depth information on common diseases of horses including their pathophysiology, diagnosis, treatment, clinical management and control. Advanced topics in the musculoskeletal, respiratory and cardiac systems. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8690 - Equine Clinical Practice: Breathing, Circulating and Moving Lab (1 credit)

Development of clinical skills for diagnosis of diseases that affect the equine musculoskeletal, respiratory and cardiac systems. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (2 Lab, 1 Crd)

VM 8704 - Veterinary Cytopathology (1 credit)

Introduction to cytopathology and sample collection. Microscopic review of cytological samples from common neoplastic, inflammatory and infectious disorders. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8714 - Small Animal Oncology (2 credits)

Study of pathophysiology, diagnosis, staging and management of cancer in small animals. Critical evaluation of the primary veterinary oncology literature. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (1 Lec, 2 Lab, 2 Crd)

VM 8724 - Equine Diagnostic Techniques for the Musculoskeletal and Respiratory Systems (1 credit)

Diagnostic techniques commonly used in equine practice involving the musculoskeletal and respiratory systems. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (2 Lab, 1 Crd)

VM 8734 - Beef Cattle Medicine and Production (1 credit)

Management and medical conditions affecting production in beef cattle. Common procedures in beef practice. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8744 - Dairy Cattle Medicine and Production (1 credit)

Management and medical conditions affecting production in dairy cattle. Common procedure in dairy practice. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8774 - Food Animal Clinical Reproduction (1 credit)

Techniques for clinical evaluation of the reproductive tract of individual animals in herds of food animals including cattle, sheep, and goats. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (2 Lab, 1 Crd)

VM 8784 - Decision Making in Veterinary Pharmacology (2 credits)

Principles of therapeutic decision making with emphasis on selection of appropriate drug, the risks and benefits of drug treatment, monitoring the course of therapy in an individual patient, and the economic impact of therapeutic decisions including the cost of therapy costs of drug residues and adverse drug reactions. Study of drugs based on therapeutic objectives and the effect of the disease process on pharmacokinetics and pharmacodynamics.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8794 - Equine Podiatry (3 credits)

Anatomy, physiology, and biomechanics of the distal limb of the horse. Diagnosis, including radiology, and treatment of common diseases of the equine digit. Principles and practice of farriery. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 3 Lab, 3 Crd)

VM 8804 - Small Animal Physical Rehabilitation and Complementary Medicine (1 credit)

Physical rehabilitation, conditioning, and complementary therapies in small animals. Therapeutic and conditioning exercises, acupuncture, photobiomodulation, electrical stimulation, therapeutic ultrasound, nutrition and nutraceuticals. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8810 - Care Forward (2 credits)

Principles of wellness in health care professionals. Strategies for self-care, development of personal financial management, and healthy inter-professional and interpersonal relationships. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8814 - The Next Equid (3 credits)

Development of knowledge and skills for diagnosing and managing reproductive tract conditions of the horse including breeding soundness and cycles, pregnancy diagnosis, failure to breed, and parturient emergencies. Neonatal medicine including diagnosis, treatment and management of sick foals, and preventive care. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (1 Lec, 3 Lab, 3 Crd)

VM 8824 - Moving (9 credits)

Structure and function of musculoskeletal systems required for locomotion. Diagnosis and treatment of common diseases of domestic animals that limit function of movement. Pain and pain management. Pass/Fail only. Design/Lab Studio.

Instructional Contact Hours: (7 Lec, 3 Lab, 9 Crd)

VM 8834 - Food Animal Reproduction Techniques (1 credit)

Transrectal palpation skills and ultrasonography in the non-pregnant cow to assess uterus and ovarian structures. Reproductive tract scoring in the heifer, semen handling and AI techniques, and bull breeding soundness examination. Diagnosis of infertility and abortion. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design studio/lab.

