Courses

**PATH 190 Discovery Seminar**  credit: 1 to 5 Hours. 
May be repeated.

**PATH 290 Undergraduate Research**  credit: 1 to 5 Hours. 
Laboratory and/or field studies selected in consultation with a faculty mentor. May be repeated to a maximum of 10 hours. Prerequisite: Consent of instructor.

**PATH 394 Pathobiology**  credit: 1 to 4 Hours. 
To be used to designate a trial or experimental course for five or more students. It is designed to be an undergraduate course. A course can be taught under this designation two times within a two-year period and cannot be renewed as PATH 394 course. May be repeated to a maximum of 8 hours if topics vary. Prerequisite: Consent of instructor.

**PATH 410 Comparative Immunobiology**  credit: 4 Hours. 
Same as ANSC 450 and MCB 442. See ANSC 450.

**PATH 433 Virology & Viral Pathogenesis**  credit: 3 Hours. 
Emphasizes basic principles of virus structure and replication, virus-cell interactions and virus-host interactions that underlie the molecular biology, pathogenesis, and transmission of viral disease. Same as MCB 433. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 300 or MCB 354, or consent of instructor.

**PATH 439 Health Applications of GIS**  credit: 3 Hours. 
Students use spatial technologies and data to address issues of health. Topics include disease outbreak surveillance and response, environmental factors such as climate and socio-economic context, and the medical and other data needed to spatial analysis of health information. Application-based learning and class lectures are complemented by readings, guest lectures and class discussions. Geographic information system and global positioning system use is covered with examples drawn from public and veterinary health. Same as GEOG 439 and CHLH 439. 3 undergraduate hours. 3 graduate hours. Prerequisite: GEOG 280 or equivalent.

**PATH 460 Biology of Emerging Infect Dis**  credit: 3 Hours. 
Discusses the biology of emerging and re-emerging infectious disease pathogens; examples of various bacterial, parasitic, and viral pathogens are presented to characterize the diverse mechanisms and factors that enable these agents to emerge; possible corrective and/or preventative approaches are explored. No undergraduate credit. 3 graduate hours. Prerequisite: VM 607 or PATH 433; or consent of instructor.

**PATH 474 Principles of Epidemiology**  credit: 4 Hours. 
Same as CHLH 474 and ENVS 474. See CHLH 474.

**PATH 494 Pathobiology**  credit: 1 to 4 Hours. 
To be used to designate a trial or experimental course for five or more students. A course can be taught under this designation two times within a two-year period and cannot be renewed as a PATH 494 course. 1 to 4 undergraduate hours. 1 to 4 graduate hours. Approved for letter and S/U grading. May be repeated to a maximum of 8 hours if topics vary. Prerequisite: Consent of instructor.

**PATH 511 Seminar in Prod/Pop Medicine**  credit: 1 Hour. 
Discussion of selected topics and journal articles related to production and population medicine, i.e. health and disease control/prevention decisions that are based on improving productivity, profitability, and maintaining populations of animals. Requires presentation of a formal seminar to receive a letter grade. Same as VCM 511. 1 graduate hour. 1 professional hour. Approved for letter and S/U grading. May be repeated to a maximum of 4 hours. Prerequisite: Graduate standing in VCM; VM 608 or equivalent epidemiology course (requires third year standing in the professional curriculum) and consent of instructors; for graduate students outside VCM, consent of instructors required.

**PATH 513 Biomed Grant Proposal Writing**  credit: 2 Hours. 
The objective of this course is to develop skills in grant seeking and proposal writing. Topics include identification of funding sources, writing style, setting a timeline for proposal preparation, the components of a grant application, research compliance, scientific integrity, the review process, and strategies for dealing with critiques and proposal resubmission. Due to the nature of this course, enrollment will be limited. Prerequisite: Consent of instructor.

**PATH 514 Molec Mech Bact Pathogenesis**  credit: 2 Hours. 
Introduction of current research literature on host-microbe interactions. The molecular basis for disease arising from these interactions will be stressed. 2 graduate hours. 2 professional hours. Prerequisite: One or more 400- or 500-level courses in microbiology, immunology, or biochemistry, and consent of instructor.

