

# PH.D. IN PATHOLOGY

The Ph.D. in Pathology provides opportunities for graduate training in the fundamentals of modern pathobiology, immunology, and investigative microbiology, with an emphasis on a multi-disciplinary approach to research problems. Students study naturally occurring animal disease and host responses in a variety of species, including cancer, inflammatory, and infectious diseases. In addition, the program involves research in progressive areas such as emerging diseases, comparative oncology, interdisciplinary/systems biology, and translational medicine. This Ph.D. program provides training and preparation to pursue research and/or teaching careers in academia, industry, and government.

The student's graduate committee guides the student in planning a program of study to meet their goals in their area of specialization and is based on their academic background. Goals for Pathology Ph.D. students include successful completion of the preliminary exam; presentation of research at local, national and international meetings, publication of dissertation research in peer-reviewed journals, and successful completion and defense of a dissertation.

[Students interested in graduate work should refer to the Graduate and Professional Bulletin.](#)

## Learning Objectives

1. Design and execute research projects by devising hypotheses specific to the field of pathology.
2. Evaluate, integrate and demonstrate comprehensive knowledge about the molecular and organismal basis of disease.
3. Critique findings from scientific literature to enhance and inform their research proposals.
4. Interpret and justify and defend their research findings through analysis, discussion, and defense.

## Requirements Effective Fall 2024

Code	Title	Credits
<b>Required Courses:</b>		
MIP 792A	Seminar: Research/Graduate <sup>1</sup>	4
MIP 796	Group Study <sup>2</sup>	4
MIP 799	Dissertation	17
Select one course from the following:		1
GRAD 544	Ethical Conduct of Research	
GRAD 575/ NSCI 575	Ethical Issues in Big Data Research	
MIP 554	Research Policies and Regulations	
A total of 30 credits can be applied from an MS or DVM degree		30
Electives (Select a minimum of 16 credits from the lists below) <sup>2</sup>		16
<b>General Electives:</b>		
MIP 470	Graduate Fellowship Proposal Preparation	
MIP 540	Fundamentals of Biosafety and Biosecurity	
MIP 643	Grant Writing for Microbiology/Pathology	
MIP 666	Writing Scientific Manuscripts	
MIP 710	Research Team Mentoring	

Virology Electives:

MIP 533/V5 533	Epidemiology of Infectious Diseases/ Zoonoses
MIP 543	RNA Biology
<b>Bacteriology Electives:</b>	
MIP 550	Microbial and Molecular Genetics Laboratory
MIP 573A	Bacterial Pathogenesis: Introduction to Mechanisms
MIP 573B	Bacterial Pathogenesis: Mechanisms and Lifestyle
MIP 573C	Bacterial Pathogenesis: Evading Host Defenses

Vector Biology Electives:

MIP 535	Vector Collection and Identification Methods
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Molecular and Genomic Approaches Electives:

MIP 543	RNA Biology
MIP 545	Microbial Metagenomics/Genomics Data Analysis
MIP 565/BZ 565	Next Generation Sequencing Platform/ Libraries
MIP 570	Functional Genomics

Immunology Electives:

MIP 525	Flow Cytometry for Immunology
MIP 542	Pillars of Immunology
MIP 651	Immunobiology
MIP 675	Advanced Bioanalytic Pathology
MIP 730/ ERHS 730	Principles of Flow Cytometry & Cell Sorting
MIP 766	Cytopathology–Clinical Pathology
MIP 767	Advanced General Pathology
MIP 768	Advanced Clinical Pathology
MIP 778	Pathobiology of Laboratory Animals
MIP 779	Laboratory Animal Pathology Rotation

Courses offered by other departments:

BC 563	Molecular Genetics
BC 565	Molecular Regulation of Cell Function
BIOM 525/ MECH 525	Cell and Tissue Engineering
BMS 500	Mammalian Physiology I
BMS 501	Mammalian Physiology II
DSCI 510	Linux as a Computational Platform
DSCI 511	Genomics Data Analysis in Python
DSCI 512	RNA-Sequencing Data Analysis
ERHS 510/V5 510	Cancer Biology
ERHS 535	R Programming for Research
ERHS 611	Cancer Genetics
GRAD 550	STEM Communication
STAR 511	Design and Data Analysis for Researchers I
STAR 512	Design and Data Analysis for Researchers II

**Program Total Credits:** 72

A minimum of 72 credits are required to complete this program.

- <sup>1</sup> MIP 792A should be taken for a minimum of 4 credits.  
<sup>2</sup> MIP 796 should be taken for a minimum of 4 credits.  
<sup>3</sup> A minimum of 13 credits must be regular courses with the MIP subject code. Regular course work is defined as courses other than independent or group studies, thesis/dissertation credits, supervised college teaching, unique titled courses offered through the Division of Continuing Education, and any courses graded pass/fail.

## Requirements for All Graduate Degrees

For more information, please visit Requirements for All Graduate Degrees (<https://catalog.colostate.edu/general-catalog/graduate-bulletin/graduate-study/procedures-requirements-all-degrees/>) in the Graduate and Professional Bulletin (<https://catalog.colostate.edu/general-catalog/graduate-bulletin/>).

## Summary of Procedures for the Master's and Doctoral Degrees

NOTE: Each semester the Graduate School publishes a schedule of deadlines. Deadlines are available on the Graduate School website (<https://graduateschool.colostate.edu/deadline-dates/>). Students should consult this schedule whenever they approach important steps in their careers.

Forms (<https://graduateschool.colostate.edu/forms/>) are available online.

Step	Due Date
1. Application for admission (online)	Six months before first registration
2. Diagnostic examination when required	Before first registration
3. Appointment of advisor	Before first registration
4. Selection of graduate committee	Before the time of fourth regular semester registration
5. Filing of program of study (GS Form 6)	Before the time of fourth regular semester registration
6. Preliminary examination (Ph.D. and PD)	Two terms prior to final examination
7. Report of preliminary examination (GS Form 16) - (Ph.D. and PD)	Within two working days after results are known
8. Changes in committee (GS Form 9A)	When change is made
9. Application for Graduation (GS Form 25)	Refer to published deadlines from the Graduate School Website
9a. Reapplication for Graduation (online)	Failure to graduate requires Reapplication for Graduation (online) for the next time term for which you are applying
10. Submit thesis or dissertation to committee	At least two weeks prior to the examination or at the discretion of the graduate committee
11. Final examination	Refer to published deadlines from the Graduate School Website
12. Report of final examination (GS Form 24)	Within two working days after results are known; refer to published deadlines from the Graduate School website

13. Submit a signed Thesis/ Dissertation Submission Form (GS Form 30) to the Graduate School and Submit the Survey of Earned Doctorates (Ph.D. only) prior to submitting the electronic thesis/ dissertation	Refer to published deadlines from the Graduate School website.
14. Submit the thesis/dissertation electronically	Refer to published deadlines from the Graduate School website
15. Graduation	Ceremony information is available from the Graduate School website