

# Ph.D in Microbiology and Immunology

## General Information of Program of Study

- A minimum of 60 post-baccalaureate credits are required for graduation. Students who already have an applicable Master's degree may be able to apply up to 30 credits toward the 60 credits for the PhD.
- A minimum of 25 credits of coursework as defined below in the Core Curriculum and Elective Coursework is required, which should be chosen in consultation with your research advisor and Doctoral/Masters committee.
- A minimum of 18 dissertation credits (MB 690) are required.
- Up to 9cr of undergraduate courses at the 4XX-level are allowed, but not 3XX-level.
- Credit in seminar (500), individual problem (570) and internship (576) courses may not exceed 1/3 of credits required. A maximum of 6 credits for MB570 may be applied toward the program.
- Course work more than ten years old cannot be applied toward the program.
- Transfer credits – see policy at Transferring Credits ([http://www.montana.edu/gradschool/policy/degreq\\_general.html#degreq\\_general\\_othercredits](http://www.montana.edu/gradschool/policy/degreq_general.html#degreq_general_othercredits))
- Course work taken more than six years prior to admission into the graduate program may not be applied to the program.

## Core curriculum

- All Ph.D. students who are not directly admitted into one of the MBI labs are required to conduct three laboratory rotations during their first year in the MBI graduate program. Students will be expected to balance coursework and lab work during their rotations. Students may petition the MBI Graduate Committee to be exempt from one rotation if they find a suitable lab and the PI is able to accommodate the student. All modifications from curriculum must be petitioned to the MBI Graduate Committee and Department Head for approval.
- Students who are directly admitted will not take rotations, and these credits must be replaced by appropriate academic classes, as determine by the Doctoral Committee.
- All Ph.D. students are required to take BIOB 524 – Ethical Practice of Science as a core course.

## Electives Coursework (subject to change)

- All Ph.D. students are required to take the remainder of their graded coursework based on the recommendation of their faculty and committee.

## Teaching Assistantships

- All Ph.D. students will complete UP TO TWO teaching assistantships, based on need and availability. This typically will be done in the student's second year in the program. Teaching assistantships completed outside of Department of Microbiology and Immunology will not count towards this requirement unless approved ahead of time by the Department Head.
- A Teaching Assistant (TA) workload is considered to be 19 hours per week. This consists of actual class time as well as time spent in preparation and grading.
- Students who are acting as a TA for the first time in the Microbiology Department also must register for BIOM 497 – Educational Methods:

Microbiology (2 cr.). This course is meant to give new teachers assistance in developing effective teaching techniques, training in preparing laboratory materials and help with classroom management and grading.

## Doctoral Committee

- All Ph.D. students are required to form their Doctoral Committee, and file their Program of Study, no later than the end of their first summer semester. The Doctoral Committee is expected to meet annually, at a minimum, typically after the student's Research in Progress (RIP) presentation. Moreover, the student must meet with the Department Head annually.

## Seminar Series and Journal Club

- Departmental Research Seminar Series: All students are required to attend the Departmental Seminar (MB 594) each semester in residence. For fall semester 2017, the departmental seminar will be Tuesdays from 2:00 to 2:50 PM in the Procrastinator Theater. There are limits to the number of MB 594 credits allowed in a Graduate Program.
- Student Research-in-Progress (RIP) Series: All students are required to attend the Student RIP Series each year in residence, and present starting in their second year. Students may obtain credit for RIP by enrolling in MB 594 (1 credit per semester).
- Journal Clubs: All students are required to enroll in one of three MB 592 Journal Club (1 credit) sessions each semester in residence. Note that graduate students are permitted to have up to six credits of MB 592 on their program of study. o Prior to each semester, the instructors and topics of the three Journal Club will be announced. The topics will vary, but will either cover environmental or biomedical research topics or synchronize with the Departmental Research Seminar Series schedule.

## Comprehensive Exam

All Ph.D. students must successfully complete a comprehensive examination no later than the 5<sup>th</sup> semester (excluding summers) after enrollment. MCB utilizes a comprehensive examination involving written and oral components to assess breadth of the student's knowledge in their Ph.D. training. The exam design evaluates a student's ability to generate and organize scientific concepts, present those concepts in a written and oral format, and support and defend the proposal from critical analysis.

The comprehensive exam will consist of 2 components: 1) written exam, this is a research proposal that is based on their dissertation project; and 2) an oral exam, consisting of a presentation and oral examination of the proposal and general knowledge by the dissertation committee.

