

# PATHO-BIOLOGICAL SCIENCES (PATH-BIO)

## PATH-BIO 150 – CONTEMPORARY TOPICS AND CAREERS IN THE VETERINARY SCIENCES

1 credit.

Topics of importance to the animal health field.

**Requisites:** None

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**Learning Outcomes:** 1. Articulate multiple career paths that a person can take if interested in a career in animal health and veterinary medicine.

Audience: Undergraduate

2. Describe the requirements and process for applying to veterinary medical school. Audience: Undergraduate

3. Understand how to engage in career exploration. Audience: Undergraduate

## PATH-BIO/PATH 210 – HIV: SEX, SOCIETY AND SCIENCE

3 credits.

HIV kills three million people per year, more than any other infectious disease. We will learn about the transmission, immunology, virology, vaccinology and societal impact of this virus. Six of the world's leading HIV scientists will give guest lectures.

**Requisites:** None

**Course Designation:** Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Elementary

L&S Credit – Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

## PATH-BIO 299 – INDEPENDENT STUDY

1-3 credits.

**Requisites:** Consent of instructor

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Fall 2022

**Learning Outcomes:** 1. Summarize intellectual growth associated with independent study work through mentor discussion  
Audience: Undergraduate

2. Identify diversity of viewpoints through critical thinking Audience: Undergraduate

3. Illustrate growth in reading, writing, and communication skills Audience: Undergraduate

## PATH-BIO/ENTOM/M M & I/ZOOLOGY 350 – PARASITOLOGY

3 credits.

The biology of water-borne, food-borne, soil-borne and vector-borne parasites of animals including humans. Parasites are explored in the context of transmission, associated disease, diagnosis and treatment options, and environmental, cultural and socioeconomic drivers of disease epidemiology.

**Requisites:** ZOOLOGY/BIOLOGY 101 and 102, or ZOOLOGY/BIOLOGY/BOTANY 152 or ZOOLOGY 153, or BIOCORE 381

**Course Designation:** Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Intermediate

L&S Credit – Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Be conversant in terminology used in the field of Parasitology. Audience: Undergraduate

2. Recall scientific and common names for parasites and hosts, and the name of the resulting disease in humans or animals. Audience: Undergraduate

3. Attribute parasite behavior and characteristics to specific disease features in the host. Audience: Undergraduate

4. Identify appropriate means to diagnose infections with parasites. Audience: Undergraduate

5. Describe and identify factors that determine when, where, and why parasitic diseases exist. Audience: Undergraduate

6. Integrate terminology, scientific nomenclature, diagnostic features and demographics to solve case studies where the parasitic culprit is unknown. Audience: Undergraduate

7. Compare and contrast commonalities in parasite life cycles to demonstrate how flexibility in those life cycles has resulted in many different potential means of transmission. Audience: Undergraduate

8. Deconstruct the impact of parasitic diseases on human and animal health, from disease symptoms and pathology in an individual, to socioeconomics in communities and countries. Audience: Undergraduate

9. Identify reliable resources (primarily internet-based) available for researching the biology and epidemiology parasitic diseases. Audience: Undergraduate

**PATH-BIO/MED HIST 370 – ADDRESSING CONTROVERSY:  
THE SCIENCE, ETHICS, AND PUBLIC DISCUSSION OF ANIMAL  
RESEARCH**

3 credits.

Addresses the science, ethics, history, and communication strategies associated with the use of animals in research. Seeks to identify and employ common ground among those with different perspectives to enable students to make good decisions about this contentious topic.

**Requisites:** Satisfied Communications A requirement

**Course Designation:** Gen Ed - Communication Part B

Breadth - Either Humanities or Natural Science

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Identify and employ communication practices that encourage tolerant and non-threatening discussion of controversial topics. Audience: Undergraduate

10. Employ appropriate style and disciplinary conventions in writing and speaking. Audience: Undergraduate

11. Learn to use core library resources specific to the discipline. Audience: Undergraduate

2. Explain how scientific knowledge is acquired, with special reference to research with animals. Audience: Undergraduate

3. Explain and compare ethical principles associated with animal use in research. Audience: Undergraduate

4. Explore and apply principles of effective communication of complex and value-laden science. Audience: Undergraduate

5. Describe the history and evaluate the present status of the animal research controversy. Audience: Undergraduate

6. Construct and critique written and verbal presentations about animal research. Audience: Undergraduate

7. Refine and defend your own position on animal research in a respectful and non-judgmental way that encourages additional dialog. Audience: Undergraduate

8. Identify common ground among differing perspectives on animal research, and develop best practices for communicating this subject to diverse audiences. Audience: Undergraduate

9. Practice critical reading, logical thinking, and the use of evidence. Audience: Undergraduate

**PATH-BIO 510 – VETERINARY IMMUNOLOGY**

3 credits.