**PATH 515 Mechanisms Microbial Infection**  credit: 3 or 4 Hours. 
Newer concepts of host-microorganism relations; emphasis on the dynamics and pathogenic mechanisms of microorganisms, immune responses and defense factors of the host, and pathogenesis of specific infections. Lectures, discussions, laboratory, and special problems. Prerequisite: MCB 426 or VM 605, or equivalent; consent of instructor.

**PATH 516 Epidemiology Infectious Dis**  credit: 3 Hours. 
Ecology of infection and disease; spread of disease and modes of transmission; methods of control; socioeconomic consideration; selected diseases: malaria, Lyme disease, anaplasmosis, schistosomiasis, salmonellosis, pseudorabies, AIDS. Student presentations. Prerequisite: Epidemiology class (VM 608 or equivalent), or consent of instructor.

**PATH 517 Principle/Method Epidemiology**  credit: 4 Hours. 
Course covers principles of theoretical and applied epidemiology, with examples from veterinary and human medicine. The aim of the course is to integrate epidemiologic concepts and quantitative methodology in order to evaluate disease risk and treatment options at the individual and population levels. Topics include causal inference, epidemiologic study design, evaluation of bias, outbreak investigation, and special areas within epidemiology. Same as CHLH 517. Prerequisite: Graduate student standing or consent of instructor.

**PATH 518 Concepts/Topics Immunology**  credit: 2 Hours. 
Study of newer concepts and theories in the field of immunology, with major emphasis on critical review of the primary literature. Topics include: Innate immunity, MTTC, immune regulation, tolerance, autoimmunity, antibodies, and immunopathogenesis of infectious diseases. Lectures and discussion. Same as MCB 586. Prerequisite: Consent of instructor; MCB 408 recommended.
PATH 519  Mechanisms Viral Pathogenesis credit: 3 Hours.
Lecture-discussion on topics of molecular mechanisms of viral pathogenesis. Mechanisms of infection, virulence, viral spread, interaction with the immune system, persistence and other host-parasite interactions are covered using modern literature and in depth exploration of several animal virus systems. Same as MCB 561. Prerequisite: PATH 433 or VM 607 or consent of instructor.

PATH 520  Applied Epidemiology credit: 4 Hours.
Same as CHLH 578. See CHLH 578.

PATH 524  Biostatistics credit: 4 Hours.
Application of statistical methods to epidemiology, clinical and diagnostic medicine, and laboratory biomedical experiments. Topics include descriptive statistics and graphics, reliability, sample size estimation, contingency table analysis, analysis of group differences, survival analysis, correlation and linear regression. Emphasizes use of computerized statistical software in biomedical data analysis. 4 graduate hours. 4 professional hours. Credit is not given for both PATH 524 and either CPSC 440 or EPSY 480.

PATH 525  Statistics in Epidemiology credit: 4 Hours.
Same as CHLH 527 and ENVS 527. See CHLH 527.

PATH 527  Parasitology/Epidemiology Sem credit: 1 Hour.
Discussion of selected historic and current literature related to parasitology. May be repeated to a maximum of 2 hours. Prerequisite: Credit or concurrent registration in VM 607.

PATH 528  Multivariate Biostatistics credit: 4 Hours.
The application of multivariate data analysis to biology, agriculture, and medicine. Includes principal components and factor analysis, multivariate analysis of variance, discriminate analysis, cluster analysis, and multidimensional scaling. Specific applications include clinical diagnosis, nutritional and physiological profile analysis, ecological niche analysis, and patterns of genetic relatedness using molecular genotyping. Computer exercises using standard statistical software are used throughout. Students will also have individual projects and report their analysis in class presentations. Same as IB 508. Prerequisite: A course in multiple linear regression (PATH 591 or equivalent).

