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. The majority of students choose an area of specialization in veterinary anatomic pathology, veterinary clinical pathology, or veterinary parasitology (http://vetmed.iastate.edu/vpath/academics/graduate-program (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 programs in Immunobiology (www.immunobiology.iastate.edu/ (http://www.immunobiology.iastate.edu/)), Toxicology (www.toxicology.iastate.edu/ (http://www.toxicology.iastate.edu/)), Genetics (www.genetics.iastate.edu/ (http://www.genetics.iastate.edu/)), and Molecular, Cellular, and Developmental Biology (www.mcdb.iastate.edu/ (http://www.mcdb.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. 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
VPTH 5510	Postmortem Pathology Laboratory	1-3
VPTH 5700	Systemic Pathology I	4
STAT 5870	Statistical Methods for Research Workers	4
VPTH 6050	Current Topics Seminar	1
VPTH 6990A	Research: Veterinary Pathology	1-30
or VPTH 6990B	Research: Veterinary Parasitology	
or VPTH 6990C	Research: Veterinary Toxicology	
or VPTH 6990D	Research: Veterinary Clinical Pathology	

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 (VPTH 5990) and a practical diagnostic examination (VPTH 6060) 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 undergraduates:

VPTH 3530: Introductory Parasitology
(Cross-listed with BIOL 3530/ MICRO 3530).
Credits: 3. Contact Hours: Lecture 3.
Prereq: BIOL 2120
Biology and host-parasite relationships of major groups of animal parasites, and techniques of diagnosing and studying parasites. (Typically Offered: Spring)

VPTH 4010: Basics of Medical Terminology
Credits: 1. Contact Hours: Lecture 1.
Discussion of prefixes, suffixes, and roots (mostly from Latin and Greek) that comprise medical terms. (Typically Offered: Fall)

VPTH 4020: Introduction to Pathology
(Cross-listed with BIOL 4020).
Credits: 3. Contact Hours: Lecture 3.
Prereq: BIOL 2110, BIOL 2110L, BIOL 2120, *and* BIOL 2120L
Introductory exploration of pathology as a medical discipline. This includes study of disease mechanisms via an introduction to general pathology topics (cell degeneration, necrosis, disturbances of growth, disturbances of blood flow, inflammation, neoplasia) and organ system-specific response to injury. (Typically Offered: Fall)

VPTH 4030: Introduction to Pathology II
(Cross-listed with BIOL 4030).
Credits: 3. Contact Hours: Lecture 3.
Prereq: VPTH 4020 *and* BIOL 4020
Continuation of pathology topics begun in VPTH/BIOL 4020. How specific organ systems respond to injury using principles and information covered in VPTH 4020/ BIOL 4020. Study of a set of prototypical diseases that affect humans and animals. (Typically Offered: Spring)

Courses primarily for graduate students, open to qualified undergraduates:

VPTH 5030: Principles of Pathology
Credits: 3. Contact Hours: Lecture 3.
Introductory exploration of pathology as a medical discipline. This includes study of disease mechanisms via an introduction to general pathology topics (cell degeneration, necrosis, disturbances of growth, disturbances of blood flow, inflammation, neoplasia) and organ system-specific response to injury. (Typically Offered: Spring)

VPTH 5300: Teaching and Learning in Veterinary Medical Education
Credits: 3. Contact Hours: Lecture 3.
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. Offered even-numbered years. (Typically Offered: Fall)

VPTH 5420: Anatomic Pathology I
Credits: 3. Contact Hours: Lecture 2, Laboratory 2.
Basic pathology with emphasis on disease in animals and introduction to disease by system. (Typically Offered: Spring)

VPTH 5480: Diagnostic Parasitology Laboratory
Credits: 1-3. Contact Hours: Laboratory 3.
Repeatable.
Contact hours are (0-3 to 0-9). A laboratory experience in the technical and applied aspects of veterinary parasitology. (Typically Offered: Fall, Spring, Summer)

VPTH 5490: Clinical Pathology Laboratory
Credits: 1. Contact Hours: Laboratory 3.
Repeatable, maximum of 1 credits.
Laboratory procedures and clinical interpretations with emphasis on hematology, cytology, and clinical chemistry. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring, Summer)

VPTH 5500: Surgical Pathology Laboratory
Credits: 1-3. Contact Hours: Laboratory 3.
Repeatable.
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. (Typically Offered: Fall, Spring, Summer)

VPTH 5510: Postmortem Pathology Laboratory
Credits: 1-3. Contact Hours: Laboratory 3.
Repeatable.
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. (Typically Offered: Fall, Spring, Summer)