Current concepts in basic and clinical immunology with special emphasis on domesticated species and aspects of immunology.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**Learning Outcomes:** 1. Discuss and apply how the immune system in a healthy animal protects its host from infection and neoplasia. Audience: Graduate

2. Discuss and apply the mechanisms underlying the failure of the body's defenses to protect against infections and neoplasia. Audience: Graduate

3. Discuss and apply the mechanisms and consequences of over-reactions of the immune system. Audience: Graduate

4. Discuss and apply how immune system can be manipulated by vaccination to protect against infections and other strategies to combat transplant rejection and treat cancer. Audience: Graduate

5. Discuss and apply the immunological principles of diagnostic tests and how to interpret the results Audience: Graduate

## PATH-BIO 512 – INTRODUCTION TO VETERINARY EPIDEMIOLOGY

2 credits.

Learn basic concepts and approaches to population problems in veterinary medicine. Methods appropriate to investigation of disease outbreaks, surveillance of animal disease and production and the design of epidemiological studies of the determinants of disease are presented.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**Learning Outcomes:** 1. Apply the principles of causal inference to health-related outcomes Audience: Graduate

2. Recognize the effects of bias, confounding and interaction on medical research Audience: Graduate

3. Assess and evaluate health-related risk Audience: Graduate

4. Measure and analyze patterns of health-related outcomes in populations Audience: Graduate

5. Interpret diagnostic test results Audience: Graduate

6. Evaluate the validity of medical information Audience: Graduate

7. Communicate medical and scientific information to clients and the public. Audience: Graduate

## PATH-BIO 513 – VETERINARY VIROLOGY

2 credits.

Introduction to basic concepts in virology and covers biology and pathogenesis of viral diseases of animals with an emphasis on viruses important to veterinary medicine.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**Learning Outcomes:** 1. Apply basic concepts of virology, including structure, replication strategies, pathogenesis, evolution, and antiviral therapy, to viral diseases Audience: Graduate

2. Recall viral diseases and prion diseases of animals that are important in veterinary medicine and as zoonoses, describing clinical disease, prevention and control Audience: Graduate

3. Integrate knowledge of pathogenesis to describe pathophysiology of viral diseases Audience: Graduate

4. Apply concepts of diagnostic testing to diagnose viral diseases Audience: Graduate

5. Analyze primary veterinary literature in the context of viral diseases Audience: Graduate

6. Communicate concepts of viral diseases to a defined audience, such as clients, public health, or veterinary professionals Audience: Graduate

7. Identify viral diseases that are considered foreign animal diseases Audience: Graduate

**PATH-BIO 514 – VETERINARY PARASITOLOGY**

3 credits.

Basic veterinary parasitology with emphasis on biology, diagnosis, pathophysiology, treatment and management of parasitic infections of veterinary importance.

**Requisites:** Declared in Doctor of Veterinary Medicine with first year standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Name and classify important veterinary parasite species by their scientific and/or common names, as appropriate.

Audience: Graduate

2. Recognize parasites based on the morphological features of different stages. Recognize the general size, shape, and diagnostic features of adults, larvae, eggs, cysts, etc. Audience: Graduate

3. Identify how parasites of veterinary importance are transmitted. Describe salient features of the life cycles of these parasites, including as definitive hosts, intermediate hosts, paratenic hosts, infective parasite stages, prepatent and patent periods, etc.; other factors influencing transmission such as host environment, diet, season, etc. Audience: Graduate

4. Discuss the effects of parasites on their hosts. Describe the conditions under which disease is produced, the clinical signs and characteristics of disease, the role of host immunity, pathogenic mechanisms, and parasite stages responsible for pathology. Audience: Graduate

5. Explain how parasite infections are diagnosed, treated and controlled. Describe techniques of diagnosis, availability and efficacy of treatment, and the respective roles of different methods of control (e.g., vector control, management practices, chemotherapy). Audience: Graduate

**PATH-BIO 515 – REGULATORY VETERINARY MEDICINE AND PUBLIC HEALTH**

2 credits.

