Veterinary Pathology

Professional Program of Study

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

The Department of Veterinary Pathology offers a systematic study of basic disease mechanisms with emphasis on the changes in gene expression, cells, tissues, organs, and body fluids associated with disease. The theory and practice of veterinary pathology, veterinary clinical pathology, veterinary parasitology, veterinary toxicology, and related disciplines provide the basis for accurate diagnosis and a rational approach to the treatment and prevention of animal diseases.

Graduate Study

The department offers work for the degree master of science and doctor of philosophy with a major in veterinary pathology. As an option, students may choose an area of specialization in pathology, veterinary anatomic pathology, veterinary clinical pathology, veterinary toxicology, or veterinary parasitology (http://vetmed.iastate.edu/vpath/academics/graduate-program). The master of science degree is available on a thesis or nonthesis basis in the veterinary pathology major with or without an area of specialization.

For the ACVP training track (residency) of the anatomic or clinical pathology graduate program designed to train veterinary pathologists, the student must have a funded position within the Department of Veterinary Pathology. If the student does not have a funded position or is not enrolled in the departmental degree program, enrollment in courses pertaining to the residency program and activities that support the residency program must have the approval of the Department Chair of Veterinary Pathology and the head of the departmental residency training program.

Graduates have a broad understanding of the mechanistic basis of disease pathogenesis. They are able to communicate with clinicians, other scientists, and other colleagues on scientific matters, and with the general public on related science policy matters. Graduates are able to address complex problems facing the agricultural and biomedical sciences, and comparative medicine, and are able to make appropriate diagnoses and investigations of animal diseases. They consider ethical, social, legal and environmental issues, and are skilled at carrying out research, communicating research results, and writing concise and competitive grant proposals.

Collaborative work is recommended in other departments in the College of Veterinary Medicine or departments or programs in other colleges. The department participates in the interdepartmental program in immunobiology (www.immunobiology.iastate.edu/) and the interdepartmental major in toxicology (www.toxicology.iastate.edu/).

A veterinary degree (doctor of veterinary medicine or equivalent) is required for training in Veterinary Anatomic Pathology and Veterinary Clinical Pathology. Other specializations do not require the veterinary degree. A minimum score of 550 paper-based (213 computer-based; 79 internet based) is required on the TOEFL examination for students whose native language is not English. Scores on the standardized Graduate Record Examination (GRE) General Test are required of students not having a veterinary degree from the United States or Canada. The GRE General Test is strongly recommended for all other applicants. A foreign language requirement will be determined by the student's program of study committee with the approval of the departmental chair. The Graduate English Examination is a graduate college requirement for native English speakers.

The M.S. thesis degree in veterinary pathology, with or without an area of specialization, requires a minimum of 30 graduate credits. Following completion of all other requirements, a comprehensive final examination is administered covering all graduate work including the thesis. The examination is typically oral, but a written component may be specified by the program of study committee. The degree candidate must submit a thesis, including at least one manuscript suitable for publication, to the committee members and departmental chair at least two weeks prior to the final examination. The departmental requirement for graduate courses includes:

3 credits of basic biological sciences (biochemistry, genetics, cell biology)		3
STAT 401	Statistical Methods for Research Workers	4
V PTH 570	Systemic Pathology I	4
or V PTH 571	Systemic Pathology II	
V PTH 551	Postmortem Pathology Laboratory	1
V PTH 605	Current Topics Seminar	1
V PTH 699	Research	arr †

† Arranged with instructor.

The M.S. nonthesis degree in veterinary pathology, with or without an area of specialization, requires a minimum of 40 graduate credits including at least 10 graduate credits earned outside the department. Every nonthesis master's degree program requires evidence of individual accomplishment demonstrated by completion of a creative component, special report, or scientific study. A minimum of 3 credits of such independent work (V PTH 599 Creative Component Research) and a practical diagnostic examination (V PTH 606 Diagnostic Interpretation) corresponding to the area of specialization are required on every program of study. The final examination is comprehensive and consists of written and oral questions. The departmental requirement for graduate courses includes those for the M.S. thesis degree plus additional courses corresponding to the area of degree emphasis of specialization. Contact the department for a more complete list of requirements and information on areas of specialization.

The Ph.D. degree in veterinary pathology, with or without an area of specialization, requires a minimum of 72 graduate credits including at least 12 graduate credits earned outside the department. The preliminary examination, consisting of written and oral components, is comprehensive and not restricted to the content of graduate courses. The degree candidate must submit a dissertation, including at least two manuscripts suitable for publication, to the committee members and departmental chair at least two weeks prior to the final examination. The final examination is primarily a defense of the dissertation, but it may include questions on other areas of specialized knowledge. The department also offers a combined DVM/Ph.D. program designed for completion of courses for the Ph.D. degree in Veterinary Pathology simultaneously with study in the professional curriculum in the College of Veterinary Medicine. Contact the department for a more complete list of requirements for the Ph.D. degree and information on areas of specialization.