PATH 543  Necropsy for Non Path Majors credit: 1 or 2 Hours.
Course is designed to provide advanced training in veterinary diagnostic pathology for graduate students with majors other than pathology. Teaching material is drawn from diagnostic cases submitted to the Diagnostic Laboratory. Course is adapted individually for each student's major (clinical residency, laboratory animal residency, or graduate research using animals and animal samples). May be repeated to a maximum of 4 hours. Prerequisite: Graduate Veterinarian or residency status; or consent of instructor. Course restricted to graduate students or residents not majoring in pathology.

PATH 544  Immunobiological Methods credit: 3 Hours.
A number of immunobiological methods and current immunological techniques are introduced in the context of various research designs with reference to their significance, their evolution and historical value. Detailed description of protocols includes optimization of parameters and modifications of conditions to satisfy different research situations and trouble shooting. Students are required to perform the techniques, collect data, analyze results and keep records. Lab reports including documented critical assessment of the attained conclusions are required for each technique. Same as ANSC 554. Approved for letter and S/U grading. Prerequisite: VM 605 or MCB 408 or ANSC 450 and consent of instructor.

PATH 545  Vet Diagnostic Path 1 credit: 0 to 6 Hours.
Instruction in diagnostic pathology for pathology majors. Instruction based on necropsy cases with emphasis on necropsy protocol; sample collection and submission; recognition, description, and interpretation of gross and microscopic lesions; and case diagnosis based on all test results. Approved for letter and S/U grading. May be repeated to a maximum of 10 hours. Prerequisite: Graduate veterinarian, graduate student with major in pathology, and consent of instructors.

PATH 546  Vet Diagnostic Path 2 credit: 0 to 6 Hours.
Instruction in diagnostic pathology for pathology majors. Instruction based on necropsy cases with emphasis on recognition, description, and interpretation of gross and microscopic lesions; evaluation of results of other diagnostic assays; disease pathogenesis; and final case diagnosis and comments. Approved for letter and S/U grading. May be repeated to a maximum of 10 hours. Prerequisite: PATH 545 and consent of instructors.

PATH 547  Pathology Seminar credit: 0 to 1 Hours.
Review and discussion of selected pathologic and clinico-pathologic material. Students are required to participate in weekly discussions and present at least one formal seminar per semester, on a topic approved by Pathology faculty. Approved for letter and S/U grading. May be repeated to a maximum of 6 hours. Prerequisite: Consent or concurrent registration in PATH 545, and consent of instructor.

PATH 548  Toxicologic Pathology credit: 4 Hours.
Examines the morphological and biochemical aspects of cellular reactions to injury in acute and chronic toxicities; effect of selected toxic agents on target organs in relation to functional and structural changes induced. Prerequisite: VM 605 or equivalent.
PATH 549  Gross Pathology  credit: 1 Hour.
This course is aimed at veterinary students and anatomic pathology residents. This course is aimed at veterinary students and anatomic pathology residents. Veterinary students will receive weekly orientation to gross lesions by system with an image and discussion based format, and then will take mock ACVP boards-style gross exams followed by a group discussion of the exam. Pathology residents will take mock ACVP board-style gross exams. Veterinary students meet twice a week for an 8 week block and pathology residents meet once a week for the semester. 1 graduate hour. 1 professional hour. Approved for letter or S/U grading. May be repeated in separate terms for unlimited graduate or professional hours.

PATH 550  Concepts in Pathology  credit: 4 Hours.
Lectures and related discussions of selected topics in experimental and theoretical aspects of general pathology. Emphasis on interdisciplinary approach to the mechanisms of disease. Prerequisite: DVM degree or MS in Biology; consent of instructor.

PATH 551  Interpretive Cytopathology  credit: 1 Hour.
Discusses selected cytologic material. Emphasizes recognition, interpretation, oral presentation, and written description of cytology case materials. May be repeated to a maximum of 8 hours.