Role and regulatory obligations of the veterinary profession in preventing zoonoses, understanding the need for judicious use of antibiotics, and promoting the safety of food of animal origin.

**Requisites:** Declared in Doctor of Veterinary Medicine with third year standing

**Repeatable for Credit:** No

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Summarize and compare the clinical presentations of selected zoonotic diseases in both animals and humans. Audience: Undergraduate

2. Explain at a technical level, and in a language appropriate for educating clients, the role(s) that animals play in disease transmission and the relative risks for human infections posed by contact with animals. Audience: Undergraduate

3. Uphold the premise that "One Health" is an important framework for addressing important public health challenges and describe the ways that veterinarians are involved. Audience: Undergraduate

4. Outline the roles and responsibilities of veterinarians and government agencies in animal importation, response to disasters, animal abuse, and the control of zoonotic and animal diseases. Audience: Undergraduate

5. Outline the roles played by veterinarians in the safety of food of animal origin and how carcasses are processed and inspected. Audience: Undergraduate

6. Explain ways that veterinarians work to decrease antibiotic and other drug residues in food products and stem the emergence of antibiotic resistance through careful stewardship of antibiotics. Audience: Undergraduate

## PATH-BIO 517 – VETERINARY BACTERIOLOGY AND MYCOLOGY

4 credits.

Emphasis on the pathogenesis of bacterial and fungal diseases of animals. Become familiar with the methods used to identify representative bacterial and fungal pathogens.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**Learning Outcomes:** 1. Construct a valid differential diagnosis list of bacterial or fungal organisms contributing to disease, given a patient signalment, presenting complaint, physical examination, and pertinent laboratory data. Audience: Graduate

2. Describe methods for proper collection and transport of samples for bacterial or fungal culture and identification. Audience: Graduate

3. Perform basic laboratory tests for identification of bacterial and fungal species (e.g. streak a bacterial culture plate, Gram stain, microscopic identification of bacterial and fungal organisms). Audience: Graduate

4. Prepare an appropriate diagnostic plan and interpret diagnostic test results for bacterial and fungal organisms. Audience: Graduate

5. Describe important features of treatment for bacterial and fungal diseases of veterinary species. Audience: Graduate

6. Discuss the importance of proper disinfection techniques for prevention of bacterial and fungal diseases. Audience: Graduate

## PATH-BIO 525 – ACTIVE, INTEGRATED LEARNING I

1 credit.

Active Learning experience highlighting problem solving and critical thinking that horizontally and vertically integrates material from other veterinary medicine courses by using exercises constructed in the context of clinical cases or scenarios.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**Learning Outcomes:** 1. Create medical problem lists for individual animals and groups of animals using information collected from the signalment, history, physical examination, laboratory tests, diagnostic imaging, and additional ancillary tests and investigations. Audience: Undergraduate

2. Develop a comprehensive differential diagnosis based on the presenting complaint, that is organized by body system or mechanisms of disease, and select relevant disorders for a ranked differential diagnosis based on collected evidence. Audience: Undergraduate

3. Develop a diagnostic plan based on the ranked differential diagnosis. Audience: Undergraduate

4. Prepare rounds presentations (short summaries), in an organized and succinct manner using medical terminology, that can be used for clinical presentations or with submissions for ancillary testing. Audience: Undergraduate

5. Replicate these analytical problem-solving skills for diverse animal species that present with various complaints. Audience: Undergraduate

6. Capitalize on the strengths of teams that are diverse in experience, interest, and problem-solving preference to explain and communicate complex clinical problems in a respectful and responsible manner. Audience: Undergraduate

**PATH-BIO 526 – ACTIVE, INTEGRATED LEARNING II**

1 credit.

Active Learning experience highlighting problem solving and critical thinking that horizontally and vertically integrates material from other veterinary medicine courses by using exercises constructed in the context of clinical cases or scenarios.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Repeatable for Credit:** No

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Create medical problem lists for individual animals and groups of animals using information collected from the signalment, history, physical examination, laboratory tests, diagnostic imaging, and additional ancillary tests and investigations. Audience: Undergraduate

2. Develop a comprehensive differential diagnosis based on the presenting complaint, that is organized by body system or mechanisms of disease, and select relevant disorders for a ranked differential diagnosis based on collected evidence. Audience: Undergraduate

3. Develop a diagnostic plan based on the ranked differential diagnosis. Audience: Undergraduate

4. Prepare rounds presentations (short summaries), in an organized and succinct manner using medical terminology, that can be used for clinical presentations or with submissions for ancillary testing. Audience: Undergraduate

5. Replicate these analytical problem-solving skills for diverse animal species that present with various complaints. Audience: Undergraduate

6. Capitalize on the strengths of teams that are diverse in experience, interest, and problem-solving preference to explain and communicate complex clinical problems in a respectful and responsible manner. Audience: Undergraduate

**PATH-BIO/M M & I 528 – IMMUNOLOGY**

3 credits.