Courses primarily for professional curriculum students:

V PTH 342. Anatomic Pathology I.
(Dual-listed with V PTH 542). (2-2) Cr. 3. S. *Prereq: First-year classification in veterinary medicine*
Basic pathology with emphasis on disease in animals and introduction to diseases by system.

V PTH 353. Introductory Parasitology.
(Cross-listed with BIOL, MICRO). (3-0) Cr. 3. S. *Prereq: BIOL 212*
Biology and host-parasite relationships of major groups of animal parasites, and techniques of diagnosing and studying parasites.

V PTH 372. Anatomic Pathology II.
(Dual-listed with V PTH 572). (3-3) Cr. 4. F. *Prereq: Graduate classification and V PTH 542*
Response to injury by each body system.

V PTH 376. Veterinary Parasitology.
(Dual-listed with V PTH 576). (3-3) Cr. 4. F. *Prereq: Graduate classification and V PTH 542*
Parasitic diseases of domestic animals and their control.

V PTH 377. Case Study III.
(0-4) Cr. 2. F. *Prereq: Second-year classification in veterinary medicine*
Clinical applications of the basic sciences taught concurrently in the fall semester of the second year curriculum in veterinary medicine.

V PTH 401. Basics of Medical Terminology.
(1-0) Cr. 1. F.
8 weeks, offered first half semester only. Discussion of prefixes, suffixes, and roots (mostly from Latin and Greek) that comprise medical terms.

V PTH 409. Introduction to Veterinary Cytology and Laboratory Techniques.
(0-2) Cr. 1. S. *Prereq: Third-year classification in veterinary medicine*
Description, interpretation, and techniques for cellular preparations from tissues and body fluids.

V PTH 410. Llama Medicine.
(1-0) Cr. 1. S. *Prereq: Second or third year classification in veterinary medicine*
Offered first half semester only. Introduction to basic camelid medicine, including anatomy, behavior, restraint, handling, husbandry, herd health, common diseases, surgical conditions, and anesthesia protocols.

V PTH 425. Clinical Pathology.
(2-4) Cr. 4. S. *Prereq: V PTH 372*
Principles of clinical hematology, clinical chemistry, and urinalysis in domestic animals.

V PTH 456. Necropsy Laboratory Practicum.
Cr. 1. Repeatable. *Prereq: Fourth-year classification in veterinary medicine*
Practicum in postmortem examination and diagnosis.

V PTH 457. Clinical Pathology Laboratory Practicum.
Cr. 1. Repeatable. *Prereq: Fourth-year classification in veterinary medicine*
Methodology in clinical chemistry, hematology and cytology; practice in interpretation of laboratory data.

V PTH 478. Medical Protozoology.
(Dual-listed with V PTH 578). (Cross-listed with ENT, MICRO). (2-1) Cr. 3. F. *Prereq: MICRO 302 or BIOL 314, or equivalent*
Medically important protozoa: their ecology and biology and the diseases they cause in humans and animals. Emphasis is on the protozoa, with some consideration of parasitic nematodes. Topics include: infection and immunity, computational biology/bioinformatics, unique/special subcellular systems (pathways and organelles), vector-parasite-host interactions, disease prevention/ treatment strategies, developmental biology. Nonmajor graduate credit.

V PTH 490. Independent Study.
Cr. arr. Repeatable. *Prereq: Permission of instructor and department chair*

V PTH 492. Orientation for International Experience.
(2-0) Cr. 1. Repeatable. S. *Prereq: Classification in veterinary medicine*
8 weeks. Predeparture orientation for group study abroad. Cultural considerations for the study abroad experience and a conversational language introduction. Out of class work will be assigned. Offered on a satisfactory-fail basis only.

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

Courses primarily for graduate students, open to qualified undergraduates:

V PTH 530. Teaching and Learning in Veterinary Medical Education.
(3-0) Cr. 3. Alt. F., offered 2014.
Study of principles of teaching and learning as they relate to veterinary medical education. These include: theories of learning, analyzing content/learners/context, identifying goals, identifying appropriate instructional strategies (specific to medical education), matching assessment processes to goals and strategies, common curricular approaches and decision-making processes in medical education, and the scholarship of teaching and learning for veterinary medical educators.

