VETERINARY PATHOBIOLoGY (VPTH)

VPTH 550 One Health Study Design Seminar
This course number is cross-listed with VPTH 650 and therefore shares the same schedule and course description. It exists for Penn students who wish to enroll and are not Vet students. Eligible students: Penn students who have completed one year of graduate or professional school and who have an interest in addressing problems related to human, animal, and environmental health. Students from the Med, Dental, Nursing, Social Policy, MPH, MES and Wharton programs are encouraged to apply. This seminar course will introduce students to One Health approaches that address critical local, regional and global health problems. Students will work in interdisciplinary teams to review case studies and analyze past and current literature where One Health approaches have been applied. The course is specifically designed to foster the development skills that allow students to think and communicate across professional disciplines. It will also help students develop transdisciplinary connections that might serve them in their professional futures. Students will be assigned a transdisciplinary team. Grading will be based on team-led presentations and analysis of literature, participation and discussion, and a final capstone project (One Health in Practice Plan) in the form of both a paper and presentation.
Taught by: Drs. S. Rankin, S. Cole, and J. Punt
Also Offered As: VPTH 650
Activity: Lecture
0.5 Credit Hours
Notes: Limitations: 15 students. Penn students who have completed one year of graduate or professional school and who have an interest in addressing problems related to human, animal, and environmental health. Students from the Med, Dental, Nursing, Social Policy, MPH, MES, and Wharton programs are encouraged to apply. Please contact the Registrar at the School of Veterinary Medicine at vetregistrar@vet.upenn.edu if you wish to enroll.

VPTH 602 General and Systemic Pathology
The course includes general pathology and systemic pathology. The general principles and mechanisms of disease are discussed through the basic principles of cell and tissue reactions to injury, including degeneration, necrosis, pathological pigmentation, disturbances of circulation, disturbances of growth, inflammation and neoplasia. This course completes the systemic pathology of domestic animals with emphasis on the etiology, pathogenesis, gross and microscopic lesions, and diagnosis of diseases of the organ systems in the body. Formal classroom lectures are complemented with laboratory classes, gross pathology demonstrations and Moodle-based exercises all aimed at interpretation of gross and microscopic lesions.
Taught by: Dr. A. Durham and Staff
Activity: Lecture
16.0 Credit Hours

VPTH 603 Parasitology
This core course is concerned with fundamentals of the morphology and developmental cycles of helminth, arthropod and protozoan parasites of animals and those that are transmissible from animals to man. The epidemiology and control of the infections are stressed along with pathogenesis, pathology and immunology. Lectures are supplemented by demonstrations of living and fixed materials and by exercises in identification and diagnosis. Laboratory exercises are supplemented by independent work on case studies of clinical parasitisms.
Taught by: Dr. J. Farrell and Staff
Activity: Lecture
8.0 Credit Hours

VPTH 604 Immunology
This course aims to educate students in Veterinary Medicine on fundamental aspects of immunology, including functional anatomy of the immune system, mechanisms of innate and adaptive immunity, immunological mechanisms of disease, and principles of vaccination.
Taught by: Dr. C. Lopez and Staff
Activity: Lecture
4.0 Credit Hours

VPTH 605 Microbiology
This course presents the fundamentals of medical microbiology (bacteriology, mycology, virology) and the applied art of diagnostic bacteriology. Emphasis is placed on the microbial agents of veterinary disease, their biology, mode of pathogenesis, and control with some introductory material concerning treatment and recognition. This course is presented as prerequisite to a later study of infectious disease.
Taught by: Dr. R. Harty and Staff
Activity: Lecture
7.0 Credit Hours

VPTH 606 Clinical Pathology
Appropriate test selection and interpretation are essential to diagnostic evaluation. This course is an introduction to Clinical Pathology presented via case-based learning. Topics include hematology, serum chemistries, urinalysis, cytopathology, clinical endocrinology and blood banking. Within each topic, discussion will cover indications, limitations and interpretation of specific tests, but the emphasis will focus on integrating this information in the context of laboratory panels. Laboratory exercises provide the opportunity to perform and demonstrate basic competency in urinalysis, blood smear preparation and evaluation, and blood banking, as well as to evaluate clinical cases individually and in groups. A microscope is needed for the laboratories.
Taught by: Dr. N. Weinstein and Staff
Activity: Lecture
6.0 Credit Hours