Corequisite(s): VM 8574

Instructional Contact Hours: (2 Lab, 1 Crd)

VM 8844 - Applied Veterinary Diagnostics (2 credits)

Case based applications of veterinary diagnostic testing. Interpretation of gross lesions, radiographic images, laboratory data, and ultrasound images relevant to body systems. Clinical and diagnostic reasoning to determine clinically significant abnormalities. Pass/Fail only.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 8864 - Clinical Reptile Medicine (1 credit)

Anatomy, physiology and husbandry of four reptilian groups. Diagnostic tests, hospital care, anesthesia, analgesia, critical care, and surgical treatment of common diseases and injuries of reptiles. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8874 - Ferret Medicine and Surgery (1 credit)

A comprehensive study of domestic ferret from the veterinary perspective. Topics include husbandry/management, common diseases and surgical procedures. The course consists of lectures and laboratories. Pre: third year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8884 - Traditional Chinese Veterinary Medicine (1 credit)

History and fundamental theories of traditional Chinese veterinary medicine (TCVM). Assessment, diagnosis and treatment of disease using these theories. Diagnostic techniques and their interpretation associated with TCVM including the use of meridians. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8894 - Small Animal Ophthalmology and Neurology (1 credit)

Clinical features and pathophysiology of common diseases of the eyes and nervous system of dogs and cats. Diagnosis and treatment of ocular and neurological diseases. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 8914 - Small Animal Dentistry (2 credits)

Normal dental anatomy, diagnosis of common dental/oral diseases of dogs and cats including radiology. Complete oral health assessment and treatment. Techniques for tooth extraction, regional nerve blocks, mandibular fractures, interceptive and restorative dentistry. Pre: 3rd year standing in the DVM program. Pass/Fail only. Design Lab/Studio.

Instructional Contact Hours: (1 Lec, 2 Lab, 2 Crd)

VM 8984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

VM 9004 - Avian Medicine and Surgery (1 credit)

Course is designed to provide students with basic information and skills necessary for the diagnosis and treatment of disorders of avian species with an emphasis on pet birds. Pre: third-year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 9014 - Advanced Diagnostic Imaging (1 credit)

This course is designed to introduce students to the basic principles of and applications for advanced diagnostic imaging in veterinary medicine. Topics will include computed tomography, magnetic resonance imaging, nuclear imaging, linear tomography, fluoroscopy, and ultrasonography. Tours of imaging facilities at the VMRCVM Teaching Hospital and Montgomery Regional Hospital will be available. Pre: third-year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 9024 - Equine Sports Medicine and Rehabilitation (2 credits)

Sports medicine, rehabilitation, and complementary medicine in horses. Examination and diagnosis of performance limiting musculoskeletal injuries and cardiorespiratory conditions in the equine athlete. Therapeutic and rehabilitation treatment options including therapeutic shoeing, soft tissue manual therapies, conditioning exercises, acupuncture, chiropractic, photobiomodulation, electrical stimulation, underwater treadmill and hydrotherapy; regenerative medicine and nutrition including herbal medicines. Regulations regarding use of medications. Pre: 3rd year standing in the DVM program. P/F only. Design Lab Studio

Instructional Contact Hours: (1 Lec, 2 Lab, 2 Crd)

VM 9034 - Advanced Small Animal Surgery (2 credits)

This course concentrates on the study of soft tissues and orthopedic surgical principles and methods that are applicable to small animal practice. Emphasis is placed on the identification of disease conditions treatable by surgical therapy, applicable surgical methods, and expected outcome. Detailed, step-by-step, surgical procedures will be presented prior to student performance in the complementary laboratory in the Advance Small Animal Surgery Laboratory course (VM 9134).

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 9044 - Food Animal Clinical Problem Solving (2 credits)

This course will present food animal clinical cases in a problem oriented format. Although the majority of the problems presented will begin with the individual animal case, emphasis will be placed on control and prevention in the flock or herd. Aspects of outbreak/disease investigation, production medicine, economics, and epidemiology will also be utilized. Pre: third-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 9064 - Advanced Histopathology (1 credit)

Pathology centering on reaction of organs, tissues and cells at the light microscopic level is presented in a case-based format. Emphasis will be placed on classic tissue and cellular response to injury and will incorporate information and correlate disease mechanisms presented in prerequisite courses. Pre: third-year standing in the DVM curriculum.

