

MASTER OF SCIENCE IN MICROBIOLOGY, PLAN A

The MS in Microbiology, Plan A program provides training and preparation to pursue research and/or teaching careers in multiple areas in microbiology including Bacteriology, Virology, Mycobacteriology, Infectious disease pathogenesis, Vector-borne infectious disease, Prion Biology, Immunology, Computational microbiology, and Science Education in Microbiology and Immunology. This program provides opportunities for graduate training in fundamentals of modern investigative microbiology, immunology, and pathobiology with an emphasis on a multi-disciplinary approach to research problems. It involves research in progressive areas such as emerging infectious diseases, biosecurity, interdisciplinary/ systems biology, and translational medicine.

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 Plan A students include presentation of research at local and national meetings and successful completion and defense of a thesis.

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

Learning Objectives

Upon successful completion, students will be able to:

- Formulate hypotheses and perform independent research:** Students will develop hypotheses and perform original, independent research in their areas of concentration in Microbiology including Bacteriology, Virology, Mycobacteriology, Infectious disease pathogenesis, Vector-borne infectious disease, Prion Biology, Immunology, Computational microbiology, and Science Education in Microbiology and Immunology. They will design experiments and apply discipline specific techniques to test these hypotheses.
- Acquire and apply in depth knowledge:** Students will gain a thorough knowledge of principles in Microbiology by synthesizing knowledge from their research focus. Foundational knowledge is gained through course work, scientific presentations in departmental seminars, and through review of the relevant literature.
- Demonstrate ability to critically review and analyze scientific literature and apply knowledge from literature to research:** Students will critically analyze and evaluate scientific literature to develop a rationale for how their research builds on the body of knowledge in Microbiology.
- Discuss and defend research findings:** Students will present, discuss and defend their research findings in their area of research in Microbiology. This will take place in the form of student presentations at departmental seminars. Results of final thesis will be discussed, presented and defended as requirement of graduation.
- Perform activities in support of other graduate students' well-being, sustainability and advancement of knowledge:** Students will periodically present at the departmental seminar and, when possible, engage in graduate student peer mentoring and in activities such as promoting healthy graduate students and professional development activities that are organized by the graduate student organization within the department.

Requirements Effective Fall 2026

A minimum of 30 semester credits and a high-quality research project are required. At least 12 credits must be earned in graduate-level (500+) didactic coursework. Of those 12 credits, at least 9 must be Department of Microbiology, Immunology, and Pathology courses (i.e., courses with the MIP prefix). Remaining 18 credits may be in special studies, graduate seminars, topics, research and dissertation credits.

Code	Title	Credits
Required Courses:		
MIP 700	Topics in Microbiology ¹	2
MIP 792A	Seminar: Research/Graduate ²	4
MIP 698	Research ³	1
MIP 699	Thesis ³	1
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	
Electives (select a minimum of 12 credits from the lists below) ⁴		12-21
General Electives:		
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/VS 533	Epidemiology of Infectious Diseases/ Zoonoses	
MIP 543	RNA Biology	
Bacteriology Electives:		
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	
Molecular and Genomic Approaches Electives:		
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 730/ ERHS 730	Principles of Flow Cytometry & Cell Sorting	

Pathology Electives:

MIP 675	Advanced Bioanalytic Pathology
MIP 765	Comparative Neuropathology
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

Other Electives:

MIP 551	Infectious Diseases and Social Equity
MIP 552	Social Impacts of Biomedical Research
MIP 553	Health Communication for Infectious Diseases
MIP 611	Advanced Microbiological Research Methods
MIP 612	Applied Immunology
MIP 613	Applied Microbiology and Virology
MIP 614	Medical Microbiology
MIP 616	Modern Molecular Biology for Microbiologists
MIP 617	Principles of Biodefense/Emerging Pathogens
MIP 618A	MIP Master's Seminar: Series A
MIP 618B	MIP Master's Seminar: Series B
MIP 619A	MIP Master's Topics: Series A
MIP 619B	MIP Master's Topics: Series B
MIP 660	Fundamentals of Computational Microbiology

Courses Offered by Other Departments:

BC 563	Molecular Genetics
BC 565	Molecular Regulation of Cell Function
BIOM 525/ MECH 525	Cell and Tissue Engineering
BIOM 550	STEM Communication
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/VS 510	Cancer Biology
ERHS 535	R Programming for Research
ERHS 611	Cancer Genetics
STAR 511	Design and Data Analysis for Researchers I
STAR 512	Design and Data Analysis for Researchers II

Program Total Credits: **30**

A minimum of 30 credits are required to complete this program.

¹ MIP 700 should be taken for a minimum of 2 credits. Exemptions and substitutions may be granted with written approval from the associate department head of graduate education.

² **MIP 792A** should be taken every Fall and Spring semester while in the program for a minimum of 4 credits. Exemptions and substitutions may

be granted with written approval from the associate department head of graduate education.

³ **MIP 698 and 699** each should be taken for a minimum of 1 credit.

⁴ A minimum of 9 credits must be regular courses with the MIP subject code prefix. 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.

Non-Coursework Requirements

Seminar Participation Requirement:

Students are required to register for the Department Seminar (MIP792A) and regularly attend seminars during the fall and spring semesters. Each graduate student is required to present in their second year in the program. Exemptions or waivers may be granted with written approval from the advisor and ADH of Graduate Education.

Thesis Requirement:

Students are required to prepare a thesis based upon research conducted during their program of study that contributes area knowledge. Requires approval of a research proposal, data collection/analysis, and formal oral defense.

Oral Defense Presentation:

Each candidate for a Master plan A degree must pass an oral final examination at least five weeks before the expected graduation. This is a public presentation to present research findings with a Q&A session.

Graduate Student Organization Participation and Well-being Check:

All enrolled graduate students are automatically members of the departmental graduate student organization and are assigned peer mentors when they enter the program. All incoming students set up a meeting each semester in their first year to discuss their well-being and assess their progress in integrating into the program, and to alleviate any possible hurdles that might prevent them from doing so.

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