VPTH 5540: Ethics in Scientific Research and Writing
Credits: 1. Contact Hours: Lecture 1.
Ethical conduct in biomedical research, criticism, writing, and adherence to regulations. Offered even-numbered years. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

VPTH 5700: Systemic Pathology I
Credits: 4. Contact Hours: Lecture 4.
Pathology of the respiratory, reproductive, endocrine, musculoskeletal, and cardiovascular systems. Emphasis on pathogenesis and histopathology correlated with interpretive clinical pathology where appropriate. DVM degree required. Offered even-numbered years. (Typically Offered: Fall)

VPTH 5710: Systemic Pathology II
Credits: 4. Contact Hours: Lecture 4.
Pathology of the integumentary, urinary, digestive, lymphoid, and nervous systems and special senses. Emphasis on pathogenesis and histopathology correlated with interpretive clinical pathology where appropriate. DVM degree required. Offered odd-numbered years. (Typically Offered: Fall)

VPTH 5720: Anatomic Pathology II
Credits: 4. Contact Hours: Lecture 3, Laboratory 3.
Response to injury by each body system. (Typically Offered: Fall)

VPTH 5760: Veterinary Parasitology
Credits: 4. Contact Hours: Lecture 3, Laboratory 3.
Parasitic diseases of domestic animals and their control. (Typically Offered: Fall)

VPTH 5900A: Special Topics: Veterinary Pathology
Credits: 1-4. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

VPTH 5900B: Special Topics: Veterinary Parasitology
Credits: 1-4. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

VPTH 5900C: Special Topics: Veterinary Toxicology
Credits: 1-4. Repeatable.
(Typically Offered: Fall, Spring, Summer)

VPTH 5900D: Special Topics: Veterinary Clinical Pathology
Credits: 1-4. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

VPTH 5900E: Special Topics: Other
Credits: 1-4. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

VPTH 5960: International Preceptorship
Credits: 1-12. Repeatable, maximum of 12 credits.
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. (Typically Offered: Fall, Spring, Summer)

VPTH 5990A: Creative Component Research: Veterinary Pathology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
Course for departmental graduate research. (Typically Offered: Fall, Spring, Summer)

VPTH 5990B: Creative Component Research: Veterinary Parasitology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
Course for departmental graduate research. (Typically Offered: Fall, Spring, Summer)

VPTH 5990C: Creative Component Research: Veterinary Toxicology
Credits: 1-30. Repeatable.
Course for departmental graduate research. (Typically Offered: Fall, Spring, Summer)

VPTH 5990D: Creative Component Research: Veterinary Clinical Pathology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
Course for departmental graduate research. (Typically Offered: Fall, Spring, Summer)

Courses for graduate students:

VPTH 6040: Pathology Case Seminar
Credits: 1-2. Contact Hours: Lecture 2.
Repeatable.
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. (Typically Offered: Fall, Spring)

VPTH 6050: Current Topics Seminar
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Prereq: Instructor Permission for Course
A seminar of graduate research at the time of thesis or dissertation defense. (Typically Offered: Fall, Spring, Summer)

VPTH 6060A: Diagnostic Interpretation: Veterinary Pathology
Credits: Required. Contact Hours: Lecture 1.
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. (Typically Offered: Fall, Spring, Summer)

VPTH 6060B: Diagnostic Interpretation: Veterinary Parasitology
Credits: Required. Contact Hours: Lecture 1.
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. (Typically Offered: Fall, Spring, Summer)

VPTH 6060C: Diagnostic Interpretation: Veterinary Toxicology
Credits: Required. Contact Hours: Lecture 1.
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. (Typically Offered: Fall, Spring, Summer)

VPTH 6060D: Diagnostic Interpretation: Veterinary Clinical Pathology
Credits: Required. Contact Hours: Lecture 1.
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. (Typically Offered: Fall, Spring, Summer)

VPTH 6550: Cellular and Molecular Pathology I
Credits: 3. Contact Hours: Lecture 3.
Cellular and molecular mechanisms of cell injury, cellular responses to injury, and inflammation. Graduate course in biochemistry, genetics, or cell biology recommended. Offered odd-numbered years. (Typically Offered: Spring)

VPTH 6560: Cellular and Molecular Pathology II
(Cross-listed with TOX 6560).
Credits: 3. Contact Hours: Lecture 3.
Cellular and molecular mechanisms of carcinogenesis. Offered even-numbered years. (Typically Offered: Spring)

