

Department of Microbiology and Cell Biology

Microbiology & Cell Biology offices:

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The Department of Microbiology and Cell Biology (MCB) conducts one of the premier infectious disease research programs in the Northwest, as demonstrated by the success of our faculty in competing nationally for extramural grant funding and publishing high-impact papers. Research funding comes from a range of sources such as the National Institutes of Health, US Department of Agriculture, National Science Foundation and the Montana Agricultural Experimental Station among others. Over the past five years, MCB averaged over \$6 million for annual research expenditures. MBI is also home to an NIH Center of Biomedical Research Excellence in Zoonotic and Emerging Infectious Diseases, which provides substantial core facilities and training opportunities for junior investigators. MBI is housed in a state-of-the-art facility with core laboratories for flow cytometry, cell biology, and molecular sciences, as well as pathogen containment facilities for small (BSL-3) and large animal research (ABSL-2). Instrumentation suites house equipment for DNA sequencing, genomic analysis, flow cytometry and cell sorting, and confocal microscopy.

We are truly unique in our close proximity to Yellowstone National Park.

On our doorstep is one of the most exciting microbial ecosystems in North America, ripe with opportunities to discover new microbial life forms and contribute to major biotechnological advances. Many of our undergraduate and graduate students conduct research in the Park under the mentoring of our distinguished faculty.

Weekly seminars are offered by the department and the Frank N. Nelson Distinguished Lecture Series brings many accomplished scientists to Montana State University.

Admission

For detailed information, refer to the *Admission Policies and Application Requirements* sections on the department pages: <https://www.montana.edu/mbi/graduates/GradSchoolAppInfo.html>. The Graduate Core Committee, MCB faculty, and the MCB head will decide on the acceptability of all applicants. The Graduate Core Committee will serve as the "adviser" for all students accepted into the program during their first year of study.

Research

The research problem will be chosen in consultation with the student's thesis or dissertation advisor. Research areas include microbiology, molecular biology and immunology, bacteriology, cell biology, mycology, parasitology, protozoology, phycology, genetics, biochemistry, ultrastructural cytology, virology, immunopathology, and a strong focus on biomedical research. Specialized equipment and facilities include large and small animal isolation units, a flow cytometry core facility, automated DNA sequencers, proteomics and genomics instrumentation, a microscopy core, numerous analytical equipment, multiple tissue-culture and histopathology laboratories.

Financial Assistance

Normally, all students accepted into the MCB graduate program are offered graduate stipends funded by State sources and research grants obtained

by MCB faculty. Teaching assistantships are normally available for partial support after a student is enrolled. Appointments are made on a 12-month basis. See the Graduate Assistantship sections on the department website for detailed information on appointment criteria.

Degrees Offered

- M.S. in Microbiology and Immunology (<http://catalog.montana.edu/graduate/agriculture/microbiology/ms-microbiology-plan-a/>)
- Ph.D. in Microbiology and Immunology (<http://catalog.montana.edu/graduate/agriculture/microbiology/phD-microbiology-immunology/>)

The Immunology and Infectious Diseases Program uniquely combines expertise in the study of pathogen biology, host defense, cell biology and use of small and large animal models. Four areas broadly encompass the scope of immunology and infectious diseases research:

- Molecular and genetic studies of animal and pathogen biology
- Understanding molecular pathways of communication between pathogen and host
- Regulation of host immune responses in human and animal diseases
- Uncovering molecular mechanisms of pathogen virulence

Immunology and Infectious Diseases Program Requirements

Graduate students are expected to have a basic understanding of biochemistry, molecular biology, immunology, and microbiology. The Master of Science degree requires a minimum of twenty (20) course credits and ten (10) credits of Master's Thesis research beyond the baccalaureate degree as specified below. Students must maintain a 3.0 GPA.

1. A maximum of 3 credits of 400-level coursework may be applied to the M.S. degree.

Elective 400-level coursework Credits

BCH 441	Biochemistry of Macromolecules	3
STAT 401		3

2. There are 18 credits of required 500-level coursework for the M.S. degree.

Required 500-level coursework Credits

BIOB 524	Ethical Practice of Science	3
IMID 501	Exper Immunology/Pathology	3
IMID 505	Gene Regulation in Human Development, Disease, and Immunity	3
IMID 594	Seminar	1

3. A minimum of 6 credits of elective 500-level coursework is required for the M.S. degree.

Elective Coursework Credits(examples)

BCH 524	Mass Spectrometry	3
BCH 543	Proteins	3
BCH 544	Molecular Biology	3

4. A minimum of 10 credits of IMID 590 (Master's Thesis) is required for the M.S. degree.

Master's Thesis Research Credits

IMID 590	Master's Thesis	10
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Graduate students enrolled for the Ph.D. degree are required to take at least 25 credits of coursework and 35 credits of doctoral Thesis Research credits as specified below. Students must maintain a 3.0 GPA.

1. 9 credits of 400-level coursework may be applied to the Ph.D. degree.

Elective coursework Credits

BCH 441	Biochemistry of Macromolecules	3
STAT 401		3

2. There are 23 credits of required 500-level coursework for the Ph.D. degree.

Required coursework Credits

BIOB 524	Ethical Practice of Science	3
IMID 501	Exper Immunology/Pathology	3
IMID 505	Gene Regulation in Human Development, Disease, and Immunity	3
IMID 521	Laboratory Rotation I	1
IMID 522	Laboratory Rotation II	1
IMID 523	Laboratory Rotation III	1
IMID 594	Seminar	1

3. A minimum of 6 credits of elective 500-level coursework is required for the Ph.D. degree.

Elective Coursework Credits

BCH 524	Mass Spectrometry	3
BCH 543	Proteins	3
BCH 544	Molecular Biology	3

4. 35 credits of IMID 690 Doctoral Thesis is required for the Ph.D. degree

Doctoral Thesis Research Credits

IMID 690	Doctoral Thesis	1-10
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Candidates for Ph.D. degree are required to pass qualifying examinations prepared by the members of their advisory committee. Refer to the For Master's Students and For Doctoral Students sections for further degree requirements.