VPTH 615 Introduction to Comparative Medical Research
This course will review the broad scope of animal involvement in contemporary biomedical and veterinary research, with specific discussions of unique species (rodents, nonhuman primates) and laboratory animal medicine and science. Goals for the course are to gain a strong appreciation for the role of research in furthering the practice of veterinary and human medicine, as well as for importance of the humane care, welfare and responsible use of laboratory animals. Completion of this course will permit students to readily participate in biomedical research opportunities available at the University. Grades will be determined by attendance, completion of compliance training, an out-of-class writing exercise and a final exam.
Taught by: Dr. J. Marx and Staff
Activity: Lecture
2.0 Credit Hours
VPTH 633 Ecotoxicology for Veterinarians
The major goal of this course is to provide an introduction to ecotoxicology, the science of assessing the effects of toxic substances on ecosystems with the goal of protecting entire ecosystems. The course will present lectures about various research and career opportunities involving ecotoxicology, such as measuring the effects of pollutants on ecosystems, wildlife serving as monitors of environmental quality, important environmental pollutants such as insecticides, petroleum hydrocarbons and metals, and approaches to rehabilitating damaged ecosystems. Students will research, plan, and present a PowerPoint presentation on a topic relevant to ecotoxicology. The course grade will be based on attendance, the group presentation, and student participation in class discussions.
Taught by: Dr. L. Murphy and Staff
Activity: Lecture
2.0 Credit Hours

VPTH 634 Microbial Pathogenesis
The goal of this course is to provide the student with a conceptual framework regarding the mechanisms of microbial pathogenesis. A range of host-microbe interactions will be studied to illustrate how different microbes breach host lines of defense and lead to infections. Transmission, etiological diagnosis, as well as prophylactic and therapeutic approaches against infectious agents will be discussed with examples related to viral and bacterial pathogens, including zoonotic and Category A select agents.
Taught by: Dr. D. Schifferli and Staff
Prerequisites: Prerequisites: VPTH 604 Immunology and VPTH 605 Microbiology
Activity: Lecture
2.0 Credit Hours
Notes: Limitations: Maximum of 20 students

VPTH 635 Introduction to Fish Diseases
This course is intended to introduce veterinary students to the biology and medicine of teleost fish. The first few lectures will provide a foundation in the classification, gross anatomy and immunology of fish, including practical laboratory classes. The remainder of the course will be more clinically oriented, and will present the most prevalent diseases of fish, emphasizing both the pathology and etiology of the diseases. In addition, the course will also focus on health maintenance through the control of water quality and treatment of diseases in fish. This part of the course will include some practical laboratory demonstrations. Grades will be determined on the basis of class participation and a 5-6 page research paper on a topic of the students choice.
Taught by: Dr. O. Sunyer and Staff
Prerequisites: Prerequisites: 1st and 2nd Year Core Courses
Activity: Lecture
2.0 Credit Hours

VPTH 640 Large Animal Pathology & Toxicology
The first goal of this course is to introduce large animal autopsy techniques for the purposes of identification of common postmortem lesions and review of clinical-oriented anatomy. The second goal is to provide a systems-based approach to domestic and global diseases commonly encountered large animal anatomy, including horses, cattle and small ruminants, swine, camelids and cervids. The course requires students to recognize pertinent gross and microscopic lesions correlated with clinical history in order to formulate appropriate differential diagnoses and promote in-depth knowledge of non-infectious and infectious etiopathogeneses, including zoonoses and domestic and foreign reportable diseases. Components of this course include lecture, gross autopsy demonstration and laboratories that involve inspection of fresh gross specimens, and interactive small group seminars pertaining to toxicology and species-specific lesions. Grades will be determined by two homework assignments, one final exam, and attendance to laboratories and small group seminars.
Taught by: Dr. J. Engiles and Staff
Prerequisites: Prerequisites: VPTH 602 General and Systemic Pathology
Activity: Lecture
3.0 Credit Hours
Notes: Limitations: Maximum of 75 students

VPTH 641 Laboratory Animal Medicine
Note: This course is encouraged as a prerequisite for VPTH 789 ULAR - Laboratory Animal Medicine Clinical Rotation. This course is designed to provide further information about laboratory animal medicine to those students with a potential interest in the field. Issues of pain and distress, facility design, regulatory issues, and special procedures involving rodents and rabbits are addressed. Students will also be introduced to the mechanism of an Institutional Animal Care and Use Committee and will be primary participants in a "mock" meeting with visiting members of the committee here at Penn and actual research protocols. Grades will be determined by class participation and a short paper on a topic relevant to laboratory animal medicine.
Taught by: Dr. J. Marx and Staff
Activity: Lecture
2.0 Credit Hours
Notes: Limitations: Allergies to lab animals