V PTH 542. Anatomic Pathology I.
(Dual-listed with V PTH 342). (2-2) Cr. 3. S. *Prereq: Graduate classification and BIOL 352 or equivalent for graduate credit, permission of instructor*
Basic pathology with emphasis on disease in animals and introduction to diseases by system.

V PTH 548. Diagnostic Parasitology Laboratory.
Cr. 1-3. F.S.SS. *Prereq: V PTH 376 or V PTH 576*
Contact hours are (0-3 to 0-9). A laboratory experience in the technical and applied aspects of veterinary parasitology.

V PTH 549. Clinical Pathology Laboratory.
(0-3) Cr. 1. Repeatable. F.S.SS. *Prereq: V PTH 457; permission of instructor*
Laboratory procedures and clinical interpretations with emphasis on hematology, cytology, and clinical chemistry. Offered on a satisfactory-fail basis only.

V PTH 550. Surgical Pathology Laboratory.
Cr. 1-3. Repeatable. F.S.SS. *Prereq: V PTH 570 or V PTH 571; permission of instructor*
Contact hours are (0-3 to 0-9). Diagnosis of lesions in biopsy specimens; classification of neoplasms. Course includes rotation through departmental biopsy service and review of selected cases from departmental archives. Offered on a satisfactory-fail basis only.

V PTH 551. Postmortem Pathology Laboratory.
Cr. 1-3. Repeatable. F.S.SS. *Prereq: V PTH 542; permission of instructor*
Contact hours are (0-3 to 0-9). Necropsy techniques of animals with emphasis on gross and microscopic lesions and diagnosis. Offered on a satisfactory-fail basis only.

V PTH 554. Ethics in Scientific Research and Writing.
(1-0) Cr. 1. Alt. S., offered 2014. *Prereq: Graduate classification*
Ethical conduct in biomedical research, criticism, writing, and adherence to regulations. Offered on a satisfactory-fail basis only.

V PTH 570. Systemic Pathology I.
(2-4) Cr. 4. Alt. F., offered 2014. *Prereq: V PTH 342 or V PTH 542; permission of instructor*
Pathology of the respiratory, reproductive, endocrine, musculoskeletal, and cardiovascular systems. Emphasis on pathogenesis and anatomic pathology correlated with interpretive clinical pathology where appropriate.

V PTH 571. Systemic Pathology II.
(2-4) Cr. 4. Alt. F., offered 2013. *Prereq: V PTH 342 or V PTH 542; permission of instructor*
Pathology of the integumentary, urinary, digestive, lymphoid, and nervous systems and special senses. Emphasis on pathogenesis and anatomic pathology correlated with interpretive clinical pathology where appropriate.

V PTH 572. Anatomic Pathology II.
(Dual-listed with V PTH 372). (3-3) Cr. 4. F. *Prereq: Graduate classification and V PTH 542*
Response to injury by each body system.

V PTH 576. Veterinary Parasitology.
(Dual-listed with V PTH 376). (3-3) Cr. 4. F. *Prereq: Graduate classification and V PTH 542*
Parasitic diseases of domestic animals and their control.

V PTH 578. Medical Protozoology.
(Dual-listed with V PTH 478). (Cross-listed with ENT, MICRO). (2-1) Cr. 3. F. *Prereq: MICRO 302 or BIOL 314, or equivalent*
Medically important protozoa: their ecology and biology and the diseases they cause in humans and animals. Emphasis is on the protozoa, with some consideration of parasitic nematodes. Topics include: infection and immunity, computational biology/bioinformatics, unique/special subcellular systems (pathways and organelles), vector-parasite-host interactions, disease prevention/ treatment strategies, developmental biology. Nonmajor graduate credit.

V PTH 590. Special Topics.
Cr. 1-4. Repeatable. F.S.SS. *Prereq: Permission of instructor*

V PTH 590A. Special Topics: Veterinary Pathology.
Cr. 1-4. Repeatable. F.S.SS. *Prereq: Permission of instructor*

V PTH 590B. Special Topics: Veterinary Parasitology.
Cr. 1-4. Repeatable. F.S.SS. *Prereq: Permission of instructor*

V PTH 590C. Special Topics: Veterinary Toxicology.
Cr. 1-4. Repeatable. F.S.SS. *Prereq: Permission of instructor*

V PTH 590D. Special Topics: Veterinary Clinical Pathology.
Cr. 1-4. Repeatable. F.S.SS. *Prereq: Permission of instructor*

V PTH 590E. Special Topics: Other.
Cr. 1-4. Repeatable. F.S.SS. *Prereq: Permission of instructor*

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

V PTH 599. Creative Component Research.
Cr. arr. Repeatable.
Course for departmental graduate research.