Development and functions of immune response in animals; a comprehensive study of experimental humoral and cellular immunity.

**Requisites:** (CHEM 104 or CHEM 109) and (ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151 or BIOCORE 383), or graduate/professional standing

**Course Designation:** Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**PATH-BIO 559 – VETERINARY GENERAL PATHOLOGY**

2 credits.

General mechanisms of disease at the cellular, tissue, organ, and organismal levels. Cell injury and cell death, neoplasia, inflammation, circulation, and genetics.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**Learning Outcomes:** 1. Describe gross and microscopic changes seen in tissues and organs and understand the underlying processes making them appear the way they do Audience: Undergraduate

2. Identify tissues and organs and summarize the abnormalities present Audience: Undergraduate

3. Interpret the gross and microscopic changes utilizing the language of pathology by formulating a morphologic diagnosis Audience: Undergraduate

4. Apply important pathologic concepts and principles to draw conclusions about the pathogenesis of the changes they see Audience: Undergraduate

5. Integrate clinical, historical, clinicopathologic, imaging results, and pathologic findings and draw conclusions relevant to the disease or process affecting the animal Audience: Undergraduate

## PATH-BIO 560 – VETERINARY SYSTEMIC PATHOLOGY I

2 credits.

Morphological manifestations of disease in animals. Diseases and disease processes will be discussed by organ system, stressing important diseases in domestic animals.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Repeatable for Credit:** No

**Last Taught:** Fall 2023

**Learning Outcomes:** 1. Describe gross and microscopic changes seen in tissues and organs and understand the underlying processes making them appear the way they do Audience: Undergraduate

2. Identify tissues and organs and summarize the abnormalities present Audience: Undergraduate

3. Interpret the gross and microscopic changes utilizing the language of pathology by formulating a morphologic diagnosis Audience: Undergraduate

4. Apply important pathologic concepts and principles to draw conclusions about the pathogenesis of the changes they see Audience: Undergraduate

5. Integrate clinical, historical, clinicopathologic, imaging results, and pathologic findings and draw conclusions relevant to the disease or process affecting the animal Audience: Undergraduate

6. Identify what are common, usual, and typical aspects of pathology within each organ system Audience: Undergraduate

7. Discuss common or important diseases and where appropriate identify specific etiologies associated with them Audience: Undergraduate

## PATH-BIO 561 – VETERINARY SYSTEMIC PATHOLOGY II

4 credits.

Morphological manifestations of disease in animals. Diseases and disease processes will be discussed by organ system, stressing important diseases in domestic animals.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Repeatable for Credit:** No

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Describe gross and microscopic changes seen in tissues and organs and understand the underlying processes making them appear the way they do Audience: Undergraduate

2. Identify tissues and organs and summarize the abnormalities present Audience: Undergraduate

3. Interpret the gross and microscopic changes utilizing the language of pathology by formulating a morphologic diagnosis Audience: Undergraduate

4. Apply important pathologic concepts and principles to draw conclusions about the pathogenesis of the changes they see Audience: Undergraduate

5. Integrate clinical, historical, clinicopathologic, imaging results, and pathologic findings and draw conclusions relevant to the disease or process affecting the animal Audience: Undergraduate

6. Identify what are common, usual, and typical aspects of pathology within each organ system Audience: Undergraduate

7. Discuss common or important diseases and where appropriate identify specific etiologies associated with them Audience: Undergraduate

**PATH-BIO 562 – VETERINARY CLINICAL PATHOLOGY**

4 credits.

Concepts and techniques of clinical pathology with emphasis on those procedures that are important in the diagnosis of animal diseases.