VPTH 650 One Health Study Design Seminar
This seminar course will introduce students to One Health approaches that address critical local, regional and global health problems. Students will work in interdisciplinary teams to review case studies and analyze past and current literature where One Health approaches have been applied. The course is specifically designed to foster the development of skills that allow students to think and communicate across professional disciplines. It will also help students develop transdisciplinary connections that might serve them in their professional futures. Students will be assigned a transdisciplinary team. Grading will be based on team-led presentations and analysis of literature, participation in discussion, and a final capstone project (One Health in Practice Plan) in the form of both a paper and presentation.
Taught by: Drs. S. Rankin, S. Cole, and J. Punt
Also Offered As: VPTH 550
Activity: Lecture
3.0 Credit Hours
Notes: Limitations: 10 students
VPTH 710 Small Animal Diagnostic Services
The course in the Small Animal Section consists of exposure to the Diagnostic Services of MJR-VHUP, namely clinical pathology, anatomic pathology (necropsy service), parasitology and microbiology. The course is focused on development of clinical pathology and necropsy skills and will include a practicum of necropsy technique. A portion of the rotation is also focused on biopsy, parasitology and microbiology. Furthermore, students will be exposed large animal necropsy by spending time at PADLS at New Bolton Center. The bioanalytical pathology portion, which comprises clinical pathology, parasitology and microbiology, will be divided into microscopy, discussion, and online interactive lesson sections. During the microscopy section, students will work with the supervising clinical pathologist or resident in the evaluation, interpretation, and reporting of cytologic specimens and blood film reviews. Discussions involving parasitology and microbiology will also include treatment options and best practices. Online lessons include work in parasitology, clinical pathology and microbiology. Students are also required to perform necropsies, write necropsy reports and to familiarize themselves with the pathophysiology, histopathology and the clinical manifestations of various disorders encountered. Participation of students in presentation and discussion of cases is required. Students will be evaluated based upon enthusiasm, effort, ambition, and advancement in pathology knowledge as evaluated through the directed group discussions, necropsies, microscopy sessions and clinical competency outcomes assessments. A short paper is required. There is a web-based introduction to VPTH710 Diagnostic Services and VPTH770 Diagnostic Services Elective, which students must review prior to the start of their rotation. Students may find this introduction by logging in to https://learn.vet.upenn.edu with their Penn Key and Vet Domain password. Please note that it will take approximately 3 hours to review the video and written materials on the website.

Taught by: Dr. C. Bradley and Staff
Also Offered As: VPTH 770
Activity: Clinical Rotation Dental & Vet school
6.0 Credit Hours
Notes: Limitations: 4 students/rotation - Required: SA - Satisfies pathology requirement: SALA

VPTH 711 Farm Animal Pathology-NBC
The course will provide students with experience in farm animal and companion animal autopsies and biopsies including interpretation of gross and microscopic lesions in the context of clinical history, and proper collection of samples for histology and ancillary diagnostics (e.g. microbiology, parasitology, cytology and toxicology). Students will participate in the diagnostic services provided by the Pennsylvania Animal Diagnostic Laboratory System (PADLS) at New Bolton Center. Multiple species commonly encountered at our diagnostic laboratory (horses, cattle and small ruminants, swine, cameldids and cervids, small animals and exotics) will be utilized to illustrate the pathogenesis of infectious and non-infectious disease, and the principles of gross and microscopic description with formulation of morphologic diagnoses. Students will be evaluated based upon enthusiasm, effort, ambition, and advancement in pathology knowledge as evaluated through diagnostic autopsy technique, directed group discussions, microscopy sessions and clinical competency outcomes assessments. A short paper providing a succinct scientific review of a select topic pertaining to large animal pathology is required. Although gross pathology will be emphasized, exposure to histopathology and occasionally cytology will be included. Although there is no lecture component to this course, there is a web-based introduction to VPTH 711 Diagnostic Services and VPTH 771 Diagnostic Services Elective, which students must review prior to the start of their rotation. Students may find this introduction by logging in to https://learn.vet.upenn.edu with their Penn Key and Vet Domain password.

Taught by: Dr. J. Engiles and Staff
Also Offered As: VPTH 771
Activity: Clinical Rotation Dental & Vet school
6.0 Credit Hours
Notes: Required: EQ - Satisfies pathology requirement: SALA, LA, FA

VPTH 718 Poultry Production Medicine-NBC
This course is designed to provide students with a working knowledge of the management and production of poultry from hatchery to processing. The course will involve multiple field trips to a hatchery, grow out pullet house, layer house, breeder house, processing plant and a feed mill. There will also conduct necropsies on cases submitted to the diagnostic laboratory and learn the diagnostic procedures such as serology, virology and PCR testing.