The format of the written proposal will be determined by the student and faculty advisor, with input from the committee when necessary. The student will have **three weeks** to prepare the proposal that is based on the dissertation research. Once the three-week time interval begins, the student cannot seek advice or input on the proposal from their advisor, members of the dissertation committee or other Departmental faculty, including research professors or postdoctoral scholars. Students are allowed and encouraged to seek insight and feedback from other graduate students.

Once written, the proposal should be provided to the dissertation committee a minimum of **one week** before the scheduled presentation. Students are strongly encouraged to write-up their dissertation proposal in the form of a Pre-doctoral Fellowship application [See suggested formats below].

- | <u>Agency</u> | <u>Program</u> | <u>Website</u>  |
|---------------|----------------|---|
| NIH           | F31            | <a href="http://grants.nih.gov/training/">http://grants.nih.gov/training/</a> ( <a href="http://grants.nih.gov/training/F_files_nrsa.htm">http://grants.nih.gov/training/F_files_nrsa.htm</a> )   |
| USDA          | NNF grants     | <a href="http://nifa.usda.gov/">http://nifa.usda.gov/</a> ( <a href="http://nifa.usda.gov/funding-opportunity/food-and-agricultural-sciences-national-needs-graduate-and-postgraduate/">http://nifa.usda.gov/funding-opportunity/food-and-agricultural-sciences-national-needs-graduate-and-postgraduate/</a> ) |
| DOD           | NDSEG          | <a href="http://ndseg.asee.org">http://ndseg.asee.org</a> ( <a href="http://ndseg.asee.org/">http://ndseg.asee.org/</a> )   |
| NSF           | various        | <a href="http://www.nsf.gov/funding/">http://www.nsf.gov/funding/</a> ( <a href="http://www.nsf.gov/funding/education.jsp?fund_type=2">http://www.nsf.gov/funding/education.jsp?fund_type=2</a> )   |

At the exam, the student will deliver a short presentation of the proposed research to the committee. The committee will engage the student with questions relevant to the proposed research as well as general knowledge pertinent to the student's background and proposed dissertation research area. Students are expected to know details of their proposed research, to have general knowledge, and be capable of discussing scientific topics and questions that are more broadly relevant to their research. When evaluating the performance of the student, the dissertation committee can choose to:

- A) Pass the student on both written and oral aspects.
- B) Request written revisions to the proposal or that a new oral presentation be provided. In the event of re-write or re-take of oral questioning, the committee decides format and timing to address the student's needs.
- C) The student has summarily failed both the written and oral examination. In this case, the committee will provide feedback as to what will be required of the student prior to retaking the exam. The student has a single chance to re-take the exam within a 6-month time frame and as decided by the committee. A second failure will result in dismissal from the Ph.D. program.

#### Publications

- All Ph.D. students must have one manuscript accepted and at least one manuscript submitted for publication in peer-reviewed journals before the dissertation defense. The Ph.D. student must be first author on at least one of the two manuscripts.

#### Dissertation & Defense

- The student is required to present a public, oral defense of their dissertation research, followed by a critical examination by their Doctoral Committee. Please refer to [http://www.montana.edu/gradschool/policy/degreq\\_doctoral.html#degreq\\_doc\\_def](http://www.montana.edu/gradschool/policy/degreq_doctoral.html#degreq_doc_def) for all timelines, requirements and paperwork.
- The primary role of the major professor and Doctoral Committee is to guide the student throughout their dissertation research. It is required that the student's Doctoral Committee meet at least once each year following a formal presentation of the student's research to discuss the student's progress.
- A student's dissertation must be prepared and submitted electronically in the format described in the latest version of the Electronic Thesis and Dissertation (ETD) Initiative (<http://www.montana.edu/etd/>). Previously published electronic theses and dissertations may be viewed through the MSU Library.
- A dissertation draft must be approved by the major professor before it is submitted to the Doctoral Committee. The student must defend the dissertation orally no sooner than two weeks after submission of the dissertation to the Doctoral Committee. The oral defense consists of a public seminar followed by a detailed examination of the student and dissertation by the Doctoral Committee.

- Notification of the oral defense must be to The Graduate School and the MBI Department at least two weeks prior, so that proper posting can be made well in advance. Final approval of the dissertation rests with The Graduate School. That office reads the dissertation for formatting, grammar and content.
- A dissertation approved by the Doctoral Committee, Department Head, and the Dean of The Graduate School is required. This must be submitted as an electronic dissertation no later than 14 days before the end of the semester. A hardbound copy of the dissertation is appreciated, but not required, by the MBI Department.