PATH 552  Diagnostic Cytology  credit: 2 or 4 Hours.
Instruction in diagnostic cytology for clinical pathology majors. The course is for clinical pathology graduate students to advance their training in cytology. This is an intensive course with one-on-one training with the instructor. Clinical cytology cases and blood smears are evaluated microscopically and then a thorough written description and interpretation of each case is performed and reviewed. May be repeated in separate terms to a maximum of 30 graduate hours. Note that a maximum of 8 credit hours will count towards a graduate degree. Prerequisite: DVM degree or equivalent, clinical pathology graduate student or consent of instructor.

PATH 555  Comparative Oncology  credit: 4 Hours.
Comparative study of the nature of mammalian and avian neoplasms based on general and special methods of tumor identification and classification; lectures, demonstrations, and laboratory. Prerequisite: VM 605 and VM 608, or equivalent.

PATH 556  Exotic/Wild Animal Diag Path 1  credit: 1 or 2 Hours.
Instruction in the performance of necropsy examinations on exotic and wild animals; emphasizes recognition, interpretation, oral presentations and written descriptions of gross and histologic lesions; emphasizes histologic features of lesions. For pathology majors only. May be repeated to a maximum of 10 hours. Prerequisite: VM 605 and VM 608; consent of instructor.

PATH 557  Exotic/Wild Animal Diag Path 2  credit: 0 to 2 Hours.
Instruction in the use of supplemental diagnostic data in the areas of bacteriology, clinical pathology, immunology, parasitology, toxicology, and virology in arriving at differential and definitive diagnoses of wild and exotic animals. Pathogenesis of gross and histologic lesions and mechanisms of lesion development are emphasized. For pathology majors only. May be repeated to a maximum of 10 hours. Prerequisite: PATH 556 or equivalent or consent of instructor.

PATH 558  Exotic/Wild Animal Path Sem  credit: 0 to 1 Hours.
Discussion of selected pathologic and clinico-pathologic material pertaining to exotic and wild animals and presentation of a formal seminar. Approved for letter and S/U grading. May be repeated to a maximum of 6 hours. Prerequisite: Concurrent enrollment in PATH 556 or PATH 557 or consent of instructor.

PATH 559  Surgical Pathology  credit: 0 to 2 Hours.
Discussion and interpretation of disease processes of domestic animals; emphasizes interpretation of pathologic changes in tissue specimens obtained during surgical procedures; correlates structure, function, and prognosis. Approved for letter and S/U grading. May be repeated to a maximum of 10 hours. Prerequisite: PATH 545 and PATH 546, or equivalent; consent of instructor.

PATH 560  Spatial Epidemiology  credit: 4 Hours.
Patterns of health and disease in place and time; application of geographic information systems; analysis of time-space relations; clusters and diffusion of disease; geographic epidemiology of selected infectious and noninfectious diseases. Same as GEOG 560. Prerequisite: CHIH 474 or equivalent, or VM 608 or PATH 517 or equivalent; PATH 524 or SOC 485 or equivalent.

PATH 561  Veterinary Clinical Chemistry  credit: 1 Hour.
Course will focus on the clinical interpretation and physiologic principles behind conventional clinical biochemical testing, and introduce newer concepts and procedures. The course is directed primarily to graduate veterinarians intending to seek board certification from specialty colleges that require basic knowledge of veterinary clinical pathology of their candidates. Approved for letter and S/U grading. Prerequisite: Graduate Veterinarian or consent of instructor.

PATH 575  Vet Info Tech/Computer App  credit: 1 Hour.
Veterinary applications of word processing, spreadsheet, database, statistical, and health management software packages and various methods of information access and retrieval will be complemented by lecture/discussion and computer laboratory sessions. Prerequisite: Two years of work experience as a veterinarian (post-graduate DVM) or consent of instructor; priority will be given to students enrolled in the Executive Veterinary Program.

PATH 576  Communication Vet Consultation  credit: 1 Hour.
Utilization of communication as a tool in veterinary consultation and management. Skills will be developed in oral and written communication through assigned presentations, technical reports, newsletters, and business letters. Veterinary applications will be emphasized. Prerequisite: Two years of work experience as a veterinarian (post-graduate DVM) or consent of instructor; priority will be given to students enrolled in the Executive Veterinary Program.