VPTH 6600: Pathogenesis of Persistent Infections
(Cross-listed with VMPM 6600).
Credits: 2. Contact Hours: Lecture 2.
Study of current knowledge related to host pathogen interactions during persistent and chronic infections by bacteria, viruses and parasites. Offered odd-numbered years. (Typically Offered: Spring)

VPTH 6610: Comparative Immunology and Infectious Disease
(Cross-listed with IMBIO 6610).
Credits: 2. Contact Hours: Lecture 2.
Discuss and define similarities and differences of varied host responses to infectious challenge. Learning will focus on comparative aspects of the host response and the unique aspects of immunity from different organisms, while highlighting molecular and mechanistic similarities of pathogen recognition, response and resolution. Offered odd-numbered years. (Typically Offered: Spring)

VPTH 6790: Histopathology of Laboratory Animals
Credits: 2.
Prereq: VPTH 5700 *or* VPTH 5710*; Permission of Instructor*
Study of microscopic lesions in laboratory animals with emphasis on description, etiology, pathogenesis, and diagnosis.

VPTH 6990A: Research: Veterinary Pathology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
Course restricted to graduate program within the department. (Typically Offered: Fall, Spring, Summer)

VPTH 6990B: Research: Veterinary Parasitology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
Course restricted to graduate program within the department. (Typically Offered: Fall, Spring, Summer)

VPTH 6990C: Research: Veterinary Toxicology
Credits: 1-30. Repeatable.
Course restricted to graduate program within the department. (Typically Offered: Fall, Spring, Summer)

VPTH 6990D: Research: Veterinary Clinical Pathology
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
Course restricted to graduate program within the department. (Typically Offered: Fall, Spring, Summer)

Courses primarily for professional curriculum students:

VPTH 7342: Anatomic Pathology I
Credits: 3. Contact Hours: Lecture 2, Laboratory 2.
Basic pathology with emphasis on disease in animals and introduction to disease by system. (Typically Offered: Spring)

VPTH 7372: Anatomic Pathology II
Credits: 4. Contact Hours: Lecture 3, Laboratory 3.
Response to injury by each body system. (Typically Offered: Fall)

VPTH 7376: Veterinary Parasitology
Credits: 4. Contact Hours: Lecture 3, Laboratory 3.
Parasitic diseases of domestic animals and their control. (Typically Offered: Fall)

VPTH 7377: Case Study III
Credits: 2. Contact Hours: Lecture 1, Laboratory 2.
Clinical applications of the basic sciences taught concurrently in the fall semester of the second year curriculum in veterinary medicine. (Typically Offered: Fall)

VPTH 7409: Introduction to Veterinary Cytology and Laboratory Techniques
Credits: 1. Contact Hours: Laboratory 2.
Description, interpretation, and techniques for cellular preparations from tissues and body fluids. (Typically Offered: Spring)

VPTH 7425: Clinical Pathology
Credits: 4. Contact Hours: Lecture 2, Laboratory 4.
Principles of clinical hematology, clinical chemistry, and urinalysis in domestic animals. (Typically Offered: Spring)

VPTH 7456: Necropsy Laboratory Practicum
Credits: 1. Contact Hours: Laboratory 2.5.
Repeatable.
Practicum in postmortem examination and diagnosis.

VPTH 7457: Clinical Pathology Laboratory Practicum
Credits: 1. Contact Hours: Laboratory 1.
Repeatable.
Methodology in clinical chemistry, hematology and cytology; practice in interpretation of laboratory data.

VPTH 7476X: Clinical Veterinary Parasitology
Credits: 1-2. Repeatable.
Two week clinical rotation in clinical veterinary parasitology. Students will investigate parasitic disease with supervision of the instructors. Variable amount of travel to farm or sites will be required. Biosecurity: All students must follow current College policies regarding animal contact following foreign travel.

VPTH 7490: Independent Study
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
(Typically Offered: Fall, Spring, Summer)

VPTH 7492: Orientation for International Experience
Credits: 1. Contact Hours: Lecture 1.
Repeatable, maximum of 1 credits.
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. (Typically Offered: Spring)

VPTH 7495: Clinical Competency Skills Checklist/Remediation
Credits: Required. Contact Hours: Lecture 1.
In order to graduate, all 4th year veterinary students are required to complete a checklist of clinical procedures and complete any assigned remediation (based on evaluation in core clinical rotations). These requirements are tied to the college's AVMA COE accreditation, and this course is used to document completion of those requirements. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

VPTH 7496: International Experience
Credits: 1-12. Repeatable.
International Preceptorships and Study Abroad Group programs. 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. (Typically Offered: Fall, Spring, Summer)