Taught by: Drs. S. Davison and Staff
Also Offered As: VPTH 780
Prerequisites: Prerequisites: VMED 608 Introduction to Poultry, Swine, and Dairy Medicine
Activity: Clinical Rotation Dental & Vet school
5.0 Credit Hours
Notes: Limitations: 1 student/rotation - Satisfies pathology requirement: FA, LA

VPTH 770 Small Animal Diagnostic Services
There is a web-based introduction to VPTH 710 SA Diagnostic Services and VPTH770 Small Animal Diagnostic Services Elective, which students must review prior to the start of their rotation. Students may find this introduction by logging in to https://learn.vet.upenn.edu with their Penn Key and Vet Domain password. Please note that it will take approximately 2 to 3 hours to review the video and written materials on the website.

Taught by: Dr. C. Bradley and Staff
Also Offered As: VPTH 710
Activity: Clinical Rotation Dental & Vet school
6.0 Credit Hours
Notes: Limitations: 4 students/rotation - This is an elective rotation equivalent to VPTH 710
There is a web-based introduction to VPTH 711 Diagnostic Services and VPTH 771 Diagnostic Services Elective, which students must review prior to the start of their rotation. Students may find this introduction by logging in to https://learn.vet.upenn.edu with their Penn Key and Vet Domain password.

**VPTH 771 Farm Animal Pathology-NBC**

Taught by: Dr. J. Engiles and Staff
Also Offered As: VPTH 711
Activity: Clinical Rotation Dental & Vet school
6.0 Credit Hours
Notes: Limitations: Based on Hospital Needs - This is an elective rotation equivalent to VPTH 711

**VPTH 780 Poultry Production Medicine-NBC**

Taught by: Drs. S. Davison and Staff
Also Offered As: VPTH 718
Prerequisites: Prerequisites: VMED 608 Introduction to Poultry, Swine, and Dairy Medicine
Activity: Clinical Rotation Dental & Vet school
5.0 Credit Hours
Notes: Limitations: 1 student/rotation - This is an elective rotation equivalent to VPTH 718

**VPTH 789 ULAR-Laboratory Animal Medicine**

This rotation will provide an opportunity to work with the wide variety of animal species used in biomedical research at the University of Pennsylvania, including nonhuman primates, small rodents, guinea pigs, rabbits, dogs, cats, pigs, and sheep. The students will participate in all aspects of the care and treatment of these animals across the facilities at the University of Pennsylvania. Participation may include handling, husbandry, diagnosis, treatment, anesthesia, and assistance with surgery. Students will perform daily rounds with the clinical veterinarians and other staff members. The student may have the opportunity to observe on-going interdisciplinary research programs including cardiopulmonary bypass, organ transplantation, gene therapy, device implantations, and metabolic disease progression. Students will participate in clinical rounds, didactic training classes, and related seminars and journal clubs as scheduled. Participation in necropsies of clinical cases, sentinel animals, and study animals is expected. A brief assignment on aspects of lab animal medicine will be required prior to completion of the rotation. Depending upon scheduling, the students will have an opportunity to attend a meeting of the Institutional Animal Care and Use Committee. A recent (within 6 months) negative skin test against tuberculosis is required by the first day of the rotation.

Taught by: Dr. J. Marx and Staff
Prerequisite: Prerequisites: Successful completion of VPTH 641
Laboratory Animal Medicine is encouraged but not required
Activity: Clinical Rotation Dental & Vet school
5.0 Credit Hours
Notes: Limitations: Maximum 2 students/rotation - Notes: The focus of this rotation is the humane care and use of animals in biomedical research. Students should have interest in the specialty of Laboratory Animal Medicine

**VPTH 790 Small Animal Pathology Holiday Rotation**

This is an elective rotation similar to the necropsy component of the Diagnostic Services Rotation, VPTH 710,770. The rotation consists of practicum spent in performing necropsies and interpreting findings. Students are required to perform necropsies, write necropsy reports and to familiarize themselves with the pathophysiology, histopathology and the clinical manifestations of various disorders encountered. There will be two one-week rotations over the Holiday period, each for 2 credits. Each rotation will consist of half of the Holiday period and will not meet on either Christmas Day (week one) or New Years Day (week two). There is no clinical pathology, parasitology or microbiology component to this rotation. No paper is required for this rotation.

Activity: Clinical Rotation Dental & Vet school
2.0 Credit Hours
Notes: Limitations: 2 students/rotation