PATH 577  Vet Leadership Organ Behavior  credit: 2 Hours.
Leadership principles and organizational theory with practical application to veterinary management and consultation. Includes individual, interpersonal, and organizational influences focusing on current issues in the veterinary profession. Prerequisite: Two years of work experience as a veterinarian (post-graduate DVM) or consent of instructor; priority will be given to students enrolled in the Executive Veterinary Program.

PATH 578  Veterinary Business Management  credit: 4 Hours.
Instruction in and application of the principles of veterinary business management including economics, decision making, financial management, marketing, and legal issues. Emphasis on specific practice type (small animal, food animal, equine) depending on interest of students. Prerequisite: Two years of work experience as a veterinarian (post-graduate DVM) or consent of instructor; priority will be given to students enrolled in the Executive Veterinary Program.
PATH 579  Adv Concept Swine Health Med 1  credit: 3 Hours.
Instruction on the biostatistics involved in the effective analysis of swine production records, diagnostic tests, and clinical trials. Application of epidemiology principles in a swine production setting. Practical diagnostic, treatment, and preventive procedures for disease conditions related to swine production. Prerequisite: Two years of work experience as a veterinarian (post-graduate DVM) or consent of instructor; priority will be given to students enrolled in the Executive Veterinary Program.

PATH 580  Adv Concept Swine Health Med 2  credit: 4 Hours.
Illustrate effective methods to monitor and analyze the effects environmental conditions have on swine health and productivity. Design and implementation of programs to ensure product quality and consumer safety. Swine nutrition and lean growth modeling for optimal use of rations and providing nutritional consultation to swine producers. Evaluation, development, and application of genetic programs for swine production. Prerequisite: Two years of work experience as a veterinarian (post-graduate DVM) or consent of instructor; priority will be given to students enrolled in the Executive Veterinary Program.

PATH 590  Seminar  credit: 0 or 1 Hours.
Required of all graduate students whose major is veterinary pathobiology. Approved for letter and S/U grading.

PATH 591  Design/Analysis Biomed Exper  credit: 4 Hours.
Principles of sampling, treatment assignment, and statistical analysis applied to biomedical experiments; major emphasis include sample size determination, dose-response functions, single and multifactor designs, randomized blocks and repeated measures, and analysis of covariance. Prerequisite: CPSC 440 or PATH 524, or consent of instructor.

PATH 592  Special Problems  credit: 1 to 4 Hours.
Basic and applied study including orientation and research on pertinent initial and continuing problems in the student's area of interest. May be repeated to a maximum of 8 hours if topics vary. Prerequisite: Consent of instructor.

PATH 593  Econ of Food Animal Health  credit: 3 Hours.
Concepts and procedures for economically driven decision-making with special emphasis on veterinary medicine. Topics will include: partial budgeting, enterprise budgeting, break-even analysis, decision analysis, production economics, computer modeling and benefit-cost analysis. Published scientific literature will be reviewed to provide practical examples of economic decision-making in optimizing animal health management. 3 graduate hours. 3 professional hours. Prerequisite: Graduate Veterinarian; VM 608 or equivalent epidemiology course (requires third year standing in the professional curriculum); or consent of instructor.

PATH 594  Veterinary Pathobiology  credit: 1 to 4 Hours.
Course is to be used to designate a trial or experimental course for five or more students, designed to be an elective in the CVM graduate curriculum. A course can be taught under this designation two times within a two year period and cannot be renewed as a PATH 594 course. May be repeated to a maximum of 8 hours if topics vary. Prerequisite: Prerequisites for each experimental course may vary and must be stated in a course outline prior to departmental approval.

PATH 596  Interdisciplinary Tox Sem  credit: 1 Hour.
Same as ENVS 596 and CB 596. See CB 596.