V PTH 599A. Creative Component Research: Veterinary Pathology.
Cr. arr. Repeatable.
Course for departmental graduate research.

V PTH 599B. Creative Component Research: Veterinary Parasitology.
Cr. arr. Repeatable.
Course for departmental graduate research.

V PTH 599C. Creative Component Research: Veterinary Toxicology.
Cr. arr. Repeatable.
Course for departmental graduate research.

V PTH 599D. Creative Component Research: Veterinary Clinical Pathology.
Cr. arr. Repeatable.
Course for departmental graduate research.

Courses for graduate students:

V PTH 604. Pathology Case Seminar.
Cr. 1-2. Repeatable. F.S. *Prereq: permission of instructor*
Description and interpretation of microscopic lesions and clinical pathology data collected from cases of natural and experimental disease. Offered on a satisfactory-fail basis only.

V PTH 605. Current Topics Seminar.
Cr. 1. Repeatable. F.S.SS.
A seminar of graduate research at the time of thesis or dissertation defense.

V PTH 606. Diagnostic Interpretation.
Cr. R. F.S.SS. *Prereq: permission of instructor*
A comprehensive examination in the diagnostic description and interpretation of case materials relevant to veterinary pathology and areas of specialization for the graduate degree preliminary examination.

V PTH 606A. Diagnostic Interpretation: Veterinary Pathology.
Cr. R. F.S.SS. *Prereq: permission of instructor*
A comprehensive examination in the diagnostic description and interpretation of case materials relevant to veterinary pathology and areas of specialization for the graduate degree preliminary examination.

V PTH 606B. Diagnostic Interpretation: Veterinary Parasitology.
Cr. R. F.S.SS. *Prereq: permission of instructor*
A comprehensive examination in the diagnostic description and interpretation of case materials relevant to veterinary pathology and areas of specialization for the graduate degree preliminary examination.

V PTH 606C. Diagnostic Interpretation: Veterinary Toxicology.
Cr. R. F.S.SS. *Prereq: permission of instructor*
A comprehensive examination in the diagnostic description and interpretation of case materials relevant to veterinary pathology and areas of specialization for the graduate degree preliminary examination.

V PTH 606D. Diagnostic Interpretation: Veterinary Clinical Pathology.
Cr. R. F.S.SS. *Prereq: permission of instructor*
A comprehensive examination in the diagnostic description and interpretation of case materials relevant to veterinary pathology and areas of specialization for the graduate degree preliminary examination.

V PTH 652. Pathologic Hematology.
(2-2) Cr. 3. *Prereq: V PTH 425; permission of instructor*
Pathologic changes in blood constituents of domestic animals.

V PTH 655. Cellular and Molecular Pathology I.
(3-0) Cr. 3. Alt. S., offered 2015. *Prereq: Graduate course in biochemistry, genetics, or cell biology*
Cellular and molecular mechanisms of cell injury, cellular responses to injury, and inflammation.

V PTH 656. Cellular and Molecular Pathology II.
(Cross-listed with TOX). (3-0) Cr. 3. Alt. S., offered 2014. *Prereq: Graduate course in biochemistry, genetics, or cell biology*
Cellular and molecular mechanisms of carcinogenesis.

V PTH 660. Pathogenesis of Persistent Infections.
(Cross-listed with V MPM). (2-0) Cr. 2. Alt. S., offered 2015. *Prereq: Permission of instructor*
Study of current knowledge related to host pathogen interactions during persistent and chronic infections by bacteria, viruses and parasites.

V PTH 663. Clinical Chemistry.
(2-2) Cr. 3. *Prereq: V PTH 425; permission of instructor*
The pathophysiology, methodology, and clinical application of laboratory medicine.

V PTH 679. Histopathology of Laboratory Animals.
(0-4) Cr. 2. Alt. SS., offered 2014. *Prereq: V PTH 570 or V PTH 571; permission of instructor*
Study of microscopic lesions in laboratory animals with emphasis on description, etiology, pathogenesis, and diagnosis.

V PTH 699. Research.
Cr. arr. Repeatable.
Course restricted to graduate program within the department.

V PTH 699A. Research: Veterinary Pathology.
Cr. arr. Repeatable.
Course restricted to graduate program within the department.

V PTH 699B. Research: Veterinary Parasitology.
Cr. arr. Repeatable.
Course restricted to graduate program within the department.

V PTH 699C. Research: Veterinary Toxicology.
Cr. arr. Repeatable.
Course restricted to graduate program within the department.

V PTH 699D. Research: Veterinary Clinical Pathology.
Cr. arr. Repeatable.
Course restricted to graduate program within the department.