Instructional Contact Hours: (3 Lab, 1 Crd)

VM 9074 - Goat and Sheep Medicine (1 credit)

This is an in-depth treatment of health and management as well as diseases of goats and sheep. Production cycles, management concerns, as well as routine preventative care are covered as well as management of traumatic, infectious, and toxic disease problems. Pre: third-year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 9085 - Emerging Infectious Diseases (1 credit)

Stand-alone, fully on-line, asynchronous distance and distributed learning course, accessible as streaming videos on the Internet or on CDs. 9085: The course defines and discriminates amongst numerous factors influencing the emergence of infectious diseases. Selected emerging food-borne, bacterial, viral, zoonotic diseases of animals and humans are described and analyzed. 9086: The course expands the pathology of emerging infectious diseases. Additional viral, parasitic and zoonotic diseases of animals and humans are described and analyzed. Xenotransplantation is also discussed from the perspective of zoonotic diseases. Third year standing in the DVM curriculum, or good standing in a graduate studies program is required.

Instructional Contact Hours: (1 Lec, 1 Crd)

Course Crosslist: BMVS 5005

VM 9094 - Advanced Veterinary Public Health (1 credit)

Consideration of the organization and delivery of Veterinary Public Services at the local, state, national and international levels including zoonoses surveillance, investigation and response to disease outbreaks, biological warfare and terrorism, response to natural emergencies and disasters, and public health policy formulation. Pre: third-year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

Course Crosslist: BMVS 6564

VM 9104 - Veterinary Practice Business Management (3 credits)

Core business management, marketing and entrepreneurship concepts for veterinary practice. Requirements, risks, rewards and ethical considerations of practice ownership. Assessment, analysis and solutions for business problems including financial, legal and organizational. Business leadership skills. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (3 Lec, 3 Crd)

VM 9124 - Equine Theriogenology II (1 credit)

Advanced equine theriogenology. Reproductive procedures and latest techniques of assisted reproductive technology. Collection of semen/embryos and processing/shipment of each. Surgical management of reproductive disorders will be presented. Prerequisite: Third year standing in the DVM curriculum.

Instructional Contact Hours: (3 Lab, 1 Crd)

VM 9134 - Advanced Small Animal Surgery Laboratory (1 credit)

Principles and skills for entry-level surgery. Applied practice in surgical principles and techniques, including ovariohysterectomy, orthopedic, ophthalmic procedures.

Instructional Contact Hours: (3 Lab, 1 Crd)

VM 9144 - Problem Solving in Small Animal Medicine (2 credits)

Problem solving skills for diagnoses of medical diseases in small animal patients. Problem-oriented case material for diagnoses evaluation and therapeutic options. Pre-requisite: Third-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 2 Crd)

VM 9174 - Equine Neonatal Medicine (1 credit)

Normal parturient events, disease that affect neonatal foals, and the diagnostic and treatment options currently available to practitioners. Emphasis placed on problem oriented approach through evaluation of case examples. Pre-requisite: Third-year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 9224 - Pocket Pet Medicine (1 credit)

Care and management of companion exotic species including rats, mice, gerbils, hamsters, guinea pigs, chinchillas, rabbits, ferrets, sugar gliders, and hedgehogs. Common clinical problems including major infectious and non-infectious diseases, nutritional problems and trauma. Diagnostic approaches, medical and surgical treatments, including anesthesia and vaccination protocols. Pre: 3rd year standing in the DVM program. Pass/Fail only.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 9244 - International Veterinary Medicine (2 credits)

Overview of international veterinary activities. Understanding of the role of governmental agencies, inter-governmental and non-governmental organizations in international relations, development, relief work, conversation, disease control and prevention, and trade. Understanding of the legal authority of binational agreements and international treaties. Training in intercultural communications, negotiation and conflict resolution. Review of current global issues. Pre: third-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 2 Crd)

Course Crosslist: BMVS 6594

VM 9254 - Small Animal Theriogenology (1 credit)

This course deals with the normal reproductive function and management in the dog and cat. Diagnosis and management of reproductive diseases are considered. Pre: second-year standing in the DVM curriculum.