PATH 598  Non-Thesis Research  credit: 1 to 8 Hours.
Independent research to fulfill requirement for non-thesis alternative in Master of Science program only. Approved for S/U grading only. May be repeated to a maximum of 8 hours if topics vary. Credit is not given for both PATH 598 and PATH 599. Prerequisite: Must be Graduate Veterinarian.

PATH 599  Thesis Research  credit: 0 to 16 Hours.
Approved for S/U grading only. May be repeated.

PATH 636  Advanced Clinical Pathology  credit: 2 Hours.
A case-based approach to clinical pathology. Students are required to critically evaluate clinical case data, turn in a written description of the case and be a discussion leader for at least one class period. students will be provided with basic history and signalment of cases and with laboratory data including CBC, clinical chemistry, urinalysis and occasionally additional data. Focuses on the dog and cat, however horse and food animal cases will be presented.

PATH 639  Veterinary Forensic Medicine  credit: 1 Hour.
This course is aimed at veterinary students. This is a small group lecture and discussion based class where we will discuss veterinary medicine. Topics to be discussed include blunt force trauma, projectile injuries, record keeping and forensic entomology. Students will meet twice a week for an 8 week block. 1 professional hour. Approved for S/U grading only.

PATH 640  Geographic Methods for Health  credit: 1 Hour.
An introduction to geographic information system software and applications through lectures and exercises. Uses application-based learning to address topics related to spatial analysis and mapping for animal and public health. Exercises include making maps of disease occurrence and disease rates, using census data for population estimates, and creating maps that combine environmental factors with patterns of illness. 1 graduate hour. 1 professional hour. Approved for letter and S/U grading. Credit is not given for both PATH 642 and PATH 439.

PATH 642  Bioscientific Writing  credit: 1 Hour.
Instruction in communicating research results to a scientific audience. Assignments focus on writing an abstract, constructing a poster presentation, and completing a short manuscript. Intended for veterinary students who have some previous experience in a research setting and access to experimental data that can be used as a basis of writing exercises. Prerequisite: Enrollment in the veterinary curriculum and consent of instructor.

PATH 644  Outbreak Investigation  credit: 1 Hour.
Published cases of foodborne outbreaks and other outbreaks serve as the basic learning materials for the course. Details about particular diseases/illnesses, how outbreak investigation are conducted, how risk factors are identified in an outbreak, how these factors contribute to incidence of disease, and resolutions of outbreaks are examined. The course expands upon content in the core veterinary curriculum and allows student to hone and apply their epidemiology skills. This course is valuable for veterinary public practice and anyone interested in public health, food safety, and epidemiology. 1 graduate hour. 1 professional hour. May be repeated in separate terms up to 2 hours if topics vary. Prerequisite: DVM students: VM 608 or permission of instructor. Graduate students: None. Restricted to DVM or graduate students.
PATH 669  Veterinary Diagnostic Medicine  credit: 1.5 to 3 Hours.
For VM-4 professional students, a veterinary diagnostic medicine clerkship in the Veterinary Diagnostic Laboratory. 1.5 to 3 professional hours. Approved for S/U grading only. May be repeated in the same or separate terms to a maximum of 4.5 hours. Prerequisite: Fourth year standing or its equivalent in veterinary curriculum.

PATH 692  Special Problems  credit: 1 to 3 Hours.
Individual research on a special problem chosen in consultation with the instructor and department head. Approved for both letter and S/U grading. May be repeated to a maximum of 6 hours if topics vary. 1 to 3 graduate hours. 1 to 3 professional hours. Prerequisite: Registration in veterinary curriculum with grade-point average of 3.0 or above, or consent of instructor.

PATH 694  Veterinary Pathobiology  credit: 1 to 3 Hours.
To be used to designate a trial or experimental course for five or more students, designed to be an elective in the CVM professional curriculum. The course can be taught under this designation for two years or two offerings, whichever time is greater. Approved for letter and S/U grading. May be repeated to a maximum of 6 hours if topics vary. Prerequisite: Registration in the veterinary curriculum or consent of instructor.