**Requisites:** Declared in Doctor of Veterinary Medicine with second year standing

**Repeatable for Credit:** No

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Describe the principles for routine laboratory tests in hematology, hemostasis, urinalysis, clinical chemistry, endocrinology, and cytology, including the principles of quality control and preanalytical, analytical, and post-analytical variables that may affect test results. Audience: Undergraduate

2. Demonstrate technical skills in preparing a diagnostic blood smear, performing a complete urinalysis and microhematocrit centrifugation for the measurement of packed cell volume and total protein by refractometry, and microscopically evaluating peripheral blood smears, urine sediments, and cytologic specimens. Audience: Undergraduate

3. Interpret test results, including microscopic findings, by integrating information from the signalment, history, and physical examination, and organize a complete, but succinct, problem list using correct medical terminology for animal patients. Audience: Undergraduate

4. Based on the established problem list, identify relevant differential diagnosis(es) or conclusion(s) and suggest appropriate ancillary testing to gather evidence toward a final diagnosis. Audience: Undergraduate

5. List the essential/supporting evidence for your diagnosis/conclusion and explain the relevant pathophysiologic mechanism(s) using appropriate medical terminology. Audience: Undergraduate

6. Support the learning of your peers while clarifying and solidifying your own knowledge by working in teams within the laboratory and on course exercises. Audience: Undergraduate

**PATH-BIO 660 – VETERINARY NECROPSY ROTATION**

2 credits.

Provides experience with necropsy procedures in all animal species and in developing interpretive skills by participating in the School of Veterinary Medicine/Veterinary Medical Teaching Hospital diagnostic anatomic pathology service under the guidance of the faculty.

**Requisites:** Declared in Doctor of Veterinary Medicine with fourth year standing

**Repeatable for Credit:** No

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Perform accurate and complete routine gross necropsy procedures, methods, and techniques. Audience: Undergraduate

2. Describe and interpret gross morphologic lesions and clearly, concisely, and accurately record these in a written report. Audience: Undergraduate

3. Select and sample tissues for histopathological examination using proper technique. Audience: Undergraduate

4. Select and sample specimens for ancillary procedures (e.g., cytology, bacteriology, virology, etc.). Audience: Undergraduate

5. Correlate pathologic changes with clinical, clinicopathological, imaging, and other findings, to better understand and explain disease pathogenesis. Audience: Undergraduate

6. Differentiate between normal anatomy and anatomic differences (between individuals and between species), and postmortem autolysis, artifactual changes, and true pathological lesions. Audience: Undergraduate

**PATH-BIO 675 – SPECIAL TOPICS**

1-5 credits.

Topics vary.

**Requisites:** Declared in Doctor of Veterinary Medicine

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Develop competence and professional skills in veterinary medicine Audience: Undergraduate

2. Explore current topics and trends in veterinary medicine Audience: Undergraduate

3. Developing breadths of experiences related to veterinary medicine Audience: Undergraduate



**PATH-BIO 681 – SENIOR HONORS THESIS I**

2-4 credits.

Individual research and study in pathobiological sciences for completing an honors thesis as arranged with a faculty member.

**Requisites:** Consent of instructor

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Spring 2022

**Learning Outcomes:** 1. Articulate a clear research question or problem and formulate a hypothesis Audience: Undergraduate

10. Articulate the relevance of their research to their professional future and speak to project-specific learning outcomes established with their research instructor and mentor Audience: Undergraduate

2. Demonstrate technical mastery of a research methodology Audience: Undergraduate

3. Define and use terminology and concepts specific to their research topic Audience: Undergraduate

4. Demonstrate competence and confidence in searching for existing research relevant to their project Audience: Undergraduate

5. Explain how their project adds to knowledge gaps in the field Audience: Undergraduate

6. Apply problem solving skills to address research hurdles Audience: Undergraduate

7. Work collaboratively with other researchers in the laboratory (including other trainees, staff and the PI) Audience: Undergraduate

8. Demonstrate growth in working autonomously over the course of the 681/682 enrollment period Audience: Undergraduate

9. Explain their research to others in the field and to broader audiences in research presentations Audience: Undergraduate

**PATH-BIO 682 – SENIOR HONORS THESIS II**

2-4 credits.

Individual research and study in pathobiological sciences for completing an honors thesis as arranged with a faculty member.