Instructional Contact Hours: (1 Lec, 1 Crd)

VM 9264 - Small Animal Community Practice Clerkship (4 credits)

Senior veterinary students will be trained in clinical medicine and surgery in a private veterinary practice setting under the direction of experienced veterinary practitioners. Opportunities will exist to participate in the routine aspects of veterinary practice, to interact with clients and clinic personnel, to improve surgical and diagnostic skills, and to observe and understand business management activities. Fourth year standing in the DVM curriculum required.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9324 - Pub Hlth Infect Contrl & Prev (3 credits)

Assessment, policies, and procedures for control and prevention of infectious diseases in communities and populations. Sources, transmission mode, and local community to international dissemination of infectious disease agents; antimicrobial and chemical resistance; vaccine development, safety, and coverage; community and hospital based needs and interventions; and regulatory frameworks. Pre: Graduate Standing required.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: PHS 5324

VM 9334 - Principles Infectious Diseases (3 credits)

Principles of infectious diseases important for local, national, and global public health. Bacterial, viral, fungal, and parasitic pathogens; mechanisms of disease; host immune response to pathogens. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: PHS 5334

VM 9344 - Neglected and Emerging Infectious Diseases in Public Health (3 credits)

Neglected infectious diseases and their association with marginalized populations and factors including poverty, social and health inequities, water, sanitation and hygiene, and urbanization. Critical factors for emergence/re-emergence of infectious diseases in populations and regions, including geopolitical challenges, zoonotic and vector impacts. Evaluate studies and global responses to neglected and emerging infectious diseases to inform the development of One Health interventions. Pre: Graduate standing.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: PHS 5344

VM 9404 - Specialty Medicine Clerkship (4 credits)

In-depth study of cardiology and neurology. Instruction will be case-based in the Veterinary Medical Teaching Hospital. Pre: fourth year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9434 - Small Animal Internal Medicine Clerkship (4 credits)

Care of local area animal sick animals, routine vaccinations and yearly physical examinations, and referral internal medicine cases. Students participate in emergency and intensive care unit services. Students are given primary patient responsibility, allocated time for daily rounds and individual case study. Pre: fourth year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9454 - Veterinary Ophthalmology Clerkship (4 credits)

Diseases of the eye in several species. Examination and treatment of local and referred patients with eye problems. Students will be given primary patient responsibility. May be repeated for a maximum of 8 credits. Pre: fourth year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

Repeatability: up to 8 credit hours

VM 9504 - Large Animal Clinical Services Clerkship (4 credits)

Principles of large animal medicine and surgery including acquisition of an unbiased medical history, performance of a complete physical examination and knowledge of various diagnostic, therapeutic and surgical procedures performed on large animal patients admitted to the V.M.T.H. Students will work with large animal medical and surgical patients, attend daily ward rounds and have additional time for individual study.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9534 - Production Management Medicine Clerkship (4 credits)

Students will be introduced to clinical problems principally as they involve populations of animals within their production environment. The emphasis will be directed to problem identification, solution, and prevention. Students will handle, examine, and treat animals within their environment. Students will also attempt to determine environmental factors that contribute to the incidence of disease affecting individual animals and populations of animals, and assess how these factors can be most economically altered to prevent recurrence of the problem.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9544 - Equine Medical Center Clerkship (4 credits)

Clinical experience in both equine medicine and surgery by working with the faculty and clinical support staff in the management of horses referred by veterinarians for elective or emergency care. This will include patient admission and discharge responsibilities, pre- and post-operative patient care, routine and intensive medical surgical care. May be repeated for a maximum of 8 credit hours. Pre: fourth year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

Repeatability: up to 8 credit hours

VM 9604 - Small Ruminant Clerkship (4 credits)

Detailed clinical exercises, discussion sessions, and problem-solving exercises concerning the biology, management diseases, and therapeutics of sheep, goats, llamas, and alpacas. Pre: fourth year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9614 - Small Animal Surgery Clerkship (4 credits)

Supervised clinical experience in diagnostics, pre-operative preparation, surgery and post-operative care of dogs and cats admitted through the Teaching Hospital for surgical problems. Correlative and communicative skills will be stressed. Patient care is a prime concern. Pre: fourth year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9624 - Anesthesiology Clerkship (4 credits)

Clinical experiences in comparative anesthesiology. Prospective and retrospective rounds and case discussions regarding teaching hospital patients. Additional time will be available for individual study. Pre: fourth year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9634 - Radiology Clerkship (4 credits)