**Requisites:** Consent of instructor

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Learning Outcomes:** 1. Articulate a clear research question or problem and formulate a hypothesis Audience: Undergraduate

10. Articulate the relevance of their research to their professional future and speak to project-specific learning outcomes established with their research instructor and mentor Audience: Undergraduate

2. Demonstrate technical mastery of a research methodology Audience: Undergraduate

3. Define and use terminology and concepts specific to their research topic Audience: Undergraduate

4. Demonstrate competence and confidence in searching for existing research relevant to their project Audience: Undergraduate

5. Explain how their project adds to knowledge gaps in the field Audience: Undergraduate

6. Apply problem solving skills to address research hurdles Audience: Undergraduate

7. Work collaboratively with other researchers in the laboratory (including other trainees, staff and the PI) Audience: Undergraduate

8. Demonstrate growth in working autonomously over the course of the 681/682 enrollment period Audience: Undergraduate

9. Explain their research to others in the field and to broader audiences in research presentations Audience: Undergraduate

**PATH-BIO 699 – DIRECTED STUDY**

1-5 credits.

Projects in the laboratory and/or through library work in specific subject area under the direct guidance of faculty member.

**Requisites:** Consent of instructor

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2024

**PATH-BIO/M M & I 720 – ADVANCED IMMUNOLOGY: CRITICAL THINKING**

3 credits.

Advanced focus on current questions in immunological research. Explores immunology topics including genetic, cellular, and molecular features of immune system fundamental to regulation of immune responses.

**Requisites:** PATH-BIO/M M & I 528 and graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2016

**PATH-BIO/M M & I 750 – HOST-PARASITE RELATIONSHIPS IN VERTEBRATE VIRAL DISEASE**

3 credits.

Detailed study of the pathogenesis of vertebrate viral disease, stressing viral invasion, dissemination, mechanisms of disease production and resistance, and transmission.

**Requisites:** (PL PATH/M M & I/ONCOLOGY 640 or PATH-BIO 513), PATH-BIO/M M & I 528, and graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2023

**PATH-BIO 775 – EXTERNSHIP**

1-24 credits.

Offers opportunities for faculty coordinated experience in the veterinary medical profession outside School of Veterinary Medicine.

**Requisites:** Declared in Doctor of Veterinary Medicine with fourth year standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2023

**Learning Outcomes:** 1. Understand real-world applications of foundational veterinary medical knowledge and skills Audience: Graduate

2. Apply foundational veterinary knowledge and critical thinking to solve real-world problems Audience: Graduate

3. Perform select techniques and procedures to develop various skills professional in veterinary medicine Audience: Graduate

**PATH-BIO 799 – PRACTICUM IN VETERINARY SCIENCE TEACHING**

1-3 credits.

Instructional orientation to teaching at the higher education level in the agricultural and life sciences, direct teaching experience under faculty supervision, experience in testing and evaluation of students, and the analysis of teaching performance.

**Requisites:** Consent of instructor

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2018

**PATH-BIO 920 – THESIS RESEARCH SEMINAR**

1 credit.

**Requisites:** Graduate/professional standing

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Fall 2016

**Learning Outcomes:** 1. Articulate critical thinking and knowledge about the significance of current research in the fields of animal and dairy science by presenting and/or critiquing scientific presentations Audience: Graduate

2. Develop skills for oral and/or written communicating of complex ideas in a clear and understandable manner Audience: Graduate

**PATH-BIO 930 – ADVANCED SEMINAR**

1 credit.

**Requisites:** Consent of instructor

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Use mind mapping to create a hierarchal structure to contextualize the projects/aims in your thesis research and design an effective scientific presentation. Audience: Graduate

2. Apply concepts for effective data display and presentation to create and give a clear and well-organized research seminar presentation. Audience: Graduate

3. Prepare a graphical abstract that effectively communicates the significance, design, and take-home message of your study or proposed work. Audience: Graduate

4. List 3 best practices for delivering an effective scientific presentation based on your peer evaluations of presentations delivered by classmates this semester. Audience: Graduate

5. State 3 things that you do not want to do when giving a talk, based on your experience giving a presentation and your observations of the presentations by others. Audience: Graduate

## **PATH-BIO 990 – RESEARCH**

1-12 credits.

**Requisites:** Consent of instructor

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Spring 2024

**Learning Outcomes:** 1. Exhibit a broad understanding of general pathobiological science principles Audience: Graduate

2. Conduct independent research using a variety of approaches Audience: Graduate

3. Think critically to address research challenges Audience: Graduate

4. Exhibit and foster professional and ethical conduct in their research Audience: Graduate

5. Collaborate with other investigators within or outside the thesis lab Audience: Graduate