Practical training in the production of diagnostic quality radiographs of various body parts of large and small animals with attention given to radiation safety and optimal radiographic positioning and technique; development of skills in radiographic interpretation.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9644 - Small Animal Private Practice Clerkship (4 credits)

Training of senior veterinary students in clinical medicine and surgery in the small animal private practice setting under the direction of experienced veterinary practitioners. Opportunities to participate in the routine of veterinary practice, to interact with clients and clinic personnel, to improve surgical and diagnostic skills, and to observe clinic management. Pre: fourth-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

Repeatability: up to 8 credit hours

VM 9714 - Government and Corporate Veterinary Medicine Clerkship (4 credits)

Develop and expand an awareness and understanding of career opportunities in veterinary medicine other than those in private clinical practice.

Instructional Contact Hours: (3 Lec, 3 Lab, 4 Crd)

VM 9724 - Laboratory Services Clerkship (4 credits)

To provide senior veterinary students with experience in the necropsy service of the Veterinary Teaching Hospital by working on actual case material; to give students an overview of laboratory support services of the hospital.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9744 - Morphologic Pathology Elective Clerkship (4 credits)

This course focuses on the details of performing animal necropsies and interpreting the lesions that may be found. Sampling and preparation techniques are considered for the preparation of histopathological specimens. Correlation of laboratory results with gross and histopathological findings is stressed and a final diagnostic report is prepared.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9764 - Independent Study/Research Elective (4 credits)

Provides the opportunity for students considering a career in public practice (Government/Corporate) to obtain in-depth experience in their focus area. Also allows students enrolled in the DVM/MS or DVM/PhD program to pursue research or other objectives in specified areas. Experiences will be tailored to the students area of interest.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9784 - Government and Corporate Veterinary Medicine Elective Clerkship (4 credits)

Develop and expand an awareness and understanding of career opportunities in veterinary medicine other than those in private clinical practice. (This course may be taken three times for a maximum of 12 semester credit hours).

Prerequisite(s): VM 9714

Instructional Contact Hours: (3 Lec, 3 Lab, 4 Crd)

Repeatability: up to 12 credit hours

VM 9794 - Center for Government and Corporate Veterinary Medicine Clerkship (4 credits)

The three-week clerkship provides hands-on involvement in the public practice of veterinary medicine, for the purpose of skill building, networking, and understanding/celebrating diversity. CGCVM faculty serve as mentors, structure opportunities, and provide debriefing following experiences. Government/corporate veterinarians in the Washington DC Metropolitan region, individually selected to match the career focus of the students, serve as advisors and consultants. Case studies will be used to explore current veterinary issues. Pre: fourth-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9804 - Food Animal Private Practice Clerkship (4 credits)

Training of senior veterinary students in clinical medicine and surgery in the food animal private practice setting under the direction of experienced veterinary practitioners. Opportunities to participate in the routine of veterinary practice, to interact with clients and clinic personnel, to improve surgical and diagnostic skills, and to observe clinic management. Pre: fourth-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9814 - Equine Private Practice Clerkship (4 credits)

Training of senior veterinary students in clinical medicine and surgery in the equine private practice setting under the direction of experienced veterinary practitioners. Opportunities to participate in the routine of veterinary practice, to interact with clients and clinic personnel, to improve surgical and diagnostic skills, and to observe clinic management. Pre: fourth-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9824 - Mixed Species Private Practice Clerkship (4 credits)

Training of senior veterinary students in clinical medicine and surgery in the private practice setting under the direction of experienced veterinary practitioners. Opportunities to participate in the routine of veterinary practice, to interact with clients and clinic personnel, to improve surgical and diagnostic skills, and to observe clinic management. Pre: fourth-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9834 - Equine Theriogenology Clerkship (4 credits)

Allows the interested student to pursue off-campus training in equine theriogenology beyond that provided in earlier theriogenology courses (VM 8374, 8514, 9124). Students will work on cases involving breeding management and abnormal reproductive function and will become familiar with methods to correct or treat these problems. Pre: fourth-year standing in the DVM curriculum.

Instructional Contact Hours: (2 Lec, 6 Lab, 4 Crd)

VM 9964 - Practicum/ Clerkship (1-19 credits)

Instructional Contact Hours: Variable credit course